A FEASIBILITY STUDY FOR PRIVATE PUBLIC PARTNESHIP FOR E-FREIGHT IN EUROPE

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Abstract - This paper illustrates the results of a study that has been carried out as an activity of the e-Impact project, a European project founded in the framework of the Connecting Europe Facility (CEF), and aiming at fostering the implementation of e-Freight in Europe. The study has the goal to assess the technical, financial and legal feasibility of an e-Freight Public Private Partnership (PPP) determining if it is possible to promote an e-Freight PPP, the form that this might take and the appropriate level of risk allocation to the private sector. An overview of the legal frameworks for PPP for the different countries involved in the project is presented as well as the methodological approach for the evaluation of PPP feasibility.

Keywords - E-Freight, TEN-T, Public Private Partneships, digital services, Maritime.

I. INTRODUCTION

Connecting Europe Facilities (CEF) is a financing instrument aimed at encouraging economic and employment growth and improving the competitiveness of the European Union through infrastructure investments. It supports the development of trans-European networks in the transport, energy and digital services sectors [1]. For transport sector, CEF aims to:

- Support investments in the construction of new transport infrastructure in Europe or in the rehabilitation / updating of existing ones;
- Eliminate "bottlenecks" in the transport sector and develop new traffic management systems;
- Improve the use of infrastructure, reduce the environmental impact of transport and improve safety and energy efficiency.

E-Freight project [2], funded on the CEF transport program, aims to develop a pilot of a collaborative solution among the supply chain stakeholders (maritime agencies, shippers, carriers, network managers and Institutional Authorities) aimed at ensuring the dematerialization of communications and the continuity of information exchange between the various actors. The project is carried out in the "core" ports of Italy, Poland and Portugal, affected by the TEN-T Mediterranean, Baltic-Adriatic and Atlantic corridors [3]. In particular, the ports involved are:

- Port of Trieste in Italy;
- Port of Gdynia in Poland;
- Port of Leixões and port of Lisbon in Portugal

According to the objectives of the CEF, the realization of the e-Freight project aims to [4]:

- Improve the efficiency of the logistics sector through the sharing of travel planning data and the execution of logistics and transport activities among the various actors;
- Reduce operating costs by automating information exchange;
- Improve the profitability of the sector by optimizing the use of infrastructure, vehicles and, more generally, logistics resources.

The handling of goods with unimodal and multi-modal transport involves various actors who take part in different ways in the organization of transport. The actors involved must interact with each other, exchanging functional information, to optimize and make more efficient operations like:

- The handling of goods from the point of origin to the destination point;
- The conduction of Public Authority checks;
- The organization of logistic operations within the logistic node.

E-Freight solution is designed to support the exchange of information between the multitudes of actors that compose the logistics chain of the freight transport [5]-[6]. Figure 1 shows the set of actors involved in the transport logistics chain.

Figure 1 – The set of actors involved in the transport logistics chain.

II. INITIATIVE FRAMEWORK

During the e-Impact project, four specific business cases have been developed [7]. Each Business Case has the objective of implementing a specific e-freight pilot. Each Business Case is structured in different sub-activities, is deployed in different geographical areasand involves different companies. The initiative framework consists of four pilots, representing ad hoc software with a common line represented by the ISO/IEC DIS 19845 standard [8]. So, e-Impact is not a single platform but different applications that can overcome the local character in terms of business. The Activities set up in the project are:

- **Activity 1: e-Freight adoption toolkit;**

Activity 1 concerns the production of guidelines and templates for the e- Freight toolkit and the production of the connectivity infrastructure based on the e-Freight framework, adopted as part of the ISO/IEC DIS 19845 Standard. The assumption is that e-Freight can be a unifying standard across modes of transport. The toolkit aims to facilitate the transition or the mapping from the current used formats to e-Freight. The toolkit is composed by a set of flexible tools to assist an adopter in the mapping process of its own specific case into e-Freight [9]. This infrastructure is virtual, there is no hardware, but only software. The maintenance of the toolkit concerns the upgrade of the software and the potential building of a new data mapping. The toolkit, indeed, allows the mapping and documentation of the data elements, so that each pilot can adapt to it. The toolkit is flexible, any other can use it. If other processes are added, the model must be updated and the update must be implemented in the individual vertical applications. Toolkit is composed by an illustrative part about connections, generic software to manage transformation of messages and specific data mapping for each pilot. The tools are divided in two categories: documents (guidelines, templates, governance model and tests) and software (access point and connectors).

- **Activity 2: Business Case 1: Multimodal freight journey planning and booking;**

Business case 1 is focused in establishing a pilot multimodal freight journey planning and booking solution associated to intermodal operations in the Port of Trieste by Terminal Operator EMT - Europe Multipurpose Terminals. EMT has a 25-year concession contract for a pier in the Port of Trieste [10]. Trieste is a gateway towards East Europe and the Balkans and can be considered the meeting point of the Mediterranean and the Baltic/Adriatic Core Network Corridors. The Business Case involves the intermodal traffic flows composed by maritime transportation, that is Ro-Ro services operated from the East Mediterranean area (Turkey and Greece) to Trieste, and by rail connections, organized to daily link Trieste with Germany and North European area. The technical solution adopted for this Pilot is the open source software Domibus, version 3.2.5, produced in the field of the CEF project eDelivery [11]. Modules are intended to be part of the management software platform of the Terminal Operator EMT, which is a TOS (Terminal Operating System). The TOS allows the management of intermodal traffic (ship/train/road) of freight (ITU) which arrive and depart from the VI pier in question. The TOS is automatically interfaced with the IT systems of the logistics partners that use the EMT terminal for their traffic as well as to the external systems of the Authorities such as: the PCS of the Port System Authority of the Eastern Adriatic Sea, the PMIS of the Italian Coast Guard and the AIDA telematics system of the Customs Agency and Monopolies. Potential private buyers: DBA, as technological partner, could resell the product in similar contexts. There would be other operators in the logistics supply chain (Terminal operators, Cargo railway companies, Shippers etc.) that could be interested in adopting a software platform that allows communication with their customers / service providers, adopting an official transnational standard. Potential public buyers: currently there is not a public subject interested in buying the platform.

- **Activity 3: Business Case 2: e-freight multimodal operations planning and execution management over maritime, road, rail and IWT (Inland Water Transport);**

Business Case 2 focuses on the fact that thousands of trucks are entering in the city of Lisbon every month to access the port without mechanism to manage these flows. The e-Impact project is focused in delivering mechanisms to better plan and synchronize operations between land access to the port and terminal operations. e-Impact is producing an innovative Virtual Gate Operational System of the Port of Lisbon that provides consistent access control and truck flow management capabilities across all areas and terminals of the port, regardless the specific profile of each terminal, their level of technological maturity and their pre-existing (or NOT) Gate and Access Control capabilities. This solution also relies on the innovative eDelivery infrastructure, based on the Access Point technology. The Virtual GOS of Lisbon will contribute to improve overall efficiency of terminals and logistic operations. Furthermore, it will also mitigate the congestion of truck along the city roads, through a more efficient planning of the operations. It will also decrease abusive parking of trucks within the Port of Lisbon areas. Potential private buyers: potential buyers are: terminal operators for time slot management, truck appointment management, inspections planning, check in and support to gate procedures; carriers for truck appointment. Potential public buyers: potential buyers are Authorities for inspections planning.

- **Activity 4: Business Case 3: Collaborative e-cargo ecosystem;**

Business Case 3 consists on the usage of e-Freight messages to provide interoperability between companies in the Port of Leixões through an electronic platform. The platform supports processes from service quotation to service execution. The interaction between players and the platform is supported by the Access Point (result of Activity 1). On this structure and artifacts, the concept of extended gateway is implemented by the fact that the platform provides the required visibility of the execution and rapid response to changes. The ecosystem integrates a set of services, solutions and applications for collaboration and multimodal chain sourcing, booking, planning and execution management over the Atlantic Corridor. In the context of the Business Case, two pilots have been developed: Intelligent Cargo pilot and Synchromodal pilot. The pilots adopt an existing IT platform known as Logistics Single Window (LSW) that allows the search, announce, hire, track, close and feedback of logistics services. The platform can be operated by public and private companies, but the selling model has not been evaluated.

- **Activity 5: Business Case 4: Information system for synchromodal operations in ports.**

Business Case 4 is focused in developing synchromodal operations in the Baltic/Adriatic Corridor. There is no joint approach to management of operations in Polish sea Ports and related multimodal services as well as there is no capability to properly support electronic data exchange between business, customs and other administration bodies. Either companies are using their own, not-synchronized ICT solutions or they have no ICT tools in use. With e-eimpact pilot, all parties involved (logistics service providers, shippers, authorities, and port administration) will use e-Freight framework standards. The implemented technical solution will be a part of the planned Polish PCS (Port Community System). The first step concerns the integration of the intermodal platform with the Access Point using the e-Freight and ISO Standards and applying the guidelines defined in the toolkit (Activity1). The goal is to promote communication integration between the platform and terminals/railway companies. Next steps, not included in the pilot, concern the integration of the platform with intermodal operators, logistic companies and shippers. Pilot includes a system, localized in the port of Gdynia, and involves three main partners: ILIM, BCT (Baltic Container Terminal) and Qumak Company. The implemented technical solution needs the following architecture: Access point; Access point connectors; Integration module;Reporting Module; Role and rights management to train, ship visit, container, wagon; Dictionaries; Alerts and notifications module; Archive. The implemented pilot will be a part of the Polish Port Community System.

III. OVERVIEW AND LEGAL FRAMEWORK OF PUBLIC PRIVATE PARTNESHIP

In 2015 the African Development Bank (AFDB), the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), the Inter-American Development Bank (IADB), the Islamic Development Bank (IsDB), and the World Bank Group, with the support of the Public-Private Infrastructure Advisory Facility (PPIAF) launched the “PPP Knowledge Lab” [12]. The PPP Knowledge Lab serves the needs of governments and professionals, filling the gap in the knowledge about public private partnerships. This PPP Knowledge Lab has realized the “Public-Private Partnerships Reference Guide” that defines the Public-Private Partnership as “a long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance”The Reference Guide of the PPP Knowledge Lab describes PPP contracts in terms of threeparameters:

- The type of asset involved;
- The functions the private party is responsible for;
- The way in which the private party is paid.

Many PPPs involve new assets. PPPs can also be used to transfer responsibility for upgrading andmanaging existing assets to a private company.The functions for which the private party is responsible depend on the type of asset and serviceinvolved. Typical functions include:

- Design: involves developing the project from initial concept and output requirements toconstruction-ready design specifications;
- Build, or Rehabilitate: when PPPs are used for new infrastructure assets, they typicallyrequire the private party to construct the asset and install all equipment. When PPPs involveexisting assets, the private party may be responsible for rehabilitating or extending the asset;
- Finance: when a PPP includes building or rehabilitating the asset, the private party isrequired to finance all or part of the necessary capital expenditure;
- Maintain: PPPs assign responsibility to the private party for maintaining an infrastructureasset to a specified standard over the life of the contract;
- Operate: the operating responsibilities of the private party to a PPP can vary depending onthe nature of the asset and the associated service.
- The private party can be paid by collecting fees from service users, by the government, or by a combination of the two:
- Under user-pays PPPs, the private party provides a service to users and generates revenue

bycharging users for that service. These fees can be supplemented by government payments.The social returns generated by user-pays PPPs may benefit the broader population, not onlywho directly use the asset;

- In government-pays PPPs, the government is the sole source of revenue for the private party.Government payments can depend on the asset or service available.

These three parameters can be combined in various ways to create a wide range of PPP contracts [8].

3.1 European Regulatory Framework of PPP projects

Under EU law, there is no specific system governing PPPs [13]. There is, however, EU legislation which is relevant to certain aspects of PPPs. For example, PPPs represent one method of public sector procurement. The EU has three procurement directives:

- The Public Sector Directive (2004/18/EC), which prescribes the procedures for the award ofworks contracts, public supply contracts and public service contracts, replaced in 2014 by EUDirective 24 on public procurement;
- The Utilities Directive (2004/17/EC), which prescribes procurement procedures for entitiesoperating in the water, energy, transport and postal services sectors, replaced in 2015 by EUDirective 25;
- Directive 2014/23/EU on the award of concession contracts. The new EU directive sets outminimum EU requirement for the award of concession contracts by public authorities toprocure works or services from private suppliers.

Furthermore, all contracts in which a public body awards work involving an economic activity to a third party, whether PPPs or not, must be examined in the light of the rules and principles of the EC Treaty, including, in particular, the principles of transparency, equal treatment, proportionality and mutual recognition.

3.2 Italian Regulatory Framework of PPP projects

Public-Private Partnership contracts in Italy are regulated by Art.3 and Art.180 of Legislative Decree No. 50/2016 (also "New Codes of Procurement"). Specifically, Article 3, letter eee, defines public-private partnership contracts as "contract for pecuniary interest with which one or more contractingauthorities confer to one or more economic operators, for a given period, a set of activities consisting of the construction, transformation, maintenance and operational management of a work in exchange for its availability, or its economic exploitation, or the provision of a service related to the use of the work, with the assumption of risk according to modalities identified in the contract by the operator". Article 180 details rules for the Public Private Partnership as follows:

1. The partnership contract is the contract for pecuniary interest referred in Article 3, letter eee;
2. In private public partnership contracts, the income of the economic operator derives from the fee recognized by the granting body and/or any other form of economic consideration received from the same economic operator, also in the form of direct revenue from the management of the service to external users. The partnership contract can be used by the granting administrations for any type of public work;
3. In the public private partnership contract the transfer of risk to the economic operator involves the allocation to the latter, as well as the construction risk, also the risk of availability or, in cases of profitable activity towards external, of the risk of demand for services rendered, for the period of management of the work. The content of the contract is defined among the parties so that the recovery of the investments made and the costs incurred by the economic operator, to perform the work or provide the service, depends on the actual provision of the service or use of the work or from the volume of services provided and, in any case, on the respect of the quality levels contracted. The public private partnership contract regulates also the risks, incidents on the fees, deriving from facts not attributable to the economic operator;
4. In view of the availability of the work or the request for services, the contracting authority may choose to pay a fee to the economic operator which is proportionally reduced or deleted in the periods of reduced or non-availability of the work, or reduced or non-provision of services. In any case, these variations in the fee must be able to significantly affect the net present value of all the investments, costs and revenues of the economic operator;
5. The contracting authority also chooses that, in view of the availability of the work or the request for services, a different economic utility is paid, or replace the remuneration of the service to the direct exploitation of the service by the economic operator, who therefore assumes the risk of negative market fluctuations in the demand for the service;
6. The financial and economic balance is the prerequisite for the correct allocation of the risksreferred to in paragraph 3. For the sole purpose of achieving the aforementioned balance, during the tender the contracting authority can also establish a price consisting of a public contribution or the sale of real estate that no longer perform functions of public interest. A right of enjoyment can berecognized as a

contribution, the use of which is instrumental and technically connected to the work to be assigned in concession. The methods of use of real estate are defined by the contracting authority and constitute one of the conditions that determine the economic-financial balance of the concession. In any case, any recognition of the price, added to the value of any public guarantees or other financing mechanisms to be borne by the public administration, may not exceed forty-nine percent of the total investment cost, including any financial charges;

7. The types of contracts referred to in paragraph 1 include project finance, construction and management concession, service concession, the financial leasing of public works, the availability contract and any other procedure of realization of works or services in partnership, presenting the characteristics referred to in the preceding paragraphs.

Another element considered decisive of the contractual situation assumed by the PPP framework relates to the award procedure. In this regard, Legislative Decree no. 50/2016 provides that PPP contracts can be awarded through open, restricted or negotiated procedures, including competitive comparison. The New Codes of Procurement also provides for the special procedure of "Project Financing".

3.3 Polish Regulatory Framework of PPP projects

PPP in Poland is regulated by:

- Public Procurement Law, dated 29 January 2004; the Act on Public-Private Partnership, dated 19 December 2008;
- The Act on Concessions for construction works or services, dated 9 January 2009;
- Regulation of the Minister of Economy of 2015 , based on the Act of 2008, that specifies the extent of particular types of risk and factors taken into consideration for the risk assessment.

The acts regulate the fundamental principles of public-private cooperation in which the private side can bring its financial capital, share the most important tasks and risks occurring in the project with the public sector and receive remuneration for their engagement. The definition of ‘public entity’ is essential for the application of the Act on PPP. Public entities can be: organs of public authority, local government units and their associations, budget units, local government budgetary establishments, executive agencies, institutions of budget economy, special state funds, Social Insurance Institution and funds, National Health Fund, independent public healthcare establishments, public higher education institutions, Polish Academy of Sciences, state and local cultural institutions and state-owned film institutions. PPP was determined in the Act on PPP as cooperation between the public entity and the private partner. The subject of PPP is joint implementation of a project based on division of tasks and risks. Cooperation (usually lasting several years, including the entire cycle of the project from designing, financing, construction and exploitation of the infrastructure) requires division of tasks between the public entity and the private partner in the way that both parties of the PPP agreement should have specified tasks to implement assigned. The Act on PPP does not use any normative definition of the term task. Operations implemented within PPP by the private partner must aim at implementation of the project. Furthermore, the Act on PPP does not determine any principles concerning obligatory division of risks between the parties of the partnership. The PPP agreement should always transfer the risk to the party which can control it better, which means that it will carry lower costs in the case of its materialization. The object of the project implementation can be:

- Construction or renovation of a building;
- provision of services;
- performance of work, in particular equipping an asset with a device increasing its value or utility;
- other service.

Signing the PPP agreement, the private partner is obliged to implement the project for remuneration and to incur all or part of expenses to implement it and the public entity is obliged to cooperate in order to implement the project objective, in particular through their own contribution. The private partner shall receive remuneration for implementation of the project. Consequently, the PPP agreement should be considered to be a payable agreement, as each party obtains particular financial benefits from the other party [14].

3.4 Portuguese Regulatory Framework of PPP projects

- PPP in Portugal is regulated by:
- 2012 PPP Law: Decree Law 111/2012 of 23 May 2012;

2008 Public Contracts Code: Decree Law 18/2008 of 27 April 2008 and amendments.

Decree-Law 111/2012 provides amendments to the legal framework of PPP. The 2012 PPP Law broadens the scope and application of the PPP framework to include a wider group of public partners. In general terms, the sector ministries (energy, infrastructure, transports, health, etc.) are responsible for the launching, licensing and major regulation of the projects, either directly or through their governmental departments. The approval of the Ministry of Finance is also required when the project involves public investment or when the PPP legal framework applies. Decree Law 111/2012 introduced several amendments to the previous legal regime, in particular regarding the preparation, launching,

execution and modification of PPPs. The 2012 PPP Law also provides for yet closer monitoring and additional requirements with regard to the analysis of fiscal impact, budgetary affordability, risk analysis/allocation and cost-benefit analysis of projects for new or amended contracts. The 2012 PPP Law supports increased transparency, requiring mandatory publication of PPP documentation. It also allows, if required, for separate tendering of the financial component of PPP projects. The definition of PPP is more widely drawn within some requisites but excludes contracts where the discounted value of future payments and investment is below 10m€ and 25m€ respectively.According to Decree Law 111/2012 project risks are to be shared between the public and private partners according to their capacity to manage such risks. Moreover, a PPP project should imply an effective and significant transfer of risks to the private partner. The concession contract allocates the relevant project risks between the contracting authority and the project company. The risks that remain with the contracting authority are usually covered by the financial rebalance mechanism, which is a key concept in all concession-based transactions in Portugal. Other than assets in the public domain (e.g., the hydric domain, mineral resources, roads, railways) which may not be appropriated by private entities, the ownership of land or other assets may be acquired by the private partner. The Public Contracts Code (PCC) was published on 29 January 2008 by means of Decree Law 18/2008. The PCC applies to every public tender procedure launched by a public authority. The Code sets out different procedures for the procurement process applicable to administrative contracts, including those to be entered into in connection with PPP projects: the direct agreement, the public tender, the limited tender by pre-qualification, the negotiation procedure and the competitive dialogue. The 2008 Public Contracts Code also includes substantive provisions for public service concessions, some of which are mandatory provisions of law whilst others are default provisions to be used in theabsence of an expressed contract provision or which may be covered by the Portuguese Civil Code, such as those relating to force majeure and change in circumstances [15].

IV. METHODOLOGICAL APPROACH FOR THE EVALUATION OF PPP FEASIBILITY

Considering the framework of the initiative, the Business Cases and the ownership of the platforms, there are two possible hypotheses of Public Private Partnership, whose feasibility (according to Italian law) is linked to the presence of certain conditions.

Hp.1: SINGLE PPP

The conditions that have to be respected for the implementation of a single PPP are:

- The presence of a holder, a public legal entity interested in acquiring an infrastructure to make available to users a specific service. The infrastructure should be implemented and managed by the private subject with a public contribution, which cannot exceed the 49% threshold (valid in Italy and in Europe);
- The presence of a single project, with a common infrastructure. At the moment there are separate private modules, united because they can dialogue thanks to the use of standard in interoperability messages;
- The verification of economic and financial sustainability: the financial and economic balance must be assessed on the total initiative;
- The interest of the owners of the software of the 4 pilots to get in partnership with the companies that have developed the software of the other pilots;
- The presence of "new implementation" aspects not included in the EU project. If there were not, it would be just a purchase by a public entity.

Hp.2: FOUR PPPs

The conditions that have to be respected for the implementation of 4 PPPs are:

- The presence of four public subjects interested in the pilots. The infrastructure should therefore be created and managed by the private partner with a public contribution, which cannot exceed the 49% threshold (valid in Italy and in Europe);
- The verification of economic and financial sustainability;
- The presence of "new implementation" aspects not included in the EU project. In case there were not, considering that the asset and the modules have already been implemented, there would be no possibility of a PPP but just a purchase by a public entity.

V. E-IMPACT PPP ISSUES

The issues observed for PPP feasibility assessment for the e-Impact project include:

- The presence of Public interest in the project: public interest in e-freight project is present only in some cases. In addition, the interest is from different public authorities and for different modules. In particular:
- Business Case 1: currently, in the context of the project, there is only a private interest in Trieste, with a software realized by DBA LAB (private) that will be offer to EMT, a private terminal operator;
- Business Case 2: Lisbon Port Authority could be interested;
- Business Case 3: in Leixões there is Mitmynid (private company that implemented software), it is necessary to understand if the Port is interested;

- Business Case 4: the pilot will be a part of the Polish Port Community System.
- The presence of a common infrastructure: there is not a single infrastructure, there are separate private modules, connected because they can dialogue thanks to the use of a standard in interoperability messages (but in practice there are no operational reasons why the 4 applications have to dialog, as they cover local processes);
- The presence of "new implementation" aspects: it is necessary to identify aspects of new implementation of the infrastructure;
- The verification of economic and financial sustainability: currently, there is neither a business model nor the related operating model. It is necessary to identify the pilots that could be aimed to the business and the related revenue models.

CONCLUSIONS

Therefore, to transform actual e-freight initiative into a PPP initiative is required preliminarily to:

- Identify the Partner of PPP (in general one Public Authority and one or more Private companies);
- Define the PPP initiative to be implemented with one common infrastructure and defined services to be sold to the market by private companies;
- Estimate market for each service;
- Elaborate an economic and financial sustainability of whole initiative.

The final consideration about PPP feasibility for the e-Freight initiative is influenced by the strategic choices undertaken during the project. In fact, at first, work team took into consideration the opportunity to set up an infrastructure for logistics information exchange, so a PPP contract would have been extremely beneficial to implement it. Hence, the activity concerning a "PPP Feasibility Assessment Study", could have been meaningful to investigate PPP relationships. Then, during the project, has emerged the possibility of using European Commission "eDelivery" infrastructure. This platform was initially built for exchange of information related to public services,public procurement, health etc. Then it became clear that eDelivery infrastructure, developed by CEF programme, could be used also for logistics information exchange. The choice of eDelivery infrastructure has been beneficial both to the e-Impact project (reduction of risk using an infrastructure already implemented and a software publicly available) and to the CEF Digital eDelivery initiative (value addition). The choice to adopt the existing eDelivery infrastructure has made the PPP assessment study less relevant. PPP contract would have been relevant in case of development of new infrastructure, is no longer needed for e-Freigth initiative in the moment in which the project is developing applications that are using the eDelivery infrastructure.

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