CONTRACTUAL FLEXIBILITY IN TRANSPORT INFRASTRUCTURE PPP

Sérgio Domingues
University of Antwerp, Department of Transport and Regional Economics
sergio.domingues@uantwerpen.be
Dejan Zlatkovic
University of Belgrade, Faculty of Transport and Traffic Engineering
d.zlatkovic@gmail.com
Athena Roumboutsos
University of the Aegean
athena@aegean.gr

ABSTRACT

The issue of contractual flexibility is becoming increasingly important as a tool to address uncertainty affecting Public Private Partnership (PPP) projects and as a mechanism to ensure its economic and financial viability. Although there is a wide spectrum of ways to assess and implement flexibility in PPP projects, there are also important trade-offs that are not always easily quantifiable. Nonetheless, the idea of contractual flexibility as a tool that allows adapting to uncertainty gains momentum. This paper explores the potential benefits of contractual flexibility with respect to PPP's critical success factors through the analysis of case studies of European PPPs in the road sector. Our results show the existence of flexible mechanisms in contractual agreements in order to respond more adequately to the uncertain future. Moreover, it is identified that effective communication mechanisms improve respond to unforeseen events and reinforce the partners' commitment in delivering a win-win project.

KEYWORDS: Contractual Flexibility, Critical Success Factors, Renegotiation

1 INTRODUCTION

The worldwide tendency in the past few decades of governments to create and implement Public-private partnerships (PPP) policies and projects has received increasing attention from academia and policymakers (Dewulf *et al.*, 2011; Grimsey & Lewis, 2007; Hodge & Greve, 2007). One of key government motivations for PPP usage is the off-balance sheet treatment of capital expenditures (Hodge & Greve, 2008, p. 96). On the other hand, it has been often argued that PPPs are inconstant in achieving value for money and that they actually lack innovative power, flexibility, and impetus for competition (Akintoye *et al.*, 2003; Eversdijk & Korsten, 2009; Grimsey & Lewis, 2005, 2007; Pollitt, 2005).

Notwithstanding, the usage of the PPP model for project delivery has increased over the past decades, especially for transport infrastructure projects (COST Action TU1001, 2013b). In 2013, the aggregate PPP European market amounted to EUR 16.3 billion and, between 1990 and 2013, 80% of European Investment Bank loans directed to PPP schemes were absorbed by transport sector projects (EPEC, 2014a, 2014b).

Transport infrastructure PPP project contracts have frequently long life cycles of over 25 years and are exposed to various exogenous changes arising from the political, social and economic spheres. In particular, PPP contractual agreements often depart from base-case scenarios relying on forecasts (e.g. demand, macro-economic variables) which, in many cases are not realised (Cruz & Marques, 2013).

Furthermore, transport PPP contracts typically involve large investments and are susceptible of opportunistic behaviour from both the private (Engel *et al.*, 2006, 2009) and the public partners (Guasch *et al.*, 2007). It is therefore not surprising that Guasch (2004) finds renegotiation especially common in transportation concessions, occurring in 55 % of the concessions with the private operator being the initiator of renegotiations in 61 % of all cases. This behaviour can in part be explained by the practitioners' attempt of writing over prescriptive contracts in order to address the inherent incompleteness of long term agreements or simply because incompleteness was not foreseen (Hart, 2003).

In essence, risk management in PPP should be dynamic corresponding to the evolution of risks over time as the future unfolds new information and dissipates the uncertainty around them (Pellegrino *et al.*, 2013). Thus, PPP projects often fall short in achieving value for money for two main reasons: (a) rigidity of PPP contracts which fail to account for uncertainties and needed changes and (b) limited knowledge on which critical success factors influence performance flexibilities (Bloomfield, 2006; Coghill & Woodward, 2005; Grimsey & Lewis, 2005). To this extent, considerable attention has recently been devoted on dealing with uncertainty, both by protecting projects from downside scenarios and at the same time allowing to extract value from upside circumstances (Chiara & Kokkaew, 2013; Cruz & Marques, 2013; de Neufville & Scholtes, 2011; Dong & Chiara, 2010).

This paper's focus is on understanding which forms of contractual flexibility can be more relevant to the successful implementation of a PPP project. For this purpose, we start by examining PPP's critical succes factors in section 2 and follow by addressing in section 3 the trade-offs of contractual flexibility. We then analyse in

section 4 a set of European PPP case studies in the road sector in order to understand the relation and importance of contractual flexibility vis-à-vis the project's critical success factors. We discuss results in section 5, and finally derive conclusions in section 6.

2 CRITICAL SUCCESS FACTORS

For any business, it is crucial to identify the factors constituting "the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization", i.e., its critical success factors (CSF) (Rockart, 1978, 1982). The CSF methodology is a procedure that attempts to make explicit those few key areas that dictate managerial success (Boynton & Zmud, 1984). In the literature there are a number of CSFs or drivers to the success of PPP projects identified and discussed by a number of researchers.

However, even if the majority of CSFs were in place, the inability to cope with unforeseen exogenous circumstances could trigger contracts renegotiation with high transaction and social costs for both parties. If on one hand it is not possible to assume that a contract will contain all possible future scenarios, on the other hand, the rigidity of PPP contracts and the lack of provisions on how to act on unforeseen circumstances also carries a high price. The long life cycle of PPP projects will thus lead to inevitably incomplete contracts in many aspects. Incomplete contract theory foresees the inevitability of re-negotiations.

Little research has been focusing on the factors relevant to the initial stage that are critical to project success. Ng *et al.* (2012) conducted the survey that indicated the most critical factors for evaluating the feasibility of PPP projects as perceived by public sector, private consortium and general community. Authors categorised 36 CSFs under five main groups, (i) technical factors; (ii) financial and economic factors; (iii) social factors; (iv) political and legal and (v) others (possible management actions). Research showed that CSF related to contractual flexibility, "Contract is flexible enough for frequent change in output specification", appeared to be differently perceived by the respondents from the public sector and private consortium, and ranked among less important CSF. Although the flexibility in the PPP contracts didn't receive a proper consideration by the stakeholders, it seems that in practice there is a strong correlation between the effects of the contractual flexibility and the success of the PPP projects.

Mladenovic *et al.* (2013) analyzed the use of key performances indicators (KPI) based on the analysis of critical success factors (CSF) for monitoring of PPP

transport projects from the different stakeholder's perspective, aggregating them in a public (socio-economic and project related) and private sector perspectives. Domingues and Zlatovic (forthcoming) made the correspondence between the determinant factors for renegotiation and the CSF of transport PPP projects, as described in table 1.

Table 1: CSF according to determinant factors for renegotiation

	Governance and institutional frameworks	**Contract design**	**Macro-economic environment**	**Political and social environment**
Public: Socio-economic	Transparent and predictable legal framework	Transportation infrastructure needs	Favourable investment climate; Stable macroeconomic environment	Stable political and social environment
Public: Project-related	Transparent, competitive and efficient procurement process	Detailed project planning and evaluation; Appropriate risk allocation		Project economic efficiency
Private	Transparency	Appropriate risk allocation; Implementation of innovative technologies		Faster project completion
Common	Clear definition of roles. Transparency. Professional relationship			

2.1 Governance and institutional frameworks

The analysis of a database of over 1000 concessions awarded in Latin America from 1985 to 2000 covering the sectors of telecommunications, energy, transport and water by Guasch *et al.* (2007) on government-led renegotiations confirms some of the main insight that Guasch *et al.* (2003) presented with respect to firm-led renegotiation. Renegotiations are more likely whenever inadequate regulatory frameworks and deficient institutional environments are present. The private partner has typically been more prepared and eager to engage in concession renegotiations under strategic behaviour (Guasch, 2004). It recognized an opportunity in the fragilities of weak governmental institutions and "complete" contracts that attempted to foresee the future. Capable institutions are therefore relevant for the quality of the partnership as well as deterring opportunistic renegotiations. The degree of institutional maturity and capacity can nonetheless be increased over time with experience and the development of governance institutions (e.g. law courts, opposition parties) that operate to support the contracts. However, an important role

remains on autonomous regulators capable of monitoring, enforcing, and when necessary, modifying infrastructure contracts under due process (Dassiou & Stern, 2009; Stern, 2012). Moreover, PPPs have also contributed in the renewal of procedures, arrangements and institutions (Guasch *et al.*, 2003; Guasch *et al.*, 2008; Van Ham & Koppenjan, 2001). The existence of a regulator capable to supervise contract design and oversee the renegotiation process is therefore essential to ensure that renegotiations result in the economic and financial equilibrium of the project.

2.2 Contract design

Notably, the essence of renegotiations centres over the allocation of risks. Risk management in PPPs should be dynamic corresponding to the evolution of risks over time (Pellegrino *et al.*, 2013). Moreover, the scarcity of public budgets has typically conduced to private investment obligations or governmental guarantees, which created pernicious incentives for opportunistic behaviour (Guasch *et al.*, 2003; Guasch *et al.*, 2008). On the other hand, academia has recently devoted considerable attention on how to cope with uncertainty, by protecting from downside scenarios and sharing benefits from mechanisms (e.g. variable term contracts, contract transparency, dynamic revenue insurances) which allow extracting value from upside circumstances (Chiara & Kokkaew, 2013; Cruz & Marques, 2012, 2013; Dong & Chiara, 2010; Vassallo, 2006). Hence, a key aspect of these contractual arrangements lies in their ability to accommodate change and create a trade-off between transaction costs that are due to changes and incentives to reduce costs (Bajari & Tadelis, 2001). Furthermore, Bitran *et al.* (2013) suggest, contract renegotiations are more often induced by an inadequate contract set-up or opportunistic behaviour rather than the assumptions behind the incomplete contract theory.

2.3 Political and social environment

Infrastructure projects have been frequently accused of optimism bias (Flyvbjerg *et al.*, 2003, 2005). There are two main reasons behind this behaviour. Firstly, scarce public budgets find in PPPs the ideal mechanism to deliver transport infrastructure whereby by lump sum investments were given, until recently, an off-balance sheet treatment. Secondly, electoral cycles may induce incumbents to invest in order to guarantee their re-election (Engel *et al.*, 2006, 2009). Moreover, depending on whether it is the incumbent or newly elected politician, renegotiations also tend to occur in the first year after elections, which can be explained by institutional factors related to corruption or lack of social acceptability of the project's characteristics

(Guasch *et al.*, 2007). Finally, PPP projects may also find in users and communities low acceptability, either by their unwillingness to pay to use the new infrastructures or simply because it affects them directly in a negative way (e.g. noise, pollution, no direct benefits).

2.4 Macro-economic environment

Furthermore, optimism bias adds to the vulnerability of economic cycles. Transport PPP contracts, given their inherent dependence, are highly exposed to exogenous risks (Nikolaidis & Roumboutsos, 2013). Fluctuations of few percentage points in macroeconomic growth, interest or exchange rates can have important impact on a project, moving from success into failure (Guasch *et al.*, 2007, 2008). Although both public and private partners have little control over macro-economic shocks, understanding the degree of volatility of the uncertainty around these shocks may help limit the downside and benefiting from the upside in case those risks materialize. For instance, the effects of the recent economic and financial crisis have already been felt in such contractual arrangements, leading to renegotiations between national governments and concessionaires. Moreover, projects already at the best and final offer (BAFO) were postponed due governmental incapacity to compromise with further budgetary burden (COST Action TU1001, 2013b, p. 150). Cruz and Marques (2013) argue that there are several characteristics affecting the economic value of PPP projects which make them particularly sensitive to uncertainty namely, i) large sunk investments, meaning large construction costs and large debts (public and/or private), ii) high sensitivity to demand variations/estimations iii) great exposure to financial markets (due to the large debts), and iv) vulnerability to political instability. The authors claim that the complexity of risk sharing is the key reason for contractual renegotiations and emphasize three main sources of uncertainty: cost overruns, demand forecasting and capital costs.

3 CONTRACTUAL FLEXIBILITY

PPP contracts are, in practice, incomplete to the extent that it is not possible to anticipate all the future scenarios for any given contractual arrangement (Hart, 1995). The need for adjustment in response to unforeseen events and unexpected divergence in project performance introduces the necessity of flexibility a priori stipulated in PPP contracts. The problem is that revising incomplete contracts as the future unfolds imposes several costs (Hart, 1995). Moreover, incomplete contracts incur potential opportunistic behaviour that might compromise the initial decision to undertake the PPP mechanism (Athias & Saussier, 2007).

Moreover, standard decision making practice does not deal well with the reality of rapid change. From a contractual perspective, the principal agent (i.e. the public partner) is often seen in a hold-up situation by closed, rigid PPP frameworks, when foreseen perspectives do not take place (e.g. insufficient demand, increase of commodities' price, technological breakthroughs). Moreover, from a technical viewpoint, standard practice proceeds from a set of deterministic objectives and constraints that defines what designers must accomplish, failing to recognize that intelligent management eventually decides to change the system in response to new circumstances (de Neufville & Scholtes, 2011). PPP contracts are thus highly exposed to an extensive list of risks (e.g. design, construction, operational, demand, regulatory, political, etc.) which can be more or less uncertain (i.e. have higher or smaller probabilities of materializing) and that may compromise the project's feasibility. Transport infrastructure PPPs are particularly vulnerable to uncertainty due large construction periods and costs, sensitivity to demand estimations, exposure to financial markets and political instability (Cruz & Marques, 2013).

3.1 Real Options and Transport Infrastructures

Real Options Analysis (ROA) is the most used methodology to value flexibility in large scale projects. ROA is a natural extension of the theory of financial option pricing to projects and assets of the real world. By definition, a real option is the right, but not the obligation, to take some actions in the future (if they are convenient) against a fixed predefined cost to acquire this right (Dixit & Pindyck, 1994). The concept of managerial flexibility in PPP can be described and modelled by ROA since it represents the possibility of taking some actions in the future by spending a certain cost to acquire this right. Therefore, the techniques of real option pricing can be adopted for assessing the value of such managerial flexibility as well as its impact on PPP project risk (Carbonara *et al.*, 2012). From a methodological standpoint Borison (2005) discusses the fundamentals of different approaches which conduce to contradictory results in spite of the conceptual similarity.

With respect to the practical implementation of flexible designs in engineering systems, Richard de Neufville has widely used ROA on airport related investments (Chambers, 2007; de Neufville, 2008a, 2008b; de Neufville & Belin, 2002; de Neufville & Odoni, 2003; Morgado et al., 2011; Ohama, 2008) and more recently Martins *et al.* (2014) study the flexible development of airports. In the maritime sector, Bendall and Stent have extensive work on the application of ROA in maritime investments under market uncertainty (Bendall & Stent, 2003; Bendall & Stent, 2005). In the road sector, the variable most frequent assessed under ROA is

uncertainty in demand (Blank *et al.*, 2009; Chiara & Garvin, 2008), but others such as toll prices, operating expenses or revenue guarantees are also investigated (Chiara & Kokkaew, 2013; Vandoros & Pantouvakis, 2006).

Literature acknowledges that risk management processes and contracts need to include managerial flexibilities, which can be considered as real options (Pellegrino & Vajdic, 2011). Typical types of options found in PPP projects are: call option (buy), put option (sell), switching option (between types of investments), timing option (postpone investments), and combinations of these (Cheah & Garvin, 2009). In their review article, Pellegrino and Vajdic (2011) list the real option strategies for different kinds of risks in transport infrastructure projects (demand risk, revenue risk, price risk, regulatory risk, land price, inflation and interest rate risk, and exchange rate risk). These strategies may refer to options (to adjust prices, expand project capacity, delay investment. etc.), guarantees (e.g. tariff guarantees, debt guarantees, minimum revenue guarantees) or renegotiation rules which can be stipulated in contracts. Despite the wide range of real options available in literature, their application in real world practice has not been straightforward (Pellegrino *et al.*, 2013).

3.2 Trade-offs of contractual flexibility

Hart and Moore (1988) study the case in which two parties engage in an incomplete contract and explored whether the parties can make up for this incompleteness by introducing a mechanism for revising the terms of trade as the future unfolds. They conclude that the divisions of achieved *ex post* surplus are very sensitive to existing communication mechanisms and whether the parties' messages are verifiable or not. According to Athias and Saussier (2007) a flexible contract, in contrast to a rigid one, induces renegotiation costs that constitute deadweight losses. However, this does not imply that rigid contracts are always to be preferred to flexible ones since the global surplus is also a function of the investments realized by private partners. More precisely, under rigid contracting, private operators might under invest for fear of contractual maladaptation, leading to a lower surplus compared to the flexible contracting case. Finally, Dassiou and Stern (2009) study trustworthiness in hybrid infrastructure contracts where renegotiation is possible post-investment, but not pre-scheduled. A lack of trust between partners induces a reduction in welfare and suboptimal investments but expectations can be updated over time through experience.

In order to address its inherent incompleteness, PPP contracts have traditionally been made excessively rigid and highly prescriptive (e.g. long term traffic forecasts

as basis for financial compensations). In turn, this has frequently led to situations where the public grantor is captured by legal provisions where he must compensate the private operator for situations he could have not foreseen beforehand. Flexible contracts, on the other hand, recognize the uncertainty and try to fill these contractual gaps by introducing ground rules on when and how to should the terms of trade be revisited. Both approaches attempt, in different ways, to address contract's incompleteness.

While flexible contracts may contain contingency clauses that allow for contract revisions after investments have been made, rigid contracts set fixed contract terms before the investments are made and do not allow for modifications or renegotiation. Moreover, the long life span of PPP agreements involves non-verifiable investments (e.g. a contractor's effort to improve safety or quality cannot be easily verified) in which the degree of uncertainty is high. Thus, designing PPP contracts involves the challenge of finding the "appropriate" level of flexibility, as too much flexibility may give rise to undesirable opportunistic renegotiations, while too little flexibility may jeopardize opportunities for welfare-enhancing renegotiations (Athias & Saussier, 2010).

Although the first theoretical models on renegotiation trade-offs have been around for over twenty years, there is little application to the real world. Moreover, there are significant differences on fundamental assumptions such as contract completeness, information symmetry and investment verifiability. For instance, some earlier models look at contracts done within a firm between owner and manager, which tend to assume higher contract completeness but can have different degrees of investment verifiability (i.e. one or multiple screening variables of manager's investment), which are associated with shorter term contracts (Dewatripont, 1989; Dewatripont & Maskin, 1990, 1995). With respect to contracts with longer durations, one frequently observes assumptions of contract incompleteness but where information can be considered symmetric in one model (Hart & Moore, 2008) but not in the other (Athias & Saussier, 2010). Finally, ROA are again used to evaluate the benefits of flexibility and costs of contingent claims under flexible contractual frameworks (Chiara & Kokkaew, 2009; Dong & Chiara, 2010).

4 ROAD SECTOR PPP: CASE STUDIES ANALISYS

The experience in PPP project implementation differs significantly between countries. Following on the key issues described previously, eight case studies from Portugal, Spain, Greece, Italy, Poland, United Kingdom and Norway (Table 2) were

studied in order to identify the degree of implementation of flexibility in their respective PPP contractual arrangements.

Table 2: Case studies brief description

Istrian Y Toll Motorway*	The Istrian Y is 141 km long motorway, renowned as the first PPP in Croatia. It consists in a 32 year concession with an estimated cost of EUR 1200 million, connecting the Istrian peninsula to continental Croatia and central Europe.
Attica Toll highway**	The Athens Ring Road opened to traffic in 2001 and the contract has a maximum duration of 25 years. Project budget amounts to EUR 1300 million. It currently serves over 250.000 daily users.
Bre.Be.Mi Toll road*	This project consists in new 62 lm toll way and a 35 km brownfield motorway, connecting Brescia and Milan in the Lombard region in northern Italy. The contract, signed in 2009, has a duration of 20 years and a budget of nearly EUR 2200 million.
E-39 Klett-Baardshaug*	The E-39 is the first PPP project in Norway and served to test the model. It covers a 27 km stretch, 10km of which are tunnels. Overall budget amounts to nearly EUR 200 million and the contract has a duration of 27 years.
A2 Motorway*	A2 motorway is an availability fee greenfield toll highway concession project for the design, finance, construction and operation of the Świecko-Nowy Tomyśl section in Poland.
A22 Highway*	The A22 highway was signed 2000 and was part of a shadow toll concession model launched in 1997 in order to accelerate the execution of the planned national road network.
M12 (Airport Axis) Toll Motorway*	With a duration of 25-26 years and a budget of EUR 358 million, the M12 is a 10lm toll motorway providing access to Terminal 4 of Madrid Barajas Airport. The economic crisis had a strong negative effect on traffic demand.
A19 Dishforth DBFO**	With an extension of 118km, the A19 connects New Castle to Dishforth in north-eastern England. The concession period is 30 years for a global budget of nearly GBP 30 million.

Source: (*)COST Action TU1001 (2014), (**)COST Action TU1001 (2013a)

Apart from the E-39 project in Norway which served as a pilot trial of the PPP model, all remaining projects have a financial motivation. Common reasons have been the scarcity of public budgets, the need to attract private capital along with private sector know-how and innovation.

With respect to actual demand in relation to forecasted traffic our sample is equally divide. While the Istrian Y, Attica, E39 and A2 motorways have shown higher than expected traffic volumes; the remaining projects have not realised forecasts. Moreover, the economic crisis had a strong negative impact on traffic volumes in the

A22, A19 and Bre.Be.Mi projects. Also half of the projects analysed were renegotiated, namely the Bre.Be.Mi, A2, A22 and M12. Despite the small sample size, the relation between optimistic forecasts and renegotiation of concessions becomes evident.

5 DISCUSSION OF RESULTS

Despite the small size of our sample of PPPs from the road sector, the cases form the basis for a qualitative analysis. Firstly, they come from countries with different institutional maturity and governance practices with respect to the implementation of the PPP model. Secondly, and although the ulterior motivation behind the choice for this delivery method being financial, the practical reasons range from lack of public funding to testing innovative procurement methods. Thirdly, contract monitoring and concessionaire's performance is measured differently across projects and only the M12 (Spain) case did not explicitly include key performance indicators (KPIs) in the contractual agreement.

Table 3 below summarizes the identified forms of contractual flexibility and their influence on contract performance.

Table 3: Influence of contractual flexibility on project performance

PPP	Forms of Flexibility	Influence on contract
Istrian Y Toll Motorway	· Staged development, with investment obligations dependent on traffic volumes. · Profit-sharing agreement of 70:30 between public and private partners respectively. · Revision of terms scheduled for key events in the concession contract. · Tax benefits granted until the 14th year of the concession facilitates cost structure.	· Higher than forecasted traffic volumes led to anticipation of capital investments. · Staged development positive for downside scenarios but was not properly structured for upside events, as it was the case. · Legal framework was not fully developed (war for Croatian independence had just finished)
Attica Toll Road	· Contract allows for early contract termination if RoE reaches 13,1% · Profit sharing arrangements. · Full disclosure of contracts to the public enhances transparency	· In case of need to amend contract, it must be ratified in national parliament.

Bre.Be.Mi. Toll Road	· 1st phase of tendering process gives positive incentives for private participation. · Consortium involves a wide range of regional stakeholders, enhancing communication between different interested parties · Vertical bundling with construction of biomass plants for power supply to the motorway	· Economic crisis resulted in the definition of financial indicators to guarantee bankability even in adverse market conditions.
E-39 Klett-Baardshaug	· Public assumes traffic risks and transfers design and operation risks to private operator. · Some degree of flexibility on early delivery. · Incentives for technological innovations in construction process and adoption of free flow electronic devices	· There are no penalties for special non-performance, but there are criteria under which availability payments are done. · Safety payment bonus. · State must cover traffic payments if heavy trucks exceed forecasted values.
A2 Motorway	· Large presence of environmental KPI · Performance requirements are not made public. · Extensive renegotiation process resulting in serious restructure of the SPV.	· Construction completed 6 months in advance. · Considerable increase of road safety. · Actual traffic has exceeded forecasts.
A22 Highway	· Contingency clauses for financial rebalance in the following situations: · legislative changes introduced unilaterally by the State implying increased costs or reduced revenue for the private partner; · traffic reaches threshold that justify increasing capacity on certain road sections, · when financial rebalance payments are due, renegotiation of shadow toll values can be initiated as a means to make the payment	· When no other agreement between partners can be achieved, the public partner is bound by the contract to pay financial compensations for changes in two of the following indicators: · A minimum yearly debt service coverage ratio; · A minimum loan life coverage ratio, · A minimum IRR for the stockholders. · Strong social opposition to the introduction of toll collecting systems.
Airport Axis Toll Motorway	· Allows for flexibility to extend the concession period, and an option for early exit. · No performance KPI and only general requirements for operation and maintenance are in place to ensure high quality and comfort. · Risk allocation does not seem to be expressly written in detail.	· Traffic and revenue down 60% from forecasts provided from the public sector. · Expropriation risk transferred from private to public partner.

A19 Dishforth DBFO	· Presence of good regulatory framework- · Contracted tendered based on performance objectives.	· No provisions on windfall profits. · No measures of maintenance performance.

As observed from the case studies there are different degrees of potential benefits arising from contractual flexibility for the successful performance of a PPP project. To a larger extent, flexibility is more likely to contribute to the project's success when implemented in the contract design and help adjusting to shocks in the macro-economic environment. The contract design should focus on elements related to an adequate specification of the infrastructure and/or service desired characteristics while allowing to adapt to the uncertain future. For instance, output specification and key performance indicators are preferred over a detailed prescription of execution plans. Not only it will remove unnecessary burdensome costs for the grantor in the tendering process, but also fosters innovations from the private concessionaire and facilitates contract monitoring at construction and operational phases.

Regarding governance institutions and regulatory/legislative frameworks, critical success factors revolve around effectiveness, predictability and transparency, which make investments more attractive to private investors. That is not to say that contractual flexibility is not relevant at this level of the PPP process. On the contrary, it may well contribute for the above mentioned success factors, with the introduction of standardized practices that account for contractual flexibility. The learning process at the institutional level can therefore be enhanced but it is nonetheless delayed in time.

From the social and political environment perspective, flexibility can provide interesting contributes at the project level, namely by helping reduce the negative social perception of PPPs. Moreover, by envisaging revisions of trade, contractual flexibility may contribute to reduce opportunistic behaviour from both public and private partners thus enhancing the project's economic efficiency and creating incentives for faster completion.

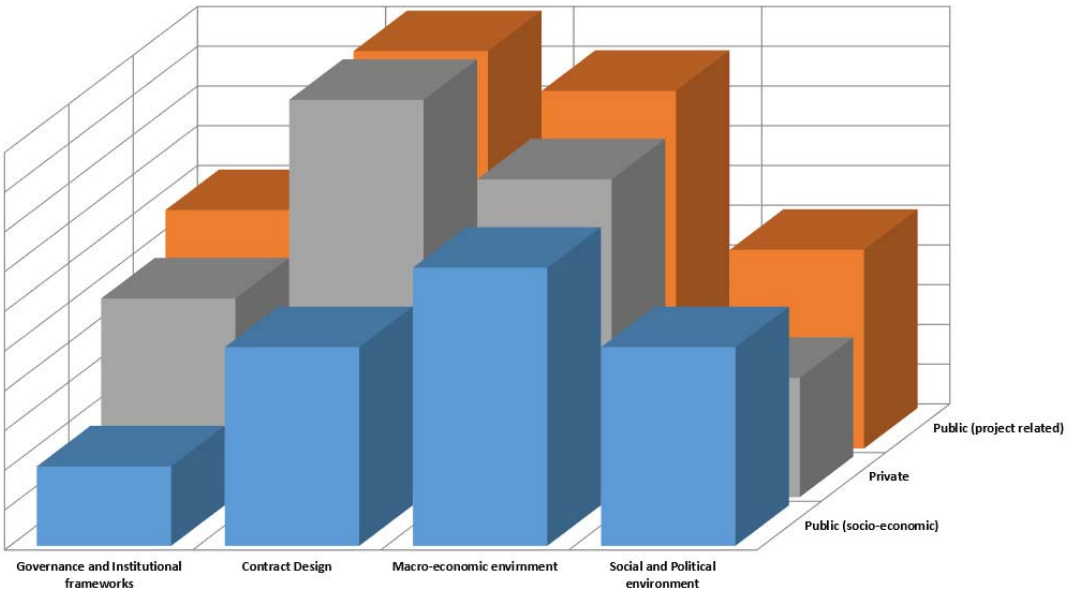

Figure 1: Potential importance of contractual flexibility of PPP performance (own composition)

Departing from Table 1 on PPP's CSF and following on our case studies analysis of road PPPs, Figure 1 provides a first step in a conceptual approach to assess the potential importance of contract flexibility in PPP performance. Intuitively, one could argue for a relatively higher probability of deriving benefits from flexibility in terms of contract design and the macro-economic environment, as compared to governance and institutional frameworks. A counter-argument is that countries differ on governance capacities and governments lagging behind on adequate institutional frameworks could capture important benefits from adopting contractual flexibility. More importantly, figure 1 gives insight towards the recognition and assessment of areas for future research.

Hence, a deeper understanding of the potential benefits arising from contractual flexibility is desirable. A quantification of such importance would allow the public promoter to focus on the areas it is currently lagging behind and enforce mechanisms that would help increase the probabilities of delivering a successful project. As discussed in section 3.2, the tools are available, but a comprehensive application to the real world is still missing.

6 CONCLUSIONS

The needs and specificities of PPPs necessarily change over different projects, objectives and countries. Best practices must be assimilated and implemented in order to ensure an innovative infrastructure provision. The critical success factors previously mentioned must be taken into account in order to derive added value from infrastructure delivered by means of PPP. Transparency and effective communication do not occur naturally, especially in millionaire projects. They are however part of a learning process and crucial elements for successful project implementation. Moreover, the potential benefits arising from contractual flexibility are several and may outweigh its pitfalls. This is particularly true if the way has been paved for an effective dialogue to take place and the revisions for the terms of trade are foreseen in contingency clauses allowing them to take place in good-faith. Without the proper incentives and effective political and regulatory frameworks, both partners will inevitably enter in a lose-lose situation. Contractual flexibility, enhanced by transparency and trust-based relationships, may effectively be the cornerstone for the successful implementation of a PPP project. Crucially, flexibility allows better managing the uncertainty which will inevitably affect the long term relationship between public and private partners. Higher contract rigidness or merely poor contractual design has so far provided the incentive for opportunistic behaviour from the part of private concessionaires. Notwithstanding, the mechanisms behind contractual flexibility rely on stronger governance institutions in order to prevent such behaviour and potential hold-up problems.

In spite of the recent work developed on trust relations and more dynamic contracts, it is still not clear which is the desirable degree of contractual flexibility on infrastructure provision and in which aspects of the contract its impact can be higher. Consequently, it is worth investigating the consequences of less rigid contractual frameworks to the current tendering procedures and whether the incentives for opportunistic behaviour would in fact be eliminated. Finally, it would also be interesting to understand the social-economic impact of communication mechanisms and contracts' flexibility with more frequent revisions of terms of trade taking place. Similarly to the European need of improving transportation infrastructures and its delivery methods, the scope for future research on contractual renegotiations is quite large, with many gaps to fill.

7 REFERENCES

Akintoye, A., Hardcastle, C., Beck, M., Chinyio, E., & Asenova, D. (2003). Achieving best value in private finance initiative project procurement. *Construction Management and Economics, 21*(5), 461-470.

Athias, L., & Saussier, S. (2007). Un partenariat public-privé rigide ou flexible? *Revue économique, 58*(3), 565-576.

Athias, L., & Saussier, S. (2010). Contractual flexibility or rigidity for public private partnerships? Theory and evidence from infrastructure concession contracts. Paris: Chaire EPPP.

Bajari, P., & Tadelis, S. (2001). Incentives versus Transaction Costs: A Theory of Procurement Contracts. *The RAND Journal of Economics, 32*(3), 387-407. doi: 10.2307/2696361

Bendall, H., & Stent, A. F. (2003). Investment strategies in market uncertainty. *Maritime Policy & Management, 30*(4), 293-303.

Bendall, H. B., & Stent, A. F. (2005). Ship Investment under Uncertainty: Valuing a Real Option on the Maximum of Several Strategies. *Maritime Economics & Logistics, 7*(1), 19-35.

Bitran, E., Nieto-Parra, S., & Robledo, J. S. (2013). Opening the black box of contract renegotiations: An analysis of road concessions in Chile, Colombia and Peru: OECD Publishing.

Blank, F. F., Baidya, T. K. N., & Dias, M. A. G. (2009). *Real options in public private partnership: case of a toll road concession*.

Bloomfield, P. (2006). The challenging business of long-term public-private partnerships: reflections on local experience. *Public Administration Review, 66*(3), 400-411.

Borison, A. (2005). Real Options Analysis: Where are the Emperor's Clothes? *Journal of Applied Corporate Finance, 17*(2), 17.

Boynton, A. C., & Zmud, R. W. (1984). An assessment of critical success factors. *Sloan management review, 25*(4), 17-27.

Carbonara, N., Gunnigan, L., Pellegrino, R., & Sciancalepore, F. (2012). Tendering procedures in PPP: a literature review. In A. Roumboutsos & N. Carbonara (Eds.), *Public Private Partnerships in Transport: Trends and Theory. 2011 Discussion Papers* (pp. 1-14). Brussels: COST Office.

Chambers, R.-D. (2007). *Tackling uncertainty in airport design: a real options approach.* (M.Sc M.Sc), MIT. Retrieved from http://ardent.mit.edu/real_options/Real_opts_papers/Chambers%20ThesisTackling%20Uncertainty%20Thesis.pdf

Cheah, C. Y. J., & Garvin, M. J. (2009). Application of real options in PPP infrastructure projects: opportunities and challenges. In A. Akintoye & M. Beck (Eds.), *Policy, Finance & Management for Public-Private Partnerships* (pp. 219-249). Oxford/Malden, MA: Wiley-Blackwell.

Chiara, N., & Garvin, M. J. (2008). Variance models for project financial risk analysis with applications to greenfield BOT highway projects. *Construction Management and Economics, 26*(9), 925-939. doi: 10.1080/01446190802259027

Chiara, N., & Kokkaew, N. (2009). Risk analysis of contractual flexibility in BOT negotiations: a quantitative approach using risk flexibility theory. *International Journal of Engineering and Management, 1*(1), 71-79.

Chiara, N., & Kokkaew, N. (2013). Alternative to Government Revenue Guarantees: Dynamic Revenue Insurance Contracts. *Journal of Infrastructure Systems, 19*(3), 287-296.

Coghill, K., & Woodward, D. (2005). Political issues of public-private partnerships. In G. Hodge & C. Greve (Eds.), *The Challenge of Public-Private Partnerships: Learning from International Experience* (pp. 81-94). Cheltenham: Edward Elgar.

COST Action TU1001. (2013a). *2013 Discussion Papers Part II Case Studies* (A. Roumboutsos, S. Farrell, C. L. Liyanage & R. Macário Eds.).

COST Action TU1001. (2013b). *2013 Discussion Papers: Part I Country Profiles* (K. Verhoest, N. Carbonara, V. Lember, O. H. Petersen, W. Scherrer & V. d. Hurk Eds.).

COST Action TU1001. (2014). *2014 Discussion Series: Country Profiles & Case Studies* (A. Roumboutsos, S. Farrell & K. Verhoest Eds.).

Cruz, C. O., & Marques, R. C. (2012). Risk-Sharing in Seaport Terminal Concessions. *Transport Reviews, 32*(4), 455-471. doi: 10.1080/01441647.2012.664576

Cruz, C. O., & Marques, R. C. (2013). Flexible contracts to cope with uncertainty in public–private partnerships. *International Journal of Project Management, 31*(3), 473-483. doi: 10.1016/j.ijproman.2012.09.006

Dassiou, X., & Stern, J. (2009). Infrastructure Contracts: Trust and Institutional Updating. *Review of Industrial Organization, 35*(1-2), 171-216. doi: DOI 10.1007/s11151-009-9221-4

de Neufville, R. (2008a). Building Airport Systems for the Next Generation. *Journal of the National Academy of Engineering*(Special Issue on Transportation Infrastructure), 41-46.

de Neufville, R. (2008b). Low-Cost Airports for Low-Cost Airlines: Flexible Design to Manage the Risks. *Transportation Planning and Technology, 31*(1), 35-68.

de Neufville, R., & Belin, S. (2002). Airport Passenger Buildings: Efficiency through Shared Use of Facilities. *ASCE Journal of Transportation Engineering, 128*(3), 211-217.

de Neufville, R., & Odoni, A. R. (2003). *Airport systems: planning, design, and management*. NY: McGraw-Hill.

de Neufville, R., & Scholtes, S. (2011). *Flexibility in engineering design*. Cambridge, Mass.: MIT Press.

Dewatripont, M. (1989). Renegotiation and information revelation over time: the case of optimal labor contracts. *The Quarterly Journal of Economics, 104*(3), 589-619.

Dewatripont, M., & Maskin, E. (1990). Contract renegotiation in models of asymmetric information∗. *European economic review, 34*(2), 311-321.

Dewatripont, M., & Maskin, E. (1995). Contractual contingencies and renegotiation. *Rand Journal of Economics, 26*, 704-719.

Dewulf, G., Garvin, M., & Duffield, C. (2011). *What are the benefits of standardised PPP procurement processes? Working paper proceedings*. Paper presented at the Engineering Project Organizations Conference, August 9-11, Estes Park, CO.

Dixit, A., & Pindyck, R. (1994). *Investment Under Uncertainty*. Princeton, NJ: Princeton University Press.

Domingues, S., & Zlatovic, D. (forthcoming). Renegotiating PPP Contracts: Reinforcing the "P" in Partnership. *Transport Reviews*.

Dong, F., & Chiara, N. (2010). Improving Economic Efficiency of Public-Private Partnerships for Infrastructure Development by Contractual Flexibility Analysis in a Highly Uncertain Context. *The Journal of Structured Finance, 16*(1), 87-99.

Engel, E., Fischer, R., & Galetovic, A. (2006). Renegotiation without holdup: Anticipating spending and infrastructure concessions: National Bureau of Economic Research.

Engel, E., Fischer, R., & Galetovic, A. (2009). Soft Budgets and Renegotiations in Public-Private Partnerships. *National Bureau of Economic Research Working Paper Series, No. 15300*.

EPEC. (2014a). Market Update: Review of the European PPP Market in 2013. Luxembourg: European PPP Expertise Centre.

EPEC. (2014b). PPPs Financed by the European Investment Bank since 1990. Luxembourg: European PPP Expertise Centre.
Eversdijk, A., & Korsten, A. (2009). Concessionele publiek-private samenwerkingsrelaties: feiten en ficties bij op DBFM gebaseerde infrastructurele projecten. *Bestuurswetenschappen, 63*(3), 25-44.
Flyvbjerg, B., Skamris, M. K., & Buhl, S. L. (2003). How common and how large are cost overruns in transport infrastructure projects? *Transport Reviews, 23*(1), 71-88.
Flyvbjerg, B., Skamris, M. K., & Buhl, S. L. (2005). How (in) accurate are demand forecasts in public works projects?: The case of transportation. *Journal of the American Planning Association, 71*(2), 131-146.
Grimsey, D., & Lewis, M. K. (2005). Are public-private partnerships value for money? Evaluating alternative approaches and comparing academic and practitioner views. *Accounting Forum, 29*, 345-378.
Grimsey, D., & Lewis, M. K. (2007). *Public Private Partnerships: The Worlwide Revolution in Infrastructure Provision and Project Finance*. Cheltenham: Edward Elgar.
Guasch, J. L. (2004). Granting and renegotiating infrastructure concession: doing it right. The World. Washington, DC: World Bank.
Guasch, J. L., Laffont, J.-J., & Straub, S. (2003). *Renegotiation of concession contracts in Latin America* (Vol. 3011): World Bank Publications.
Guasch, J. L., Laffont, J.-J., & Straub, S. (2007). Concessions of infrastructure in Latin America: Government-led renegotiation. *Journal of Applied Econometrics, 22*(7), 1267-1294. doi: 10.1002/jae.987
Guasch, J. L., Laffont, J.-J., & Straub, S. (2008). Renegotiation of concession contracts in Latin America: Evidence from the water and transport sectors. *International Journal of Industrial Organization, 26*(2), 421-442. doi: http://dx.doi.org/10.1016/j.ijindorg.2007.05.003
Hart, O. (1995). *Firms, contracts, and financial structure*: Oxford University Press.
Hart, O. (2003). Incomplete contracts and public ownership: Remarks, and an application to public-private partnerships. *Economic Journal, 113*(486), C69-C76. doi: Doi 10.1111/1468-0297.00119
Hart, O., & Moore, J. (1988). Incomplete Contracts and Renegotiation. *Econometrica, 56*(4), 755-785. doi: Doi 10.2307/1912698
Hart, O. D., & Moore, J. (2008). Contracts as Reference Points. *The Quarterly Journal of Economics, 123*(1), 1-48.
Hodge, G. A., & Greve, C. (2007). Public-private partnerships: An international performance review. *Public Administration Review, 67*(3), 545-558. doi: DOI 10.1111/j.1540-6210.2007.00736.x
Hodge, G. A., & Greve, C. (2008). The PPP Phenomenon: Performance and governance insights. In J. O'Flynn & J. Wanna (Eds.), *Collaborative Governance: A New Era of Public Policy in Australia?* (pp. 93-112). Canberra: ANU E Press.
Martins, J., Marques, R. C., & Cruz, C. O. (2014). Maximizing the value for money of PPP arrangements through flexibility: An application to airports. *Journal of Air Transport Management, 39*(0), 72-80. doi: http://dx.doi.org/10.1016/j.jairtraman.2014.04.003
Mladenovic, G., Vajdic, N., Wündsch, B., & Temeljotov-Salaj, A. (2013). Use of key performance indicators for PPP transport projects to meet stakeholders' performance objectives. *Built Environment Project and Asset Management, 3*(2), 228-249. doi: 10.1108/BEPAM-05-2012-0026
Morgado, F., Nagaaralo, S., Macário, R., & de Neufville, R. (2011). *Value of Options in Airport Expansion*. Paper presented at the European Regional Science Association, Barcelona, Spain. http://ardent.mit.edu/airports/ASP_papers/Morgado%20Options.pdf

Ng, S. T., Wong, Y. M. W., & Wong, J. M. W. (2012). Factors influencing the success of PPP at feasibility stage – A tripartite comparison study in Hong Kong. *Habitat International, 36*(4), 423-432. doi: http://dx.doi.org/10.1016/j.habitatint.2012.02.002

Nikolaidis, N., & Roumboutsos, A. (2013). A PPP renegotiation framework: a road concession in Greece. *Built Environment Project and Asset Management, 3*(2), 264-278. doi: 10.1108/BEPAM-05-2012-0031

Ohama, D. (2008). *Using Design Flexibility and Real Options to Reduce Risk in Private Finance Initiatives: The Case of Japan.* (M.Sc), MIT. Retrieved from http://ardent.mit.edu/real_options/Real_opts_papers/Ohaman%20MS%20Thesis.pdf

Pellegrino, R., & Vajdic, N. (2011). Risk management and real options in PPP projects: a literature review. In A. Roumboutsos & N. Carbonara (Eds.), *Public Private Partnerships in Transport: Trends and Theory. 2011 Discussion Papers* (pp. 42-55). Brussels: COST Office.

Pellegrino, R., Vajdic, N., & Carbonara, N. (2013). Real option theory for risk mitigation in transport PPPs. *Built Environment Project and Asset Management, 3*(2), 4-4.

Pollitt, M. (2005). Learning from UK private finance initiative experience. In G. Hodge & C. Greve (Eds.), *The Challenge of Public-Private Partnerships: Learning from International Experience* (pp. 207-230). Cheltenham: Edward Elgar.

Rockart, J. F. (1978). Chief executives define their own data needs. *Harv Bus Rev, 57*(2), 81-93.

Rockart, J. F. (1982). *The changing role of the information systems executive: a critical success factors perspective*: Massachusetts Institute of Technology.

Stern, J. (2012). The relationship between regulation and contracts in infrastructure industries: Regulation as ordered renegotiation. *Regulation & Governance, 6*(4), 474-498. doi: 10.1111/j.1748-5991.2012.01141.x

Van Ham, H., & Koppenjan, J. (2001). BUILDING PUBLIC-PRIVATE PARTNERSHIPS: Assessing and managing risks in port development. *Public Management Review, 3*(4), 593-616. doi: 10.1080/14616670110070622

Vandoros, N., & Pantouvakis, J. P. (2006, 2006). *Using real options in evaluating PPP/PFI projects*.

Vassallo, J. M. (2006). Traffic risk mitigation in highway concession projects: the experience of Chile. *Journal of Transport Economics and Policy*, 359-381.