
Current PPP-Models for German Motorways
***An Economic Analysis of the F-Model, the A-Model
and the Functional Construction (& Maintenance) Contract***

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Agenda

- 1. Traditional Way of Financing and Procuring Motorways in Germany**
- 2. Economic Analysis of the PPP-Approach in the Motorway Sector**
- 3. PPP-Models in Germany**
- 4. Conclusions**

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3. PPP-Models in Germany

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Options to Provide Funds for the Motorway Sector

Budget System

- (-) Theoretical considerations and international experiences show that the financing of the motorway sector within the scope of the budget system is threatened with the danger of under-investment.
[GWILLIAM / SHALIZI (1999)]

Road Funds

- (+) Earmarking of revenues
- (+) Separation of financing and production allows to decide on the procurement strategy purely based on cost-efficiency considerations

Conclusion

- Road funds seem to be the more appropriate solution to finance projects in a motorway *network* where investment decision should be based on a public sector evaluation

Main Shortcomings of the Traditional Way of Financing and Procuring Motorways in Germany

Shortage of Investment

Inefficient Allocation of Available Funds

Inefficiencies due to the Federal Order Administration

Inefficiencies in Procurement

Traditional Way of Financing and Procuring Motorways in Germany: Shortcomings and Potentials for Improvement

Shortcoming	Analysis / Description	Possible Improvement
Shortage of investment	<ul style="list-style-type: none"> • Too few funds available to undertake the urgently needed investments (newbuilds, extensions, renewals) • Although 50% of the income from the HGV-toll is earmarked for the motorway sector, the overall level of funds for the federal trunk roads is still determined through the yearly budget 	<p>Foundation of a real road fund (similar to the ASFINAG in Austria) ... providing further competences to the VIFG</p>
Inefficient allocation of available funds	Allocation of available funds according to quotas on projects in the different states	Prioritization of projects according to their cost-benefit-ratio
Federal Order Administration	<p>The Federal Government as the legally and financially responsible body delegates the activities of construction, operation and maintenance of the motorways to the 16 federal states.</p> <p>→ one more principal-agent-relationship within the public sector → lower cost efficiency</p> <p>→ wrong incentive structure for states realizing project appraisals → lower investment efficiency</p>	<ul style="list-style-type: none"> • Abolishment of the federal order administration • Foundation of few institutions (e.g. north-east, north, west, south-west, south) under supervision of a central body (e.g. BMVBW or VIFG) which are responsible for the management and procurement in the motorway sector (examples: Highways Agency, ASFINAG)
Inefficiencies in procurement	<p>Construction and maintenance: determination of project size and bundling of works according to the capabilities of small and medium-sized enterprises (SMEs) and not purely orientated to cost efficiency considerations</p> <p>Inefficiencies in operation and routine maintenance realized by the public road maintenance divisions</p>	<ul style="list-style-type: none"> • Cost efficiency should become the main driver for procurement strategy • More innovations in procurement • Realization of projects (new construction, extension) as PPPs?

Traditional Procurement Approach

Contracting Out of Construction and Capital Maintenance

- Different ways of structuring the contracts are possible:
 - Different remuneration schemes can be applied (fixed price, unit price, target costing)
 - Different modes of risk sharing between the public sector and the contractor can be applied
 - Etc.
- (+) High competition tendering the contracts
- (+) Works to be realized by the contractor can in general easily be defined
- (-) If the public authority is responsible for the motorway sector, it cannot implement a long-term cash-flow- and investment-strategy (which typically happens when financing the highway sector within the budget system), minimization of life-cycle-costs is impossible
- (-) Strategy for allocating resources on construction and maintenance is not subject to competition

In-house-Production of Operation and Routine Maintenance by public Road Maintenance Divisions

- (?) Are strategies in procurement and use of human resources directed by political wishes or by efficiency considerations?

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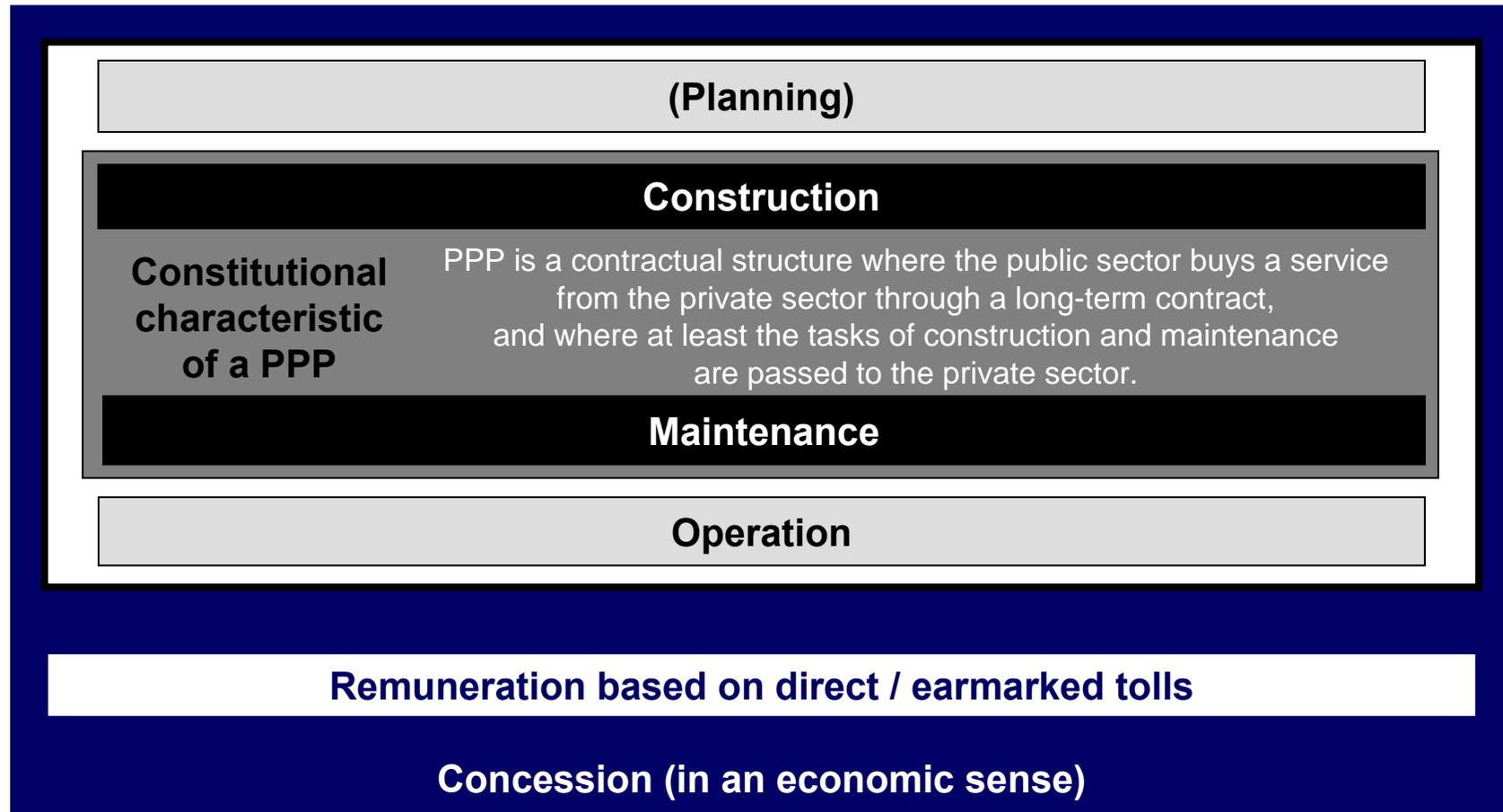
4. Conclusions

Criteria for Evaluating Organizational Models and Regulation in the Motorway Sector from a Social Welfare Perspective

To evaluate the social welfare effects of different organizational models and ways of regulation in the motorway sector, it is convenient to apply the following criteria ...

Criteria	These Criteria Refer to ...	Description
“Cost Efficiency“	Costs	Minimization of the costs to produce a certain output → cost efficiency is high
“Allocative Efficiency“ ... in a narrow sense	Price setting	Price = marginal costs → allocative efficiency is high
“Investment Efficiency“	Undertaking of investment decisions	Decision to invest in capacity extension (new construction, extension of existing stretches) ONLY if benefits \geq costs → investment efficiency is high
“Time Efficiency“	Availability of financial funds to undertake Investments	Funds are available to realize all projects where benefits \geq costs → time efficiency is high

PPP and Concessions: Definitions



Economic Analysis of the PPP-Approach in the Motorway Sector (considering theoretical results and empirical evidence)

(a) Higher cost-efficiency?

b) Advantages resulting from the combination of PPP's and user fees?

(c) Earlier project realization using private finance?

(d) Positive external effects?

Economic Analysis of the PPP-Approach in the Motorway Sector: Higher Cost-Efficiency? (1/3)

(a) Higher cost-efficiency?

Theoretical analysis

- (+) Private management and supervision realized by investors refers to a higher share of the overall value
- (+) Strategy for allocating resources on construction and maintenance is subject to competition
- (+) Implementation of a long-term cash-flow- and investment-strategy allows minimization of life-cycle-costs
- (-) Higher transaction costs and possible shifts of rents to the operator in renegotiations (which are relatively likely to emerge due to the long term nature of the contract)
- (-) Private sector bears more risk, but it has higher costs of risk bearing

Empirical evidence

Conclusions

(b) Advantages resulting from the combination of PPP's and user fees?

(c) Earlier project realization using private finance?

(d) Positive external effects?

Economic Analysis of the PPP-Approach in the Motorway Sector: Higher Cost-Efficiency? (2/3)

(a) Higher cost-efficiency?

Theoretical analysis

Empirical evidence

- DE BETTEGNIES / ROSS (2004): "... there is a surprising shortage of what we might call objective research on the topic, or independent evaluations of the success and failures ..."
- UK experiences indicate that cost savings might be achievable
 - Evaluations of National Audit Office of DBFO-projects in the 1990s (in which remuneration was based on shadow tolls) indicated that cost savings were realized applying the PPP-approach. BUT: In the 1990s in the UK PSC calculations were realized applying a discount rate of 6%. If the public has already taken the investment decision it seems reasonable to apply a lower discount rate.
 - Shift from shadow tolls to availability payments has resulted in cost savings
- The Netherlands: Cost comparisons (PPP vs. traditional model) indicate that cost savings might be achievable
- Analysis done by EIB of 10 PPP's in 2005 does not give a conclusive answer to the question

Conclusions

(b) Advantages resulting from the combination of PPP's and user fees?

(c) Earlier project realization using private finance?

(d) Positive external effects?

Economic Analysis of the PPP-Approach in the Motorway Sector: Higher Cost-Efficiency? (3/3)

(a) Higher cost-efficiency?

Theoretical analysis

Empirical evidence

Conclusions

Cost savings applying the PPP-approach seem possible

- in appropriate projects (not too small, little uncertainty, fixed-price-remuneration schemes are appropriate)

if the following conditions are fulfilled:

- efficient risk allocation
- stable and competent institutions in the public sector
- competition in the tendering phase

(b) Advantages resulting from the combination of PPP's and user fees?

(c) Earlier project realization using private finance?

(d) Positive external effects?

PPP and Concessions: Cost Efficiency

BACK UP

Concessions (in an economic sense = PPP + earmarked tolls)

(-) Concessions bring about specific problems; that is why cost savings seem to be less probable than in availability-models

- (-) Concessionaire bears demand risk
(even by applying PVR-auctions the risk can only partially be reduced)
- (-) Renegotiations occur more frequently
- (-) Political economy considerations and empirical evidence indicate a higher probability of political influence which aggravates an efficient regulation and an efficient management of renegotiations

Economic Analysis of the PPP-Approach in the Motorway Sector

(a) Higher cost-efficiency?

b) Advantages resulting from the combination of PPP's and user fees?

- **Implementation and earmarking of tolls can also be realized by a road fund**

(-) Traffic evasion if parallel roads exist and are untolled

(-) Disadvantages if the concessionaire bears demand risk

(-) Winner's curse

(-) Renegotiations occur more frequently

(-) Higher costs of risk bearing

- Can PVR-auctions solve the problem? Not really in many projects: even with PVR-auctions, the concessionaire has to bear the (demand) risk of the long-term profitability risk

(?) Better investment decisions as bidders check if future revenues \geq costs

- Just relevant for construction of new stretches

- Problem: Are projects really stopped if firms do not submit bids?

- Problem: Network effects have to be calculated regardless by the public sector

→ No advantages resulting from the combination of PPP's and user fees for projects within the network; network wide strategies for raising and earmarking revenues are preferable

→ Just for the realization of new projects where traffic evasion is low (bridges, tunnels etc.) concessions might be preferable in some cases

Theoretical Analysis of the PPP Approach for Motorways and Trunk Roads

(c) Earlier project realization using private finance?

- (−) False incentives choosing between the procurement options (PPP vs. traditional model)
- (−) Private financing can be used as a way to bypass the budgetary rules
 - Capital should be raised by a road fund
 - However, investments in a PPP should at least partially be financed by private capital to protect the public sector against bankruptcy of the private firm

(d) Positive external effects?

- (+) Incentives for the public administration resulting from indirect competition with PPP as alternative procurement form
- (+) Innovations

Conclusions

- General conclusions concerning the potential of PPP cannot be drawn
- PPP is an inappropriate approach to solve the problems of financing motorway networks
 - therefore a road fund should be implemented
- But PPP should be regarded as a relevant procurement alternative

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The Current PPP-Models in Germany: A-Model, F-Model, and Functional Construction (& Maintenance) Contract

F-model

- **FStrPrivFinG**
(from 1994, modified in 2002 and 2005)
- **Construction, maintenance and operation plus financing through a private operator**
- **Source of remuneration:**
 - Direct tolls
 - Subsidy of max. 20% of the building costs from the budget
- Only **tunnels, bridges and passes** on motorways and some kind of trunk roads

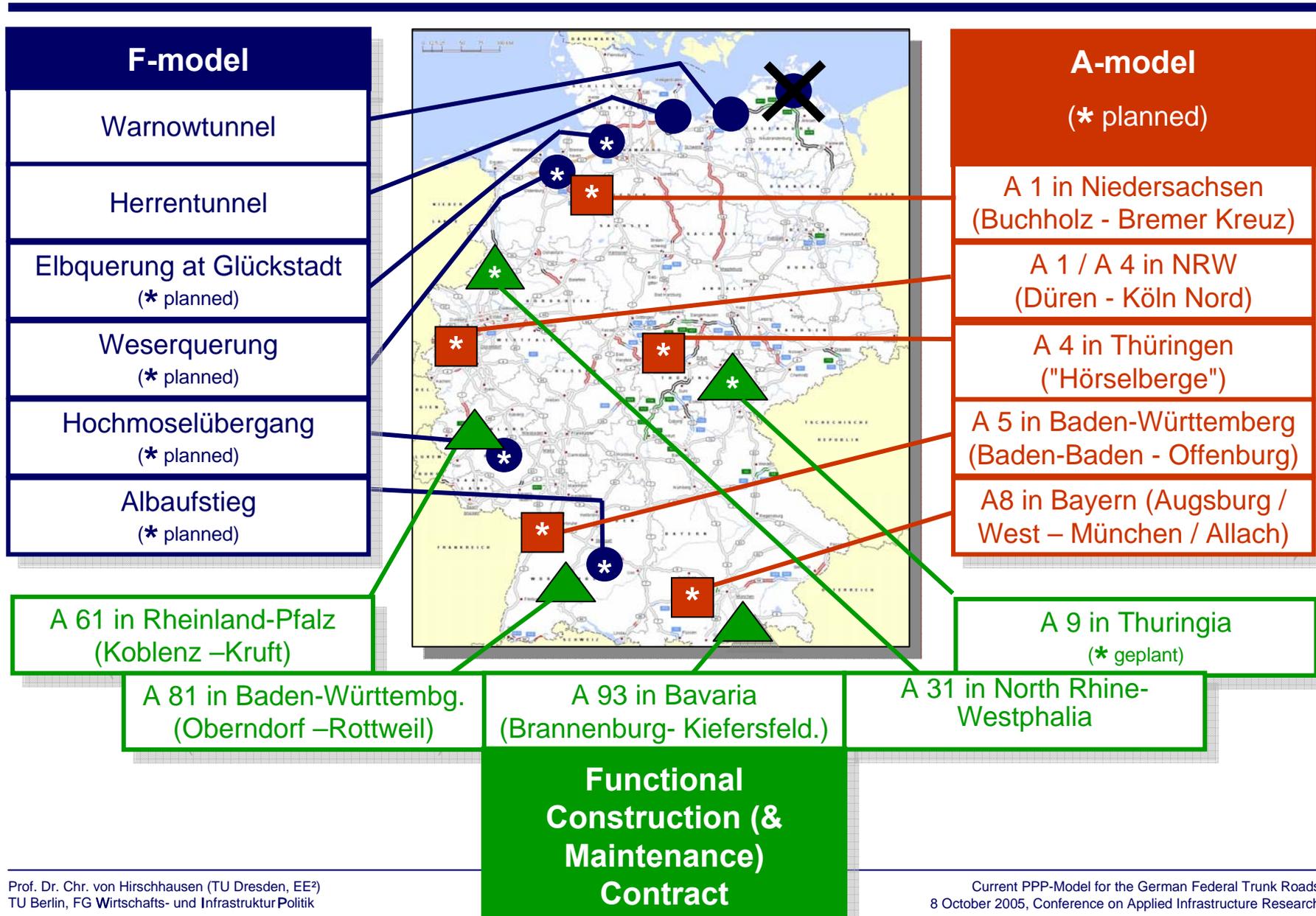
A-model

- **Construction, maintenance and operation plus financing through a private operator**
- **Source of remuneration:**
 - HGV-(shadow)-toll
 - Subsidy of max. 50% of the building costs from the budget
- **Extension of motorways from 4 to 6 lanes**
- **5 pilot projects (in tendering phase)**

Functional Construction (& Maintenance) Contract

- **Construction and maintenance**
- **Source of remuneration:**
 - Payments by the state
- **Building and maintenance by a private firm**

Realized, Planned, and Failed PPP-Projects in Germany An Overview



F-Model

The F-Model approach can be evaluated in a positive way for bridges, tunnels etc.

The lack of financial resources should be overcome through the implementation of a network wide road fund

The application of an inefficient regulatory legal framework causes welfare losses

- To many cost-plus-elements in the regulation
- Decreasing tolls during the duration of the concession

→ *The regulation should be modified*

- Present-value-of-revenue (PVR) (but without flexible concession duration)
- Clear definition of the toll calculation in the concession contract

A-Model

Risk allocation and remuneration scheme

- Inefficient risk allocation (private operator bears “50% demand risk”)
- Availability payments instead of shadow tolls would result in cost savings

The lack of financial resources cannot be overcome

- Pre-financing according to the A-Model is the wrong way
- The implementation of a network wide road fund instead of pre-financing with private capital is preferable
- False incentives can cause that the responsible institutions will not choose the procurement form mainly under cost efficiency considerations

→ *The A-Model should be substantially modified due to these deficits*

Functional Construction (& Maintenance) Contract

From an economic perspective, the Functional Construction (& Maintenance) Contract is a better approach than the A-model.

But there is still room for improvement:

- A higher ratio of private capital would strengthen the commitment of the operator
- Strategic bidding resulting from a unit-price remuneration scheme
→ fixed-price contracts should be enabled
- Contract is “too incomplete” to guide a long term relationship

Inclusion of the operation

- To realize economies of scope the inclusion of the operation should be considered for large projects (> 50 km)

Cost savings appear to be achievable

- Winning bids of the first projects indicate cost savings

→ *The functional construction (& maintenance) contract should be improved*

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PPP-Model	Assessment
F-Model	<p>(+) Application is limited to bridges, tunnels and passes which are the cases suitable for concessions in Germany</p> <p>(-) Inefficient time structure of the tolls due to current regulation (too high tolls in the early years)</p> <p>(-) Remuneration includes too many cost-plus-elements</p>
A-Model	<p>(-) Operator has to bear too much demand risk</p> <p>(-) Wrong approach to combat the „financing gap“ in the German motorway sector → foundation of a road fund is urgently needed</p>
Functional Construction (& Maintenance) Contract	<p>(+) Model does not intend to combat the financing gap in the motorway sector</p> <p>(-) No private capital included → too little protection of public sector for the case of bankruptcy of the private firm</p> <p>(-) Remuneration until now is always based on a unit price system. Remuneration based on a fixed price should be made possible.</p> <p>(-) Contract is too incomplete to guide a long term relationship</p>