
**Communal road networks in Switzerland:
Forms of new Public-Private Partnership (PPP)
Cooperations for the Maintenance**

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Communal road networks in Switzerland: Forms of new Public-Private Partnership (PPP) Cooperations for the maintenance

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Abstract

Due to the globalization a development towards privatization of infrastructure can be observed nationally and internationally. Worldwide, various investigations show that privately managed public infrastructures show higher cost-efficiency and enable more flexible utilization as well as change of usage. In times of sinking public income, local authorities must proof their efficiency in carrying out public duties. Public Private Partnership (PPP) can be seen as a possible initiative towards increasing efficiency. The central question in this research project is about splitting and allocation of tasks in planning, project implementation and actual road maintenance of communal road networks in Switzerland to either private businesses or to local authorities. The objective of the research project is to develop and design new models of Public Private Partnership (PPP) cooperation for operational and structural road maintenance.

Keywords

Public Private Partnership – Communal Road Network – Road Maintenance – Performance

1. Introduction

The Swiss Road Network contains about 1'600 km of highways, 20'000 km of trunk roads and about 50'000 km roads in communal areas. In Switzerland the operational and structural maintenance of this road network will always be an important duty of the public sector. While the budget for road maintenance of the highway and trunk road network is partly funded by toll fees and taxes, the communal roads have to be financed only through the local authorities. For that reason especially the local authorities as the owner of the different communal road networks have to proof their efficiency in carrying out public duties in times of a sinking public income.

International studies have shown that one answer to the problem of increasing deficit in the budget of the public sector can be Public-Private Partnership (PPP) models. There is a rising number of projects for these PPP cooperations in different fields of the public duties all around Europe and in other countries for example maintaining schools, prisons or different infrastructure. Mostly the private sector is integrated in long-term contracts. The idea of such cooperation models is to allow for a win-win situation for both participants, the public and the private sector.

This research project was commissioned by the Swiss Federal Road Authority in June 2003 and originated by two Institutes of the ETH Zurich. The Institute for Construction Engineering and Management (IBB) and the Institute for Transport Planning and Systems (IVT) are researching the subject matter in the field of the operational and structural maintenance of the Swiss communal road network. The project does not intent to give a strict answer for a Public-Private Partnership (PPP) but enable for the local authorities in Switzerland to compare and if considered to run a PPP in their road maintenance duty.

2. Research procedure

2.1 Aims and structure of research

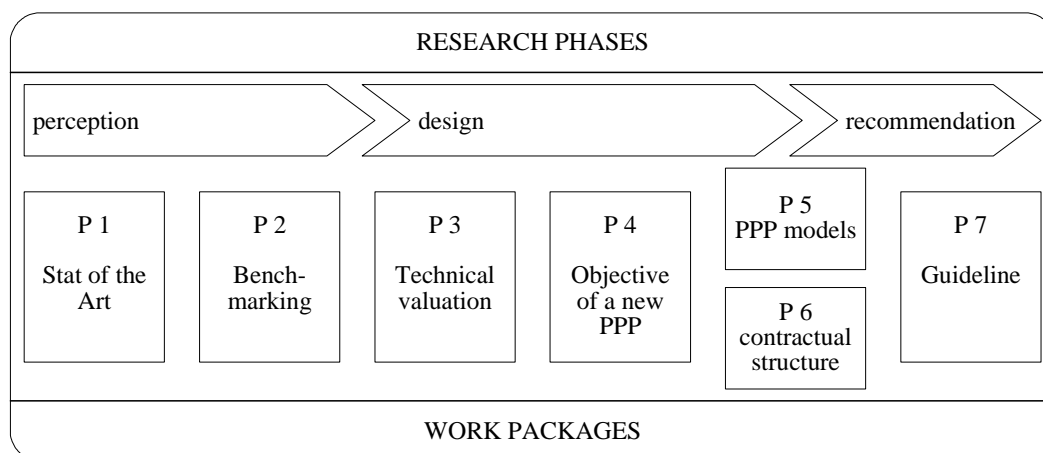
The initial position in Switzerland was that the topic Public-Private Partnership (PPP) did not exist. That research had to start with fundamentals, because there was neither basic definitions of the term nor experience from pilot projects like in other countries of Europe. Further, world wide there is no experience in running a PPP for the maintenance of the communal road network, because of its different demands and many special local conditions.

In order to get a well-founded result for the local authorities in Switzerland the main four objectives of this research project are:

- to design processing models for the implementation of an Public-Private Partnership from the procurement, the placing and completing of the contract
- to generate tender documents for the procurements with the technical specification and the quality standards of the maintenance in the network
- to create a contractual framework
- to develop a methodology of assessing the efficiency of PPP projects

To reach these aims the project has got three research phases and is fragmented into seven work packages.

Figure 1 Research structure



As shown in the figure above it starts with the perception which includes the descriptions of the state of the art and benchmarking in maintaining communal roads. The design mode concentrates on the assessment operations concerning a technical validation of the network and releases aims of a possible Public-Private Partnership (PPP). It describes the different PPP models and gives fundamentals for the contractual structure. This design mode continues to the third research phase recommendation with a guideline contained in the final report.

2.2 Participants

The maintenance of communal road networks in Switzerland is not only depending on the structure and dimension of the network, it also varies because of the different topography. To meet many of the different demands and to get a reliable information for the state of the art in maintaining communal road networks, ten local authorities participated in the project. They have a variety in population and size of the road network as well as differences in their geographical location and climatic influences.

The following table shows the participating authorities:

Table 1 Participants of Swiss local authorities

Name	Canton	Altitude [m]		Population	Size of road network [m ²]
		Min	Max		
Malans	Graubünden	535	600	2'050	143'051
Balgach	St. Gallen	404	405	4'035	278'040
Sursee	Luzern	488	526	8'100	333'608
Rorschach	St. Gallen	398	470	8'550	315'000
Bassersdorf	Zurich	441	545	9'000	286'100
Pully	Waadt	375	800	16'370	400'073
Wil	St. Gallen	510	715	17'000	407'996
Wettigen	Aargau	388	-	18'432	545'293
Luzern	Luzern	434	600	60'195	1'685'000
Zurich	Zurich	392	871	364'528	8'011'025

In addition to the researching institutes the project gets support from professionals in different fields, especially in the domain of the preparation of contractual structures as well as sponsorship of private building and consulting companies.

3. Communal road maintenance of local authorities in Switzerland

For the research it was not only of importance to analyze all the different perceptions of the word Public-Private Partnership. For the possibility to implement this model in the communal road maintenance it was fundamental to analyse the state of the art in maintaining the road network of local authorities in Switzerland. For this reason the first two working packages were each scheduled to include a survey. A first survey was about general information about the communities and the procedures. A follow-up interview allowed to clarify questions and to prepare the creation of the second survey about costs.

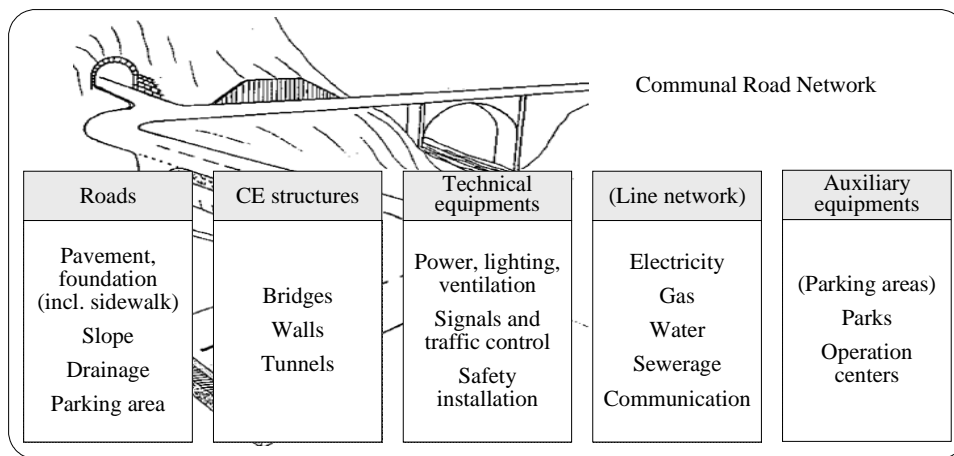
3.1 Operations in maintaining the network

The communal road maintenance in Switzerland comprehends the scale of tasks in operating and maintaining the network. For the understanding of the different operations it is necessary to define them and of course to confine the road network itself. The Swiss Association of Road and Transportation Experts gives a definition of the network in the Swiss Standard. It divides the whole system of the road network into five parts:

- Roads
- Civil engineering structures
- Technical equipment
- Line network
- Auxiliary equipment

A first survey and a follow-up interview with the mentioned ten authorities produced an insight in the state of the art of the communal road maintenance. With consideration of the mentioned classification above it pointed out that the line network is mostly already run by other public or private corporations. For that reason this part was excluded to give a definition of the network.

Figure 2 Structural definition of the communal road network



Further it showed that the local authorities use a different definition. Especially for the costing it facilitates the assignment if the main focus is on the maintenance operations. For that reason the road maintenance is divided into two operational parts:

- Operational maintenance
- Structural maintenance

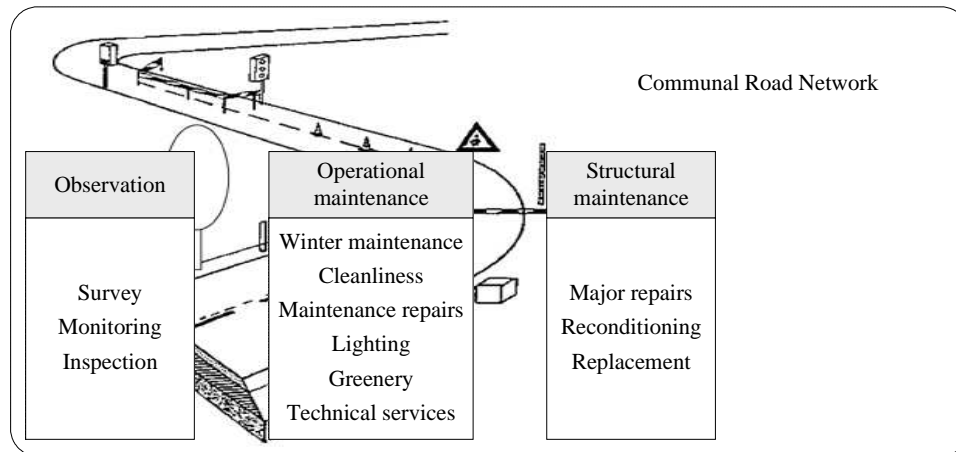
The operational maintenance includes all the operations which are carried out annually and deal with the defined road network. This contains winter maintenance, cleanliness and maintenance repairs as well as lighting, greenery and technical services for maintaining signals and traffic control systems.

The structural maintenance of the road network consists of major repairs, reconditioning and replacement. But there is a clear definition of exclusion. Every replacement which is done causing an increment of the value or a widening of the road, for example due to more traffic, is not a structural maintenance. That is a modification of the road and not part of the research.

Another important part of an efficient road maintenance is the observation. This part has an increasing importance and the development of the automation, particularly with software instruments, is in progress. The first survey within this research indicated that some of the communities already work with this kind of tools, but there is still a backlog demand.

The following figure addresses this classification to the road network.

Figure 3 Operational definition of the communal road network



3.2 Costs of maintaining the network

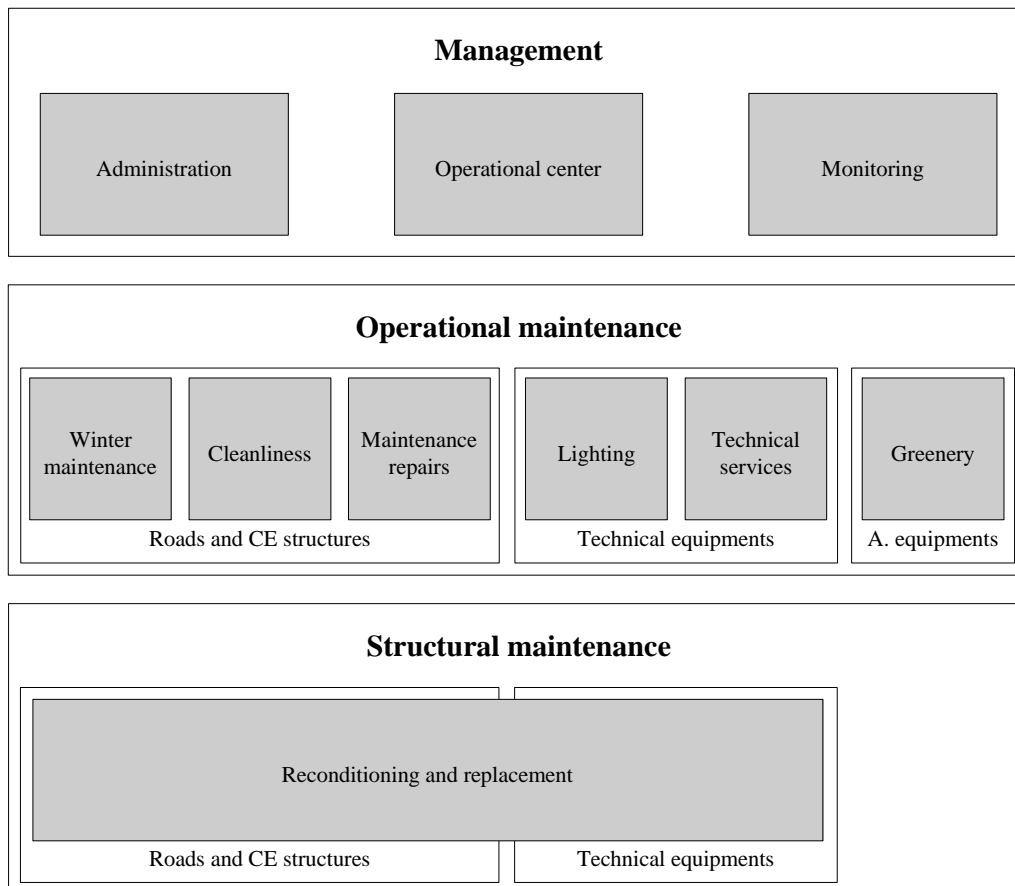
As mentioned, the second survey comprehended the costs of the different operations in maintaining the communal road network. It is imaginable that this survey is the most important and of course a delicate one. But especially with the interviews it was possible to convince at least nine out of ten authorities to stay committed to the research. In the beginning it was designated to specify the costs of each activity of the different operations. But some of the authorities could not even allocate the cost to the operation itself.

The Swiss Community Association defined a standard for local authorities to structure their costing in order to make it possible to compare the costs in the communal road maintenance. Unfortunately these standards are not adopted in all communities yet. Therefore a similar costing sheet was designed in order to get at least the costs of each operation and enabling to compare it with the recommended costing structure. Because of the different structure and complexity of the authorities it was necessary to separate the management costs from the operational costs with the intention to get an objective potential to compare the different operations within the same range.

This costing sheet contains three levels with different sections. The first represents the management level. This contains administration of the department, operation center and monitoring. Finally the last section could not be considered because of few data. Only in larger cities this kind of management tools are already properly in use.

The second and third level represent the operations of maintenance. The following figure clarifies the structure of the costing sheet. For understanding reasons both definitions, structural and operational, were brought together.

Figure 4 Costing sheet



The above costing sheet is the foundation for the benchmarking among the nine authorities and can be used for the comparison of economic efficiency to a private company.

After these two surveys the data was evaluated. The costs were standardized with reference to the area and length of the communal road network as well as the population of the communities. Because of the importance of these figures it is agreed that they will be published at the end of the research project only.

4. State of the research and further action

The following paragraph just shows the state of the research in short words to summarize the present and further actions. Both research institutes are working separately on different working packages. At the end of the research the final report will include all mentioned facts about Public-Private Partnership in the road maintenance of the communal road network.

4.1 Definition and models of Public-Private Partnership

For discussing Public-Private Partnership (PPP) it is necessary to give a definition and to show the exertion within a systematization. For this matter twenty world wide references were analyzed. Public-Private Partnership (PPP) can be defined with the following characteristics:

- Realization of a public assignment
- Participation of at least one private and one public partner
- Long-term cooperation (contract)
- Contractual predefinition of the partnership
- Increase of efficiency by e.g. sharing of risks and life-cycle considerations

The definition of PPP will be pointed out with all the different perceptions in this field.

The different models will be described and an applicable example for the communal road maintenance will be exposed. This means from the concept to the detailed contract.

4.2 Cost-benefit analysis

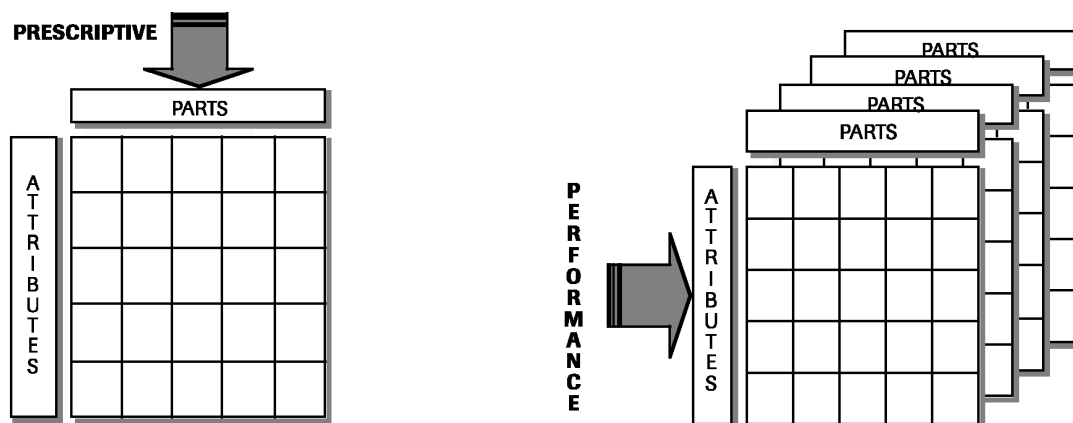
The cost-benefit analysis describes the comparison between the classical way of maintaining the road network and the implementation of PPP in the process chain. Here it is important to state that synergies of the classical structure of the community will be implemented in the analysis. The configuration of the model will be established on an approach with mathematical methods like the calculation of costs and investments as well as the simulation of fuzzy values within the process. The result will be a suitable tool to analyse the efficiency in maintaining the road network.

4.3 Procurement for Public-Private Partnerships in the communal road maintenance

As mentioned the research aspires to design processing models for the implementation of a PPP as well as having a controlling management when running it. A very important part of the process is the procurement of the operations in the communal road network. Therefore it is necessary to define the operation in type and expansion. As opposed to the trunk and highway network it is very difficult to demarcate. In one place the operation includes rather manual labour, in others just machine-made work. A striking example here is the comparison of an inner-city junction to a highway in winter maintenance. With highways it makes sense to refer to their length. In the inner-city area it is not even possible to refer to the square meter because of the different expansions.

The question is how to prescribe the expansion of the operation for a procurement without dropping the quality of the maintenance within the community. That leads to the assumption that the prescriptive approach is not a satisfying solution. After an analysis of references in the domain of building, construction and civil engineering it can be pointed out that it is already ordinary to look at the output-side of the operation or object rather than describing the different parts or services at the input-side. In other words the performance is of importance. The performance-based approach has got the advantage of always achieving the aim which is defined by performance-based indicators and standards, another one is that there is no barrier to innovation. The following figure clarifies the difference with an example of a construction with different parts.

Figure 5 Difference between the prescriptive and the performance-based approach



Source: Foliente, G. C. (2000) Developments in Performance-Based Building Codes and Standards, Forest Products Journal Vol. 50, No. 7/8, Madison USA, July/August 2000

This performance-based approach can be easily adopted for the communal road maintenance. The entire defined road network has to be divided into different objects which have to comply to predefined performance. The condition for that is the ability to assess the performance of the maintenance with different assessment methods of each operation.

The research will describe the different assessment methods for the maintenance in Switzerland with the possible indicators and standards followed by the development of performance-based tender documents.

5. Conclusion

Finally the conclusion can be drawn with the following expected results of the research:

- The local authorities of Switzerland will receive the opportunity to assess the efficiency of the communal road maintenance.
- They are able to come to a decision either implementing PPP in the maintenance of their road network or maintaining it in the classical way.
- The technical and contractual principles for the procurement and placing of maintenance operations within the framework of an PPP will be developed.
- The authorities will get a description of controlling and performance of a PPP cooperation.

The completion of the project is scheduled for 2006.

6. References

Foliente, G. C. (2000) Developments in Performance-Based Building Codes and Standards, Forest Products Journal Vol. 50, No. 7/8, Madison USA, July/August 2000

Girmscheid, G.; Dreyer, J. (2005) Public Private Partnership – Arten von Modellen, der bauingenieur, Springer Science+Business Media Schweiz AG, 4/2005

Girmscheid, G.; Dreyer, J. (2005) Public Private Partnership – Begriffliche Strukturierung, der bauingenieur, Springer Science+Business Media Schweiz AG, 3/2005

Girmscheid, G.; Dreyer, J. (2005) Public Private Partnership – Prozessodelle für den kommunalen Strassenunterhalt, der bauingenieur, Springer Science+Business Media Schweiz AG, 6/2005

HM Treasury, Public Private Partnership: The Government's Approach. Printed in the United Kingdom for The Stationery Office, London, 2000 (www.hm-treasury.gov.uk/media/1D111/80.pdf)

SN 640 900a, Vereinigung Schweizerischer Strassenfachleute, Erhaltungsmanagement (EM), Grundnorm, Zürich, 2004