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ORIGINAL PAPER

Critical success conditions of collaborative methods: a comparative evaluation of transport planning projects

Alexander I. Walter · Roland W. Scholz

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Abstract This paper explores critical success conditions of collaborative planning projects in the area of urban transport, evaluating the impact of new collaborative methods, instruments and processes on project performance. Hypothesis building is based on a comparative, empirical research design, rather than on deductive theory construction. Potential critical success conditions are derived from literature. Based on five urban transport planning projects in Gothenburg (Sweden), London (United Kingdom), Milwaukee (United States), Tokyo (Japan) and Mexico City (Mexico), a rough set analysis of the five cases reveals validated success conditions, which can be used for formulating hypotheses for further research or for policy and process improvement. The results suggest that a dedicated management of the multi-actor network, a high diversity of actors, as well as an extensive use of knowledge integration methods in combination with a high network density are critical success conditions of these planning processes. Surprisingly, the extensive use of unilateral methods also showed to be an important success condition. The traditional role of the planner will have to be complemented with the expertise of network and methodology management. The authors conclude that rough set analysis can be a valuable addition to narrative, single-case analysis of collaborative urban transport planning processes.

Keywords Project evaluation · Multi-actor planning · Participatory planning · Rough set analysis · Critical success conditions · Collaborative planning · Knowledge integration

1 Introduction

Many researchers consider transportation as a critical factor for urban sustainability. It causes negative local effects such as noise and pollution (cf. Kemp and Rotmans

A. I. Walter (✉) · R. W. Scholz
Institute for Environmental Decisions (IED), ETH Zurich, Universitätsstrasse 22, 8092 Zurich, Switzerland
e-mail: alexander.walter@env.ethz.ch

2002), and uses 30% of the primary energy in the EU (Commission of the European Union 2001, p. 124). Its infrastructure demands much of the scarce urban space (cf. Henson and Essex 2003). However, urban residents consume fewer resources than peri-urban residents (Handy 2005). Thus, urban transport can also be seen as a potential driver of sustainable development (Banister 2000).

Against this background, the requirements for transport planning have changed in the last decades (Goetz and Szyliowicz 1997; Low and Gleeson 2001; Meyer 2000), such that it has to acknowledge the interactions between transport solutions and sustainable urban development. Many recent publications deal with new approaches to transport planning, proposing new processes, methods, and instruments for planning processes (Booher and Innes 2002; Davidson 1996; Healey 1998; Henson and Essex 2003; Kane and Del Mistro 2003; Kemp and Rotmans 2002; Loukopoulos and Scholz 2004; Nijkamp et al. 1997; Szyliowicz 2003; Talvitie 2001; Tapio and Hietanen 2002; Ward 2001; Willson 2001; Zegras et al. 2004). Most of these publications agree that planning has become a public issue (e.g. Banister 2003, p. 249). The planning process takes place in a multi-actor network. Collaborative interaction between the actors becomes more important (Booher and Innes 2002; Vigar 2000). The power of participating actors also requires a focus on learning and the acceptance of a constructivist view (Chermack and van der Merwe 2003). Willson (2001) and others call this a shift from a scientific to a communicative rationality.

Additionally, most authors agree that the inherent complexity of the issue requires a new planning methodology (cf. Lo and Wong 2002; Lo and Wong 2004). There are also some new transport policy instruments proposed, which link different aspects of transport planning (e.g. the integration of different modes of transport or public–private partnerships).

Methodologically, most new approaches presented are deductive models, which have to prove their usefulness in real-life planning processes (Szyliowicz 2003). Their usefulness is demonstrated based on one single case, following a qualitative and narrative approach to the reflexion on planning processes. This approach delivers important qualitative insights into how collaborative planning processes can be improved. The works of, among others, Patsy Healey, Jean Hillier, and Judith Innes are important examples.

Still, planning research needs a pluralistic approach to capture the pluralism of planning practice itself (Myers and Banerjee 2005). There is a need to obtain a ''critical distance'' for a ''broader analytical view'' on planning processes in order to be able to make explanatory statements about planning processes (Yiftachel and Huxley 2000, p. 910). With our approach, we do not propose to ''re-rationalize'' the planning process or to go back to the old ideal of a ''general planning theory'' (Alexander 1998). Rather, we see a need for comparative evaluation approaches to planning processes (Brody and Highfield 2005; Laurian et al. 2004), as one form of obtaining ''critical distance''. Comparative approaches deliver different insights than narrative approaches, allowing inductive conclusions on general and specific aspects of planning processes (Gissendanner 2003).

We concentrate in this study on the comparison of methods, processes and instruments of collaborative planning, applied in different cultural and political contexts. Our goal is to derive critical success conditions (CSCs) only for the mentioned field, in order to learn about the benefits of different collaborative planning methods and approaches. Other important factors, such as the local ''planning

culture'' or ''planning style'' (Innes and Gruber 2005), are better analysed with a narrative approach and are not the subject of our research.

Critical success ''conditions'' or ''factors'' have been defined as necessary conditions for success (Jenster 1987; van Egmond et al. 2003). We will show in our comparative study, which CSCs from the above mentioned approaches are necessary preconditions for a successful collaborative planning project in urban transportation in the analysed cases. This also serves to demonstrate the benefits of a comparative approach for the reflexion on planning processes. Based on a set of five case studies, we deduce relationships between the status of the postulated CSCs and the performance of the cases. Eisenhardt (1989) indicates that linkages between quantitative and/or qualitative variables or indicators in a framework model, can be achieved using a cross case analysis of a sample of 5–10 cases. Yin (1984) refers to this kind of research approach as a ''groundbreaking case study.'' The deduced relationships take the form of ''if-then''-rules and are valid within the ''mental model'' of the analysis and analysed dataset. Causality cannot be claimed, because we do not go into the detail of the mechanisms of action. Nevertheless, the comprehensive qualitative information about the cases will be used in the discussion and conclusions to derive some causal hypotheses.

The paper is organised as follows. Section 3 provides an introduction to the method used for the cross-case analysis. In Section 4, the analytic-evaluative framework for the assessment of the CSCs is presented. The cases are introduced in Section 5. Section 7 presents the results of the analysis and the corresponding discussion. Conclusions on the results and on the applicability of the methods are drawn in Section 8.

2 Method

In our type of cross-case comparison, standard statistical approaches are difficult to apply because of the relatively low sample size (Glass et al. 1994). We, therefore, adopt *rough set analysis (RSA)*, a multivariate classification method that aims to detect deterministic rules in a dataset. The approach was developed by Pawlak (1991). It has already been used in research on urban transport (cf. Baaijens and Nijkamp 2000; van Egmond et al. 2003). It is a transparent method, designed to help the researcher in discovering patterns in a data set and setting them apart from contingencies. It does not prove any form of causality, but it can suggest new hypotheses where to look in detail for causal mechanisms of action. The advantage of RSA is that it delivers robust results for fuzzy information that can easily verified with the raw data.

The dataset for analysis consists of a matrix of *cases*, which are represented by *attributes* (i.e., independent variables) and by *decision variables* (i.e., dependent variables). The attributes represent the available knowledge on the cases, while the decision variables represent a classification of the cases. The process of RSA can then be divided into a number of substeps. The first is the *mapping of case information* into an information table (Table 3). The following steps are the *completion of data*, followed by a *discretisation*, especially of interval and ratio-scaled values. In the step of *rule generation*, the algorithm starts with a set of all possible rules and performs a search for the best rules. *Rules* take the form of if-then-statements (e.g. IF attribute X = A AND attribute Y = B THEN decision variable Z = C). Rules

can be formed combining any number of attributes. The rules have to be *complete*, i.e. they have to include all cases with the decision variable value, and *consistent*, i.e. cases with other values cannot be included. In the last step, the *rule filtering*, the amount of rules is limited by defining a maximum length (based on the number of attributes in one rule) and minimum strength (based on the number of cases included in the rule).

The goal of RSA is twofold: to predict the value of the decision variables for a given case and to represent the knowledge in the dataset in an understandable format of rules. The advantage of RSA is that it can process low scales of measurement and small sample sizes while still delivering meaningful results (cf. Olkowski and Skowron 1998; Pawlak 1991).

Methodologically, this paper follows the approach Nijkamp et al. (2002) applied to a comparative evaluation of public–private partnership projects. The attributes in our case consist of *CSCs* of the cases, which we derived from transport planning research literature. The decision variables represent the *performance* of the cases. Therefore, the ''usage of participatory methods'' represents a CSC and an attribute, whereas the ''achievement of a consensus between the stakeholders'' is a *performance indicator* and consequently a decision variable.

3 The analytical-evaluative framework

Comparing unfinished projects of differing sizes, goals, and participants is a difficult task (cf. Berechman and Paaswell 2005, p. 225; Colebatch 1995). Van der Meer and Edelenbos (2002) state that abstract criteria would be needed in order to ensure applicability. We, therefore, used abstract performance indicators and CSCs on an ordinal scale level with two to three different values. This represents a specific trade-off for this study between accuracy and generality of the estimations (cf. Gissendanner 2003). The more detailed the scales are defined, the more difficult it is for RSA to find consistent patterns, which eventually lead to new insights about the dataset.

3.1 Performance indicators

We selected *efficiency*, *effectiveness*, and *relevance* as performance indicators, all of which are frequently used criteria for the evaluation of planning projects (cf. Bots and Lootsma 2000). We also took into account the *legitimacy* of the process (cf. Dror 1997). We are aware that at least some of these criteria conflict with each other (Dahl 1994), but since we do not aggregate them for an overall evaluation score, this approach is possible.

Relevance was assessed as the accuracy of the measure that was finally proposed in regard to targeting the postulated problem. The better the measure targeted the problems defined in the project, the greater the relevance. *Effectiveness*, or the ability of the project to produce an effect, was measured by how well the proclaimed goals of the project where attained by the measures implemented. *Relevance* and *effectiveness* are therefore distinguished by the difference in the problem and goal definitions of the projects, respectively.

The *efficiency* as the relation of means and outcomes is here defined as the time between the first multi-actor problem recognition process, and the beginning of the implementation phase. The *legitimacy* of the process was assessed by the degree of

consensus reached by the five most involved actors. The *total performance* represents an overall rating of the case's performance, incorporating an overall judgement derived from the qualitative parts of the stakeholder interviews (Walter and Scholz forthcoming) (Table 1).

3.2 Critical success conditions (CSCs)

3.2.1 Interaction and organisation

The *Level of involvement* distinguished between information, consultation, and deliberation, analogous to the 'ladder of participation' (Arnstein 1969; Petts 2001). We expected a high involvement to lead to more *relevant* results as well as to increase *effectiveness*, although such processes typically take longer (Healey 1998; Susskind and Cruikshank 1987).

Standard planning procedure indicated whether the planning process was part of the standard legislative procedure or whether it was specially adapted. We expected that ''tailor-made'' processes would increase the *total performance* of the projects through their adaptation to the specific circumstances (Mayer 1995).

Dedicated network management indicated whether there is an explicit and autonomous entity responsible for the co-ordination of the actor network. We expected it to have a strong positive influence on all performance indicators through more effective interaction of stakeholders (Davidson 1996; Willson 2001).

Actor diversity measured the different resources the actors could supply to the process: specific knowledge, authority, or financial resources. We expected a higher diversity to lead to a higher availability of diverse resources, thus making the process more *relevant*, *efficient* and *effective* (Ward 2001; Willson 2001).

Actor network density was measured according to Scott (2000), based on the intensity of communication between the five most important actors. We postulated that a high density would enable a higher degree of understanding between the actors, thus leading to more *relevant* and *effective* solutions, following the ideas of Booher and Innes (2002).

Network structure differentiated between hierarchical and heterogeneous networks. Hierarchic networks are characterized by a clear ''chain of command'', while heterogeneous networks have distributed and task dependent power relationships. We estimated heterogeneous networks to lead to a higher *relevance* of the projects (cf. Ward 2001).

To account for the effect of different kinds of participants, we classified them according to the diversity measurement (Walter and Scholz forthcoming): municipal, city, regional, and national administrations; business associations; companies; the public, including public interest groups and NGOs. The NGOs where combined with

Table 1 The codification matrix for the performance Indicators

Performance Indicators	Short name	1	2	3
Measure relevance	*Relevance*	High	Partial	Low
Goal attainment	*Attainment*	Full	Partial	None
Length of process	*Length*	<10 years	10–30 years	>30 years
Consensus of stakeholders	*Consensus*	Yes	No	
Total performance	*Performance*	Full	Partial	None

the public, because their interests, relationships and resources where very similar to the general publics opinion in the cases. The administrative levels were differentiated because they took on different roles in the same projects. The municipal administration was defined as the level of administration below the city level, partitioning the city.

3.2.2 Instruments and methods

Unilateral, bilateral and multilateral methods were assessed according to Bickerstaff and Walker (2001). Unilateral methods are one-way communication methods (e.g. surveys, leaflets). Bilateral methods involve a dialog (e.g. interviews, consultation processes). Multilateral methods require at least three different parties (e.g. round tables, scenario workshops).

The methods used in a planning process are crucial for the integration of different knowledge bases (Kane and Del Mistro 2003; Zegras et al. 2004; Wiek and Binder 2005; Scholz et al. 2006; Stauffacher et al. 2006). There has been much research specifically examining knowledge integration methods in planning (Scholz and Tietje 2002; Hansmann et al. 2003; Loukopoulos and Scholz 2004). We expected multilateral methods to have the highest impact on *total performance* (Scholz and Tietje 2002).

Types of knowledge exchanged: We rated each method used according to its potential to integrate different types of knowledge: regarding the definition of the problem and the perception of the current situation (system knowledge), the measures to use (transformation knowledge), and the goals of the project (goal knowledge) (Mogalle 2001). We postulated that it is important to integrate all types of knowledge in order to enable a *relevant* and *effective* process (Willson 2001; Tapio and Hietanen 2002; Szyliowicz 2003).

Public and private transport in the same measure considers whether public and private transport are packaged into one measure, which is considered to increase *efficiency*, *effectiveness*, and *consensus* on the measures (Kemp and Rotmans 2002; Langmyhr 2001).

Governmental subsidies recorded whether the instruments used contain governmental subsidies for *specific* transport modes or technologies, which was expected to decrease *efficiency*, *relevance*, and *effectiveness* (Karlaftis and McCarthy 1997).

3.2.3 Issues

To test whether the issue at hand of the project had an influence on the outcome, we included the involvement of the project with the issues *congestion*, *city development*, *pollution*, *public transport* and *equity/accessibility* into the analytical-evaluative framework.

3.2.4 External conditions

We included some external conditions to take into account their influence on project performance. Van Egmond et al. (2003) and Banister (1996) consider city size and city density as the most important external conditions to be controlled in this type of analysis.

It has to be noted that the framework (cf. Table 2) is not an instrument for sufficiently describing transport planning projects. It also includes redundant descriptions. This is not problematic insofar as each CSC is tested independently. Combinations of similar CSCs can easily be identified as redundant if they appear in the resulting rule set.

4 The cases

As we strove for generalized CSCs, we selected a broad range of projects. They were selected to be in the area of urban transport; to be completed or near completion; to have substantial scope with at least five actors and at least one public and one private actor; and to have a multi-actor approach to planning.

At least three key persons from different institutions were interviewed for each case in the end of 2002. In Tokyo, one interviewee had to cancel on short notice. All interviews were recorded and transcribed (Walter and Scholz forthcoming). The five most involved actors were identified by the number of nominations from the interview partners.

Table 2 The codification matrix for the dimensions of planning processes considered

Dimensions and corresponding CSCs	Short name	1	2	3
(a) *Interaction and organisation*				
Level of involvement	*Involvement*	Information	Consultation	Deliberation
Standard planning procedure	*Standard*	Yes	No	
Dedicated network management	*Dedicated*	Yes	No	
Actor diversity	*Diversity*	High	Average	Low
Actor network density	*Density*	High	Low	
Network structure	*Structure*	Hierarchical	Heterogeneous	
Municipal Administration	*Municipal*	Yes	No	
City Administration	*City*	Yes	No	
Regional Administration	*Regional*	Yes	No	
National Administration	*National*	Yes	No	
Business Associations	*Business*	Yes	No	
Companies	*Companies*	Yes	No	
Public	*Public*	Yes	No	
(b) *Instruments and Methods*				
Unilateral methods	*Unilateral*	None	1–2	3 or more
Bilateral methods	*Bilateral*	None	1–2	3 or more
Multilateral methods	*Multilateral*	None	1–2	3 or more
Types of knowledge exchanged	*Knowledge*	Transformation	Also goal	Also problem
Public and private transport in the same measure	*Same*	Yes	No	
Governmental subsidies	*Subsidies*	Yes	No	
(c) *Issues*				
Congestion	*Congestion*	Important	Marginal	Not an issue
City development	*Development*	Important	Marginal	Not an issue
Pollution	*Pollution*	Important	Marginal	Not an issue
Public transport	*Publictransport*	Important	Marginal	Not an issue
Equity/Accessibility	*Equity*	Important	Marginal	Not an issue
(d) *External conditions*				
City size	*Size*	Smaller City	Bigger City	Megalopolis
City density	*Citydensity*	Low (<3,000)	High (>3,000)	

While the performance indicators were assessed using an expert approach (cf. Nijkamp et al. 2002, p. 1871), the attributes were assessed using a qualitative database consisting of the interviews, publications, and reports about the projects, deriving a score through comparative analysis. Since the measurement scale is low, we expect the information to be robust enough on this scale level to draw conclusions based on the data (cf. Baaijens and Nijkamp 2000; Nijkamp et al. 2002; Gissendanner 2003; van Egmond et al. 2003).

4.1 Gothenburg—mediation process of ring road construction

Gothenburg with its 778,000 inhabitants straddles the Göta River. There are only three ways to cross the river. By the 1990s, the city suffered from these insufficient connections. Therefore, a mediation process between state and city was initiated to construct a ring road (cf. Falkemark 1999). The participants involved were the state of Sweden, who called upon a private mediator, and several different regional representative organisations. Initially, traffic experts from the Gothenburg traffic department and the national road administration also took part.

4.2 London—congestion charging in the inner city

Inner London has a population of 2.7 million and a population density of 8,600 per km^2 (Greater London Authority 2001). The London congestion-charging scheme has been developed in the record time of only 18 months (Banister 1996, 2003). An extensive stakeholder consultation and public outreach process was conducted, with the most important stakeholders being the Greater London Authority, Transport for London, the London business associations, car user associations, the London boroughs and the public.

4.3 Mexico City - restructuring the bus system

The Mexico City Metropolitan Area has about 17.9 million inhabitants with a density of 12,260 inhabitants per km^2 in the urbanized area. About 20 million trips are made by public transport per normal workday, the vast majority in buses (cf. Molina and Molina 2002). In 2001, the city government initiated a program to improve the bus service: the substitution of the old ''Microbuses,'' with modern, diesel-driven buses with a higher seating capacity. The most important participants in this project were the city's secretary of the environment, the secretary of transport, the metropolitan commission, bus manufacturers, banks, and bus driver organisations.

4.4 Milwaukee–introduction of downtown fixed rail public transport

Milwaukee (600,000 inhabitants and a density of 2400 inhabitants per km^2) is undergoing a major change from an industrial centre to a mixed-use area of working, living, and leisure (Milwaukee Economic Development Cooperation 2001). In 1994 the central actors in the city area started devising a new public transport system. The project included innovative technology, economic considerations, social concerns, and ecological issues. The most important participants were authorities from all

levels of administration, business representatives, a dedicated case manager, the manufacturer of the transport system, and the public.

4.5 Tokyo—introduction of compressed natural gas powered vehicles

Tokyo city centre is home to 8.21 million persons, with a density of about 13,211 inhabitants per km^2. In August 1999, the Tokyo government started a campaign to replace the biggest contributors to the city's pollution problem, diesel vehicles, with more environmentally friendly natural gas powered vehicles. The campaign started very slowly, due to coordination difficulties between actors (Yarime 2004). The campaign, which included a round table discussion on the introduction of natural gas powered vehicles (NGVs), had the following participants: The Tokyo metropolitan government, NGV manufacturers, NGV users, and gas companies.

5 Discussion

The application of RSA to the information table (cf. Table 3) using the ROSE2 software program (Predki et al. 1998) yields the rule set listed in Table 4. Obviously, the interpretation is valid to the extent that the case studies considered offer a fair representation of urban transport planning projects. For all rules, the strength of the RSA approximation is equal to 1, which means that they are all applicable to each one of the cases analysed.

Rules that could be linked using logical operators (AND and OR) were merged into one single rule to increase clarity. Rules with more than two attributes or rules derived on the basis of only a single case were omitted. Two exceptions of the latter were made, in order to show that a set of rules explains all values of a CSC (rules 6–8 and 27–29). Rules that were obviously derived from random relationships between the cases were omitted. This concerned several rules that combined attributes from the ''Issues'' dimension with the ''Methods and Communication'' dimension. It derived from a random relationship of two projects. The relationship could not be confirmed to have any causal mechanism or other reasoning behind it, and the rules were therefore omitted.

The cases seem to be divisible into three groups, corresponding to the *total performance* (Table 3): London and Milwaukee, Tokyo and Mexico City, and Gothenburg (cf. Fig. 1). This seems a plausible result, as we evaluated the cases with respect to their performance. The rules should reflect this analytic categorization.

London and Milwaukee represent a type of case with high values in almost all performance indicators (cf. Table 3). Surprising is the extensive use of *unilateral methods*, which seems to have been necessary for the high performance of the cases (rule 17). In both cases however, great effort was put also into the process of integrating the diverse stakeholders into a multi-actor network, and using advanced methods of knowledge integration for generating a common view of the situation. Also, all actors with a perspective on sustainable urban development were included in the process (*the public*, *municipal administration*, and *business associations*).

Mexico City and Tokyo represent cases with medium performances. Neither the *municipal administration*, nor *business associations*, nor *the public* were included in the process, leading to a lack of *consensus* (rules 10,13,16). This group is characterized by a missing awareness of the implications of multi-actor planning. The

Table 3 (a) The information table on CSCs. For an explanation of the codification see Table 2; (b) The information table on performance indicators. (GO = Gothenburg, LO = London, MX = Mexico City, MW = Milwaukee, TO = Tokyo)

	Short Name	GO	LO	MX	MW	TO
(a) Domains and corresponding CSCs						
A. Interaction and Organisation						
Level of involvement	*Involvement*	2	2	1	3	3
Standard planning procedure	*Standard*	2	1	2	1	2
Dedicated network management	*Dedicated*	2	1	2	1	2
Actor diversity	*Diversity*	3	1	2	1	2
Actor network density	*Density*	2	1	2	1	1
Network structure	*Structure*	1	1	1	2	2
Municipal Administration	*Municipal*	2	1	2	1	2
City Administration	*City*	2	1	1	1	1
Regional Administration	*Regional*	1	2	1	1	2
National Administration	*National*	1	2	2	1	1
Business Associations	*Business*	2	1	2	1	2
Companies	*Companies*	2	1	1	1	1
Public	*Public*	2	1	2	1	2
B. Instruments and Methods						
Unilateral methods	*Unilateral*	1	3	2	3	1
Bilateral methods	*Bilateral*	2	3	2	3	3
Multilateral methods	*Multilateral*	1	2	2	3	2
Types of knowledge exchanged	*Knowledge*	1	3	3	3	1
Public and private transport in the same measure	*Same*	1	1	2	2	2
Governmental subsidies	*Subsidies*	2	2	1	2	1
C. Issues						
Congestion	*Congestion*	1	1	2	2	3
City development	*Development*	3	3	3	1	3
Pollution	*Pollution*	3	3	2	3	1
Public transport	*Publictransport*	2	2	1	1	3
Equity/Accessibility	*Equity*	3	2	2	2	3
D. External Conditions						
City size	*Size*	1	2	3	1	3
City density	*Citydensity*	1	2	2	1	2
(b) Performance indicator						
Measure relevance	*Relevance*	3	1	2	1	2
Goal attainment	*Attainment*	3	1	2	2	2
Length of process	*Length*	2	3	1	2	1
Consensus of stakeholders	*Consensus*	2	1	2	1	2
Total performance	*Performance*	3	1	2	1	2

planning process still followed the old general comprehensive paradigm too much, instead of shifting towards collaborative planning.

The case of Gothenburg represents a failed planning process. The performance indicators rate very low. It is similar to Mexico City and Tokyo, with an even lower *diversity* (rule 8), which led to a low *relevance* of the proposed measure. Also, the total amount of *knowledge integration* methods used was very low. There were only knowledge integration methods used that focused on the measure, not on the goals of the actors or on a common view of the problem situation.

Table 4 The rules derived from the information table can be interpreted straightforward. E.g., the second rule states that if the standard planning procedure is used, a high level of performance, high consensus between stakeholders, and high effectiveness are reached. This holds true for the cases of London and Milwaukee

Dimension and Rule Number	If CSC meets the condition...	Then performance indicator is...	Applicable Cases
(a) **Interaction and Organisation**			
Rule 1	*Involvement* in (3,1)	*Attainment* = 2	MX, MW, TO
Rule 2	*Standard* = 1	*Performance* = 1 AND *Consensus* = 1 AND *Relevance* = 1	LO, MW
Rule 3	*Standard* = 2	*Consensus* = 2	GO, MX, TO
Rule 4	*Dedicated* = 1	*Performance* = 1 AND *Consensus* = 1 AND *Relevance* = 1	LO, MW
Rule 5	*Dedicated* = 2	*Consensus* = 2	GO, MX, TO
Rule 6	*Diversity* = 1	*Performance* = 1 AND *Consensus* = 1 AND *Relevance* = 1	LO, MW
Rule 7	*Diversity* = 2	*Performance* = 2 AND *Length* = 1	MX, TO
Rule 8	*Diversity* = 3	*Relevance* = 3	GO
Rule 9	*Municipal* = 1	*Performance* = 1 AND *Consensus* = 1 AND *Relevance* = 1	LO, MW
Rule 10	*Municipal* = 2	*Consensus* = 2	GO, MX, TO
Rule 11	*Municipal* = 2 AND *City* = 1	*Performance* = 2	MX, TO
Rule 12	*Business* = 1	*Performance* = 1 AND *Consensus* = 1 AND *Relevance* = 1	LO, MW
Rule 13	*Business* = 2	*Consensus* = 2	GO, MX, TO
Rule 14	*Business* = 2 AND *Companies* = 1	*Performance* = 2	MX, TO
Rule 15	*Public* = 1	*Relevance* = 1 AND *Consensus* = 1 AND *Performance* = 1	LO, MW
Rule 16	*Public* = 2	*Consensus* = 2	GO, MX, TO
(b) **Instruments and Methods**			
Rule 17	*Unilateral* = 3	*Performance* = 1 AND *Consensus* = 1 AND *Relevance* = 1	LO, MW
Rule 18	*Unilateral* in (1,2)	*Consensus* = 2	GO, MX, TO
Rule 19	*Multilateral* = 2 AND (*Standard* = 2 OR *Dedicated* = 2 OR *Municipal* = 2 OR *Business* = 2 OR *Public* = 2)	*Performance* = 2 AND *Relevance* = 2	MX, TO
Rule 20	*Knowledge* = 3 AND *Density* = 1	*Performance* = 1 AND *Consensus* = 1	LO, MW
Rule 21	*Same* = 2	*Attainment* = 2	MX, MW, TO
Rule 22	*Subsidies* = 1	*Performance* = 2 AND *Length* = 1 AND *Relevance* = 2	MX, TO
Rule 23	*Subsidies* = 2 AND *Knowledge* = 3	*Consensus* = 1	LO, MW

Table 4 continued

Dimension and Rule Number	If CSC meets the condition...	Then performance indicator is...	Applicable Cases
Rule 24	*Subsidies* = 2 AND *Bilateral* = 3	*Performance* = 1	LO, MW
Rule 25	*Legal* = 2	*Length* = 2	GO, MW
Rule 26	*Legal* = 1 AND (*Standard* = 2 OR *Same* = 2 OR *Dedicated* = 2 OR *Municipal* = 2 OR *Business* = 2 OR *Public* = 2)	*Performance* =2	MX, TO
(d) **External Conditions**			
Rule 27	*Size* = 3	*Performance*= 2 AND *Length* = 1 AND *Relevance* = 2	MX, TO
Rule 28	*Size* = 2	*Length* = 3	LO
Rule 29	*Size* = 1	*Length* = 2	GO, MW
Rule 30	*City density* = 1	*Length* = 2	GO, MW

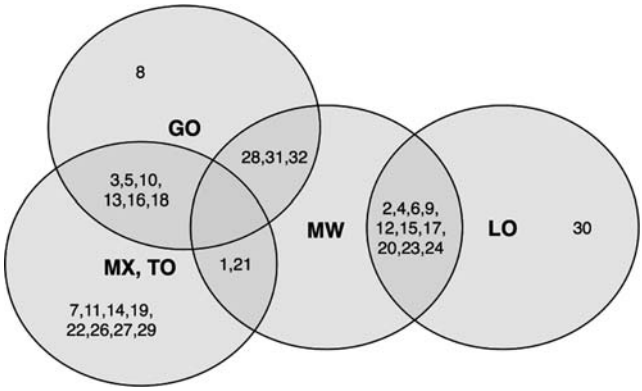

Fig. 1 The sets of rules attributable to the different cases (cf. Table 4; GO = Gothenburg, LO = London, MX = Mexico City, MW = Milwaukee, TO = Tokyo). These sets (grey circles) can be deducted from the ''Cases'' column of Table 4 and show for all rules (displayed by numbers), to which cities they are applicable

The most interesting linkage in the diagram is the similarity between Milwaukee's and Gothenburg's rules. Both rules (29 and 30) refer to external conditions: Milwaukee and Gothenburg have a similar *size* and *density*. Nevertheless, the performance of the two cases is very different.

The CSCs *level of involvement* and *network structure* did not result in any unambiguous rules and will thus not be discussed further.

5.1 Interaction and organisation

The *standard planning procedure* has a positive relation to *total performance*, *relevance*, and *consensus* (rules 2 and 3). This is in accordance with Desfor and Jørgensen (2004), who found that circumventing local planning practices raises conflicts with local stakeholders. It is contrary to our expectations and can be explained with the fact that ''off-the-record'' processes are often excluding stakeholders expected to have opposing interests (cf. Hillier 2000).

Dedicated network management has a strong influence (rules 4 and 5) on the *total performance*, *consensus*, and *relevance*. This supports our expectations and highlights the importance of communication and interaction in planning processes.

Actor diversity seems to be the strongest CSC, as it can differentiate best between the cases, although its effect is divided among different performance indicators. Still, one cannot conclude that the higher the diversity, the better the performance. A further increased diversity could very well have negative effects due to higher transaction costs (cf. Noteboom 2000).

Actor network density, together with an intensive process of *knowledge integration*, contributes to a high *overall performance* as well as to *consensus* (rule 20). The two CSCs seem to depend on each other. There is no direct influence on *effectiveness* or *efficiency*.

Participants: It is striking that the participation of *regional*, *city*, and *national* levels of administration is not related to the performance. Rule 11 states that if the *municipal administration* is absent from the process but the *city administration* is present, relatively poor project performance will result. The *municipal*

administration seems to be a strong CSC, as well as the *business associations* and *public CSCs*. Not surprisingly, their influence on the *consensus* is strong (rules 9 and 10, 12 and 13 and 15 and 16, respectively).

5.2 Instruments and methods

Unilateral, bilateral and multilateral methods: unilateral methods have a strong influence on a range of performance indicators (rule 17). This runs contrary to many arguments for participatory methods. There was no clear relationship found for *multilateral* and *bilateral* methods, possibly because of the strong influence of the *unilateral* methods.

Types of knowledge exchanged: in order for knowledge integration to function, a high *density* of the actor network is necessary (see the CSC *actor network density*).

Public and private transport in the same measure: uncombined measures lead to partial goal attainment (rule 21), although it cannot be said whether *effectiveness* would be higher or lower with a combined measure.

Governmental subsidies have a negative impact on overall *performance* and *relevance* (rules 22–24). The influence is only in combination with other CSCs (cf. Table 4). A clear conclusion cannot be drawn based on the rule set.

5.3 Issues

There is no CSC from the issues dimension (see Table 3) in any rule. As such, it can be concluded that there is no influence of the concrete issue at hand on the planning process.

5.4 External conditions

The *external conditions* considered seem to be particularly related to the *efficiency* of the process (rules 27–30). This can be interpreted with the knowledge gathered in the case interviews: In relatively small cities like Milwaukee and Gothenburg, there is a higher political and institutional continuity, and projects can slowly build up. In big cities, sudden shifts in the political framework are more likely. Therefore, projects have to wait a very long time (like in London) until they can be implemented. If the political ''window of opportunity'' is there, the actors have to implement the project very quickly, as it was the case in London, Mexico City, and Tokyo.

6 Conclusions

The RSA returned similar CSCs for different performance indicators, which indicates a robustness of the model, because the performance indicators are most likely highly correlated. Considering the relatively small number of cases, it seems that RSA can deliver meaningful insights where other meta-analytic methods fail. Validity testing through application of the rule set to new cases should be the subject of further research.

We conclude that the application of RSA to the comparative evaluation of planning processes is a valuable addition to lessons drawn from single, in-depth case studies. Comparative methods like RSA, which focus evaluating specific parts of the

planning process, can deliver new hypotheses which can then be verified through in-depth case studies. Instrumental use of the rules can be made in the form of ''best practice lessons,'' while at the same time allowing for conceptual use in theory-building. These results can then be re-applied to comparative designs. In this way the advantages of both methods can be combined.

Further research is needed to increase the reliability of the assessment process, possibly through a comparison of a self-evaluation with an expert evaluation. It would be interesting to conduct a RSA concerning other fields of possible CSCs, such as the cultural and contextual background of the cases. The limitations of RSA obviously lie in the relatively coarse mapping of the cases. Facing the current need for evaluative methods, we can see some potential in the method for developing it into a useful evaluation tool, if more stringent mapping of the data into an information table can be accomplished, without excessively increasing the time needed for the analysis.

Regarding the results of the analysis, CSCs in the areas of interaction, communication, methods, and instruments seem mainly to influence the *relevance* of the projects, the amount of *consensus* that can be reached between the stakeholders, and the *total performance*. They are therefore not sufficient to predict a project's outcome, but necessary to orientate the project towards its overall goals.

Our analysis clearly reveals the most relevant CSCs in the areas investigated and for the set of transport planning cases considered: an integration of the project into the *standard planning procedure*, a dedicated *network management* team, a high *diversity* of involved participants, and the inclusion of representatives from *municipal administration*, the *business associations*, and the *public*. These results correspond with the literature. The influence of the *city administration* will have to be clarified. The current results indicate that the *municipal administration* is more important, whereas the *city administration* could even have a negative influence on the performance.

Furthermore, a high *density* of the actor network combined with an extensive *knowledge integration* process was shown to be a CSC. This area should be addressed in further research, also considering the influence of *diversity* and cognitive distance (cf. Noteboom 2000).

Quite remarkably, the extensive use of *unilateral methods* also proves to be a success condition. It seems that this can ''prepare the ground'' for a planning process on a higher level of involvement. It is also a hint towards the ''dark side of planning'' (Yiftachel 1998): A plethora of information can be used to deliberately shift the perceptions of unsuspecting stakeholders.

These insights lead us to the proposition that, in multi-actor planning projects, performance is, to a certain degree, dependent on the process of interaction and communication, as well as on the methods chosen for knowledge exchange. It seems that a mix of high and low involvement is the ''golden mean'' between lengthy and ineffective processes on the one side and overruling top-down planning on the other. The planning process itself needs to be carefully managed. We argue in line with Booher and Innes (2002) that this requires additional competence, which could be introduced by specialised process managers. These new experts should combine the competence of mediators with problem structuring and problem solving methods in order to integrate the knowledge of traditional planners with the logic of practice.

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Roland W. Scholz is a full professor at ETH Zurich and holds the chair of Environmental Sciences: Natural and Social Science Interface. His current research field focus on environmental decision making in human–environment interactions. Current topics are complex environmental system analysis and complex problem solving.

Alexander I. Walter is a researcher at ETH Zurich at the Natural and Social Sciences Interface. His research interests include the analysis, evaluation and implementation of transdisciplinary research processes, including collaborative planning methodology and theory. Furthermore, he is developing new methods of strategic and cross-sectoral transdisciplanary planning.