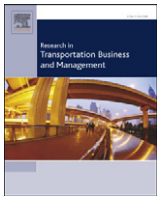
Research in Transportation Business & Management 7 (2013) 106–113

Contents lists available at SciVerse ScienceDirect

Research in Transportation Business & Management



The role of stakeholder engagement in the development of sustainable rail infrastructure systems

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ARTICLE INFO

Article history:
Received 30 May 2012
Accepted 15 March 2013
Available online 16 April 2013

Keywords:
Livable communities
Stakeholder engagement
Sustainable rail infrastructure planning
Transportation planning

ABSTRACT

Planning efforts are underway in the United States to evaluate rail passenger and freight capacity that promote goals of economic development, sustainability and livable communities. Success of such planning efforts depends on consensus and support among the key stakeholders and also the general public. This research investigates the impact of stakeholder attitudes and perception on rail infrastructure planning efforts in Missouri, a Midwestern state in the USA. It is important that stakeholders with an interest in community economic development play an active role in the development of the rail network. Ample opportunity must be provided for meaningful input, and stakeholders must be aware that their issues have been heard and understood. Data collected through surveys, interviews, focus group discussions, and public meetings conducted across the state are used to develop a stakeholder engagement process. The social factors and uncertainties that affect planning for a sustainable rail network are identified and validated using qualitative and quantitative methods. The process developed provides guidance to transportation planners in the creation of a comprehensive rail plan.

1. Introduction

This study explores stakeholder perceptions and needs regarding rail infrastructure in the state of Missouri as part of the development of a comprehensive rail plan. Stakeholders are defined as people responsible for decision making (for example, city officials, transportation experts, the general public, and industrial shippers/businesses). Results are used to develop the current state rail plan recently completed during a research study funded by the Missouri Department of Transportation (MoDOT). The state rail plan establishes a statewide rail vision, and identifies rail infrastructure improvements that can support existing capacity and manage future rail needs of the region. The plan provides implementation strategies for these improvements and incorporates research findings from existing passenger rail networks in Missouri and their impact as economic drivers.

To better understand the impact of stakeholder attitudes and perception on rail infrastructure planning, a stakeholder engagement process is created and analyzed as part of this research. Data collected through interviews, surveys, focus group discussions, and public meetings across the state are used to develop this process. The social factors and uncertainties from a stakeholder point of view are identified and validated using both qualitative and quantitative methods.

2. Social factors and uncertainties in transportation projects

Transportation infrastructure systems are complex to plan, design, build, and operate. Ottens, Franssen, Kroes, and Van De Poel (2006) describe these infrastructures as 'paradigmatic complex systems' as they involve human elements in various roles over the life cycle of the system. The human element complicates the technical system with non-quantifiable risks and uncertainties that can cause the proposed infrastructure to fail (Long, Gentry, & Bham, 2012; Rangarajan, Long, Ziemer, & Lewis, 2012; Ottens et al., 2006). Existing U.S. rail plans focus primarily on economic efficiency and are used for infrastructure assessments at a project level (Tuominen & Ahlqvist, 2010). These plans are limited to interactions within the transportation sector and do not consider societal factors and concerns. In Europe, research is underway to integrate transportation into a complex adaptive system that includes humans and their behavior (Goldman & Gorham, 2006). Numerous research studies have been published highlighting the positive impacts of rail on economic development and the benefits it brings to the communities in the region (for e.g., Amos, 2009; Murakami & Cervero, 2010). Deakin (2001) suggests that, from a sustainable transportation planning perspective, very little research has been done to document public opinion. Also, the role of citizens as contributors to policy and strategic decision-making so far has been rather limited (Tuominen & Ahlqvist, 2010). It is important to study stakeholder interaction with technology and the transfer process between the two, as they often tend to influence an organization's willingness and potential to innovate (Brown, 2003).

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2210-5395/$ – see front matter
http://dx.doi.org/10.1016/j.rtbm.2013.03.007

Social uncertainties are difficult to define and measure. Change is a dominant feature of human society, and one that is non-ergodic (Newman, 2005). Instability increases because society does not settle into persistent patterns, but continues to innovate and grow (Newman, 2005). Nevertheless these social elements can have a considerable influence on the functioning and outcome of a project (Steg & Gifford, 2005; Williams & Edge, 1996; Ottens et al., 2006). Fig. 1 shows the effect of technical elements and social factors on the sustainability of transportation systems. This research develops a stakeholder engagement strategy that focuses on social elements of transportation planning and implementation and overlays it on socio-technical system design.

3. Stakeholder identification

Stakeholders are core constituents with respect to transportation systems, and consumer preferences are key drivers of transportation trends (e.g., Deakin, 2001; Steg & Gifford, 2005; Newman, 2005; Long et al., 2012). Stakeholders have a direct influence on factors that stimulate sustainable development and growth of technology and infrastructures. Given the high rate of failure of technology driven projects, the study of stakeholder involvement, behavior and perspective is worthy of attention.

Elias, Cavana, and Jackson (2002) clarify the concepts of stakeholder analysis, test its validity, and present an elaborate section on its implications. Freeman (1984) suggests that stakeholders (1) are likely to be directly affected by the policies or objectives of an organization, and (2) are likely to contribute significantly towards developing policies and objectives for efficient functioning in the region.

Freeman (1984) also states that stakeholders are dynamic and over time, new stakeholders may join the group while others may leave the group. The stakes of the new group may change based on the emerging needs and issues during any point of time. Thus, it becomes important to review stakeholder groups and policies associated with transportation planning periodically to establish a sustainable development pattern. This "best practice" has been applied and validated as part of the Missouri rail plan.

A stakeholder list was developed early in the planning phase of the Missouri rail plan project. The list (see Table 1) consists of key group and individuals who are directly or indirectly involved in the management of a vital rail network capable of meeting the needs of the region.

For this planning effort various forums were established to communicate appropriately with the stakeholders. The platforms included more traditional methods such as news articles, surveys, focus group interviews, and public meetings, also contemporary methods such as Facebook, Twitter, and online meeting boards to reach out to a wider population.

Table 1
Stakeholders for the state rail plan.

Internal • Department of Transportation Officials • Rail Planning Committee	Media • Newspapers • Television news broadcasters • Radio broadcasters	Communities • Community leaders • People who have stake in efficient movement of goods and passengers in the community
Railroads • Class I railroads • Class II railroads • Terminal railroads • Regional and local railroads • Switching railroads • AMTRAK	Political/legal • Labor group • City representatives • Mayors • Elected officials	Business owners • Directly or indirectly related with railroads • Mining companies
Government • Tourism Department • City Councils • Regional planning organizations • Metropolitan planning organizations	General public • Public transport users • Commercial road users • Other road users	Related groups • Katy Trail • Action groups • Economic development organizations • Transportation experts

4. Research design and data analysis

The research design includes both qualitative and quantitative data analyses and follows the mixed methods approach (Creswell, 2003). The Mann–Whitney U-test and effect-size statistical technique are used to quantitatively analyze and validate the data. Empirical methods are used to study and analyze the system from a qualitative perspective.

4.1. Informed stakeholder survey

As part of the stakeholder engagement process, an informed stakeholder survey was developed to help prioritize the issues of primary importance to the various stakeholder groups. Results were designed to guide policy makers in creating an efficient transportation infrastructure given limited resources. The survey captured stakeholders' responses and

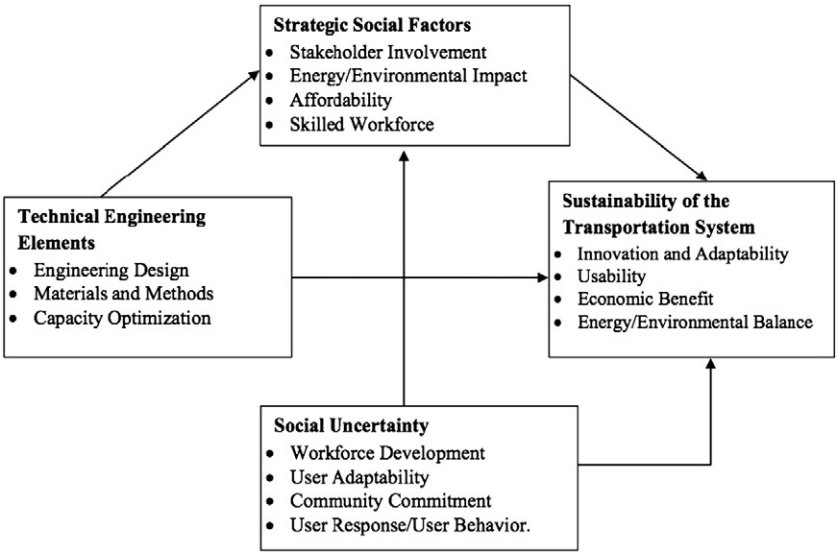

Fig. 1. Social factors of transportation infrastructure projects.