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Assessing Public Transport Research Using Scientometrics

– Extended Abstract –

Leonard Heilig · Stefan Voß

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Abstract Public transport research investigates methods, techniques and technologies for advancing public transport and for solving respective challenges. The importance of research in this area has led to a huge amount of publications in recent years. To comprehensively explore those publications, we conduct a comprehensive scientometric analysis of academic literature, published from 2009 to 2013, to empirically explore the evolution, current state-of-the-art and research trends. Based on a set of 7,868 academic publications, we explore publication patterns, research impact, and productivity from different perspectives. Furthermore, we investigate current research trends and the interplay between important subtopics by analyzing keyword clusters. Finally, we verify the application of Lotka's law for describing the frequency of publications by authors in this field. As such, our study gives a thorough overview on public transport research that may help steering individual projects, extending research collaborations, and selecting proper publication outlets, just to name a few benefits.

Keywords Keyword cluster analysis · Public transport · Public transport research · Scientometrics.

1 Introduction

Public transport plays an essential role in our modern society aiming to provide efficient and sustainable transport forms (Krygsman et al, 2004) and serving the travel needs of those who are dependent on efficient urban and inter-urban transport means or do not have access to cars, thus, supporting social

Leonard Heilig, Stefan Voß
Institute of Information Systems, University of Hamburg, Germany
Tel.: +49-40-42838-3064
Fax: +49-40-42838-5535
E-mail: {leonard.heilig,stefan.voss}@uni-hamburg.de

equity principles (Webster and Bly, 1982). The performance of public transport in terms of accessibility, eco-friendliness, safety and efficiency does not only affect inhabitants day by day, but also influences the destination satisfaction of visitors like business travellers and tourists (Thompson and Schofield, 2007).

Consequently, public transport research consists of a range of research activities to understand and advance public transport from several perspectives. Consequently, the field involves a lot of interdisciplinary research to consider all important aspects and to provide applicable schemes and solutions with regard to current and future challenges in the area of public transport including those related to planning and operations, information management, traffic congestion, and safety and security, to name but a few. Regarding the considerable high number of contributions in the field, it becomes increasingly important to investigate the current state and evolution of public transport research in order to better understand its dynamics and structure and to obtain novel insights such as on important trends and to identify research gaps. In particular, an overview may support younger generations of scholars, for instance, in directing research projects.

Quantitative studies measuring and analyzing science activities form a type of research commonly known as scientometrics (Lewis et al, 2007). By providing a view on a research field from a meta-perspective (van Raan, 1996; Schwarze et al, 2012), scientometric studies facilitate the development and improvement of an academic discipline (Lewis et al, 2007; Straub, 2006) serving as a vital basis for defining and debating future research agendas (Serenko and Bontis, 2004; Heilig and Voß, 2014). Assuming that scientific activities are reflected through scientific publications, scientometric studies apply empirical measures to analyze scientific output of a specific field in order to better understand the dynamics and structure of its development. Thereby, it is possible to explore the body of publications extensively, for example, to observe citation patterns, number and types of citations, number and structure of authors etc. Going further, a scientometric study gives some indication of research activities in general, such as with respect to knowledge sharing, research quality, socio-organizational structures, influential countries/affiliations/authors, development of key topics, structural change, and economical impact of research. For further reading see, e.g., Hood and Wilson (2001); Leydesdorff (2002); Leydesdorff and Schank (2008); van Raan (1996); Straub (2006); Voß and Zhao (2005). Moreover, scientometrics, as an evaluation tool of science, increasingly impacts the resource distribution of research institutions (Voß and Zhao, 2005). While evaluating science has a long tradition in many fields, we identify a lack of a scientometric study in the area of public transport.

This research represents a comprehensive scientometric study that empirically explores publications related to public transport covered by Elsevier's Scopus database from 2009 to 2013. In total, we investigate 7,868 publications. By this, we aim to comprehensively cover publications that are available in Scopus in order to provide empirical insights on the entire public transport research field. Although we are aware that not all publications are covered by Scopus, the number of available publications and related information is con-

siderably higher compared to other databases. Thus, the results of this study stand on a broad empirical basis. By applying scientometric means to the body of publications, based on a self-developed software application, we provide extensive insights into publishing patterns (e.g., subject areas, contributing countries, number of authors, distribution of outlets) and analyze frequent keywords as well as keyword co-occurances to identify widely discussed topics and public transport. Finally, we explore the application of Lotka's law, which describes a frequency distribution of scientific productivity widely applied in scientometric studies. Generally, this study presents novel insights from a meta-perspective that may help to better understand the evolution and state of public transport research. Due to limitations of space, this study does not intend to give an overview of public transport in general (for further reading see, e.g., Ceder, 2007; Larson and Odoni, 1981; White, 2008). To the best of our knowledge, this is the first scientometric analysis in the field of public transport research.

Among others, the results indicate that most contributions are produced in the United States, China and United Kingdom and that mostly social science, engineering, and computer science disciplines are involved. Regarding the co-authorship, we see a trend towards multi-authorship contributions to better address interdisciplinary research challenges. Knowledge is primarily shared through journal papers, which gain superior consideration in comparison with conference papers. Further, we observe current research topics and trends as well as relationships between aspects and/or topics by analyzing keywords and keyword clusters. The results demonstrate the role of research in designing policies and transportation planning based on surveys, optimization and simulation studies that consider economic, efficiency and environmental factors. Methodologically, the empirical findings demonstrate the strength of a scientometric analysis to extensively investigate a field of interest. The concentration of topics and trends can be compared with current and future challenges for elucidating research gaps. The frequency of future contributions can be predicted by applying Lotkas law with the determined parameters for the area of public transport.

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