

Socio-Technical Transition in Ports: A latent Dirichlet analysis and Network Analysis of Research in Automation and Digitalisation

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Purpose:

Seaports, as vital nodes in international transportation and logistics, are undergoing significant developments in transitioning towards a new generation of operational systems and management practices, which are characterized by full automation and complete connectedness through digitalisation. This transition may result in significant improvements in operational performance, as intended by terminal operators. However, there are also significant concerns that the transition to these new approaches will have a substantial impact on the employment of port workers and the conditions under which they work, and more broadly, safety and security within the port system. It is therefore suggested that in order to understand the impacts of this level of change, a socio-technical analysis which addresses technical developments within the context of a multi-level perspective is used to assess the transition of port operations to full automation and digitalization.

Research Approach:

An important question which needs to be addressed is whether the perspective of various stakeholders including port workers are considered in maritime research, and if so how. This study identifies key research topics and areas in port automation and digitalization using latent Dirichlet allocation (LDA) and Network Analysis of keywords from academic literature collected from SCOPUS database. Text mining and topic modelling are adopted using R packages. Two groups of port studies literature are compared: (1) First using the keywords related to 'automation' and 'digitalization' and (2) second using port worker-related keywords which are 'labour', 'employment' and 'social' 'impact'.

Findings and Originality:

This study shows socio-technical transition theory provide a useful approach to understand transition of port operations to automation and digitalisation. The findings from the bibliometric analysis highlight that there is a lack of consideration of the perspective of port workers in the academic literature relating to port automation and digitalization. While the port studies in general are concerned about the impact of port (administration or labour) reforms on social status and job security of port workers, the port studies in automation and digitalisation are seldom concerned about social impact including port workers focusing on automation equipment, terminal layouts and their impact on operational performance. This study uses text mining and topic modelling techniques that are rarely used in maritime studies, providing researchers with more possibility to analyse structure of research topics and theme with ease.

Research Impact:

In addition, this paper discusses how Socio-Technical Transition theory can be used to understand technical developments taking place within port operations. The findings contribute to the wider debate on the impact of automation and digitalization on port operations.

Key Words: Port Automation, Digitalization, Port worker, Keywords Analysis, LDA, Network Analysis

1. Introduction (SP/SHW)

2. Socio-technical transition theory and port studies

2.1. Socio-technical transition theories and application (SP)

2.2. Port studies review (SHW)

3. Data and methods (SHW)

4. Analysis results (SHW)

5. Discussion (SP)

6. Conclusion (SP/SHW)