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Identification of best uses of private freight data to support planning needs in public road sector

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Abstract
As congestion on Danish roads is increasing, it is imperative that solutions be suggested for the issues caused by this, e.g. prolonged travel time, bottlenecks, etc. A first step towards reducing congestion is to provide public policy makers in road sectors with valuable knowledge on how the roads are being used by freight transport. This can be achieved through collecting freight data from private freight transport companies and analysing the collected data to derive analytics that can inform planning decisions on the road infrastructure. Because there exist many data analytics that can be derived from shared freight data, it is essential to identify which data analytics can efficiently support the decision-making processes. This study presents a proposed framework that can be used to help identify the best uses of shared freight data, which best fit the needs of their public sectors/organizations.

Introduction

Congestion on the Danish roads, and especially on the motorway network, has increased dramatically since the end of the latest economic recession [1]. According to Danish Industry and the Danish Road Directorate, this costs the domestic logistic companies app. DKK 20 billion yearly. Without an efficient planning action, the costs due to road congestion for logistic companies are expected to increase by DKK 32 billion every year [2].

In Denmark, most of the domestic lorry transport is driven on the motorways, i.e. 56% of the total lorry transport. As efficient movement of freight influences the economy, it must be assured that effective transportation planning decisions can be made, to mitigate the growing issues due to congestions, transportation safety, capacity and maintenance of old roads on the Danish road network [3].

Most of the issues which the freight transport sector faces, are partially caused by the increase in the number of lorries moving on the roads. This leads to increasing congestion, bottlenecks on motorways and increasing emissions, among others [4]. To alleviate these issues, it is vital that the public policy makers are presented with sufficient knowledge on how motorways perform for the freight transport sectors, to make strategic decisions [5].

One way to allow public policy makers to attain sufficient knowledge on freight transport is by gathering data on the movements of lorries, and sharing the data analytics with the policy makers [6], [7], [8]. Data gathered by freight companies today often includes two different types of data - tracking data and shipment data, where tracking data is data collected by GPS devices attached to the lorry or trailer; and shipment data is information on the individual shipments carried by the lorry [9], [10]. The uses of these types of data are numerous in research, e.g. using GPS data to determine origin-destination matrices and commodity flows [10], or analysing mobility patterns on freight corridors, to determine daily delay of lorries, as well as the cost of said delay [11]. The uses of these data by public policy makers are rarer, as determining the exact needs of the public policy makers, is rarely done in existing literature. A number of studies have attempted to show how it is possible to use data from GPS tracking, to determine mobility plans, e.g. on city level to better understand the movement of freight in cities [12], [13]. The transfer of this knowledge to public policy makers, however, is still lacking investigation.

To gain full benefit of new data, it is important for the public policy maker to understand where, as well as how, it can provide value. This understanding requires knowledge of the work processes of the organisation, as well as the products they are expected to deliver - whether this be analyses of freight flow on roads of potentials of new road works.

To this end, this study aims at investigating how public policy makers may use shared freight data, in a way which fits the requirements of their organisation.

In order to answer this question, a framework is suggested, which may assist the public policy makers in determining how they may best employ shared freight data, based on an analysis of their requirements.

The proposed framework

Figure 1 illustrates the suggested framework. The suggested framework includes seven steps, as shown in figure 1. First, an extensive literature review is to be conducted to determine all possible analytics that can be derived from the data provided by freight companies. Then, the results from this review are sorted and classified according to category. Following this, preparation for a workshop, based on the literature review begins. This initially requires determining the relevant stakeholders for the workshop, following by the workshop itself. The workshop has 3 steps: Introduction & presentation, a debate session and finally the evaluation and closing. After the workshop, the scope of the work is narrowed, when combining results from the literature review with the preliminary results from the workshop. This then leads to a series on in-depth interviews, to fully understand the results from the workshop - this may go through several iterations. Finally, the results from literature review, workshop and interviews are synthesized into a requirements specification.

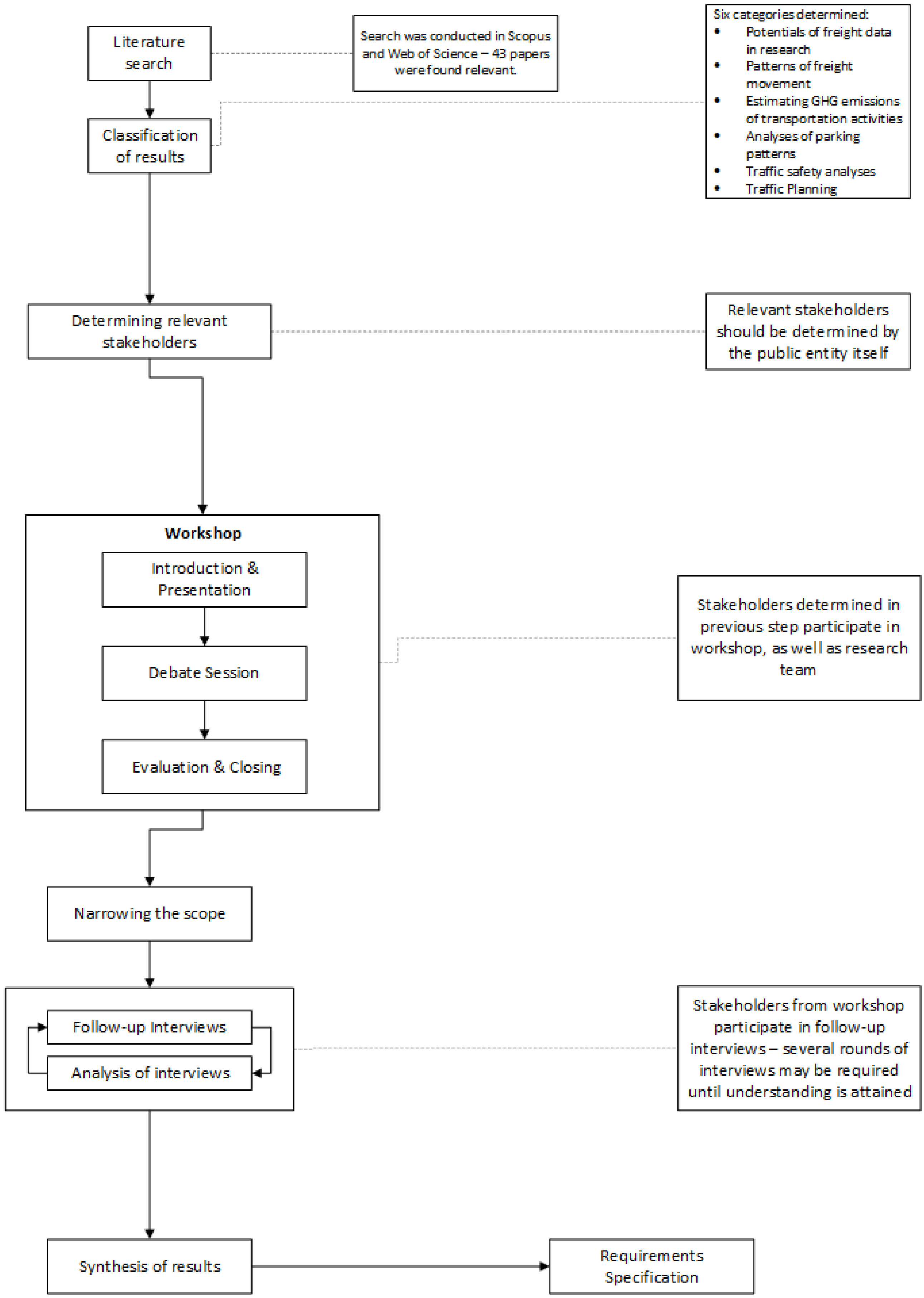

Figure 1: Flowchart of suggested framework

Conclusion

The proposed framework aims to provide new knowledge on the potentials of using data from private freight companies by public policy makers. It provides a necessary tool for identifying use cases of shared freight data, and is a first step towards data sharing between private freight companies and the public sector. Data sharing will improve the knowledge of the public organisations on the use of the roads by freight companies, thereby ensuring a more reliable basis for decisions on road infrastructure improvements. It does come with a number of questions, i.e. Privacy and data rights, business models and data management and analysis methods. The next step is to utilise the proposed framework, to identify the data requirements from the Danish Road Directorate.

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