Can Physical Internet support the integrated management of last-mile and first-mile (reverse) logistics? An exploratory analysis

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INTRODUCTION

Closed-loop supply chain (CLSC) management developed within the CE paradigm and consists mainly in managing forward and reverse flows within a supply chain simultaneously. Integrating forward and reverse supply chains means that “last mile” logistics activities within the forward flow are strictly interconnected with the first-mile logistics activities of the reverse flow. In this context, Physical Internet (PI) paradigm represents an opportunity to increase logistics management efficiency, because it attempts to transform the way physical objects are handled, moved, stored, realized, supplied and used, by applying concepts from internet data transfer to real-world shipping processes, aiming towards sustainability.

RESEARCH AIM

The aim is to investigate the opportunities of the PI application in the last mile and first mile (reverse) logistics in order to identify new frameworks for developing a Sustainable Supply Chain Management (SSCM) based on the circular economy approach.

METHODOLOGY

The research design adopted for this study is based on three steps: (i) the collection of studies about current PI applications in last-mile and first-mile (reverse) logistics activities; (ii) the network analysis to identify established and emerging research clusters; (iii) a meta-analysis to statistically synthesize existing literature and visualize the research background by combining and assessing the quantitative results of empirical studies.

PRELIMINARY RESULTS

126 documents were extracted from Scopus. Only 90 documents are empirical. 56% are articles and 44% are conference papers. The network analysis allows for the identification of four clusters within the research field. The green cluster refers to transportation and decision making, the red one refers to container and logistics network, the yellow cluster concerns IoT and the blue one regards inventory control and optimization in SC.

CONCLUSIONS

The study offers multiple opportunities to managers who must choose management options for optimizing the integration of last-mile and first-mile logistics in their everyday work. Commodities can be handled and stored through standard, modular and smart boxes, which will enable a shift toward a much more distributed, hyperconnected and efficient logistics system. The results of the conducted analyses serve as a tool for managers to assess the current state of the PI implementation in last-mile and first-mile (reverse) logistics and to identify their future needs so that they may decide whether to invest and improve current physical, digital and operational interconnectivity, thus enhancing their firm SSCM performance.

FUTURE WORK

Since meta-analysis is useful to statistically synthesize existing literature by verifying some hypotheses, it will be carried out to identify areas which need further investigation.