



Research School for Operations  
Management and Logistics

**Towards Physical Internet as a Novel Logistic Paradigm**

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Physical Internet (PI) is an emerging logistic concept that mimics the idea of the Digital Internet that transfers cargoes among decentralised physical nodes. PI is proven to enhance efficiency and sustainability through its broad interconnectivity and standardised and encapsulated containers. However, trust has been crucial to enabling data sharing and thus the routing of the cargo in the novel PI network, and lack of trust hinders the execution of the project justifying PI's value. Therefore, I have been designing a decentralised routing algorithm to effectively find the shortest path on a decentralised multimodal PI network with very low data visibility. The model is built by Agent-based Modelling (ABM), involving stochastic simulation methods like the discrete-time Markov process. As future steps for a PI routing algorithm, mechanisms should be devised to enable flexible en-route reconsolidation of the cargo within containers according to their destination, weight, size, etc. Methods such as clustering algorithms and mixed integer programming are expected to be applied in this stage. Finally, this research will give some business insight into how PI should be designed differing from the other previous logistic schemes.