

THE IMPACT OF FORKLIFT DRIVERS' BEHAVIOR ON WAREHOUSE PERFORMANCE

Prof.dr. R. de Koster, Rotterdam School of Management, Erasmus University

Drs. J. de Vries, Rotterdam School of Management, Erasmus University

Motivation

The importance of managers in maintaining high levels of warehouse performance (quality, productivity, flexibility, safety, sustainability, responsiveness) has been shown before in several studies. However, the impact of shop floor workers, specifically forklift drivers, has not been studied so far. As internal transportation is critical in many warehouses, it can be expected that, in particular for warehouses with a large number of warehouse trucks (order pickers, fork lifts, reach trucks, narrow-aisle trucks, ...) behaviour, i.e. driving style, of warehouse truck drivers has an impact on overall performance.

Warehouse performance is not solely measured by productivity or quality. Sustainability and safety are new, additional, important performance measures. Every year in the Netherlands on average 126 serious accidents and 4 deaths occur where forklifts are involved. When accidents happen production is either interrupted or stopped completely. Hence, safety is important because it has implications for the employees involved and because it has a major impact on cost. Energy consumption of forklifts also impacts operational cost. In addition, the environmental impact of warehouse buildings and operations is a major concern for companies and society. Warehousing activities account for around 40% of total emissions in developed countries and internal transportation are responsible for a substantial part of all energy consumption in warehouses. From road transportation it is known that driving style has a major impact on both energy consumption and road safety. It is therefore straightforward to expect this will also hold within warehouse environments for warehouse truck transport.

Main objective

The main focus of this research is to study the impact of driver's behaviour and attitudes on warehouse performance. Performance is expressed in terms of safety, speed (productivity) and energy emissions.

Research setting

Warehouse truck drivers work in a controlled experimental environment in which they are asked to complete two identical driving tasks. These tasks involve moving full or empty pallets on a predesigned track. Before each task, drivers are instructed to focus on either speed or sustainability in order to study the effect of promoting a certain driving style. The time to complete a task and the energy consumption of lift trucks is recorded by specialized devices. An independent examiner will judge the number of driving mistakes made. Surveys can be used to determine behavioural characteristics of drivers.

Expected results

It is expected that managerial promotion of a sustainable driving style will lead to a reduction in energy consumption of lift trucks, while speed and safety are not harmed. Also, it is expected that driving in a safe manner will not deter the work pace. Moreover, it is anticipated that certain behavioural characteristics of drivers will have a significant influence on performance indicators.

Practical implications

This research has clear practical implications for managers. Companies will learn about the effects of promoting a certain driving style in, for example, training sessions or company cultures. Moreover, in case behavioural traits of drivers are found to have an impact on warehouse performance, the results of this study can potentially aid in the recruitment of personnel in order to improve speed, safety and energy efficiency.

Results

Patricia Bivol – Dutch Internal Transport Championship (NKIT)

The annual Dutch Internal Transport Championship (Nederlands Kampioenschap Intern Transport, NKIT) offered the unique opportunity to investigate the influence of individual characteristics of forklift drivers on various aspects of their driving performance in a controlled environment. The study of Patricia Bivol focused on the influence of personality traits and regulatory focus of the drivers on safety and productivity. Data obtained through an experimental design with 62 participating professional forklift drivers showed that drivers scoring high on relatively agreeableness made more driving mistakes on average, while drivers scoring relatively high on prevention focus made fewer mistakes. Furthermore, instructions focused on productivity proved to relate to a higher number of mistakes as well.

Sepideh Zahrai – Dutch Internal Transport Championship (NKIT)

The study of Sepideh Zahrai also used the context of the Dutch Internal Championship to conduct measurements. This study emphasized the energy use of the fork lift trucks as outcome variable, in addition to safety and productivity. The results suggested that a positive relationship exists between safety and work speed, which contradicts the commonly assumed speed-accuracy trade-off. Furthermore, a higher work speed appeared to relate to lower energy use. The combination of these results indicates that it might be possible to create a situation in which companies can train and trigger drivers to combine productivity with safety and sustainability at the same time.

Angeliki Roussi – Long-term performance measurement at Simon Loos

The study of Angeliki Roussi focused on the same constructs as the other two studies, but investigated the proposed relations in a real operating warehouse during an extended period of time. The number and intensity of impacts was measured during six weeks for a substantial number of forklift drivers, in addition to the energy consumed by the trucks they drove. The study provided interesting but mixed results, with for example prevention focus the forklift drivers leading to safer driving behaviour for forklifts trucks, but not for very narrow aisle (VNA) trucks. The inconclusive results call for more research in a similar context.