

Buying groceries online/offline? What is their environmental impact for Norway before and during COVID-19?

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ABSTRACT

Both city transport and development planning need a well-grounded understanding of purchasing and travel behaviour in the "new normal" the world is experiencing. In fact, grocery purchase is the most frequent and systematic purchase activity any household performs. Its travel implications much depend on which channel is used to perform such an activity. This paper provides insights and support to researchers, city planners and business operators with respect to the environmental sustainability issues grocery channel choice implies. This is performed by comparing the actual situation with the pre-pandemic period in Norway. Stated preferences are used to evaluate market shares for grocery purchase distinguishing between in-store, home delivery and click&pick. The paper provides a comparative diachronic analysis for alternative service configurations with respect to the different purchase channel choice for groceries. It illustrates the transport and environmental consequences due to the impact COVID-19 has had on how people buy their groceries. The results obtained are particularly relevant from a policymaking perspective when deciding which transport and development policies a city should promote and deploy.

Keywords: groceries purchase, urban freight transport, stated preference, latent class, sustainability

1. Introduction

The declaration of COVID-19 as a pandemic in March 2020 by the World Health Organization has led to disruptive and fast changes in several aspects of the population's daily activities (*WHO COVID-19 Pandemic*, 2020). Restrictions on mobility and access to public places were enforced by authorities in most countries, influencing both people's habits and also their travel behaviour. The possible lasting effects of the pandemic with respect to on online shopping and its logistics, is a hotly debated topic whose implications revolve around travel choices within households. These substantial changes in the rules people had to abide with during the pandemic strongly impacted e-commerce that, as data from the EU shows, was nevertheless increasing. In fact, the number of citizens shopping online went from 60% in 2017 to 73% in 2021 (Lone, Harboul and Weltevreden, 2021). This indicates how e-commerce is perceived and how consumers appreciate online shopping. Now the question becomes, how many people will maintain these new travel styles and shopping habits? Therefore, transport planning in cities and the development of sustainable related policies should rest on a deep understanding of travel behaviour in the "new normal" situation during the pandemic period (Zannat *et al.*, 2021). In fact, buying the same product at the neighbourhood store, shopping mall, or online has different implications with respect to carbon emissions (Seebauer *et al.*, 2016) and energy consumption (Pålsson *et al.*, 2017). Consumers' travel behaviour, e-fulfilment system and basket size are key elements influencing the environmental sustainability of e-commerce (Van Loon *et al.*, 2015).

Understanding changes in people's travel behaviour, especially for their essential shopping activities throughout COVID-19, is crucial to properly plan for adequate public policies. More importantly, it is also important to comprehend to what extent these changes will be permanent or temporary. This same question has been addressed by Shamshiripour *et al.*, (2020) who discovered that people are willing to shop online for groceries more frequently even after the end of the pandemic. This indicates the reduction in mobility for this type of shopping compared to the *Pre* COVID-19 period. Furthermore, Sernicola *et al.*, (2020) detect an increase from 18% to 30% of consumers buying groceries online from a pre to a pandemic scenario in a research performed in Italy. These changes do not only influence the number of trips but might also impact other characteristics such as mode, destination, and trip length along with some variations in travel patterns (Bhaduri *et al.*, 2020).

This paper aims at contributing to the literature by, first, understanding the changes in consumers' travel behaviour in a grocery shopping context *Pre* and *During* a pandemic era, using a stated preference (SP) survey in Norway. Secondly, by analysing the impact on the environment attributable to COVID-19-induced changes. These two facets, taken together, will allow policymakers to compare the environmental implications alternative shopping channel choice might have and develop appropriate policy interventions to foster sustainability. Additionally, it provides valuable knowledge to retailers and logistics' operators interested in developing new business strategies accounting for new consumers' preferences. The added value of this paper is the robust comparative analysis between two different time periods adopting the same SP framework in the same country. Keeping methodology the same and samples comparable, the different results obtained can reliably be interpreted as COVID-19-induced due to relatively short time intervening between the two interviews. In addition, the approach of investigating three channel choices (Home Delivery, Click&Pick, In-store) instead of online versus offline only is something still not well approached by literature (Meister *et al.*, 2023; Titiloye *et al.*, 2023; Kvalsvik, 2022).

The paper is organized as follows: next section reports the results of the literature review. Section three illustrates the research methodology and survey details. The fourth section discusses and compares the results of the two investigations performed *Pre* and *During* COVID-19 pandemic. Section 5 highlights the changes in mobility and the impacts on the environment, whereas section sixth provides suggestions to both policymakers aiming at developing strategies in the 'new normal' era, and to private stakeholders interested in developing new strategies. Section seven concludes discussing the limitations of the study and future research endeavours.