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# **SUSTAINABLE LAST MILE**

**LEARNING  
COMMUNITY  
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## PREFACE

Before we start with the whitepaper, we would like to thank the members of our learning community for their time and attention. Every meeting you gave us new insights and it helped us a lot in writing this whitepaper. We would also like to thank our teachers involved who helped us along the way.

For extra information about the whitepaper you can contact [213518@buas.nl](mailto:213518@buas.nl)

# INTRODUCTION TO THE TOPIC

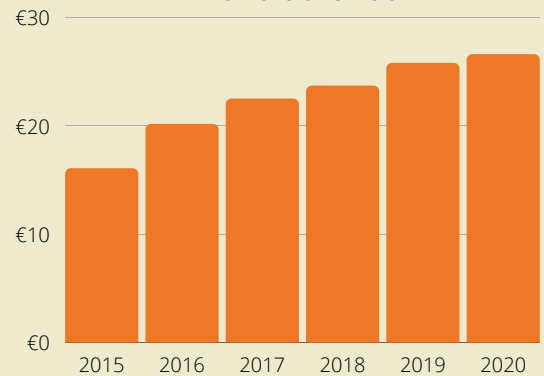
Over the past 15 years, online retailing in the Netherlands has been continuously increasing, leading to 26.6 billion euros total revenue in 2020, as can be seen in graph 1 [1]. This development directly results in more parcel deliveries. One of the biggest negative consequences is the increase in carbon dioxide emissions [2]. Additionally, this process, which is referred to as the last mile accounts on average for 41% of total supply chain costs [3].

However, this development is not in line with the global megatrend of sustainability [4]. Is it the consumers who do not clearly express their wishes or is it the companies that do not know how to influence their customers towards more sustainable solutions for the last mile?

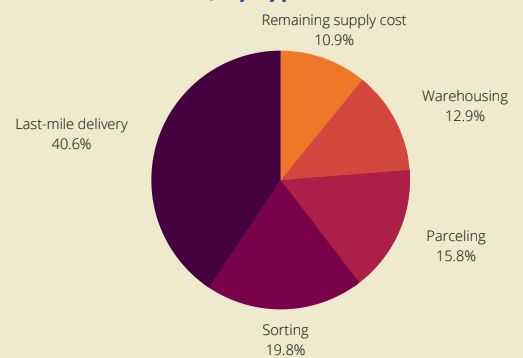
In consideration of these facts, we have made it our task to show e-commerce companies the importance of sustainable delivery. However, to do so, e-commerce companies need to have a better understanding of their customers' situations, preferences, and wishes regarding sustainable delivery options before they can offer these solutions. Therefore, the focus of this whitepaper is on how e-commerce companies can incentivize their customers to choose a more sustainable delivery option by finding out what the customers want.

To know what could incentivize customers to a more sustainable last mile, we need to know what can incentivize customers in general. In 2020, the biggest incentives to buy a product online are free shipment (53%), followed by discounts and coupons (41%) and reviews from other customers (35%) [5]. Graph 3 illustrates that an incentive always must contain something positive for the customer to be effective. In order to make the sustainability of the last mile more appealing, the customer, therefore, needs to benefit from it as well.

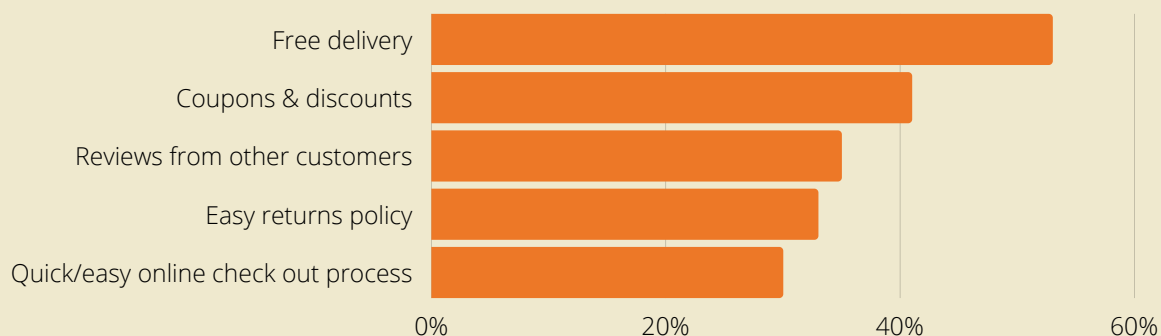
Graph 1: total revenue of e-commerce in NL in billions of euro's



Graph 2: Share of total supply costs, by type of costs



Graph 3: Reasons for shopping online



For companies, the ultimate goal is to find the sweet spot between economic goals and ensuring the sustainability of the company. In this context, the logistics industry faces a huge challenge. The last mile should leave a positive impression on the end customer, but at the same time take the environment into account. However, these two points should not be considered separately, but in a causative manner. To determine this influence, we conducted a study to find out what could influence end customers to make a more sustainable choice for the delivery of their last-mile purchases. In this white paper, the following points are discussed in depth:

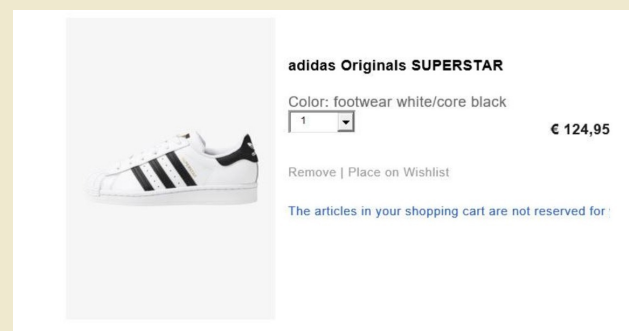
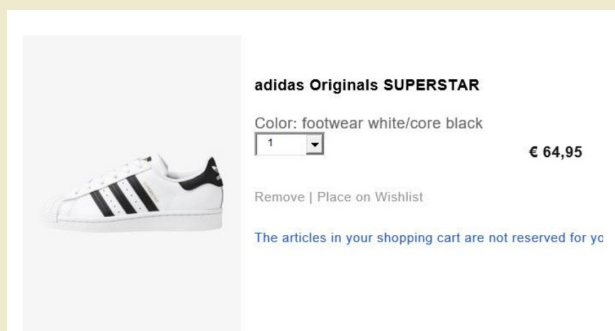
- What do the end customers want
- How can the results be translated into reality
- The possibility for e-commerce companies, to implement the results
- The need for further research

This whitepaper is based on a survey conducted among 3500 first- and second-year students at BUAS (Breda University of Applied Sciences). These students were chosen because the probability is considered very high that they order e-commerce products. Research even shows that the ordering behaviour among higher educated people is the highest of all population groups [6] Of the 3500 students, 164 completed the survey. Since the research was only conducted on this target group, the results should also be interpreted as such.

The first appendix contains more information about the demographic data of the respondents.

When completing the survey, students saw a pair of white sneakers. Some students saw a price of €124.95, while others saw €64.95. The sneakers were chosen because it is an example that most of us can relate to. After seeing the shoe (with the corresponding price), they were asked about their preferred delivery options.

The survey focused on consolidation and pedal-powered bicycles as sustainable last-mile delivery options.

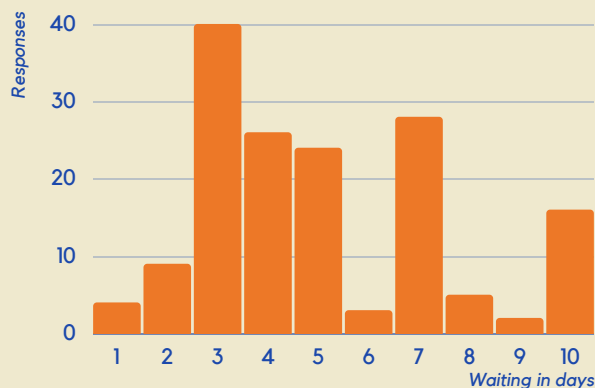


# FINDINGS

## RESULTS OF WAITING TIME FOR A CARBON NEUTRAL DELIVERY

The graphs on the right show how long the respondents are willing to wait for their packages after ordering in order to get them delivered carbon neutral or pedal powered. As can be seen in the graph respondents are willing to wait up to 10 days for their deliveries, but most people were willing to wait for 3 days.

Graph 4: Waiting time for a carbon neutral or pedal power option



## RESULT OF WILLINGNESS TO PAY FOR A CARBON NEUTRAL DELIVERY

The respondents were also asked how much they are willing to pay for their orders when it is ordered with a delivered carbon neutral or with pedal propulsion. The results show that they are willing to pay up to €6 for large parcels and around €2.5 for small parcels.

Large parcels are considered as purchases that you cannot carry yourself (like furniture) and small parcels are the packages you can carry yourself (like a book or clothing)



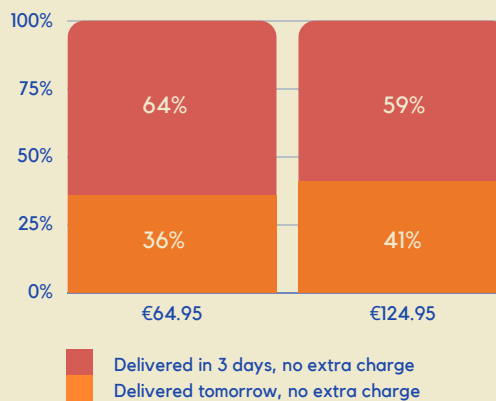
## RESULT OF WILLINGNESS TO PAYING FOR A CARBON NEUTRAL DELIVERY

In the questionnaire, the participants had the choice of whether they wanted their parcel to be delivered within 3 days after ordering or the next day delivery. In this question, both of the options had no extra charge. Graph 5 shows that more participants would wait for the sustainable delivery, even if the unsustainable arrives tomorrow free of charge. The price of the product had only a small effect.

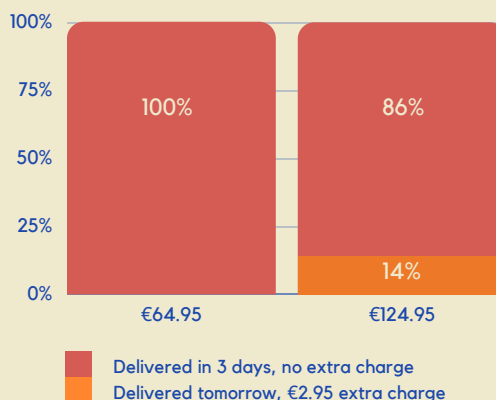
If the respondents had to pay for the non-sustainable delivery, almost all respondents decided in favour of the sustainable delivery. This is shown in graph 6 where the delivery option tomorrow has an extra charge of €2.95 whereas the delivery within 3 days didn't have an extra charge.

This shows that the respondents were sensitive to the sustainability of their delivery but also sensitive to the costs.

Graph 5: Willingness to pay for a carbon neutral delivery



Graph 6: Willingness to pay for a carbon neutral delivery



# FINDINGS

## WHAT DID WE FIND OUT?

Not one customer is the same. The motivation to order a product, the individual wishes, and expectations for service and delivery options are as different from order to order as we are as people. Customers have quickly become accustomed to service quality and maximum flexibility. But now, there is one more item to add to the list: Sustainability.

Sustainability is increasingly demanded in the last mile delivery. The survey showed that respondents clearly expressed their views on the need for sustainable delivery options. But they need to be incentivized to choose a sustainable option. Otherwise, customers still prefer to order free of charge and same or next day delivery, regardless of the product's price. The best way of incentivizing BUAs students are:

- To let them pay for a carbon-neutral delivery. Customers are willing to pay €2.5 extra for small parcels and €6 extra for large parcels if delivered carbon neutral. This can be implemented by changing the checking out system of the e-commerce company the delivery option and prices.
- Give them the option to wait for their carbon-neutral delivery. Most customers are willing to wait four or more days for a carbon-neutral delivery. The implementation is harder than the first one because the supply chain needs to be changed for this setup. Now logistic service providers are not set up for storing parcels.
- Combining paying and waiting to get carbon-neutral deliveries. This can be the most powerful but also the most complex one to implement. Results show that more than 59% of the customers will choose delivery within three days with no extra charge.

According to the respondents, the choice to reduce their own carbon footprint by waiting for the order or paying extra for carbon-neutral delivery seems to be much more important. Furthermore, it becomes even more notable when sustainable delivery is free of charge and comes with longer waiting times compared to faster, more expensive delivery. Therefore, almost all respondents opted for the sustainable solution with waiting time and combined shipping instead of the unsustainable solution with fast delivery and extra payment. This finding may also apply to a bigger customer group for the industry.

After examining the relationship between the stated price of the item and the participant's choice, a strong positive correlation between information provided about the sustainable delivery option and the chosen option was identified. The results further show that participants are always willing to trade time in regard to extra costs for having the e-commerce delivery delivered. The item's price had no significant influence on any of the options chosen.

It is also good for the industry to know that the number of waiting days for customers is becoming less and less significant; could this be the downfall of same-day and next-day delivery?



# ROAD AHEAD

## FINDINGS

Taking the findings of this research into account, one can now look at the future of sustainable e-commerce in the last mile. Incentivizing customers to choose a sustainable delivery option can have several advantages for businesses. First, to mention, it can garner positive publicity for the business, which not only helps to stand out in the competitive market but also helps to establish a larger and more loyal consumer base. Moreover, it can have a positive effect on the costs incurred by the company. That it is possible to incentivize consumers by giving information about the most sustainable option was clearly visible in the results. To ensure the implementation of a sustainable last mile, results show that consumers are either willing to wait for their packages or they are willing to pay a surcharge.

The extent to which willingness to pay a surcharge and willingness to wait affect sustainability in the last mile was not addressed in this white paper. Therefore, it is recommended that further research should be conducted on this.

## RATIONALE BEHIND STUDY

In this study being prepared to wait longer for an order was chosen by default as the more sustainable solution and was compared to next-day delivery. The reasoning behind this is that by waiting, a more optimal route planning can be scheduled which therefore ensures a higher utilization of the delivery vehicles. However, it is debatable whether this will actually be much more sustainable in practice, as delivery companies do not necessarily have the operational layout to execute this.

## IMPLICATIONS FOR TODAY'S INDUSTRY

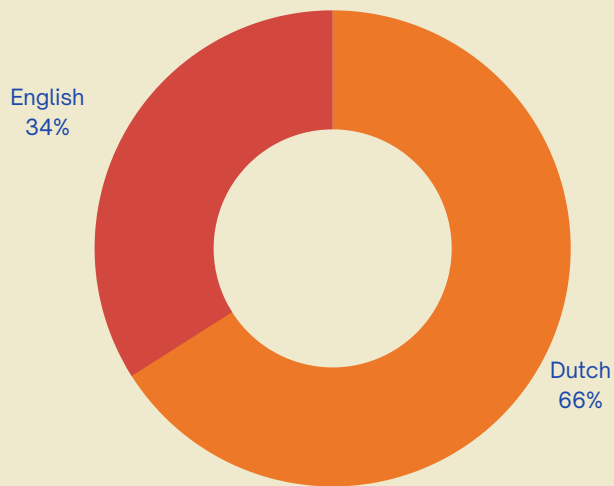
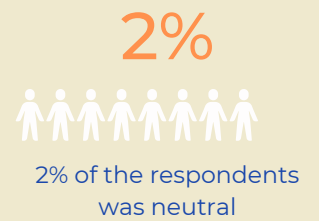
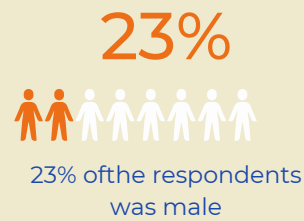
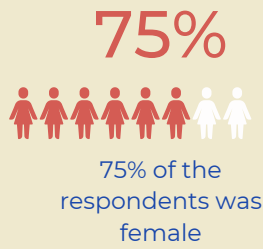
To create incentives that encourage consumers to contribute to a more sustainable last-mile delivery, it is recommended that online retailers should make their customers aware of different sustainable delivery methods. This can be achieved by providing short and simple texts pointing out the sustainable option when asking the customer to specify their preferred delivery location. If consumers increasingly opt for a sustainable option in the last mile, this indicates that transport companies will have to restructure their operations. Accordingly, transport companies are encouraged to look for further solutions that can ensure fast, reliable, and more sustainable delivery options.



# APPENDIX

## DEMOGRAPHIC AND CUSTOMER RELATED RESULTS

These results show that more women than men and neutral participated in the survey. This indicates that more women completed the questionnaire.



In addition, more respondents filled out the questionnaire in Dutch than in English.

Participants rated their satisfaction with the questions about delivery options with an average of 3,954 out of 5 and to cross-check this, they graded the questions with an average of 3,845 when asked to grade the questions in general

