

# Public summary

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While packaging of products is already fully embedded in our way of living, we become more aware of the negative environmental effects it creates. These effects should be reduced and one of the ways to do so is by thinking how to improve the recyclability of product packages. When improving the recyclability, the labelling provides a particular challenge because it often decreases the recyclability of the package. However, labels fulfil many functions that are required within the package design. At the same time, e-commerce is growing which may offer opportunities to improve the recyclability of the package-label combination, due to changing functions of the package and labelling. When combining these two rising topics, it leads to the following research question: "How does new formats of labelling for household cleaning products help with e-commerce specific packaging reducing environmental impacts whilst also being accepted by consumers?"

To discover the opportunities, the focus is narrowed down to liquid laundry detergent as an exemplary role for all the household cleaning product packages. First, grounding research is conducted to understand the product-specific elements that should be taken into account and gather insights in state-of-the art labelling and sustainable packaging.

Secondly, theoretical research is done within the three focus points: e-commerce, brand identity and environment. Where e-commerce gives more possibilities on the promotion of a product, which allows it to rely less on the labelling itself, it also requires more resistance and protection of the package because of the changing distribution chain. Brand identity should be consistent, which will become harder when labelling is changed. To reduce environmental effects, the design should adhere to some guidelines that could improve the recyclability including the use of mono-material and the avoidance of material toxicity. However, following these guidelines could reduce the attractiveness of a package. Therefore, it is important to inform users on the (reduced) environmental effects and create trust to persuade them on still buying it.

Lastly, labelling techniques are analysed on the environmental effects and the applicability for these package types. The most promising techniques include offset printing, laser engraving and prägen (or debossing / embossing). All this information is used to set up functional specification, which are again used to conduct a list of requirements and wishes.

Now that the list of requirements is created, it is transformed into three design concepts using the three most promising labelling techniques, which are assessed based on the set requirements. The concept that uses laser engraving to label the plastic bottle design scores the highest on the requirement assessment, mainly due to the absence of ink and the use of no extra material for the labelling.

This concept is further developed, where the choice is made for UV laser engraving because it's most applicable on plastics. Furthermore, it is recommended to use white or transparent package material because this increases the variety of options for re-use within the recycling process. For the package material, PET is chosen because it is best combined with a cap of PP or PE and it can be transparent which gives the opportunity of colouring the liquid to make it more appealing and contribute to the brand identity.

The graphic design of the label itself will be reduced to only relevant information because it is expected that this extra information is not required for e-commerce and it can decrease the production speed. The laser engraving uses no ink, only naturally giving the marked label elements a dark grey colour. Furthermore, the sustainability will be communicated towards the consumer by mentioning it at the front of the package and adding a QR code for more information.



Also, a roadmap is presented which includes two more designs that compensate for the transparency and the use of colour, which are expected to influence the consumer acceptance. Therefore, the roadmap is used to test on consumer acceptance (together with the optimal design) and can furthermore be used as steps-in-between towards the optimal design.

The testing is done through a survey. The results of the survey show that the optimal design is not directly preferred by the consumer, which is mostly due to three factors; (1) an indication of the smell is missing due to label simplification, (2) the environmental effects are not immediately clear while this could influence the buying behaviour and (3) the absence of colours within the label is a big step for which it would be advised to make multiple smaller steps or convince people on environmental effects of these colours. Within the testing chapter, the new design is also assessed on the requirements which are almost all met.

To conclude, the use of the new design can highly improve the recyclability of the package-label combination and it can be applied on a broader range of product packages. Furthermore, it could be suitable for e-commerce but this would require more research. The consumer acceptance could be improved and therefore more possibilities should be discovered to improve the three factors influencing the acceptance. Once these extra steps are taken, it could be a good start on more recyclable packaging for e-commerce.