

SOLUTIONS OF SUSTAINABLE PACKAGING IN FOOTWEAR AND APPAREL INDUSTRY

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Abstract: Footwear and apparel industry creates large amounts of waste, which cause environmental concerns through all value chain. Therefore, the aim of our research, as systematic review, was to identify, summarize, and evaluate existing sustainable packaging solutions in the apparel and footwear industry. The study followed the principles of a systematic review, research methodology, using a website search; Python programming language libraries were used to develop a web scraper. A sample included apparel and footwear brands that operate internationally around the World. The qualitative analysis method of thematic content clustering was then used to identify, summarize, and evaluate the results. The results have shown that less than half of the brands announced their long-term commitment to switching to sustainable packaging. Less, 84 brand have certificates for all or certain types of their packaging. There are 60 brands that offer reusable packaging services through collaboration with packaging providers. Only 52 of 400 brands have invested in eco-friendly packaging solutions and 32 joined to Responsible Packaging Movement and Ellen McArthur foundation. We found out that most of the brands with the sustainable statements and packaging solutions are from Europe (54.50 %). Others are from North America (28.25 %), Australia (10.10 %) and Asia (3 %). As expected, the clothing categories with the most sustainable packaging solutions are clothing for women and men, less footwear and accessories. The results of our study suggest that sustainable packaging is highly dependent on the social and environmental impacts, as well as the business and supply chain circumstances associated with each product packaging system. Apparel and footwear brands are generally committed to finding better packaging solutions for their products, although innovation in this area is still reluctantly shared.

Key words: packaging material, certificates, packaging solutions, sustainability, circular economy.

1. INTRODUCTION

Synthetic materials such as polyethylene, polypropylene etc. are still the most used packaging materials in fashion industry such as footwear and apparel. With plastic reuse still limited, these materials alone represent a large and rapidly growing segment of municipal solid waste. Although synthetic plastic packaging has several positive properties, such as low cost, light weight, flexibility, transparency, and impermeability, it poses a serious threat to the natural environment.

Until the adoption of sustainable packaging is proven to reduce costs, apparel and footwear retailers lack the business case for purchasing more sustainable packaging, despite the potential to advance their sustainability intentions. Considering that these industries have only relatively recently committed to sustainable packaging, there is still a lack of scientific evaluation of sustainable packaging advances. The apparel and footwear industry produces large amounts of products and therefore also packaging items, which has increased in the pandemic times. As the Global Commitment Report 2020 presented, the average post-consumer recycled content (PCR) for packaged goods and retail signatories increased 22% year-over-year, reaching 6.2% PCR overall for 2019. This increase was contributed to a slight decrease in the total volume of virgin plastic these companies used in their packaging over the same period, down 0.1%. It was also reported, that 65% of packaged goods and retail signatories' plastic packaging was reported as being reusable, recyclable, or compostable — an average increase of around 1 percentage point across signatories reporting in both years (The Global Commitment Report, 2020).

The United Nations Environment Program estimates that 8.3 billion tons of plastic have been produced worldwide since the 1950s, of which about 60% is discarded (Chamas et al., 2020).

When presenting waste hierarchy (Figure 1) in terms of packaging, it is important to prevent and reduce the negative impacts caused by the generation and management of waste and to improve resource efficiency.



Figure 1: The packaging waste hierarchy.

The first urges retailers to consider the nature of the packaging itself and to choose reusable packaging options whenever possible. The second strategy emphasizes the need to consider broader packaging systems and a combined collection, sorting, and recycling infrastructure, rather than thinking solely about how to improve packaging materials or features per se (The Global Commitment Report, 2020). To help retailers implement viable packaging improvement strategies, Glock and Kim (2015) and Vadakkepatt et al. (2021) presented research showing that the use of reusable packaging encourages shoppers to return the material to manufacturers. Similarly, Lapkin, Joyce, and Crittenden (2004) argue that retailers need to encourage their suppliers to reuse manufacturing waste and scrap material to make new products, ultimately reducing the amount of material that ends up in landfills (Lapkin, Joyce & Crittenden, 2004). Nevertheless, there is a lack of academic evaluation of the existing evidence on sustainable packaging in this sector, so there is no clear understanding of what type of "sustainable packaging" is already available. Therefore, the aim of our research was to identify, summarize, and evaluate existing sustainable packaging solutions in the apparel and footwear industry before the pandemic times around the world.

2. METHODS

The research followed the principles of a systematic review research methodology via website searching as described by Stansfield et al. (Stansfield et al., 2016). Because this study focuses exclusively on apparel and footwear brands' sustainable packaging solutions, we evaluated primary sources of relevant information on the brands' official websites and from available sustainability reports for this systematic review.

Namely, the research was performed in stages as presented:

1. Planning the research: outline the study purpose, objectives, and research methodology to reduce the possibility of researcher bias.
2. Executing the research: advanced analytical techniques of textual or data mining were utilized. The web scraper directly accessed the World Wide Web using Hypertext Transfer Protocol (HTTP) and identified the names of 400 brands that use sustainable product packaging in an automated manner. Python's library pulled the brand names, and information from the websites.
3. Screening records for relevance and data management: manual verification of websites, records screening, and data management was performed. To determine the final sample, we strictly followed the protocol and determined the relevance of the primary sources based on the predefined criteria for the selection of the web sources. The quality assessment at this stage

aimed to ensure that only primary sources that provided direct evidence for the research topic were included in further analysis, while all other sources were excluded as inappropriate (exclusion criteria 1 - non-English language websites were excluded; exclusion criteria 2 - all other sources that were not primary or did not relate exclusively to clothing and footwear were excluded).

4. Data analysis: an iterative data analysis, which involved exhaustive, repetitive assessments of all records was done. The qualitative analytical method thematic content clustering was done (Braun & Clarke, 2006). All themes and memos were included in an Excel table to facilitate constant comparisons in the analytical process (Braun & Clarke, 2006; Fingeld - Connett, 2014).
5. Synthesis and results reporting: we synthesized the findings and reported the results. Careful consideration of the research findings resulted in the sustainable packaging framework.

3. RESULTS AND DISCUSSION

The main objectives of this research were to present practical understanding of what kind of sustainable packaging is used in the mentioned sector and to evaluate the existing packaging solutions in the terms of brands around the world.

This study showed that 400 international apparel and footwear brands are committed, to varying degrees, to better packaging solutions for their products. To reduce packaging waste generation, brands are investing in seven different packaging strategies (including rethink, reject, reuse, reduce, reuse, recycle and rot), which we have termed the 7R's framework for sustainable packaging (Figure 2).

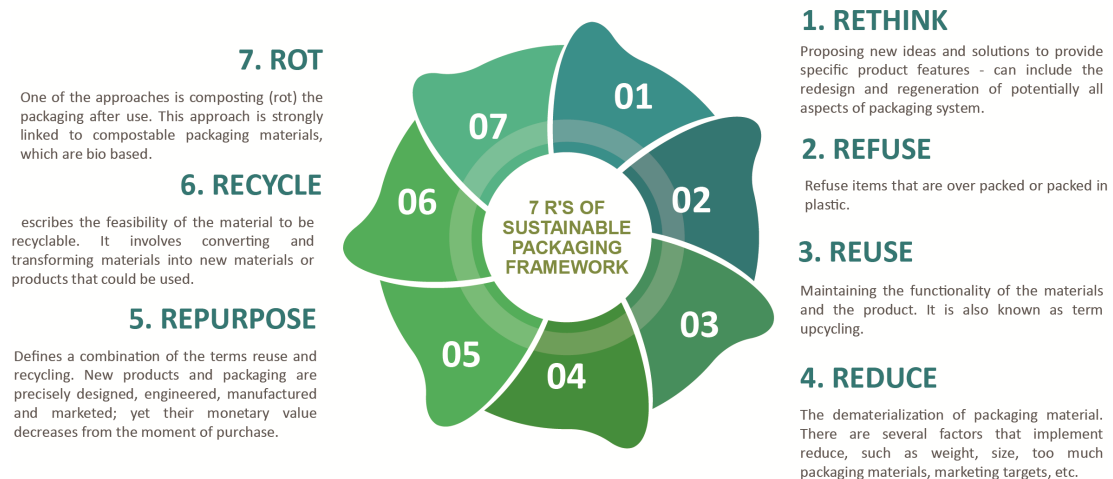


Figure 2: The 7 R's of sustainable packaging framework.

According to sustainable packaging framework presented above, the brands were also ranged to 7 strategies, as presented in figure 3. The packaging framework strategies is detailed presented in our previous published analysis (Jestratijević et al., 2021).

Among analyzed brands, more than a half of brands are using reduce sustainable packaging strategy and only 5 % a repurpose. Brands also offered reusable and recyclable packaging either on their own or through collaboration with third party packaging providers. Namely recyclability was mentioned by 53 % of brands such as packages made from recyclable plastic, paper or textiles. Higher percentage (32 %) of explored brands stopped using conventional plastic, refused to use disposable plastic (polypropylene, polyethylene) bags and are committed to "plastic free-policy". In such cases, consumers are asked to bring their own packaging, since there is no packaging available at the store.

There are other barriers to sustainable packaging that deserve special research attention. For example, new bio-based materials are often touted as better and safer alternatives. However, there is insufficient research to demonstrate the efficacy and functionality of these sustainable packaging alternatives in the apparel and footwear sectors. Moreover, many of the beneficial packaging materials are not yet ready for commercialization, as our findings confirm. Therefore, shortly after their market introduction in the future, it will be important to investigate their benefits and trade-offs.

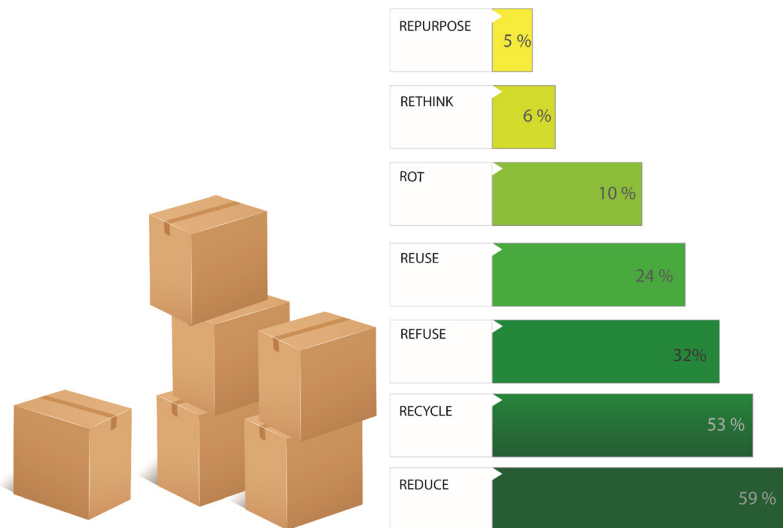


Figure 3: Percentage of footwear and apparel brands that use one of the 7 R's packaging solutions.

According to our research, the results have shown that footwear and apparel brands are involved also in sustainable packaging strategies such as The plastic global commitment, Noissue eco packaging alliance, One tree planted, The responsible packaging movement and Re:Pack. Namely, there are 60 brands that offer reusable packaging service such as Re:Pack (Figure 4). 8% (N=32) of brands have joined the Responsible Packaging Movement and/or the Ellen McArthur Foundation to rethink current packaging solutions and create circular solutions for plastic waste. These brands reject the use of single-use plastic bags in their stores and have already adopted paper-based packaging alternatives. 15% of brands offer reusable packaging in partnership with third-party suppliers. For example, brands frequently partner with Re-pack and Noissue Eco Packaging Alliance, each of which offers reusable and recycled or compostable packaging for e-commerce. In addition, 21% of brands reduce the negative impacts of their packaging by improving the quality and recyclability of packaging components by accepting legitimate third-party certifications for all packaging or, more often, for its components (e.g., GRS, GOTS, FSC). For most of these brands, packaging is fully recyclable, while in some cases packaging can be reused (e.g., reusable organic fabric packaging can be used as gift bags or scarves). Nevertheless, some of the brands invest in eco-friendly packaging solutions, replacing conventional plastic materials with biodegradable and compostable alternatives (e.g., compostable TIPA packaging, plant-based packaging). Finally, 43% of brands advertise their long-term commitment to transitioning to sustainable packaging, admitting that they are either testing sustainable prototypes at the moment or do not yet have improved packaging solutions.



Figure 4: Number of brands with included sustainable packaging strategies.

The distribution of the brands with the sustainable packaging solutions, green certificates and strategies around the world are presented in Figure 5. As seen, most of the brands, that include solutions with sustainable packaging are from Europe (54.5 %), after that North America (28.3 %) and less other countries around the world.

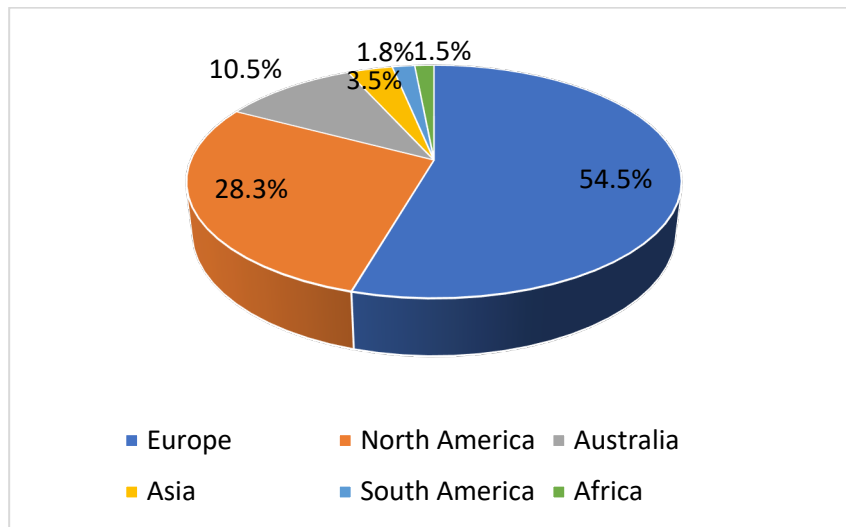


Figure 5: The distribution of analyzed footwear and apparel brands that include sustainable packaging solutions around the world.

5. CONCLUSIONS

Retailers can use framework to establish new or revised criteria for advancing sustainable packaging solutions. Depending on the type of products companies offer, some changes may be easier to test and implement than others. Therefore, the 7Rs approach is as a step-by-step path to sustainable packaging that is mutually inclusive and includes complementary approaches. This collection of the data was performed from November 2020 till January 2021, therefore any changes in sustainable packaging solutions, that were made after that time, were not collected. This research found that among the 400 brands analyzed, unique complexities were found in the packaging systems available. These complexities forced retailers to consider different sustainable packaging solutions and logistical approaches that are key to improving the overall packaging of the brand.

This study represents an important achievement for sustainable packaging in the footwear and apparel industry.

7. REFERENCES

Braun, V. & Clarke, V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology*. 3 (2), 77-101. Available form: doi: 10.1191/1478088706qp063oa

Chamas, A., Moon, H., Zheng, J., Qiu, Y., Tabassum, T., Jang, J. H., Mahdi A-O., Scott, S. & Suh, S. (2020) Degradation rates of plastics in the environment. *ACS Sustainable Chemistry & Engineering*. 8 (9), 3494-3511. Available form: doi: 10.1021/acssuschemeng.9b06635

Ellen Macarthur Foundation (2020) *Global Commitment Report*. Available from: <https://ellenmacarthurfoundation.org/global-commitment/overview> [Accessed 10th of August 2022].

Finfgeld-Connett, D. (2014) Use of content analysis to conduct knowledge-building and theory-generating qualitative systematic reviews. *Qualitative Research*. 14 (3), 341-352. Available form: doi: 10.1177/1468794113481790

- Glock, C. H. & Kim, T. (2015) A joint economic lot size model with returnable transport items. *International Journal of Integrated Supply Management*. 9 (3), 202-224. Available form: doi: 10.1504/IJISM.2015.068105
- Jestratijevic, I., Maystorovich, I. & Vrabič-Brodnjak, U. (2021) The 7 Rs sustainable packaging framework: Systematic review of sustainable packaging solutions in the apparel and footwear industry. *Sustainable Production and Consumption*. 30, 331 - 340. Available form: doi: 10.1016/j.spc.2021.12.013
- Lapkin, A., Joyce, L. & Crittenden, B. (2004) Framework for evaluating the “greenness” of chemical processes: case studies for a novel VOC recovery technology. *Environmental science & technology*. 38 (21), 5815-5823. Available form: doi: 10.1021/es035414h
- Stansfield, C., Dickson, K. & Bangpan, M. (2016) Exploring issues in the conduct of website searching and other online sources for systematic reviews: how can we be systematic? *Systematic Reviews*. 5 (1), 191. Available form: doi: 10.1186/s13643-016-0371-9
- Vadakkepatt, G. G., Winterich, K. P., Mittal, V., Zinn, W., Beitelspacher, L., Aloysius, J., Ginger, J. & Reilman, J. (2021) Sustainable retailing. *Journal of Retailing*. 97 (1), 62-80. Available form: doi: 10.1016/j.jretai.2020.10.008



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