## Environmental labels in e-commerce

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# Environmental labels in e-commerce

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**Abstract**

Increasing share of e-commerce in the sale of consumer goods has prompted considerations regarding the environmental aspects of these transactions. The selection and purchase process resulting from the specificity of shopping through websites and phone applications differs significantly from the one that takes place in traditional trade. Among other things, it is worth emphasizing the limitations in becoming acquainted with the product, its packaging and accompanying information. Various efforts that have been made so far in terms of forming the principles of ecolabelling and eco-merchandising seem to be of little use in online commerce. In view of these challenges, the aim of the study was to analyze the presence of environmental product labelling systems in selected countries, focusing on how they could support the promotion of products with a reduced environmental impact through e-commerce. The research question was to determine how diverse are the environmental labelling systems that can be used in e-commerce?

The online desk research method was used to achieve the aim of the study and to answer the research question. The conducted analysis has shown a particularly broad range of environmental labelling systems already present on the markets worldwide. Most ecolabels are found in the USA and Canada. The most popular groups of products that are subject to ecological certification include: food, building products and textiles. The research has revealed several ecolabelling systems that can be used in e-commerce to promote products with a reduced environmental impact. This wide range, however, may lead to blurred recognition of ecolabels in e-commerce, but on the other hand, it may also result in a better adjustment of the assessment criteria to the specificity of various consumer products.

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## 1. Introduction

The constantly growing trend of online sales in the 21st century commerce means that this channel is gradually gaining an increasing share in the sale of products to final consumers. Moreover, the favorable conditions have been visibly strengthened by the effects of the Covid-19 pandemic and the resulting lockdown [1]. Consequently, the development of information and communication technologies (ICT) and their impact on trade are now of keen interest to many researchers, especially in the field of online shopping. The results of various studies have indicated that changes in consumer behavior in digital settings are currently observable and that there are also many differences in consumer strategies applied compared to traditional trade [2]. The studies concerning e-commerce mostly focus on the differences in making purchases due to: purchase costs, purchase time, delivery costs, delivery time, waiting time and risk [3], [4], [5]. So far, the topic of buying eco-products in online stores has been very rarely addressed, and especially, very few studies have focused on the role of environmental labels in these purchases [6].

The protection of the environment is one of the key challenges facing humanity; particularly, its progressive degradation is now becoming an alarming problem. Its causes are generally linked to the industrial revolution and significant demographic growth as well as high demand for luxury goods [7]. Therefore, it can be easily assumed that every activity that can help achieve the balance between environmental protection and development is worth analyzing. The aim of this study was to analyze the environmental labelling schemes available in selected countries, which could support the promotion of products with reduced environmental impact and sold through the means of e-commerce.

## 2. The development of e-commerce

The emergence of the global Internet and the development, popularization, and growing availability of communication technologies have profoundly changed the behavior of both companies and consumers [8]. The ever-lower costs of purchasing goods and of using Internet technologies have allowed for the rapid development of various forms of communication and trade, of which websites and mobile applications are now the most common [9]. The available literature and research results have clearly shown the significant impact of these tools on the productivity increase of enterprises [10]. Figure 1 presents data regarding e-commerce, coming from Eurostat sources [11], which indicate that online sales are becoming an increasingly popular trading channel. Particularly, Alaimo et al. 2020 [12] suggest that most frequently respondents with higher education have a more positive attitude to online shopping and are the ones who more often choose an online alternative when doing their grocery shopping.
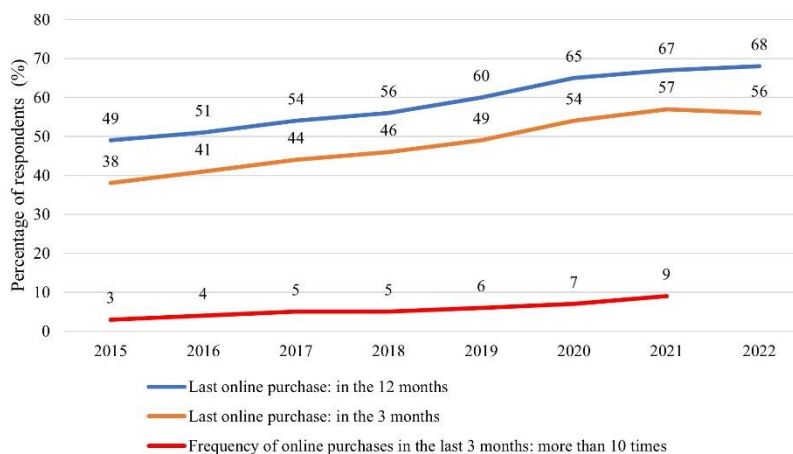


Fig. 1. Frequency of online purchases, data concerning EU-27 countries.
Note: no data for Frequency of online purchases in the last 3 months: more than 10 times, for 2022.
Source: own elaboration based on [11]

The Internet and its growing accessibility have led to the creation of several new channels for the e-commerce industry, offering more convenience and greater availability for the consumers. The marketing activities such as search engine ads, banner ads and social media ads have further increased the potential of e-commerce [13]. This, in turn, has contributed to some of the online retail platforms such as Tmall, eBay and other third-party marketplaces hosted by Amazon or Walmart collectively accounting for 2/3 of global online retail sales and their becoming key online sales channels for many businesses [14]. Having already used many platforms, customers start to actively search for products they like and make purchases on various shopping platforms, which additionally favors this channel of trade and leads to its development [15]. Online shopping is now a common and popular activity all over the world [16]. In 2022, e-commerce retail sales worldwide amounted to 5.72 trillion dollars and by 2026 this figure is expected to increase to 8.15 trillion dollars [17]

Such rapid growth of the e-commerce industry in recent years has encouraged researchers from various fields - including those focusing on information systems, consumer behavior and purchase decision-making - to examine consumer intentions and attitudes towards e-commerce applications [18]. Research shows that in this large and constantly developing market, consumers very often make spontaneous, unplanned, and not entirely well-thought-out purchases [19]. In the literature, this phenomenon is referred to as online impulsive buying [20]. Such behaviors can put a significant burden on the natural environment. What is more, the lack of accompanying environmental information may not even trigger sustainability considerations among impulsive consumers. For example, difficulties in finding specific items of organic food were shown by Shahmir et al. [21], who studied the limitations of e-commerce on the example of grocery shops. Guidelines for proper food labelling in trade have also been included in the Centers for Disease Control and Prevention (CDC) guide Healthier Food Retail: An Action Guide for Public Health Practioners [22].

The lack of appropriate education, awareness and knowledge of consumers means that they often unwittingly contribute to the degradation of nature and environmental resources. A partial solution to this problem may be to introduce an eco-labelling system that informs consumers about the environmental impact of the products they buy when they shop online.

## 3. Environmental labels in online communication

In the functioning of the market of eco-friendly products, the extent and reliability of communication are the key factors that affect the effectiveness of sales in this segment [23]. The growing importance of increasing the share of sale and consumption of products with a low environmental impact is reflected in the UN Sustainable Development Goals. The one of them calls for ensuring sustainable consumption and production patterns. In this context, the development of digital technologies and e-commerce should make it easier for consumers to change their consumption patterns towards more sustainable products [24]. However, it must be admitted that despite the observed increase in the number of available smart technologies, mobile applications, QR codes, websites and content in social media, their presence does not significantly translate into improved consumer awareness and pro-environmental decisions during purchases. One of the reasons for this situation may be insufficient promotion and distinction of eco-friendly products in e-commerce. In the realities of trade, this role is generally assigned to ecolabels.

Ecolabel is an environmental statement which indicates that a product fulfils the criteria of an ecolabelling program [25]. They are an important tool in the organization's environmental communication, which is defined as the process that an organization conducts to provide and obtain information, and to engage in dialogue with internal and external interested parties to encourage a shared understanding on environmental issues, aspects, and performance [26].

According to the ISO 14063 standard, websites and environmental labels are classified as means of written communication. Therefore, they should be characterized by: transparency, appropriateness, credibility, clarity, regionality [26]. Quality of life, sustainability, well-being, social inclusion, and community cohesion are just a few of the benefits represented by environmental labelling schemes. Environmental science is now attempting to integrate them into a system of codes that would be easier to understand, enabling successful communication also through the currently used digital methods [27].

## 4. Research methods

For the purposes of the study, the desk research method was used, which is based on collecting data from existing resources. The focus was on conducting online desk research, i.e., using resources available on the Internet. The ecolabel index [28] database of environmental labels has been identified as the main source of information. It is the world's largest database of environmental labels. Its impact on science is confirmed by very frequent citations in scientific papers and many researchers refer to the information contained therein. In 2021 alone, the ecolabel index citations were included in the papers by e.g.: Autzen et al. [29], Khachatryan et al. [30], Riskos et al. [31]. The desk research study included a systematic analysis of environmental labels in terms of: the industry in which they operate and the country. Each of the researchers got acquainted with the database and in the course of the analysis, labels were assigned to individual industries in accordance with their possible and typical use and the country in which they generally occur. It is worth noting that some of the environmental labels have a scope of application that goes beyond one industry and in this case, they were assigned to each of the possible industries. A similar situation concerned countries where labels were used. The study used descriptive statistics and charts based on the features and capabilities of Excel 2016.

## 5. Research results

In the first stage of the analysis, the number of currently used environmental labelling systems in individual countries was assessed. As the ecolabel index portal declares, labels from 199 countries are presented in the database. Figure 3 provides the data for the countries with the largest number of ecolabels with the USA leading the field. Second on the list, Canada, can boast almost 50% fewer ecolabels than their neighbor. Considered the most developed economy in the world, such a significant presence of ecolabels in the US should not be surprising. The diversification of industries, agriculture and services observed in this country with a relatively large population positively affects the promotion of eco-friendly products through various certification systems. The list presented in Fig. 2 also includes small and less populous countries, such as Switzerland, the Netherlands or Belgium. This is certainly a reflection of the environmental awareness of the inhabitants of these countries, which is manifested by a significant interest in products with ecolabels.
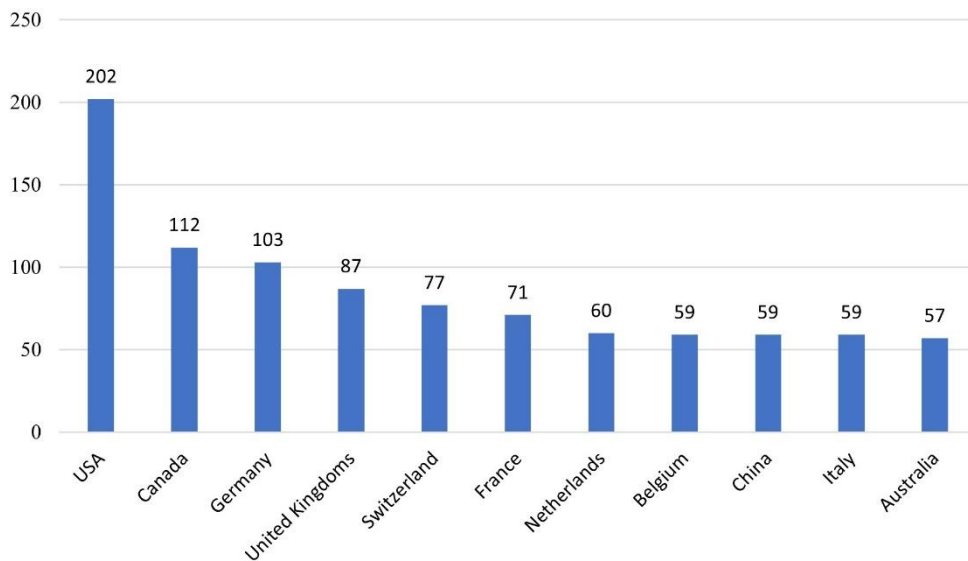


Fig. 2. Number of eco-labelling schemes by country.
Source: own elaboration based on [28]

In the next stage of the study, the fields of economy and industry using the ecolabels were analyzed. The obtained data is presented in Fig. 3 in the form of a tree map chart. Thanks to the use of this visualization method, it was possible to graphically present the proportions between the examined categories. By far, the most popular category, with the largest number of ecolabels, is the food industry. About 11% of the eco-labelling systems in the database are related to it, followed by the building products and textiles. The overall results of assigning labels to individual industries are presented in Fig. 3. It is worth noting that the analysis of the areas of the economy to which ecolabels apply shows that these are mainly products addressed to final consumers. This is a positive tendency, and it is in fact conducive to the presentation of eco-friendly products in online trade, which is mainly addressed to individual customers.
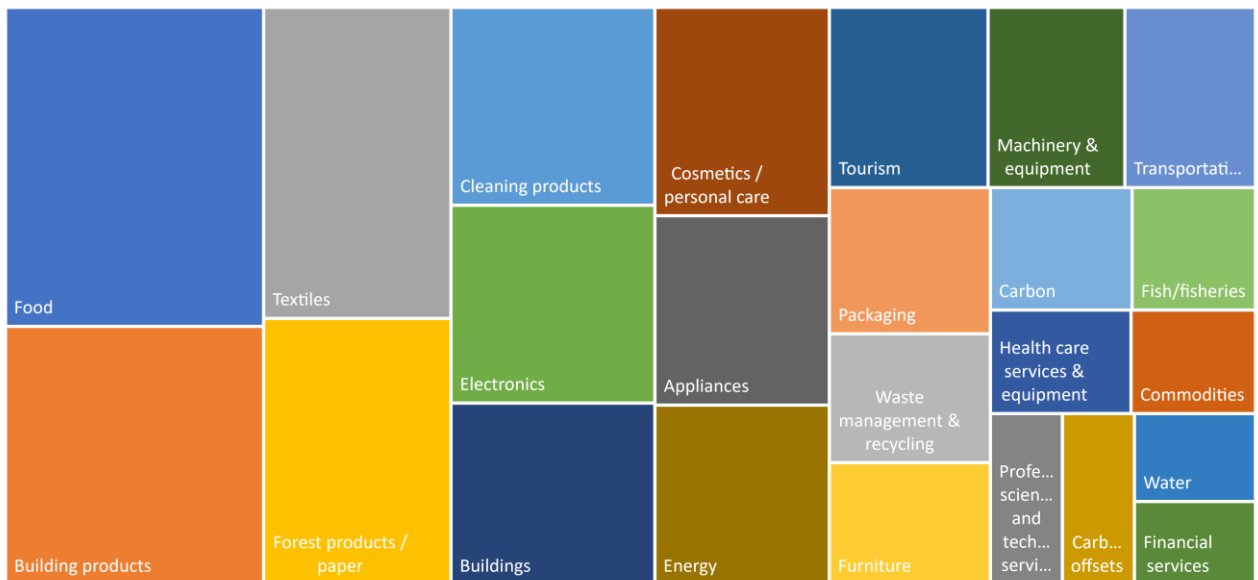


Fig 3. Industries in which ecolabels currently operate.
Note: Food 11%, Building products 9%, Textiles 8%, Forest products / paper 7%, Cleaning products 6%, Electronics 6%, Buildings 5%, Cosmetics /personal care 5%, Appliances 5%, Energy 4%, Tourism 4%, Machinery & equipment 3%, Transportation 3%, Packaging 3%, Waste management & recycling 3%, Furniture 3%, Carbon 2%, Fish/fisheries 2%, Health care services & equipment 2%, Commodities 2%, Professional, scientific and technical services 2%, Carbon offsets 2%, Water 1%, Financial services 1%.
Source: own elaboration based on [28]

In the final stage of the study, the scope was narrowed down to the environmental labels used in the EU countries. Such decision was made due to the large number of countries included in the ecolabel index database and the impossibility of presenting all data in a satisfactory manner. Moreover, the EU countries are economically, and technically developed and online trade is very popular there, as shown in the introductory part of the study. More detailed data including precise values and structure indicators are presented in Table 1. Clearly, Germany is the country with the largest number of environmental labelling systems in the European Union. Among the countries with the most significant number of ecolabels are large and populated countries such as France or Italy, but also smaller countries such as the Netherlands and Belgium. The top ten countries on the list belong to the so-called "old" EU states. They are the founding members of the community or its participants for at least several dozen years.

Table 1. Data regarding ecolabels in the EU countries.

| Lp. | Country | No. of ecolabels (n) | Structure indicator (%) |
|-----|---------|---------------------|------------------------|
| 1 | Germany | 103 | 11% |
| 2 | France | 71 | 7% |
| 3 | Netherlands | 60 | 6% |
| 4 | Belgium | 59 | 6% |
| 5 | Italy | 59 | 6% |
| 6 | Sweden | 55 | 6% |
| 7 | Spain | 54 | 6% |
| 8 | Austria | 53 | 5% |
| 9 | Denmark | 49 | 5% |
| 10 | Poland | 39 | 4% |
| 11 | Finland | 38 | 4% |
| 12 | Portugal | 37 | 4% |
| 13 | Ireland | 33 | 3% |
| 14 | Czech Republic | 28 | 3% |
| 15 | Greece | 24 | 2% |
| 16 | Romania | 24 | 2% |
| 17 | Luxembourg | 23 | 2% |
| 18 | Bulgaria | 20 | 2% |
| 19 | Estonia | 19 | 2% |
| 20 | Slovenia | 19 | 2% |
| 21 | Hungary | 17 | 2% |
| 22 | Lithuania | 16 | 2% |
| 23 | Slovakia | 16 | 2% |
| 24 | Croatia | 15 | 2% |
| 25 | Latvia | 15 | 2% |
| 26 | Cyprus | 13 | 1% |
| 27 | Malta | 11 | 1% |

Source: own elaboration based on [28]

The methods of descriptive statistics allow for the calculation of several characteristics regarding the occurrence of ecolabels in the EU and their analysis. The average number of ecolabels available on the market in the EU countries is about 36 (35.93) – and they can be found on products with a reduced environmental impact. This value deviates for the tested sample by, on average, 22.41 ecolabels. The coefficient of variation for the EU countries is 62%. The median reveals that in half of the analyzed countries the number of used ecolabel systems is lower than 28, and in the remaining 50% of the countries it is above 28. The range is 92. The kurtosis defining the concentration of the obtained results, is 1.38, which indicates that the number of outliers is greater than in the case of normal distribution. A positive skewness value (1.16) confirms that the distribution of the number of existing environmental labelling schemes is right-skewed. These data clearly show that the diversity of the number of environmental labelling schemes in the EU

countries is quite broad. The histogram showing the graphical distribution of the number of systems available in the EU countries is presented in Fig. 4.
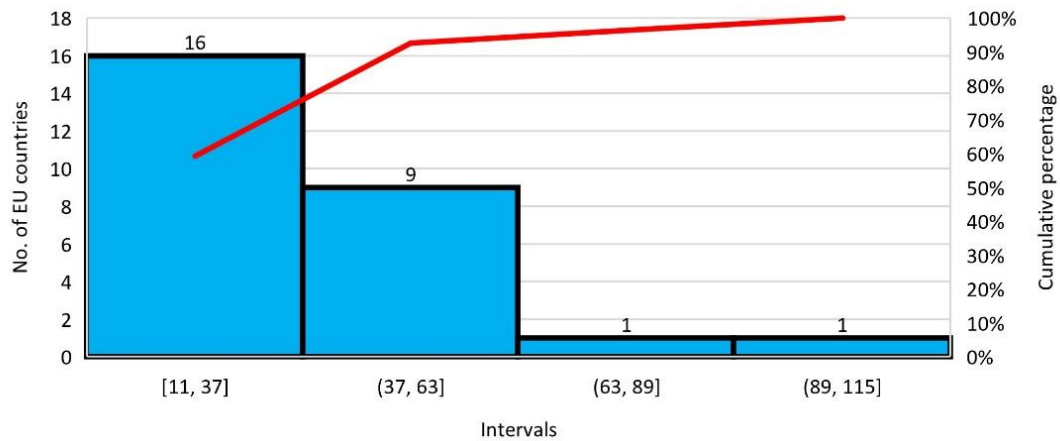


Fig. 4. Empirical distribution of the number of environmental labelling systems available in the EU countries.
Source: own elaboration based on [28]

The presented distribution deviates from the parameters of the normal distribution. Visually, it is more similar to the exponential distribution. Perhaps the construction of the histogram for all countries (199) included in the ecolabel index database would be closer to the normal distribution. The widest range refers to the countries with the number of labelling systems from 11 to 37. More than 60% of the EU countries can be found in it.

## 6. Conclusions

The analysis of environmental labelling systems that can support the sale of products with a reduced environmental impact in online trade has shown that there is a large number and variety of available schemes. The country with the largest number of ecolabels is the USA with over 200 different systems present on the market. In Europe and the EU states, the leader of this ranking is Germany with 103 ecolabels. A more in-depth analysis of the EU countries to which the study was narrowed shows that the availability of environmental labelling systems is characterized by considerable diversity. This is evidenced by descriptive statistics such as standard deviation and coefficient of variation. In a sense, this is due to the general diversity of Europe and the slow social and economic integration that generally takes longer than formal integration. In the presented analysis, it can be noticed that the long-standing EU member states have a more extensive range of environmental labelling systems available on the market. This, in turn, suggests a certain correlation with the observed pro-environmental behavior of consumers from these states, their greater ecological awareness and well-developed e-commerce industry. The categories of products for which the greatest number of ecolabels has been developed so far are: food, building products and textiles. These products are examples of consumer goods that are also frequently sold online. Changes in consumer habits caused by e.g., the Covid-19 pandemic resulted in an increase in product sales using online channels. This poses great challenges for sellers and producers to be able to effectively promote pro-ecological products also through e-commerce. The research carried out as part of this study shows that there is a very wide and developed environmental labelling system that can be used for such purposes. Undoubtedly, ecolabels are a great tool in communication on the online market and if used appropriately, they will fulfill their role very well. Indeed, there is a great number of ecolabels that can answer these needs. There may, of course, be some doubts as to whether the number of ecolabels is not too large, thus causing confusion among

consumers. Too many different ecolabels used on the market may negatively affect their recognition, also facilitating so-called greenwashing [32]. On the other hand, the advantages of a large number of ecolabelling systems are their better adaptation to the ever-wider range of products offered in e-commerce, increasing the diversity of ecological information at hand [33].

The limitation of this study is the fact that the analysis was based on a single database containing ecolabel information. It should be assumed that the actual number of labels used in e-commerce may be higher. Future research should primarily concentrate on further analysis of the ecolabelling systems that could be used in e-commerce to popularize the concept and support social awareness. E-commerce venues are often an international undertaking, so it is important to unify the systems and promote them on new markets. Observation of consumers' purchasing practices shows that the strategies typically used are difficult to change because they are combined with routine and fixed behaviors [34]. However, regardless of this, all possible actions should be taken to make consumer behavior more sustainable. In addition to the idea of labelling products in e-commerce with ecolabels, other methods of promoting sustainable shopping, such as celebrity endorsement, may also prove effective [35].

## Acknowledgements

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