



# Eye Tracker Experiment Buying Decision-Making Process with a Focus on Sustainable Consumption - Case Study

Boglárka Eisinger Balassa\*, Réka Koteczki

Széchenyi István University, Hungary, 1. Egyetem tér, Győr 9026  
eisingerne@ga.sze.hu

Today's environmentally damaging activities pose global challenges for companies, environmentalists and governments alike, but these activities are also reflected at the level of the individual. The aim of the study is to investigate the decision-making processes of Hungarian consumers regarding sustainable products and to validate the eye-trackers methodology to measure this. Two groups (n=10), one educated on sustainable products and one without prior education, were observed using Tobii Glasses 3 eye trackers while purchasing sustainable items in a local supermarket. The research uses a mixed-methods approach combining qualitative and quantitative methods. Participants completed pre-shopping questionnaires to gauge their attitudes toward ecologically responsible consumption. Post-shopping interviews provided insights into their decision-making processes. As a result of the research, Hungarian consumers are not aware of sustainable products overall, and based on the interviews, they only buy a small proportion of them. Members of the experimental group (5.03 min) were much quicker to find sustainable products than members of the control group (8.03 min). Logos suggesting sustainability are misleading to consumers, and they are most easily able to identify sustainable packaging labels. Based on our conclusions, to encourage consumers to consume sustainably, the first step is to clarify what sustainable consumption and sustainable products mean. These labels should be prominently displayed on product packaging so that consumers can find them as soon as possible.

## 1. Introduction

Global consumption is growing and is expected to continue to grow in the future (Proi et al., 2023). The circular economy is important in the context of food, as it is an economic model that aims to maximise the usability, renewal, and value of different products, components, and materials (Guo et al., 2021). It is conceivable that in the future, the economy will take a back seat, and more attention will have to be paid to sustainability (Nordahl, 2021). Information tools to promote awareness and environmentally friendly practices include certifications, eco-labels and corresponding awards (Budeanu, 2007). Sustainable certification of products or services is based on the verification of responsible authorities, and these labels help consumers identify sustainable alternatives (Penz et al., 2017). The definition of sustainable consumption is not standardised currently. Quoquab and Mohammad collected and analysed 362 articles on sustainable consumption. In their study, they have created a definition of sustainable consumption: "Sustainable consumption refers to the continued act of controlling desire by avoiding extravagant purchases and rationalised use of goods and services that satisfy the basic needs. It concerns the quality of life over material standards of living, suggests satisfying basic human needs, demonstrates care for protecting and preserving the natural resources and keeping the natural resources useful for future generations" p.311 (Quoquab and Mohammad, 2020). Ideally, consumers would weigh all information and make an informed decision, but this is not the case in reality. Through the influence of certain heuristic processes, consumers do not integrate all information communicated on products. For this reason, a number of factors may be essential for sustainability-related labels to help consumers perceive this information (Waechter et al., 2015).

Within the field of sustainable consumption, eye-tracking research has been carried out in a number of cases. Proi et al. (2023) studied the eye-tracking of sixty-one consumers of smoked salmon and sea bass with eco-labels and found that label size and visibility can greatly influence visual attention. Penz et al. (2017) investigated

sustainable consumption in the tourism sector using eye movement tracking. The results of the research showed that participants' knowledge of labels and their values about sustainable behaviour influenced their preferences (Penz et al., 2017). In the tourism sector, eye-tracking methodology has been studied in the wellness tourism sector (Wang et al., 2021). Consumer purchasing decisions are critical to the successful achievement of energy efficiency targets. Waechter et al. (2015) used an eye-tracker to investigate the importance of energy labels, which showed that energy labels generally direct attention towards energy information, but the impact of energy labels on consumers' product choices is low. Takahashi et al. (2018) applied an eye-tracking method to investigate how different labels for coffee result in different visual attention.

Prior eye-tracking research has been conducted within the field of sustainable consumption, such as studies on eco-labels in the aquaculture and tourism sectors. However, the specific research gap addressed by this paper is likely related to the focus on Hungarian consumers, the use of education as a differentiating factor, and the examination of various product categories in a local supermarket. These elements combine to create a unique context for studying sustainable consumption decision-making processes, and the results provide insights that can contribute to the broader body of knowledge on this topic.

The aim of the study is to investigate sustainable consumption patterns among Hungarian consumers with an eye-tracking methodology, specifically focusing on their awareness of sustainable products and purchasing decisions. As we could not find any example in the literature where this type of research has been conducted in a supermarket environment, we aim to validate and develop the eye-tracker methodology in this setting. In the following part of the paper, the methods used to collect data from the eye-tracker experiment, the questionnaire and the interviews are described, and the results are presented. Conclusions are drawn on the attitudes of Hungarian consumers towards sustainable products and how the eye-tracker methodology can be improved. Finally, we make practical recommendations for policymakers and businesses.

## 2. Materials and Methods

As this paper presents a case study, the experiment was therefore conducted with a small number of participants. Once the methodology has been validated, the experiment could be carried out on a larger sample. The current research uses a mixed-methods approach combining qualitative and quantitative methods. Following the eye-tracker experiment, participants completed a questionnaire, and interviews were conducted. Figure 1 shows the process of the eye-tracking experiment, including data collection and data analysis.

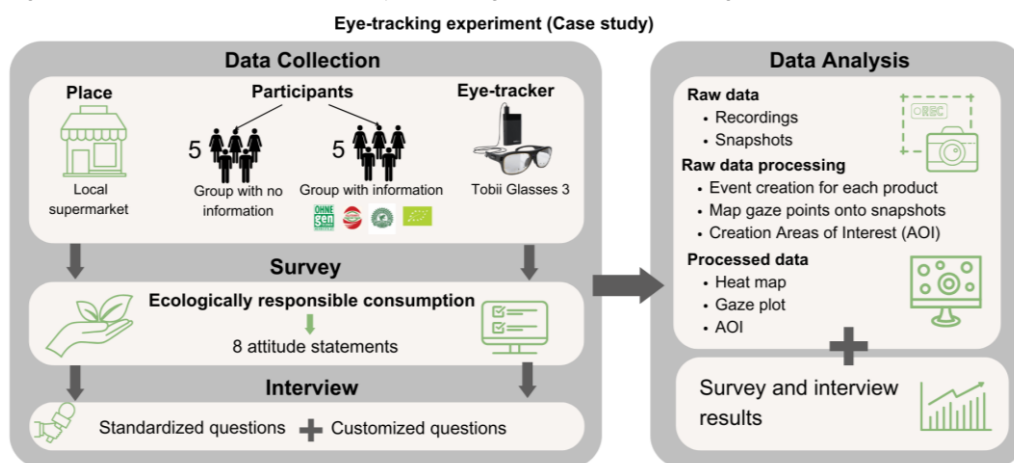


Figure 1: The process of the eye-tracking experiment

### 2.1 Data collection and experiment procedure

The experiment was conducted in a local supermarket, and participants had to choose one product from 5 product categories (1. milk, 2. egg, 3. chocolate, 4. soft drink, 5. coffee). These categories were chosen for the experiment because the preliminary survey in the local supermarket showed that these product categories have the highest number of sustainability labels on the products. Prior to the start of the research, sustainable labels were collected in the product categories under study, and these logos were shown to the experimental group. Sustainable labels were those that either had sustainable packaging, were sustainably grown, had a sustainable production process, or had not been in contact with genetically modified food. Participants were instructed to choose one sustainable product from each of the identified product categories. A total of 10 participants took part in the experiment. The control group (CG) was only instructed to choose one sustainable product from each

of the defined product categories. The experimental group (EG) was educated about the eco and sustainability labels prior to purchase. The Tobii Glasses 3 was used in the study, and the recording was done using a mobile phone and the Glasses 3 app. Before the experiment, the glasses were calibrated for each participant using a calibration card. After calibration of the glasses, participants were given 10 min to select 5 products. No additional information was provided in-store. The aim was to follow the natural purchase process. After each experiment, snapshots were taken of the products on the store shelves and the products selected. With the help of the snapshots, it is possible to create heat maps and determine the Area of Interest (AOI) points.

## 2.2 Post-shopping interview and survey

After the eye-tracking experiment, an interview was conducted with the participants to gain a deeper understanding of the underlying reasons behind their purchasing decisions. The interview was composed of two parts: standardised questions and customised questions. Standardised questions were adapted from the study by Song et al. (2019), and customised questions were personalised to the specific participant's purchase decision and behaviour. The following standardised questions were asked of participants after the experiment:

- During this shopping, do you buy products that you already know?
- Do you know about ecolabels?
- Do you prefer ecolabeled products, and why?
- What information do you evaluate when you look at a product? (Song et al., 2019)

Following the eye-tracking experiment and the interview, participants completed a questionnaire on sustainable behaviour. The attitude scales used in the questionnaire are from Roberts' (1996) study. The questionnaire included a screening question to test whether the participant belonged to the control or experimental group. The screening question was followed by 8 sustainability-related attitude statements and 4 demographic questions. The purpose of the survey was to identify ecologically responsible consumption. And then to investigate the relationship between ecologically responsible consumption and purchase decision-making. The questionnaire was sent online to the participants.

## 2.3 Data analysis

Data processing was carried out using Tobii Pro Lab software. The software was used to determine the events associated with each product category for each participant. Assisted mapping was run in order to obtain the heat map or metrics associated with the snapshots related to the AOI. In total, three AIOs were defined: brand, product name and eco-label. The total fixation duration (s) and the number of fixations (count) were determined for the three defined AOIs.

*Table 1: Demographic characteristics of participants*

	Control group (CG)	Experimental Group (EG)
<b>Generation</b>		
X Generation	-	-
Y Generation	40 %	80 %
Z Generation	60 %	20 %
<b>Gender</b>		
Male	40 %	40 %
Female	60 %	60 %
<b>Education</b>		
Primary School	-	-
Secondary education without graduation	-	-
Secondary education with graduation	20 %	20 %
Higher education	60 %	80 %
PhD	20 %	-
<b>Total monthly household net income</b>		
0 € - 263 €	20 %	-
264 € - 789 €	-	-
790 € - 1786 €	20 %	40 %
1,787 € - 3,571 €	40 %	20 %
3,572 € - 7,143 €	20 %	40 %
7,144 € - 10,714 €	-	-
10,715 € - 14,286 €	-	-
14,287 € -	-	-

### 3. Results

This chapter presents the demographic data and the willingness to consume sustainably collected by the questionnaire and the results of the data analyses of the eye-tracker experiment.

#### 3.1 Demographic characteristics and ecologically responsible consumption

A total of 10 participants took part in the experiment, 5 belonging to CG and 5 to EG. The gender ratio was equally distributed in both groups (60 % female, 40 % male). In CG, the higher proportion was Generation Z (60 %) and in EG, the higher proportion was Generation Y (80 %). In terms of education, the higher proportion in both groups was those with higher education. There were mixed responses for total monthly household net income. The results are illustrated in Table 1.

Figure 2 shows the mean of the attitude statements (AS1-AS8) for the two groups. The EG group who were educated are more price sensitive, but otherwise, both groups can be said to be relatively price sensitive, which is also true for Hungarian consumers. Those who are educated to a small extent are less environmentally aware consumers than those who are not informed.

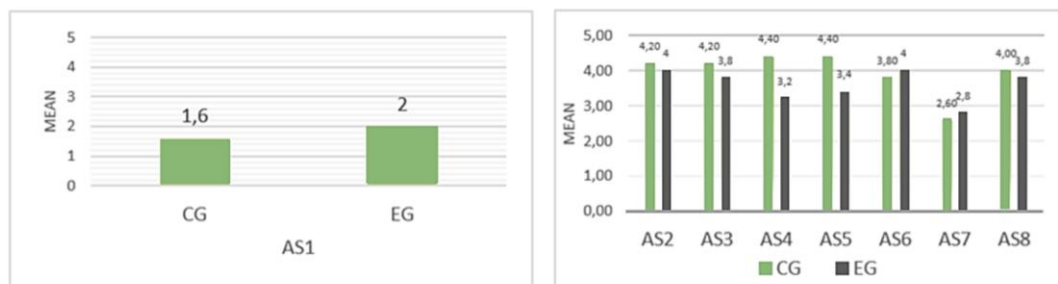


Figure 2: Mean of the attitude statements in connection with ecologically responsible consumption

#### 3.2 Eye-tracker data analysis

Figure 3 illustrates the heat map of the coffee shelf in the shop and the AOIs identified the sustainability symbiosis

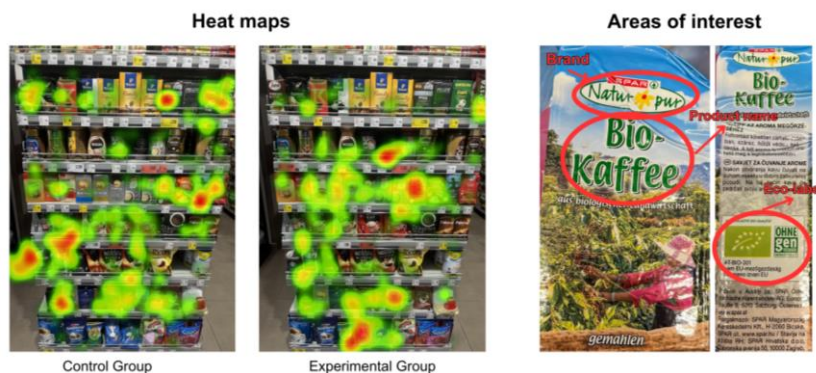


Figure 3: Heat map and area of interest

Based on the heat map, it can be said that the educated group noticed the environmentally friendly option sooner and more easily. Despite the fact that participants spent a lot of time looking for organic coffee on the shelves when they found it, they made a decision quickly.

Data analysis using Tobii Pro Lab software focused on three main data sets. First, we examined the total decision time and the decision time for each product category using events. On average, EG spent 5 min shopping, while CG spent 8 min. This difference is due to the fact that the educated group found it easier to find sustainable products by knowing the labels. CG took the longest time to select sustainable eggs, while EG took the longest time to select chocolate. According to the interview feedback, the reason why chocolate took longer for the participants was that the eco-label was very difficult to find. In addition to Total Decision Time, we examined total fixation duration and number of fixations for the three defined AOIs (brand, product name, eco-label). Organic coffee was chosen by 2-2 people per group, so we could only measure the AOIs in their case. For EG, we could only use data from one participant as the software did not recognise AOIs. In future research,

when taking recordings, it is advisable to hold the products at eye level and not to examine them by holding them downwards so that the glasses can see each AOI more accurately.

*Table 2: Decision time and visual attention paid to the defined AOIs*

	Control group (CG)	Experimental Group (EG)
Total Decision Time (min)	8.01	5.03
Decision Time (Egg)	1.26	0.34
Decision Time (Milk)	0.39	0.33
Decision Time (Chocolate)	1.09	1.18
Decision Time (Soft drink)	1.04	0.54
Decision Time (Coffee)	1.14	1.02
Total fixation duration (s)		
Brand	1.75	0
Product Name	4.84	0
Eco-label	18.29	10.15
Number of fixations (count)		
Brand	1	0
Product Name	2	0
Eco-label	3	8

#### 4. Conclusions and Discussion

Overall, the methodology is acceptable on the basis of the case study, but minor adjustments will be needed in several cases. The addition of the questionnaire and the interview to the experiment proved to be very useful, as they may reveal a number of correlations that would not be revealed by the experiment alone. The most striking difference between the uninformed (CG) and the informed (EG) groups was that it took, on average, 3 min longer to shop for the CG than for the EG. This was due to the fact that EG was more at home with eco-labels and more easily recognised sustainable products. Participants are more confident in recognising products with sustainable packaging than those that are sustainably farmed or with a sustainable supply chain.

In addition to the results of the case study, the results of the validation of the methodology itself are also important. In future research, the following aspects of the large sample experiment should be considered and modified in the research. In order to accurately measure whether the consumer recognises sustainable products when making a purchase, it is worth testing this first on one product range so that all products can be identified and the eco-labels can be seen. Furthermore, it is also preferable to test fewer products, as the eye-tracker requires manual marking of AOIs on each product. For example, in the case of a coffee shelf, even in a small shop with about 100 different coffee products, if only 4 AOIs are tested on each product, 400 AOIs would have to be determined for each data capture. In the future, it will be more appropriate to select a few products on which it can be observed whether customers perceive the sustainable labels so that all participants will perceive the products to be tested. In the experiment with the eye-tracker, particular attention should be paid to the identification of snapshots in the video footage so that the software is able to generate the analysis data. Assisted mapping did not always work well when using the software; it is likely that the product was observed from a distance further away than necessary, and the software was not able to match the eye movement to the snapshot. Since the software cannot always do the data analysis well, it is advisable to choose a number of elements that are sufficient for errors. The main limitation of the study is that the experiment was conducted on a small number of participants and that too many products were tested compared to the eye-tracker methodology. The analytical software did not recognise all the data properly, and therefore, due to the small number of items, the results cannot be generalised. In future research, we would like to conduct the study with more participants and fewer products.

The study concludes by highlighting the need for a clear definition of sustainable products and sustainable consumption and the importance of prominent labelling on product packaging to encourage sustainable consumption. This recommendation has practical implications for policymakers and businesses.

#### Nomenclature

AS – Attitude Statement

AS1 – I usually purchase the lowest-priced product, regardless of its impact on the environment.

AS2 – If I understand the potential damage to the environment that some products can cause, I do not purchase these products

AS3 – I am willing to pay a little more for products and food that are free of chemical elements and that do not harm the environment

AS4 – When I purchase products, I always make a conscious effort to buy those products that are low in pollutants

AS5 – I try only to buy products that can be recycled.

AS6 – When I have a choice between 2 equal products, I always purchase the one which is less harmful to the people and environment.

AS7 – I will not buy a product if the company that sells it is ecologically irresponsible

AS8 – I always plan my purchases in advance, I'm not an impulse shopper

CG– Control Group

EG – Experimental Group

## References

- Budeanu A., 2007, Sustainable tourist behaviour—a discussion of opportunities for change. *International Journal of Consumer Studies*, 31(5), 499-508.
- Guo Z., Wang A., Wang W., Zhao Y. L., Chiang P. C., 2021, Implementing green chemistry principles for circular economy towards sustainable development goals. *Chemical Engineering Transactions*, 88, 955-960.
- Norddahl B., 2021, Chemical product design in a sustainable environment. *Chemical Engineering Transactions*, 86, 1339-1344.
- Penz E., Hofman E., Hartl B., 2017, Fostering sustainable travel behavior: Role of sustainability labels and goal-directed behavior regarding touristic services. *Sustainability*, 9(6), 1056.
- Proi M., Dudinskaya E.C., Naspetti S., Ozturk E., Zanolli R., 2023, The Role of Eco-Labels in Making Environmentally Friendly Choices: An Eye-Tracking Study on Aquaculture Products with Italian Consumers. *Sustainability*, 15(5), 4659.
- Quoquab F., Mohammad J., 2020, A review of sustainable consumption (2000 to 2020): What we know and what we need to know. *Journal of Global Marketing*, 33(5), 305-334.
- Roberts J.A., 1996, Green consumers in the 1990s: Profile and implications for advertising. *Journal of Business Research*, 36(3), 217-231.
- Song L., Lim Y., Chang P., Guo Y., Zhang M., Wang X., Cai H., 2019, Ecolabel's role in informing sustainable consumption: A naturalistic decision making study using eye tracking glasses. *Journal of Cleaner Production*, 218, 685-695.
- Takahashi R., Todo Y., Funaki Y., 2018, How can we motivate consumers to purchase certified forest coffee? Evidence from a laboratory randomized experiment using eye-trackers. *Ecological Economics*, 150, 107-121.
- Waechter S., Sütterlin B., Siegrist M., 2015, Desired and undesired effects of energy labels—An eye-tracking study. *PloS One*, 10(7), e0134132.
- Wang T.C., Tseng M.L., Pan H.W., Hsiao C.C., Tang T.W., Tsai C.L., 2021, The development of a sustainable wellness service marketing strategy in Taiwan based on consumer eye movements and preferences. *Journal of Cleaner Production*, 282, 124382.