Identification of consumers willing to buy green products – A case study in the Czech Republic

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Abstract: *Green products are one way to protect the environment and eliminate the negative impact of human activity on the environment. However, the expansion of the sale of these products faces many challenges. One of the most significant obstacles is often cited as higher prices. The aim of this paper was to identify consumers willing to buy green products. The primary factors analysed were the social background of consumers, price and the premium for green products. Secondary data in the form of other research on the issue was used to meet the objective. The theoretical aspect of green product purchasing behaviour was supplemented with information from the processing of primary data from a questionnaire survey. The target group was the working-age population with at least a secondary education in the northwest of the Czech Republic. The survey was conducted between May and September 2023 on a sample of 267 respondents. A factor analysis was used in the data analysis to identify the relationships between the factors under study and to reduce the dimensionality of the data, as was segmentation using cluster analysis and classification using decision trees. The results provide information on the green purchasing behaviour of consumers in the study region. Two segments of marketing interest for green product purchasing were identified. One is the segment of ordinary consumers, mostly well-off women with children, who are willing to pay more for green products than other groups of people. The other interesting segment was mostly single women, influenced by opinions on their environment, who do not buy green products regularly and are willing to pay extra for green products, but not a significant amount. The findings of the study may provide useful information for marketers when planning and implementing activities related to green products.*

Keywords: *Green purchasing behaviour, green consumption, factors influencing green purchasing behaviour, social factors, economic factors.*

JEL Classification: *M30, M31, M39.*

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Introduction

Globally, the increasing consumption of goods and services is experiencing rapid growth, which is depleting natural resources and causing significant environmental degradation, a fact that has led to the emergence of the concept of sustainable development, which promotes the reduction of environmental impacts (Omar et al., 2020).

Due to global warming and climate change in particular, in recent years, there has been a steadily increasing interest in environmental issues often related to the depletion of natural resources, air and water pollution, soil erosion as well as climate change occurring globally (Takahashi et al., 2018). According to Har et al. (2011), consumers are interested in activities that can protect the environment. From this point of view, we distinguish two main concepts: green production and green products.

Green production focuses on minimising negative environmental impacts and conserving natural resources through environmentally friendly practices. It encompasses the entire production cycle, starting with raw materials and ending with a finished product (Li et al., 2023).

Green products can be defined as those products that have the least environmental impact, contain ingredients and materials that are environmentally friendly, are recyclable and require less packaging. The purpose of these products is primarily to protect the environment and human health (Gilal et al., 2020). Ciobanu et al. (2022) summarise a green product as an improved version of a conventional product, where this version causes less negative environmental impacts, has a different life cycle, has an environmentally friendly structure and saves energy. In their publication, Dropulić and Krupka (2020) point out that the definition of green products is still ambiguous, as there is no product that does not have any negative impact on the environment at any stage of its life cycle. The authors Goktuna and Hamzaoglu (2023) focus on the purchase of green products in the context of green production, perceiving its benefits for both solving environmental problems and ensuring animal welfare.

The aim of the paper was to identify consumers willing to buy green products by examining the factors influencing their purchase decisions. The selected factors analysed were the social environment of the consumers, the price and the amount of the premium on green products. Fulfilling the objective of the thesis will provide information about the target group buying green products for final consumption, which is useful for companies in order to prepare the most eye-catching marketing offers to increase purchasing of green products.

1. Theoretical background

Society needs to accept that it is important to pay more attention to the issue of green consumption and to lead an environmentally responsible lifestyle (Berenguer, 2010). Promoting green purchasing behaviour is one of the ways in which the negative environmental impacts of products can be reduced in order to achieve sustainability (Casalegno et al., 2022; Sadiq et al., 2022). It is crucial to promote sustainable agricultural and consumer practices among households by buying wisely from companies that themselves focus on sustainability (Iannuzzi, 2017; Kamalanon et al., 2022). A number of studies have addressed the issue of green purchasing behaviour along with the analysis of the factors that influence a consumer's decision to purchase green products (e.g., Dutta et al., 2022; Haffar et al., 2020; Jing et al., 2022; Liobikienė & Bernatonienė, 2017). Key factors that influence the decision to purchase green products include consumer demographic characteristics such as age, gender, income, education and marital status (Goktuna & Hamzaoglu, 2023; Vehapi & Dolićanin, 2016). In addition, social factors such as the influence of close persons such as friends and family (Khor & Mah, 2020; Kumar & Shanthini, 2020), as well as cultural and religious attitudes play a role (Addisu, 2018). Important economic factors that influence the purchase of green products include their price and any surcharges or price premiums associated with these products (Ciobanu et al., 2022; Vapa-Tankosic et al., 2018; Wang et al., 2019).

However, the literature still lacks a comprehensive picture of green consumer behaviour, especially if the influence of friends and family is a stronger factor in relation to green purchasing than the price of these products. Therefore, for the purposes of this paper, social and economic factors will be primarily considered.

1.1 Social factors

Consumer habits and consumption patterns are largely influenced by the attitudes of people who are considered important to consumers,

such as relatives, friends, co-workers and colleagues (Hynes & Wilson, 2016; Setiawan et al., 2021). Maichum et al. (2016), Ahmed et al. (2019), and Hamzah and Tanwir (2021) point out that social interests (family, friends, retailers or other people who share the experience of green products) are also important to a consumers' decision to buy green products. According to Vehapi and Dolicanin (2016), family members and friends are among the main sources from which consumers get information about green products. Also, Suki (2019) investigated the influence of the environment on consumer purchasing behaviour and found that friends and peers have a significant influence. Khor and Mah (2020) come to the same conclusion, finding that consumers are influenced by social norms in the form of expectations from friends, peers or family when purchasing green products. Addisu (2018) presents the finding that social factors in the form of culture and religion do not have a significant influence on the consumption of green products, while factors such as the aforementioned influence of friends or family members do influence the consumption of green products. Authors Kumar and Shanthini (2020) show a significant relationship between peer appeal and the purchase of green products. According to Goktuna and Hamzaoglu (2023), factors such as family and friends have a positive but insignificant influence on the consumption of green food products. Ciobanu et al. (2022) did not confirm the influence of social factors (in the form of friends' recommendations and social trends) in their study.

1.2 Economic factors

In order to understand the issues surrounding consumers' willingness to pay a higher price for green products, it is necessary to examine the factors that influence price sensitivity (Sheth, 2021). The term "willingness to pay a premium for green products" can be defined as the highest amount a consumer is willing to pay for a particular product (Katt & Meixner, 2020). The high prices of green products may represent a barrier that prevents consumers from purchasing these products.

According to a number of studies, price has a significant impact on consumers' evaluation of product alternatives, which can influence their intention to make a purchase decision (Moser, 2016). Low price sensitivity positively influences green purchasing behaviour (Eze & Ndubisi, 2013), while high price sensitivity can negatively influence consumer purchasing behaviour. High prices negatively affect the consumer's intention to purchase a green product (Joshi & Rahman, 2015; Prakash et al., 2019). Prices are set by the producers of green products who are concerned with profit maximisation, and in order to make strategic pricing decisions on consumers, it is necessary to understand what elements can influence the so-called personal acceptable price range for green products (Dominique-Ferreira & Antunes, 2019; Molinillo et al., 2020).

Khor and Mah (2020), Ciobanu et al. (2022), and de Leeuw et al. (2015) point out that the price of green products has a significant impact on consumers' willingness to purchase these products. However, Omar et al. (2020) point out that price is one of the indicators that helps consumers to distinguish green products from conventional ones. This issue has been addressed in the Czech Republic by Zámková et al. (2021), who point out that price, which used to be the most important factor of all, has taken a back seat in the Czech Republic as consumers have started to favour higher quality and appreciate the health benefits of green products.

Vehapi and Dolicanin (2016) and Zhao et al. (2018) mention in their research that most consumers are willing to pay a price premium for green products and argue that green consumers are less price sensitive compared to non-green consumers. On the other hand, Addisu (2018) states that consumers are not willing to pay a premium for green products and are very price sensitive to the products in question.

Wang et al. (2019) argue that consumers who have attained a higher educational attainment and higher income are willing to pay a higher premium for green products. According to the authors, household size also influences the premium people are willing to pay for green products, with small (up to 4 people) and medium (4–6 people) households willing to pay a price premium of 10–20% (Vapa-Tankosic et al., 2018).

The result of research by Gomes et al. (2023) showed that Generation Z is willing to pay a premium for green products because of environmental concerns, estimates of a green future and perceptions of green benefits.

2. Research methodology

This study examines the purchase of green products and explores selected factors that

influence consumer purchasing decisions. The present study examines selected factors that influence consumers in purchasing green products. Data collection from primary and secondary sources was used to meet the objective of the study. Secondary data was mainly obtained from scientific and professional publications. This data was intended to reflect current trends in the field. Primary data collection was used to investigate factors influencing consumption decisions in order to identify consumers willing to purchase green products. Primary data was collected through a questionnaire survey. The research focused on analysing people's attitudes towards the environment and the purchase of green products.

To achieve the research objective, two research questions were established based on the studies reviewed. The research questions are:

RQ1: Who is the typical consumer who is willing to buy green products?

RQ2: What are the effects of the selected factors (social and economic) on purchasing behaviour?

Twenty-five closed questions were formulated based on the purchasing behaviour of consumers of green products. In 19 questions, scaling was used to find out the degree of respondents' perception of the desired state. The respondents were required to express their opinions about the phenomenon being studied by recording a particular position on the scale. A five-point Likert scale (1 = strongly disagree, 5 = strongly agree) was used in the questionnaire. The questionnaire also included questions on the general characteristics of the respondents and their households, given that buyer purchasing behaviour is generally influenced by education, age, gender, job position and household financial situation.

The target group consisted of the population of the geographical areas of the northwest of the Czech Republic with at least a secondary education, of working age, i.e., in the age category 19–65 years, regardless of whether they currently buy green products or not. The northwest region is characterised by the lowest GDP per capita in the Czech Republic (Czech Statistical office, 2024). The low GDP in the region influences the purchasing behaviour of the population, while the high price of green products can be a barrier for them. People with limited financial resources often prefer cheaper alternatives, making it difficult to switch to sustainable and green products. The reason for obtaining data at a local level was increased feasibility in the currency of the information enabling adaptation to the requirements of a specific area. On the other hand, it can be demonstrated that information from a specific territory can also inspire other regions.

Prior to the start of the questionnaire survey, a pilot test was carried out to verify the comprehensibility of the questionnaire for all respondents and to detect any errors in the questionnaire. Shopping malls and supermarkets, universities and workplaces were used to recruit respondents. The empirical research considered various aspects of the potential of individual respondents as well as the general characteristics of their households. The survey was conducted through face-to-face interviews with the respondents and online questioning via QR code from May to September 2023.

A total of 267 respondents took part in the survey, of which 28% were male, 71% were female and 1% of respondents indicated "other" as their gender. A total of 59% of the respondents were single, 33% indicated married as their marital status and 7% of the survey respondents were divorced or widowed. For age distribution, the largest proportion of people was between the ages of 18 and 30. The survey involved respondents with different levels of completed education, with the largest proportion of respondents having successfully completed secondary education with a high school diploma (47%), while 26% of the respondents had achieved a bachelor's degree, 19% a master's degree, 5% had a higher vocational education and only 3% of the respondents had managed to obtain a doctoral degree at university. The largest proportion of respondents was employed (65%), 22% reported student status as their main economic status, and several respondents were on maternity or parental leave, self-employed, retired or on disability pension (12% in total). The groups of the unemployed and those who are housewives or caring for a child or other person were not represented in the survey.

The largest share of households has an income above EUR 32,000 (19%), while only 4% of respondents reported that their household income is below EUR 800. When asked to rate their financial situation, 66% of respondents

said they rated their financial situation as average; 18% rated their situation as above average and 16% below average.

38% of respondents live in a household of 2 persons, 27% of respondents live in a household of 3 persons, 19% of respondents live in a household with 4 persons, 5% of respondents live in households with 5 or more persons and 10% of respondents said they live alone.

The primary data obtained was further statistically processed using factor analysis, clustering and decision tree methods. Factor analysis is used to solve the problem of dimensionality reduction of data. It attempts to express the original variables in terms of latent variables that cannot be measured directly but may have some substantive interpretation. The aim is to simplify the original system of variables and at the same time to find out the structure of their dependencies.

Cluster analysis deals with the similarity of data objects. It deals with dividing a set of objects into several unspecified groups (clusters) so that objects within each cluster are as similar as possible, while objects from different clusters are as similar as possible.

A very common method of data representation used in data models are various types of decision trees. Decision trees are structures that recursively partition the data being studied according to certain decision criteria. While the root of the tree typically represents the entire sample set, the internal nodes of the tree represent subsets of the sample set. In the leaves of the tree, we can read the values of the variable being explained in addition to other information.

A decision tree is usually created recursively by dividing the space of predictor values (explanatory, independent variables). A large number of algorithms have been proposed for creating decision trees. The most commonly used are CART, ID3, C4.5, AID, CHAID and QUEST and their variants. In our analysis, we used the CRT algorithm implemented in the SPSS statistical system environment (Hlaváček et al., 2015).

3. Results and discussion

3.1 Results

As part of the evaluation of research question 1 (*RQ1*), consumers were segmented in terms of the influence of social and economic

Tab. 1: Factors influencing the purchase of green products – Part 1

Opinion questions	Components			
	1	2	3	4
I like to go on trips to the countryside, for example to the woods or fields.	0.138	0.015	0.680	0.179
People seriously abuse the environment.	0.051	0.300	0.717	−0.154
Whenever possible, I try to conserve natural resources.	0.240	0.064	0.766	0.295
It makes me sad to see forests being cut down for agriculture.	0.125	0.226	0.759	−0.078
I take an active interest in the environment.	0.166	0.278	0.651	0.324
Climate change also threatens livelihoods in the country.	0.087	0.442	0.655	−0.198
I think buying green products is a good idea.	0.359	0.548	0.498	−0.106
Most of the people I consider important think that I should buy green products when making purchases.	0.848	0.209	0.260	−0.115
Most of the people I consider important would like me to buy green products when making purchases.	0.891	0.090	0.300	0.006
People whose opinion I value would like me to buy green products.	0.835	0.175	0.298	0.086
The positive opinion of a close friend influences me to buy green products.	0.629	0.455	0.143	0.005
Green products are commonly available in the stores where I usually shop.	0.091	0.180	0.095	0.824

Tab. 1: Factors influencing the purchase of green products – Part 2

Opinion questions	Components			
	1	2	3	4
I will consider switching to green products for environmental reasons.	0.305	0.772	0.316	0.074
I plan to spend more money on a green product than on a conventional product.	0.362	0.766	0.171	0.232
I definitely want to buy green products in the near future.	0.316	0.789	0.354	0.082
My friends buy green products.	0.593	0.461	−0.005	0.275
My family buys green products.	0.652	0.429	0.028	0.221
I buy green products because my friends and colleagues also buy green products.	0.682	0.384	−0.030	0.167
Green products are commonly available in the stores where I usually shop.	0.295	0.728	0.339	0.179

Note: The individual components are differentiated by shades of grey (the first – consumer influence; the second – the reasons for purchasing green products; the third – opinion on the environment; the fourth – the availability of green products).

Source: own

factors on the purchase of green products. The variables obtained from the opinion questions in the questionnaire showed a strong correlation with each other, so factor analysis was used in the preprocessing step (Tab. 1). The result was four components. In Tab. 1, the individual components are differentiated by shades of grey. The first represented consumer influence, the second the reasons for purchasing green products, the third opinion on the environment and the fourth the availability of green products.

Tab. 2: Sociodemographic and opinion characteristics

	Sociodemographic characteristics	Opinion characteristics
1st cluster	Well-off women not living alone with at least a secondary education and at least two non-earners (mostly minor children) living in the household	▪ Buy green products because they care about the environment ▪ Mostly willing to pay a higher price and pay extra for green products
2nd cluster	Single women under 30 years of age living alone with either a high school diploma or a bachelor's degree	▪ Do not buy green products for "moral" reasons ▪ Buy because they care about the opinions of others (whether family or friends, or people they respect) ▪ Willing to pay a higher price for green products ▪ Mostly, but they're not willing to pay extra
3rd cluster	Employed married men aged 31–50 with at least a master's degree, high income living alone or in a complete family (2+2)	▪ Do not buy green products for "moral" reasons, but neither do they care about the opinions of others (whether family or friends or people they respect) ▪ Not willing to pay extra

Source: own

Subsequently, a cluster analysis was performed using a two-stage method. The input variables for the analysis were the factors emerging from the factor analysis. Classification methods were used to interpret the clusters more accurately. The interpretation was done from two aspects corresponding to two parts of the questionnaire, namely soc-dem characteristics and also opinion characteristics. The results are summarised in Tab. 2.

Cluster 1, which consists of women with at least a secondary education who are in a partnered relationship and have at least two children living in the household, were found to be existing regular green shopping customers. These people prefer to buy green products and are willing to pay a higher price. These consumers are influenced by customer retention tools (e.g., loyalty reward schemes, provision of quality customer service and problem solving) in terms of marketing activities.

Cluster 2 is predominantly single women. This group consists of people who are not opposed to green shopping and yet are influenced by views in their surroundings. This group represents an interesting segment of potential customers of green products from a marketing point of view. In terms of marketing activities, these consumers are influenced by the tools used to gain a loyal customer base. These include, e.g., influencer marketing, and emailing.

Cluster 3 consumers said that they do not buy green products either out of conviction or because they are not influenced at all by their family or friends and, thus are not willing to pay a higher price for these products. From a marketing point of view, the third cluster is not a viable customer base for buying green products in the short term. These are mainly consumers who are not very influential and do not prefer to buy green products.

A clustered comparison of the degree of willingness to buy green products and pay a premium price is visible in the box plots in Fig. 1.

The second research question of the data analysis (*RQ2*) examined the relationship between social and selected economic factors (price and price premiums) on the purchase of green products. To evaluate this research question, a decision tree method was used, specifically a classification tree constructed using the CRT algorithm. To construct the decision tree, "I buy green products because I care about the environment" (values: up to 5%, 5–10%, above 10%) was selected as the variable explained, and social factors were selected as explanatory variables observed in the questionnaire survey.

In the text contained in the rectangles of each node of the decision tree (Fig. 2), the percentage of people willing to pay a given level of surcharge can be seen. The text below the nodes lists the variables according to which the algorithm evaluated the split as the most efficient. Based on the classification tree

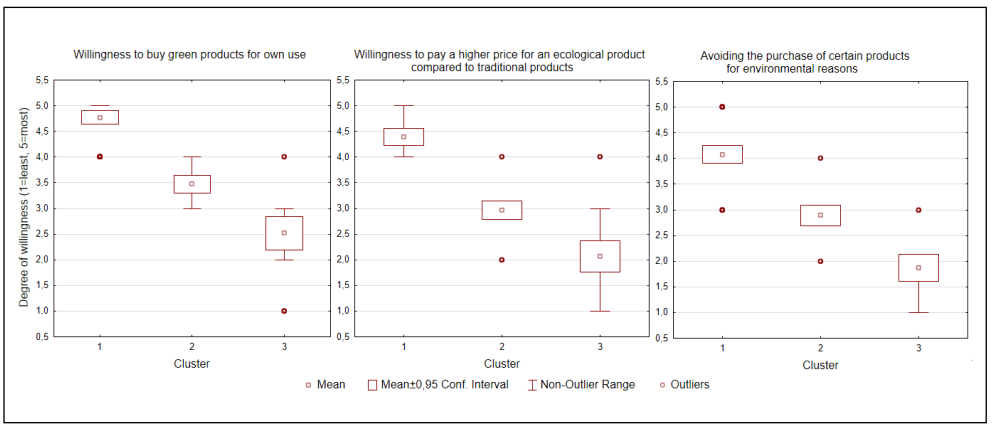

Fig. 1: Cluster comparison

Source: own

developed, it can be concluded that people who want to buy green products for their own use are mostly willing to pay a 10% premium for green products, are influenced by the positive opinion of a close friend, and buy green products because they care about the environment. People who care about the environment, but are not influenced by the positive opinion of close friends when buying green products, or people who buy green products not because they care about the environment, but because of the positive opinion of close friends, are mostly willing to pay a premium of 5–10%. People who do not care about the environment, nor are influenced by the positive opinion of close friends and do not consider buying green products a good idea, are those who will pay at most up to 5% extra for green products.

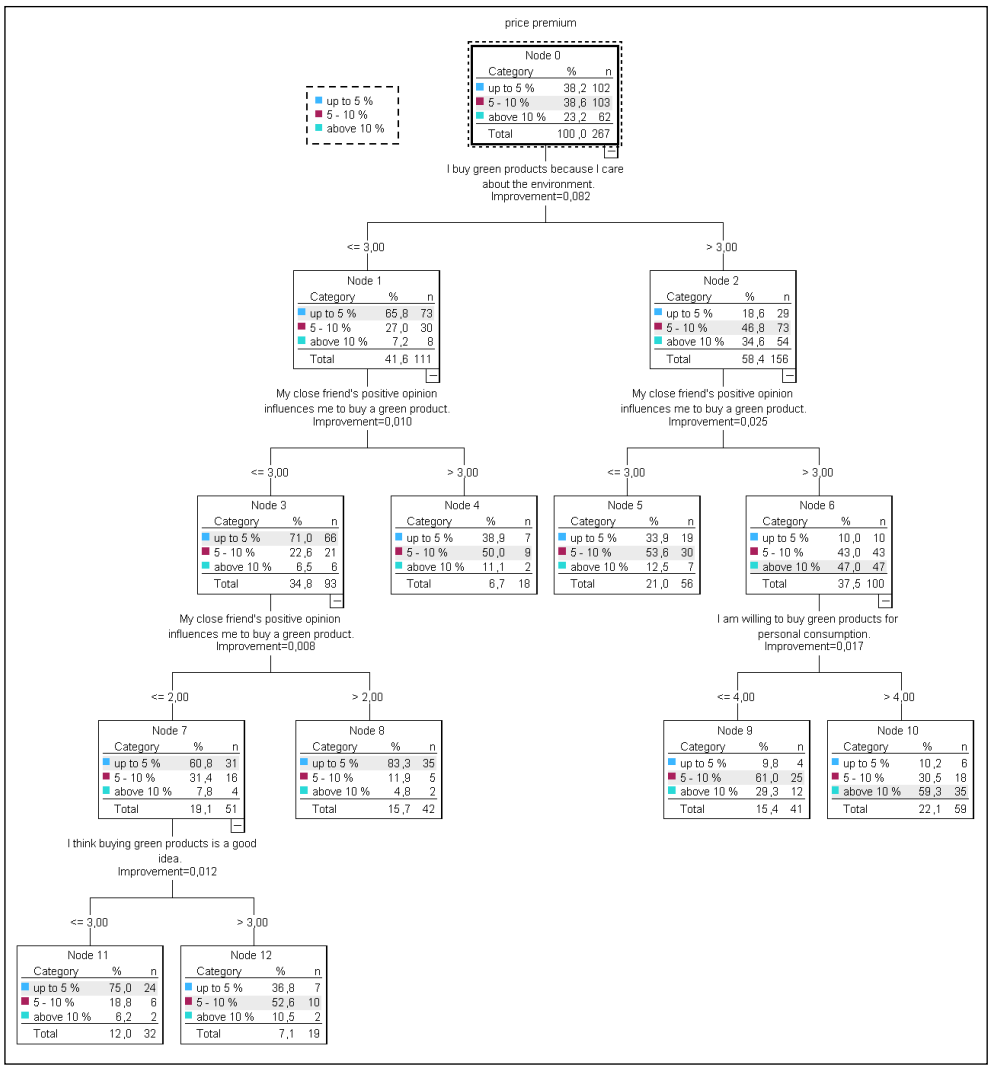

Fig. 2: Decision tree

Source: own

The results of both research questions show that consumers' willingness to buy and pay a higher price for green products is strongly influenced by the opinions of family and friends. In particular, women with at least a secondary education who are actively interested in environmental protection are more likely to prefer buying green products.

3.2 Discussion

In the Czech Republic, the market for green products continues to grow and Czech consumers are gaining a positive attitude towards buying green products; in 2020, the average per capita consumption of green products in the Czech Republic was EUR 21, while in Germany and Austria it was EUR 180 and EUR 254, respectively (Zámková et al., 2021).

According to the results of our study, the price of green products still has a significant influence on purchasing decisions. People are still deciding whether to buy these products rather than "normal" products with a lower price. In our research, this may also be due to the fact that the region studied is one of the regions with the lowest purchasing power (Czech Statistical office, 2024). The fact that the price of green products is an important factor is also confirmed by the studies of Ciobanu et al. (2022) and Khor and Mah (2020). Increasingly, however, other factors besides price as an influencing factor on the purchase of green products are entering into this process (Drupolić & Krupka, 2020; Zámková et al., 2021). One such factor is concern for the environment. People who care about the environment are more considerate towards it and adapt their purchasing behaviour to it (Addisu, 2018). This finding was confirmed by the results of our study. Another factor that still significantly influences the purchase of green products is the influence of family and friends.

The study's research found that people who see their neighbourhood investing in green products are more likely to buy them and are willing to pay more for them, suggesting that the social environment has a significant influence on green purchasing behaviour. The research results show that the opinion of people in a consumer's social environment has a significant influence on their willingness to buy green products.

The findings regarding the social environment of the consumer are consistent with the findings of studies by several other authors, such as Alzubaidi et al.(2021), Budovska et al. (2020), Hamzah and Tanwir (2021), and Kim and Seock (2019). On the other hand, authors Ciobanu et al. (2022) and Goktuna and Hamzaoglu (2023) present opposing conclusions.

From the information found regarding the social environment, it can be concluded that the social environment has an influence on green purchasing behaviour. When verifying the given facts, it was found that when considering the influence of the social environment on the consumer's willingness to buy green products, to pay a higher price for these products and the consumer's intention to buy these products in the near future, the influence of all the given factors is significant. However, the most important variable for consumers is the variable when taking into account the future. This implies that people are aware that they should buy green products and are aware of their benefits and positive consequences.

Vehapi and Dolicanin (2016) state that family members and friends are among the main sources from which consumers get information about green products. Furthermore, these authors, along with Vapa-Tankosić et al. (2018), report that typical consumers are married women or with children with a good financial situation in the household, Goktuna and Hamzaoglu (2023). These findings are consistent with the findings of our research.

Important people, whether influencers or marketing experts, should be aware of this finding. Consumers in the field are following the "if they are doing it, I should probably start doing it" formula. In the context of social media, social factors are major influences on purchase intention and behaviour (Ahmad & Zhang, 2020).

Our study focuses on consumers' purchasing behaviour in terms of green products. In the future, the research could be extended to a deeper analysis of the relationship between green production and green products.

In further research, it would be advisable to expand the sample of respondents to verify the results that were inconclusive. It would also be beneficial to conduct research in cohesion regions where GDP is higher than in our study region. The work focuses on people over 18 years of age with at least a secondary education, and therefore it could be recommended to include people with less education

in the next survey. In addition, future research should broaden the range of factors influencing green purchasing behaviour to better understand what motivates consumers to choose green products.

Conclusions

In recent years, due to global warming and climate change, there has been a steady increase in interest in environmental issues, often linked to the depletion of natural resources, air and water pollution, soil erosion, as well as climate change that has occurred globally. Pollution increases the burden of disease, reduces life expectancy and also reduces the overall quality of life in a country (Har et al., 2011). Addisu (2018) states that consumers are now more environmentally conscious and are also adapting their purchasing behaviour to the environment. It is green products that cause less pollution and contribute to the conservation of natural resources; compared to conventional products, green products are less harmful to human health and the environment, both when evaluating the content of the product itself or its packaging (Ciobanu et al., 2022).

Based on the information gathered, several recommendations can be made for organisations working on green consumption and raising awareness of the importance of green products. The social environment of consumers (in the form of family, friends and other close or important people) plays an important role in the purchase of green products. The more green products that are purchased by people in the consumer's environment, the more likely the consumer is to be willing to purchase the products. In the same way, a consumer's environment influences their willingness to pay higher prices for green products compared to conventional products, and also influences their decisions on future purchases of these products. Given the above information, education of the population is of great importance. In activities aimed at educating consumers about green products or activities aimed at selling these products themselves, it may be advisable to use the social environment of the consumers, e.g., in the form of an influencer campaign or a UGC (user generated content) campaign.

The research also identified socio-demographic variables that influence the purchase of green products. These factors included household size, which is the most important of the factors studied among consumers. The second most important factor is gender, i.e., women are more likely to buy green products. Another factor is economic status, with students and women on maternity or parental leave buying green products. It is therefore advisable to target these consumer groups in the marketing activities of the operators concerned. These insights can be used by business actors in the field to plan and implement their marketing and sales activities (Akram et al. 2024; Lavuri, 2022).

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