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Towards sustainable consumption: the practices of Krakow students

Abstract: The article presents the results of a survey of students at two Kraków universities concerning knowledge related to food production and consumer behaviour practices. Its purpose is to identify such knowledge in the context of sustainability. Sustainability has become increasingly popular in recent years, both in the context of consumer attitudes and entrepreneurial strategies, taking into account the growing awareness in terms of the products and services being offered, the authors focused on a research issue considering the process of food production and public awareness of the consequences (environmental, climate) associated with it. Students were selected for research who, as consumers and future opinion leaders, will determine the market practices of producers. In addition, the article assesses the impact of academia (universities) on economic and social sustainability.

Keywords: entrepreneurs; entrepreneurial basics; food production; students; sustainable development; university

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Introduction

The issue of sustainable development (SD) has been gaining increasing influence over the years in various areas of social and economic life. Two of these are education and higher education which are included in the Sustainable Development Goals, a roadmap adopted at the United Nations in 2015 for transforming and reshaping the world in which the needs of the present generation can be met in a sustainable manner, respecting the environment and taking into account the needs of future generations. The document includes demands aimed at a situation in which learners have the knowledge and skills needed to promote the concept of SD, expressed in *Goal No. 4: Quality education* (United Nations, 2022).

In this context, two concepts are important: 1) education for sustainable development (ESD), and 2) higher education for sustainable development (HESD). The latter involves orienting education towards the acquisition of competencies in sustainable practices, including transcending the barriers associated with the primary goal of student learning which is to gain professional knowledge in the field of study (Purcell et al., 2019).

The approach expressed in the concept of HESD, although wide-ranging, refers primarily to the professional activities of students and graduates, i.e. those related to professional life. Meanwhile, the concept of SD itself covers the entire spectrum of human activity from production to consumption. The relationship between these two is one of the main pillars of microeconomic theory, and within a system of exchange of goods and services, it is the consumer (through his or her choices) who determines their utility and ultimately "rules the market," i.e. decides what goods are produced (Hutt, 1940). While the way food is produced can be changed through regulation, market mechanisms are the main engine that drives the development of food chains. Consumers have a key role to play here. This area is under-researched in the context of HESD, therefore, the authors decided to analyze the attitudes of students from two Kraków universities (AGH University and University of Technology) towards food production in the context of HESD, as well as their attitudes related to practices in this area. It is worth noting that agricultural production (as the main source of raw materials for food production) has a very strong impact on shaping sustainable development in a national economy where consumers can "reward" sustainable food production methods by choosing goods produced with respect for the environment. The growing popularity of SD knowledge is also influencing the strategies of entrepreneurs who are responding to consumer trends while their attitudes are also influenced by national regulations, as well as at community level. For several years an evolution in company strategies with regard to sustainable attitudes has been observed. Students are a special group of consumers who set long-term trends through their influence on society and as a result the article poses the following research questions: whether students are aware of the impact of agriculture on climate change and the environment, and what their attitudes toward food waste are. The research provides answers to these questions.

It should be noted, however, that the very concept of sustainability, according to many researchers, is abstract, and this includes the context of agricultural and food production. Often consumers are unaware that certain of their behaviours can be treated in a sustainable way. Regardless of this knowledge, it is worthwhile examining attitudes towards these practices and, on this basis, formulate conclusions, including those related to sustainable agricultural production. The purpose of this article is to identify the opinions of students at Kraków's technical universities regarding food production and consumer practices in the context of sustainability.

Sustainability in higher education

The SD concept has become an important reference point for academic research, so much so that it has become a paradigm in recent years (Alvarado-Herrera et al., 2017). In 1987, the World Commission on Environment and Development published a report titled "Our Common Future," also known as the Brundtland Report (United Nations, 1987; 2024, 11 June). It is from this report that the popular definition of SD comes: "development that meets the needs of the present without compromising the ability of future generations

to meet their needs." Despite the passage of years, this definition is still cited as representative of the concept, despite the very large increase in academic publications on the subject. It was the United Nations that contributed to its popularization. An important event in terms of spreading awareness of the subject was the 1992 Rio de Janeiro Conference, which adopted Agenda 21 – a catalogue of conservation goals to be achieved in the 21st century. In September 2015, more than 150 heads of state and government attended the United Nations Sustainable Development Summit in New York which assessed the implementation of the Millennium Development Goals and adopted the document "Transforming Our World – Agenda for Sustainable Development 2030" (United Nations, 2015; 2024, 4 June). The agenda sets out the Sustainable Development Goals, which include 17 priority areas (Figure 1) and 169 specific goals.

Figure 1. Sustainable development goals

Source: UNIC Warsaw, 2022, https://www.un.org.pl/

Today, the concept of sustainable development encompasses environmental, social and economic dimensions and seeks to improve the health of communities, societies and environments. The sustainable development goals capture the entire spectrum of these areas and demonstrates that the SD concept should be considered very broadly (Sauve et al., 2016). Sustainability competencies are a very important element in shaping SD-based governance, i.e. core competencies that educate people to adopt personal lifestyles that ensure a balance between economic growth, respect for the environment and social justice (Frisk & Larson, 2011). In 2007, Matthias Barth and a group of researchers from the University of Lüneburg described the development of SD key competencies in higher education and focused on their implications for formal and informal learning. The authors emphasized the need for synergy in these two areas, i.e. on the ground of formalized university programs and informal content provided in the implementation of various ventures accompanying education (Barth et al., 2007). Five years later, a group of Swedish researchers presented a juxtaposition of SD competencies, obtained by engineers, with the needs of industry (Hanning et al., 2012). Their research found

that industry requires a wide range of SD-related competencies among engineers, going beyond university curricula.

The examples cited show that in the case of SD, it is important to have a perspective that takes into account a broad spectrum of issues, looking beyond the formal aspect of education. The HESD concept, which can be described as an interdisciplinary approach to learning that includes the integrated socioeconomic and environmental dimensions of the formal and informal curriculum, is one of the key challenges in higher education, but also in shaping a sustainable economic model (Filho, 2010; Franco et al., 2019).

In addition to the educational aspect, an important challenge related to the HESD concept is to change the growth-based paradigm that dominates both academic discourse and curricula (Kopnina, 2020). This is a very complex issue, especially since SD-related demands are sometimes difficult to implement directly into university curricula. Although recent years indicate that the situation in this matter is improving, there is still much to be done. A team of scholars affiliated with the European School of Sustainability Science and Research conducted a study, which concluded that more attention should be paid to the need to revise curricula that refer directly to the sustainable development goals (Filho et al., 2023).

HESD and sustainable consumption

While the literature in the field of sustainability advocates an interdisciplinary approach to the problems described, in order to better understand the complexities and apply inclusive thinking about universities, the problem of practical application of SD in the economy is still unresolved (Hallinger, Chatpinyakoop, 2019). This is the reason why some researchers believe that the very concept of SD should be rethought and clarified, as it currently focuses more on policies, strategies and definitions than on action itself (Ramos et al., 2020). A major challenge, therefore, is to develop practices to move from unsustainable to sustainable development.

The popular position in the literature is that in order to spread sustainable practices in the economy, a clarification of the meaning of SD is needed. Nowadays, this is a very wide-ranging concept that can accommodate an extensive spectrum of meanings (Engelman, 2013). While in academic discourse this ambiguity is not a fundamental obstacle, in economic practice it is already a problem. The more specific the practices described as sustainable, the greater the positive effect they produce (Castro-Lopez et al., 2023).

One area worth looking at in the context of economic practice is the impact of HESD on consumer behaviour. In a market economy, the dynamics of supply and demand are heavily influenced by consumer choices and it is the decisions of consumers that verify the strategies adopted by companies and influence the allocation of resources throughout the economy (Deaton, Muellbauer, 1980; Schiffman, Kanuk, 1994). With the growing popularity of SD, the concept is increasingly influencing consumer choices.

The problems presented are related to the area of sustainable consumption, the tenets of which can be described as the conscious use of available resources while minimizing harmful effects on the environment, has been in academic circulation (Dolan, 2022). The concept is very broad, applying to a wide range of consumer choices, although in some approaches it is sometimes narrowed down to health issues, among others (Lähteenmäki, 2013).

Sustainable consumption (SC) involves the use of goods and services to meet basic human needs and ensure a better quality of life, which should be done using minimal natural

resources without compromising the needs and ability of future generations to meet those needs (UNEP, 2016; 2024, 29 June). The SC concept, due to its widespread application in social policies, science and economic practice, is very inspiring and developed and leads to very interesting research results. It can be said that SC in a practical way develops the concept of SD (D. Evans, 2011). Understanding the sustainable consumption literature involves recognizing what motivates consumer attitudes and behaviour toward consumption (Moisander, 2007). SC depends on many factors and important elements are the consumer's age, gender, family size, level of education, environmental knowledge and also his/ her social and economic status (Cincera & Krajhanzl, 2013; Morrison & Beer, 2017). In the context of the ESD and HESD concepts, age and education are very important, as well as the formation and socialization within groups called generations (Naderi, van Steenburg, 2018).

When considering issues related to generations and education, it is assumed that increased knowledge of pro-environmental behaviour should result in greater awareness of the impact of students on the environment. In fact, however, the issue is more complicated, it happens that SD knowledge does not directly lead to pro-environmental behaviour, and this has been called the "paradox of sustainable consumption." It refers to a situation in which people are aware of and believe in pro-environmental activities but become conflicted in their actions because the option to engage in a sustainable lifestyle challenges them. The source of this "paradox" is greater knowledge about sustainability and this is a source of dilemmas and internal tensions (Longo et al., 2019). A factor that is very important in the SC issue is the reciprocal influence of the environment on young consumers who make decisions motivated by peer pressure (Baker, Ozaki, 2008).

The issue of sustainable consumption, especially as it relates to education, is therefore a complex one that requires multifaceted study. With the rise in popularity of the concept of SD, resulting from the turn in public policies, successive generations have a different approach to the issues described. This can be seen in the younger generation (called Generation Z) which has grown up surrounded by information about environmental degradation and has specific competencies that can be used to achieve the goals of SD (Pandita, Agarwal, Vapiwala, 2023). It is worth noting that in addition to the importance of technical competence related to the use of new technologies, the issue of sensitivity and knowledge is important. This, in turn, makes it easier to tame and implement the rules related to SC. The issue of education and socialization related to consumption attitudes is related to lifestyle changes that took place earlier, at the turn of the century. This is evidenced by research findings related to action-oriented learning, which contributes to more sustainable development. The issue of non-formal learning is also important (Sterling, 2004).

Sustainable consumption applies to a broad spectrum of products and services, one of which is food production. An important component of sustainable consumption is therefore the agri-food sector, which cannot be left out of the discussion on solving economic, environmental and ethical problems. Consumers are increasingly demanding sustainably produced food and are seeking to engage in the process of increasing food sustainability. Access to sustainable food does not necessarily depend solely on consumers' financial capabilities or individual attitudes but should be analyzed as embedded in the complex dynamics of multiple social practices (Brons & Oosterveer, 2017). Education, as well as higher education are two of these elements.

Regarding the sustainable development goals, the HE aspect is linked to Specific Area 4.7, "By 2030, ensure that all learners acquire the knowledge and skills needed to promote

sustainable development, including, but not limited to, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and cultural contributions to sustainable development." As can be seen, this point does not address the issue of sustainable consumption at all, an element that is not only missing from the goals but is also rarely present in academic analyses (Lozano et al., 2015). Whenever such publications appear, they show how complex the issue of consumer attitudes among students is, and how much variation exists among this group (Brooks, 2021). Higher education is not only a place that has a very high potential to positively influence health and sustainability, but also to shape the stakeholders of an economy fuelled by human resources – university graduates (Velazquez et al., 2005). In view of the above, the authors decided to analyze attitudes towards food production of students at Krakow's universities.

Methods

The empirical material presented was collected among students of two universities: Stanislaw Staszic University of Science and Technology in Krakow and the Krakow University of Technology. The authors undertook a study of student consumer behaviour towards food in the context of sustainable development, carried out in January-March 2023, using a survey questionnaire distributed to students. The authors conducted a survey of technical students, due to the fact that the programs of their courses provide for the transmission of information on sustainable development, both in the area of industry and in its theoretical assumptions.

The preparation of the survey questionnaire was preceded by a literature analysis of conscious food purchases in the context of sustainability. For this purpose, the research team drew up a timeline, recommended for this stage (Booth et al., 2012) whose focus was on the student group as important stakeholders in the sustainable consumption process. This topic is under-represented in the literature, and there are many research gaps (Ceulemans et al., 2015). The literature analysis considered the core competencies of SD, as well as how to design curricula that take this perspective into account (T.L. Evans, 2019) while a key challenge is the interdisciplinary nature of the SD concept. Sustainability issues cut across academic disciplines, from the natural sciences to the social sciences and humanities (Yarime et al., 2012). Given that the central research interest was food consumption practices, an effort was made to focus on a narrow slice of this knowledge.

In developing the preliminary questions, reference was made to the conclusions of studies carried out on domestic (Opalińska et al., 2018; Lodz University of Technology, 2024, 12 July) and international grounds (Karatzoglou, 2013; Zamora-Polo et al., 2019). On this basis, a preliminary list of questions was prepared and this version was revised during a focus meeting among 20 students (pilot study). After the corrections were made, the surveys were proceeded with. The actual survey was conducted on a group of 283 in January-March 2023 among students of the AGH University of Science and Technology and the Krakow University of Technology. The survey was conducted using the PAPI method. Five questions were decided for the area under analysis:

- In your opinion, how does modern agriculture affect the environment?
- In your opinion, does modern agriculture affect climate change?
- In your opinion, does food waste negatively affect the environment?

- Does the use of chemical weed control products have a negative impact on the ecosystem?
- How often do you throw away food?

After receiving the feedback, a preliminary analysis of the questionnaire took place. Questionnaires with two or more omitted responses were eliminated. Also eliminated were those surveys in which respondents exceeded the age range assumed by the researchers.

Analysis of survey results

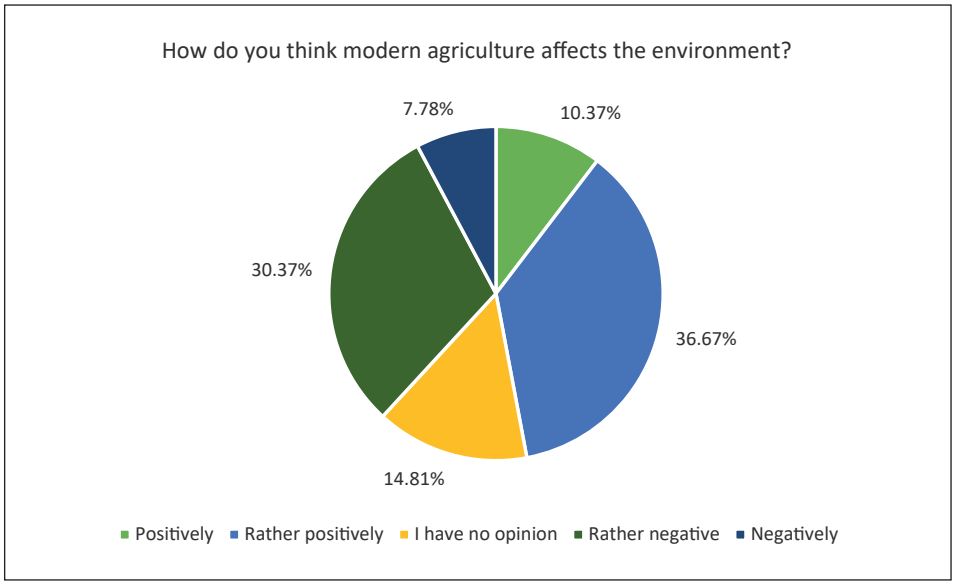
During the survey, 283 questionnaires were received, of which 13 were eliminated, exceeding a 95% return rate. The next step was to analyze the results in the context of the research objective. Of the 270 students surveyed, 63% were men and 37% were women. The analysis was based on four thematic areas.

Impact of agriculture on the environment

The first question asked how respondents rated the impact of modern agriculture on the environment. Survey participants were given a choice of five options, ranging from "positive" to "rather positive" and "rather negative" to "negative" assessments. They could also indicate a response of "I have no opinion." Responses on this topic were distributed as follows: 10.37% of respondents rated the impact as positive, 36.67% as rather positive, 30.37% as rather negative, 7.78% as negative, and 14.81% had no opinion on the subject (Figure 2).

For several decades, the academic community, but also practitioners and politicians, have taken the position that agriculture has a significant impact on the environment. Increasing demand for agricultural products, caused by the planet's continued demographic

Figure 2. The impact of agriculture on the environment



Source: authors

growth and the population's desire for better living conditions, contributes not only to agricultural intensification, but also to environmental degradation. Climate change is increasingly reducing the available pool of land and water resources, so modern agriculture has become heavily dependent on the use and introduction of new chemicals from the pesticide and insecticide industries, which in itself is a source of concern for both human and global health (Hadavi & Ghazijahani, 2018). In recent years, there has been an ongoing discussion in academic circles related to the need to change these trends, as reflected in the concept of sustainable agriculture. Issues such as closing the resource cycle by composting crop residues and municipal bio-waste, among others, are currently at the testing level. Certainly, the challenges of component recovery and reuse will lead to changes, but at present agriculture is still a major environmental burden (Dsouza et al., 2021).

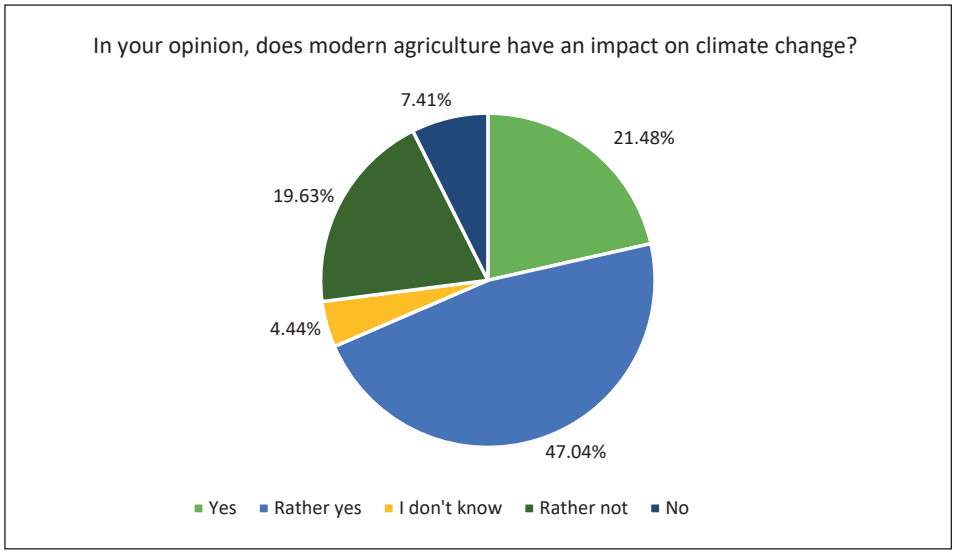
Despite the described and documented negative impact of agriculture on the environment, the opinions of respondents indicate low knowledge in this area, as 67% of respondents rate the impact of agriculture on the environment as "positive" and "rather positive," and only 38% are aware of the possibility of a "negative" or "rather negative" impact.

Impact of agriculture on climate change

In the next question, students evaluated the impact of modern agriculture on climate change. They had five options to choose from ("yes," "rather yes," "rather no," "no" and "don't know"). The predominant answers were "yes" (21.48%) and "rather yes" (47.04%). Far fewer respondents noted no such influence (19.63% of "rather not" and 7.41% of "no" responses). A small number of students (4.44% of the total) had no opinion, which can be explained by their lack of knowledge in this regard (Figure 3).

In academic circles, as in the case of environmental impacts, there is a consensus on the negative impact of agriculture on the climate. Growing livestock populations, as well as the expansion of cropland and pastureland at the expense of forests and grasslands,

Figure 3. Impact of agriculture on climate change



Source: authors

due to the increase in the number of people, are cited as the main causes. The three largest individual contributors to global warming are CO2, CH4 and NO2 while direct agricultural emissions are dominated by CH4 and NO2 gases (Myhre et al., 2013). It is difficult to estimate precisely to what extent food production contributes to CO2 emissions, but the scale is also very large. Soil erosion is also a significant problem associated with climate change (Eekhout & De Vente, 2019).

While the vast majority of students surveyed note the impact of agriculture on climate change (67% of "yes" and "rather yes" responses), a fairly sizable group (27% of "rather no" and "no" responses) have doubts in this area. This may indicate insufficient knowledge of the subject among the surveyed group.

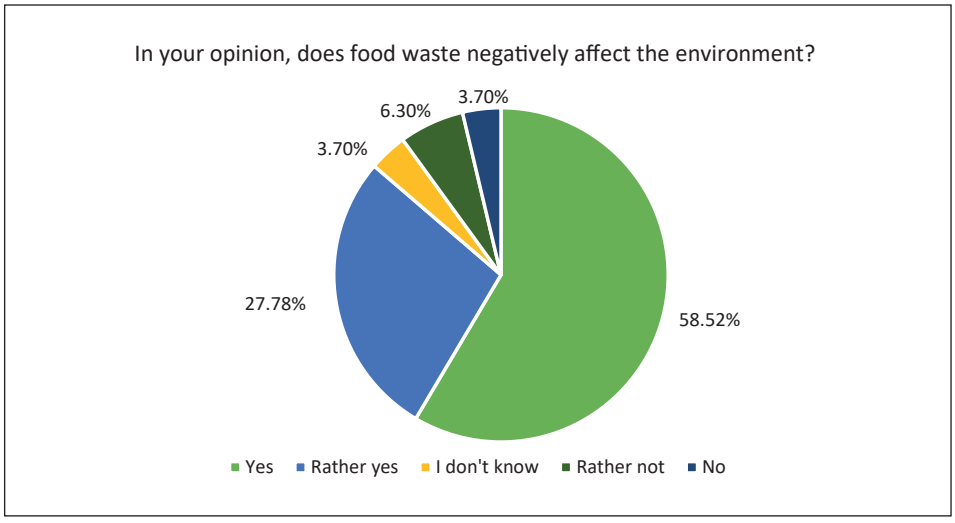
Environmental impact of food waste and food waste practices

Two questions addressed the issue of food waste. Respondents were asked whether food waste negatively affects the environment, and to indicate how often they threw away food.

The vast majority of respondents believe that food waste has a negative impact on the environment (58.52% answered "yes," 27.78% "rather yes"). However, 10% of respondents had a different opinion (6.30% answered "rather not," 3.70% "no") and 3.70% had no opinion on the subject (Figure 4).

As for the practice of throwing away food, only 15.56% of the students surveyed did it "often." It is comforting to note that 74.44% among them "rarely" threw away food and 10% did so "never" (Figure 5).

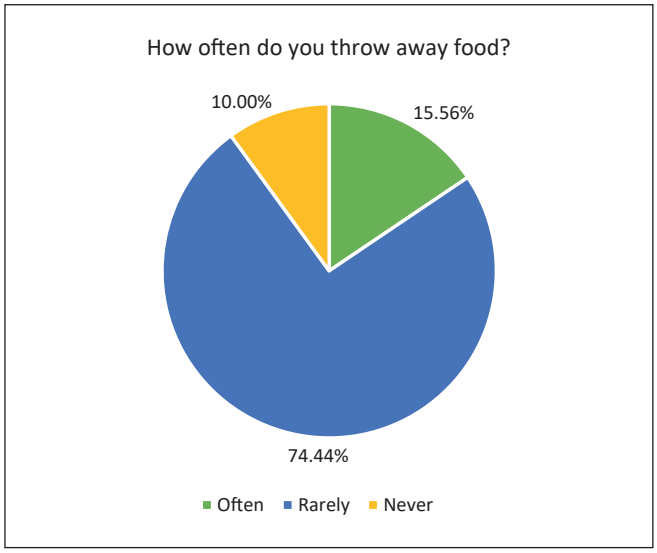
Figure 4. Environmental impact of food waste



Source: authors

Currently, about one-third of the food produced globally is wasted in the food chain. This is a significant environmental burden and demonstrates the inefficiency of the food system which, in light of the information cited related to the impact of agriculture on the

Figure 5. Discarding food



Source: authors

climate and the environment, indicates the need for decisive action (Corrado et al., 2019). Tackling food waste for many countries of the world, as well as international organizations, is one of the priorities in terms of sustainable development. On the one hand, it is important to define a methodology for quantifying food waste, but on the other hand, changing consumer habits is crucial.

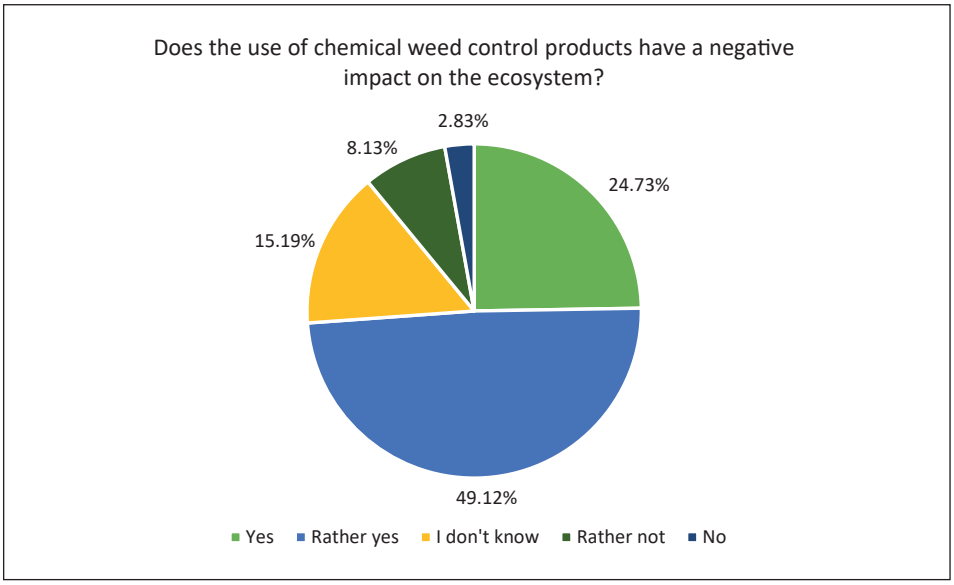
In this context, the answers given testify to a high level of awareness in this area, as well as the prevalence of practices that reflect this knowledge.

Impact of chemical weed control products on the ecosystem

There were five response options ("yes," "rather yes," "rather no," "no" and "don't know") to the question regarding the possible negative impact of using chemical weed control measures on the ecosystem. The vast majority of respondents note the negative impact of these measures (24.73% answered "yes," 49.12% "rather yes"). Almost 11% of respondents hold the opposite view (8.13% answered "rather not" and 2.83% "no") while 15.19% had no opinion on the subject (Figure 6).

Currently, pesticides are used to control weeds and insects and this increases the profitability of agricultural production, as about one-third of crop yields are the result of their use. Without pesticides, there would be a 78% decrease in fruit production, 54% decrease in vegetable production, and 32% decrease in grain production (Tudi et al., 2021). Pesticides are believed to play a key role in modern agriculture, as they help reduce disease and increase crop yields around the world. Pesticides are also used to chemically destroy pests and control weeds, which on the one hand is beneficial to agriculture but on the other can be harmful to other organisms, including birds, fish, beneficial insects and non-target plants, as well as air, water, soil and crops. Pesticide contamination of soil and sediments is a widespread problem in land areas, with adverse effects on food quality and agricultural sustainability.

Figure 6. Negative impact of chemical weed control measures on the ecosystem



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Considering that nearly 73% of the students surveyed (responses of "yes" and "rather yes") note the negative impact of weed control chemicals on the ecosystem, it can be said that this is an issue of great importance to those taking the survey.

Conclusions

Due to the complex research problem the authors have chosen, the conclusions are divided into two parts: students' evaluation of sustainable approaches and practices, and assessment of the impact of these practices on future consumption choices.

As for the beliefs and behaviours of the students surveyed, the conclusions are mixed. Given the cited definition of SD from a 1987 UN report (development that meets present needs without compromising the ability of future generations to meet their needs), agriculture itself is not seen as a threat to the environment by a significant number of respondents. At the same time, most of them note the impact of agriculture on climate change. The vast majority of those taking part in the survey agree with the statement that the use of chemical crop protection products has a negative impact on the ecosystem. Also, food waste is almost unambiguously seen as a negative factor for the environment. There is a paradox in these partial conclusions related to the simultaneous lack of perception of agriculture as a negative factor for the environment, and on the other hand, the perception of practices that are indispensable in modern agriculture (the use of pesticides), also recognizing that agri-food production has a negative impact on the climate. What remains unresolved is why agriculture itself is not seen as a negative factor, causing harm to the ability to meet the needs for future generations.

The issue of food waste, in turn, is of interest for the second main conclusion, that is, the impact of respondents' behaviours on consumer practices. Since the vast majority believe that wasting food has a negative impact on the environment, and only 15% frequently

throw away food, this must be seen as a signpost for food production. The inconsistency described earlier in terms of perceptions of the environmental impact of modern agriculture, with a dominance of opinions indicating a perception of problems associated with practices accompanying crop production, may be due to some lack of knowledge, but the direction of change shows that sustainable consumption can be an important factor in purchasing choices.

Given that the study programs of both AGH University and the Krakow University of Technology make little direct reference to SD knowledge, it can be assumed that some inconsistencies are possible and may be due to ignorance of basic concepts. This is a task for the university authorities who should shape their curricula in such a way as to focus not only on what happens during the limited period that students are at a given university, but also on developing values, knowledge and understanding among students in a way that will help shape the views of future citizens, leaders and policy makers. These inconclusive findings to some extent correspond with other studies, including those from the United States, which show that respondents do not fully integrate their beliefs and actions (Naderi & van Steenburg, 2018). Also, other research, conducted among students from Chinese universities, suggests that additional incentives are needed to more fully implement SD demands (Zeng et al., 2023).

These conclusions, in turn, can be taken as a harbinger of the direction of change in consumption, in which not only price and quality will be the most important factors determining consumer choices, but also issues of a sustainable approach to agricultural production. However, this approach, due to its ambiguity, will pose a challenge for food producers. Food consumption decisions, on the one hand, will be dictated by factors that, until recently, were called "organic," i.e. involving reduced use of pesticides etc (Aertsens et al., 2009), but will also relate to other abstract values, such as future generations, climate and waste. This process will accelerate depending on the implementation of HESD's demands into practice.

Although the concept of sustainability is becoming increasingly popular in academic circles, it is still not yet sufficiently ingrained socially (Ericson et al., 2014). A study conducted more than four decades ago showed that the greater the degree of commitment to an attitude, the more difficult it is to modify it (Sherif et al., 1981). The process of ingraining sustainable attitudes is certainly not served by the problem already signalled, namely the abstractness of the concept, especially in the process of translating it into study programs. A certain solution may be to incorporate such tools as study visits into teaching methods. In the context of food, this could be an opportunity to trace supply chains, in the context of expanding knowledge of the origin of agricultural goods, which has already been the subject of research and analysis (Kearins & Springett, 2003; Springett 2005). Another challenge is the issue of equating SD with environmental protection. While it is true that pro-environmental attitudes are key to getting people to embrace sustainability (Rands & Starik, 2009), SD is a broader concept. This broader context is crucial to understanding and identifying with sustainability, but at the same time is more difficult for consumers to grasp. There is research that consumers are sensitive to socially abusive practices, but face difficulties in accessing information to make decisions (Toussaint et al., 2021). One solution may be the introduction of sustainability labels, the effectiveness of which was proven in a study conducted by a group of Polish researchers from the University of Warsaw in 2019 (Kaczorowska et al., 2019). Such a process, however, involves an elaborate certification system, meanwhile, education in this regard would be of greater value. Nevertheless,

food producers should pay attention to this aspect, as it seems that the issue of sustainable consumption will become more important in the coming years. It is worth noting that this applies not only to the issue of food production. It can be assumed that in the near future the determinants of business development in most industries will be inextricably linked to issues of sustainable consumption.

In view of the problems presented, an important research challenge is to analyse the relationship of consumer attitudes to SD, as well as price formation and market practices in relation to this concept. It is also interesting to learn about the attitudes of entrepreneurs, mainly through the lens of strategy in the context of the growing popularity and knowledge of SD. Accordingly, there is a research gap in this area. Finally, it is of considerable importance to assess the impact of trends present among peers on food purchasing decisions. There are interesting studies on this topic (Edenbrandt et al., 2020; Lazell, 2016), but the issue is worth developing in a broader perspective that takes into account, among other things, the HESD concept.

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