



Article

Types of E-Consumers and Their Implications for Sustainable Consumption—A Study of the Behavior of Polish E-Consumers in the Second Decade of the 21st Century

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Abstract: This article is based on the findings of a longitudinal study examining the behavior of Polish e-consumers. A series of methodically planned and executed surveys was conducted to elucidate the evolution of online consumer behavior over the past decade. The objective of this article is to diagnose changes in the behavior of selected types of e-consumers from Generations X and Y over the last decade, and link them to the concept of sustainable consumption. The 2020 study employed a sample possessing attributes similar to the 2010 research study, maintaining the sample distribution in terms of gender, education, and age. Characterizations of the identified consumer types were derived from prevalent psychographic traits, attitudes towards oneself and others, behavioral patterns, and determinants of buying behavior. Four distinct types of Polish e-consumers were identified: HQ_type (those seeking the Highest Quality products), MS_type (those intending to Save Money during shopping), LT_type (those dedicating the Least amount of Time to shopping), and DP_type (those Deriving Pleasure from the shopping experience). The identified Polish e-consumer types were subjected to a comparative analysis spanning a decade. The findings reveal significant alterations in the behavior of e-consumers representing various types, with a trend favoring sustainable consumption. Generally, Polish e-consumers are shown to demonstrate conscious and sustainable consumption behaviors, such as effective financial management, especially evident in the MS_type group. They typically purchase products within their means, avoiding expensive credits to fulfill their “needs.” Half of the HQ_type, MS_type, and LT_type e-consumers recognize the importance of budgeting and spending tracking for informed consumption, whereas the DP_type, who enjoy shopping, tend to overlook active financial management, perceiving it as a burdensome task. Over the years, a positive shift in the HQ_type’s attitude towards spending management has been observed. A significant aspect of conscious and sustainable consumption involves planned purchases. More than half of the HQ_type, MS_type, and LT_type e-consumers adhere to ready-made shopping lists, while the more impulsive DP_type frequently opts to shop in-store without any preceding planning. This research carries both theoretical and practical implications. The repeatability of the studies renders them a fundamental source of knowledge about the studied populations over time, and serves as an exclusive means of learning about changes in market phenomena and processes in a scientific manner. The findings of this article may prove valuable for e-commerce managers in devising strategies for effective sales promotion and customer communication for different types of e-consumers.



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Keywords: e-consumer; sustainable consumption; consumers’ behaviors; Polish market; types of e-consumers; generation X and Y

1. Introduction

With the proliferation of markets and technological advancements, particularly in Information and Communication Technologies (ICTs), consumer behavior has undergone significant changes. Among contemporary consumers, the Internet has emerged as a vital instrument in purchasing processes. An individual who acquires goods and services online is defined as an e-consumer. The e-consumer satisfies their needs either by buying products on the Internet or by engaging in provided online services [1]. In earlier times, when ICT was not widely adopted, and Internet access was restricted or challenging, the e-consumer was a niche entity. Presently, e-consumers occupy a robust position. They manifest and fulfill their needs through personalized goods and services procured online. The impulses derived from online shopping shape consumer behavior. Distinctions are drawn between e-behavior [1], e-purchasing behavior, and e-consumer behavior. E-buying behavior refers to the selection and/or purchase of goods/services by an e-consumer on the Internet. Conversely, the term e-behavior encompasses all activities undertaken by e-consumers in both real and virtual domains. Behavior refers to the consumer's reaction to factors influencing mobile purchasing, with desire acting as the primary driving force. A hallmark of contemporary times is a life in ceaseless transition and the pursuit of various goals—whether escaping time, seeking reason, accumulating material wealth, or finding bargains intended to enhance one's quality of life. Today, diverse consumer behaviors are increasingly prominent, and some of the literature even discusses a postmodern consumer society. This notion implies that consumers, particularly in affluent societies, can select from an extensive array of consumer goods and services. This breadth of choice is coupled with a variety of beliefs and approaches to consumption, reflecting different levels of human consciousness and value systems. The overarching concept for the conscious consumer is the determinant of sustainable consumption. Nested within this framework are human needs, fair distribution of goods and services, quality of life, resource intensity, waste minimization, product lifecycle thinking, consumer health and safety, and consumer sovereignty [2].

Since the Johannesburg Earth Summit in 2002, sustainable consumption has been synergized with sustainable production (SCP—Sustainable Consumption and Production). In SCP, emphasis is placed on products, services, and consumer responsibility for purchasing sustainable items [3]. Achieving sustainable consumption is influenced, in part, by consumer behavior. In the digitization propelled by the technological advancements of the Third and Fourth Industrial Revolutions, e-consumers have become a prominent consumer group. Digitization facilitates enhanced collaboration with production process stakeholders and enables understanding and analysis of the needs of both partners and customers. Moreover, it allows consumers to participate in the co-creation of products, ensuring they align with their specific needs and desires [4].

Emerging technologies are geared towards augmenting the productivity of intelligent industrial systems. Innovations such as full automation, intelligent robotics, 3D printing, etc., enable manufacturers to boost production flexibility and orchestrate more customized products [5–7]. This flexibility means that it is possible to meet customer–user expectations without compromising the production process's profitability. This is achieved by dynamically adjusting the autonomous modules throughout the entire process of preparation, production, and delivery, utilizing Internet of Things (IoT) and Big Data stored in Cloud Computing [8–10].

Historically, the customer has not always enjoyed the extensive opportunities available today for personalizing purchased products. In nations lacking a mature market economy, customers often face challenges in acquiring personalized products. Poland is an illustrative example, having only transitioned its economic system in 1989. The country's shift toward the end of the 20th century was fraught with difficulties, necessitating numerous reforms to lay the groundwork for a market-based economy. Regrettably, the digitalization progress within Polish households lags behind that of other EU countries. As indicated by the 2022 Digital Economy and Society Index (DESI), Poland ranked 24th out of 27 EU member

states in 2021 [11]. In 2010, based on the research project funded by the Ministry of Science (MNISW), a book entitled *Polish e-consumer-typology of behavior* was written [12]. Recognizing the profound changes that have occurred in the realm of e-consumer behavior in Poland over a decade, researchers from the University of Economics (Jaciow and Wolny) embarked on a study to identify transformations in e-consumer behavior within the country. The 2010 research study was conducted nationwide through face-to-face interviews and online surveys, with the methodology and sample structure as detailed in the research section. To illuminate the shifts in e-consumer behavior over the past decade, the study was replicated in 2020.

This paper draws upon longitudinal studies conducted from 2010 to 2020, focusing on the behavior of Polish e-consumers from Generations X and Y. To elucidate the evolution in online consumer behavior over this period, two methodically planned and executed surveys were employed. The 2020 survey was carefully designed to mirror the demographic composition of the 2010 study, maintaining equilibrium in terms of gender, education, and age. Notably, participants in the 2020 study were a decade older than those in the 2010 survey (with ages starting at 28 in 2020, compared to 18 and above in 2010). The intentional exclusion of younger participants served as a deliberate strategy to prevent potential distortion of the study's findings.

The present work is structured into two main sections: the theoretical framework, referred to as the “background to research”, and the empirical component derived from field research. The aim of the article is to diagnose changes in the behavior of selected types of e-consumers from Generations X and Y over the last decade and relate them to the concept of sustainable consumption.

To achieve this goal, the authors stated the following research question:

RQ1: How have the behaviors of the types of Polish e-consumers from Generation X and Y (analyzed group) distinguished in 2010 and 2020 changed?

RQ2: How have the determinants of online shopping activity of the identified types of Polish e-consumers from analyzed group changed?

RQ3: Did the behaviors of Polish e-consumer types from Generation X and Y become more sustainable?

The paper is structured as follows: we begin with an Introduction, followed by Section 2, which presents the theoretical background. Section 3 provides information on the study method, including data collection. Section 4 presents the results of our analysis and the typology of e-consumer behaviors. The discussion about the types in the context of sustainable consumption is in Section 5. Section 6 includes conclusions and limitations as well as directions for future research.

2. Theoretical Background

E-consumption has witnessed substantial growth over recent decades, paralleling the evolution of the Internet and computer technology. Unlike traditional shopping, e-consumption is unbounded by temporal or spatial constraints [13,14]. The e-consumer, utilizing mobile devices, actively engages in browsing online shopping offers and executing purchases. Such consumers discover products on various websites, drawn by their accessibility, functionality, and convenience for shopping [15]. E-consumers actively compare the attributes, features, and prices of various products through their personal computers or mobile devices. These devices facilitate not only communication but also the ordering, payment, shipment tracking, and other transactional elements inherent to e-commerce [16].

This growth in e-consumption is further bolstered by the burgeoning information society [17]. The demographic of computer and mobile device users has expanded in tandem with increased access to the Internet and computers. As of 2010, there were approximately 1.5 billion users worldwide, a figure that ballooned to 4.66 billion by 2020, constituting 59.5% of the global population [18]. This expansion, exceeding 3 billion new users in a mere decade, signifies the e-consumer's amplified access to responsive e-commerce web-

sites. Consequently, online marketplaces have become increasingly appealing, converting more visitors into purchasers. In this digital age, individuals are devoting unprecedented amounts of time online (an average of 6 h and 43 min per day, equivalent to more than 100 days per annum or over 40% of one's lifetime [19]).

The ascent of e-commerce has also been influenced by the conceptual framework of Industry 4.0, introduced in 2011. Within this paradigm, technologies spawned from the Fourth Industrial Revolution fostered enhanced product personalization capabilities [20,21]. With ongoing advancements in digital technologies, personalization within e-commerce is gaining prominence.

E-commerce platforms and online sites proffer personalized products and services to online customers [20]. Physical devices, embedded with sensors and tags, are interwoven into the Internet of Things (IoT), granting real-time access to comprehensive information. This links electronic devices across distributed systems. Mobile devices are becoming integral to systems, processes, resources, suppliers, and customer networks, shaping purchasing into an element of cyber-physical production systems (CPPSs) that forge novel supply chains [22]. CPPSs, as open socio-technical systems, are capable of executing diverse functions and activities encompassing production, logistics, sales, and management [22]. They facilitate data collection, processing, and interaction with the physical processes of crafting personalized products, all through unlimited network connections with minimal human intervention [23–25]. In this cyber-physical ecosystem, both manufacturers and retailers are capitalizing on personalization as a means to enhance user convenience. Personalization proactively presents customers with tailored services that cater to individual needs [26]. According to Adolphs and Winkelmann [27], the capacity for manufacturers and vendors to personalize products and services hinges on three key factors: (1) the creation of a 'virtual image' of the user, (2) the availability of meta-information about the products, and (3) the presence of methodologies to synthesize these datasets into customer recommendations. These determinants are actualized through the proliferation of the Internet, cloud computing, IoT, social media, phones, laptops, AI, 5G networks, and other technological innovations. The e-consumer thus becomes an integral component of the CPPSs, actively participating in the co-creation or co-design of the product. The e-consumer serves as an active participant within the CPPS, directly communicating needs and aspirations to intelligent technologies within smart factories [28,29].

Artificial Intelligence (AI) is already facilitating new opportunities for the personalization or 'hyper-personalization' of products and services, such as intelligent conversations with customers, recognizing consumer expectations, constructing virtual images of e-consumers, and predicting customer purchasing choices [30]. Hyper-personalization empowers sales personnel to respond expeditiously to customer needs, fostering close, personal relationships without the requirement for face-to-face interactions. Products are conceived from customer experiences and preferences, enabling producers to deliver highly contextual messages to the appropriate customers at the optimal place, time, and through the right channel [31]. In contemporary sales and marketing practices, personalization is strategically tailored to enhance the buyer's experience using AI [32].

In the burgeoning digital society and economy, the e-commerce market has become increasingly appealing to various consumer groups. The e-consumer, armed with tools like product search engines, producer rankings, price comparisons, peer reviews, virtual advisors, product testing in virtual spaces, and advanced knowledge such as 3D visualization, engages differently from traditional consumers. The principal drivers and influencers in the e-commerce market comprise personalization, programmatic buying, loyalty and CRM, omnichannel and cross devices, m-commerce including mobile payments, and full funnel considerations [33,34]. The digital space offers an expansive array of purchasing choices for e-consumers, characterized by behaviors distinct from traditional consumers. Business-to-Consumer (B2C) sectors are employing agile, open communication strategies to capture e-commerce market shares. Manufacturers seek e-commerce data to track sales

and discover new opportunities, while consumers utilize e-commerce capabilities to make informed decisions [35].

The Business-to-Consumer (B2C) sector consists of transactions between a company and a customer who, upon engaging with the products on a particular website, seeks to complete the shopping experience in an efficient, fast, and user-friendly manner, devoid of unnecessary formalities. Research on e-consumer behavior spans a wide array of perspectives [36–39], acknowledging the diversity among consumers. Similar to the diversity in goods, services, and products, there exists a multiplicity of e-consumer types. These e-consumers vary in their purchase motivations, levels of engagement, and cognitive approaches. The e-consumer, analogous to the traditional consumer, engages in purchasing decisions that are motivated either by emotional impulses or rational considerations. Many scholarly publications conceptualize consumers along a bipolar axis, where one end represents the assertive consumer adhering to the “Stick to my list” philosophy, and the opposite end is characterized by consumers who “regularly make impulse purchases” [40,41]. This dichotomy of rationality versus emotionality leads to classifications such as ‘Impulsive Consumers’ or ‘Need-Based Consumers’ [42]. Personalization, attention to individual needs, and consistent marketing contact are fundamental for successful engagement with consumers [42]. Alongside traditional consumer categories, the e-consumer group also comprises ‘discount consumers’ or those oriented towards low prices [42]. Other vital determinants of purchasing decisions include quality and brand reputation [43]. The category of e-consumers also includes “wandering customers”—those uncertain about their purchase needs [44]. A proficient e-consumer is often marked by digital engagement, defined as “the customer’s willingness to actively participate and interact with a focal object (e.g., brand, organization, community, website, organizational activity), varying in positive or negative direction and magnitude (high or low) based on the nature of the customer’s interaction with different physical and virtual touch points” [45]. Recent years have witnessed an exponential growth in online e-commerce domains, with customers transitioning from mere “passive consumers of information” to active “co-creators of value,” contributing to an innovation in products and services [46]. In the realm of e-consumer behavior, it is pivotal to underline the significance of digital experience. For instance, 69% of online shoppers cite excessively high shipping costs as the primary reason for cart abandonment [47]. Similarly, 75% of smartphone users disengage with a website if it is not optimized for mobile use. Furthermore, integrating customer testimonials on a website can elevate conversion rates by up to 34% [48]. E-consumer expectations concerning the value of purchased products have evolved from a focus on mass customization [49] to prioritizing personalized experiences through applications in e-commerce [50], the customization of product information [51], and the individualization of products [52].

In the past two decades, the phenomenon known as sustainable consumption (SC) has been burgeoning in strength and significance globally, Poland included. Consumer orientation towards sustainability has emerged as a focal point of interdisciplinary research spanning sociology, economics, law, psychology, philosophy, and other fields. Sustainable consumption, grounded in a humanistic concept, strives to satisfy human needs in a manner that will not undermine the ability of future generations to meet similar needs. It is a term closely aligned with the political doctrine of sustainable development [53,54]. Various synonyms for sustainable consumption exist, such as green consumption or ethical consumption [55,56]. In the UK, for instance, the preference leans towards ethical consumption, whereas in Poland, the terminology encompasses both responsible consumption and sustainable consumption.

The notion of sustainable e-consumption encapsulates a specific form of consumer behavior. Yet, defining the framework for these various types of consumption proves to be a complex, if not insurmountable, task. Researchers’ inclinations often derive from a subjective interpretation of the research topic or the weight and cultural resonance of specific terms. Neale (2007) [57] focuses on the moral attributes of the e-consumer, frequently characterized in environmentally friendly terms. Kazdin (2009) emphasizes the

conservation of raw materials in sustainable consumption [58], while Wang (2006) outlines the universally recognized “5R” principle of green consumption (save resources, reduce pollution; green life, reevaluate; choose and buy used repeatedly, reuse; classify, recycle; protect nature, rescue) [59]. Myrseth and Fishbach (2009) posit that a sustainable consumer exhibits full self-control [60]. Despite numerous studies, a clear typology of sustainable consumers remains elusive, and definite conclusions about prevailing characteristics in consumer behavior are wanting. Within the shopping experience, the e-consumer’s decisions are often marked by a dissonance: a struggle between self-interest and the broader public interest of sustainability. When the e-consumer’s choices are predominantly driven by personal interests, purchases may lack rationality. The dynamics of online shopping present consumers with conflicting desires. On one hand, there is the aspiration to be a sustainable consumer; on the other, the pursuit of satisfying personal needs in an enjoyable manner [61,62].

Given this context (and acknowledging the research gap), the authors of this paper have embarked on a study examining e-consumer behavior in Poland over the past decade. The outcome will be an exploration of consumer typology and an evaluation in light of the principles (or ideals) of the sustainability concept. It must be underscored that contemporary scholarship increasingly highlights the misappropriation of the sustainability concept [63], complicating efforts to define it with precision (a phenomenon referred to as the “sustainable bubble”) [64]. Thus, the authors address the behavior of sustainable e-consumers without definitively categorizing whether the research findings—the proposed consumer typology—conform entirely to the broader paradigm of sustainable consumption.

3. Data and Method

In the analysis of socio-economic phenomena development, repeated studies—longitudinal research—hold particular importance. They allow not only for an evaluation of the current state of the examined phenomena but also for monitoring their changes. These studies involve multiple measurements of the same phenomena and characteristics, conducted on diverse research samples drawn from the same population, using the same measurement tool [65]. Longitudinal research was undertaken in the study of changes in the types of Polish e-consumers from Generations X and Y.

E-consumer refers to a person who uses the Internet to satisfy their consumption needs by purchasing products (goods and services). The actions and behaviors of these individuals that can be observed online are collectively referred to as e-behaviors [12]. The study conducted in 2010, was nationwide and involved a combination of face-to-face interviews and online survey methods on a sample of 1350 people. The gender distribution in the research sample was evenly distributed, with 50% women and 50% men. Approximately one-third of respondents were under 24 and the remaining two-thirds were at least 25 years old. More than half of the participants had higher education and more than two-thirds were employed.

The 2020 research study was conducted using a sample with characteristics similar to those of the 2010 study. The distribution of the sample was maintained in terms of sex, education, and age, albeit the respondents in the 2020 research were ten years older than those in 2010 (in 2010, the study involved individuals aged 18 and above, while in 2020, it included those aged 28 and above). Deliberately, younger respondents (from generation Z) were not included in the sample to avoid skewing the research results. Changes in the distribution of employment status in the sample were observed due to the transition of young people from education to active participation in the labour market. The selection criteria for the research sample remained unchanged and included individual consumers shopping online. Table 1 presents an overview of the characteristics of research samples from 2010 and 2020.

Table 1. Characteristics of research samples in 2010 and 2020 (in %).

Items		2010	2020
Sample Size (N)		1350	1150
gender	men	50.0	50.0
	women	50.0	50.0
four age groups of consumers	up to 21 years old (sample 2010) up to 31 (sample 2020)	11.2	25.8
	22–24 (sample 2010) 32–34 (sample 2020))	26.7	12.1
	25–32 (sample 2010) 35–42 (sample 2020)	31.2	31.2
	33 and over (sample 2010) 43 and over (sample 2020)	31.0	30.9
	up to 24 (sample 2010) up to 34 (sample 2020)	37.9	37.8
two age groups of consumers	25 and over (sample 2010) 35 and over (sample 2020)	62.1	62.2
	average age (in years)	29.9	39.2
education	basic and professional	2.2	2.0
	medium	39.0	41.2
	higher	58.8	56.8
activity professional	working	67.4	93.4
	not working	32.6	6.6

Source: own study.

The scope of the studies conducted in 2010 and 2020 is presented in Table 2.

Table 2. The scope of the analysis of changes in Polish e-consumers.

The Profile of E-Consumers		Attitudes Towards		Online Purchasing Behaviors	
-	economic features	-	obligations	-	assortment structure of the shopping basket
-	socio-professional features	-	ecology	-	motives for making online purchases
-	personality traits	-	fashion	-	methods of gathering and sources of information about the offer
-	value system	-	shopping	-	determinants of product selection and place of purchase
-	eating habits	-	changes		
-	physical condition	-	saving		

Source: own study.

The research presented in the article uses the methodology of an internet survey. The authors were aware of the challenges of recruiting respondents for online surveys compared to other research techniques such as face-to-face interviews. Electronic invitations to participate in online surveys often run the risk of being perceived as spam by Internet users. Therefore, the graphic presentation in the invitation plays a key role in attracting the attention of potential participants [66].

The effectiveness of the research and the credibility of the information obtained largely depend on the researchers' ability to control the distribution of the research sample. However, in survey-based studies, full control over the characteristics of the participating individuals and their response rates remain a challenge, despite efforts and reminders [67]. Online surveys face various problems including low motivation to participate [68], low

response rates, respondents randomly clicking on answers [69], carelessness of respondents, lack of reflection among participants [70], presence of bots completing surveys, and instances of IP web interface abuse [71]. In addition, the authors had to address the issue of low male participation in the study, a persistent challenge seen in studies for several years. The ratio of women and men participating in the study has slightly shifted from 80/20 in 2010 to 60/40 in 2020.

The tool employed to construct the online survey questionnaire ensured the appropriate graphical format for presenting the questions. Furthermore, it enforced the provision of mandatory responses, as respondents were unable to proceed to the next question without selecting an answer. It was explicitly stated that respondents could not modify their answers after completing the survey, and they were also unable to return to previous pages during the answering process. Additionally, each respondent was permitted to answer the questionnaire only once, ensuring data integrity and avoiding duplicate responses.

The research questionnaire encompassed enquiries pertaining to the attributes of e-consumers, their behaviors in specific market scenarios, and their attitudes towards online shopping. The questionnaire employed a diverse range of measurement scales, including nominal scales, ordinal scales, point scales, and unipolar scales. To evaluate the personality traits of e-consumer types, a scoring system ranging from 1 to 5 was employed. A score closer to 1 denoted a negative intensity of the personality trait (e.g., lack of humour, disloyalty, lack of resourcefulness, lack of ambition, etc.), while a score closer to 5 indicated a positive intensity of the characteristic. In the investigation of determinants influencing online shopping, a nominal scale was utilized, which limited respondents to selecting up to 3 choices from the available options.

The attitudes of e-consumers towards diverse market phenomena, encompassing the natural environment, transformations, prosumption, upcycling, and fashion, were examined employing a closed dichotomous scale. This scale necessitated respondents to select their preferred attitude from a set of two opposing options. Likewise, the same scale was adopted to explore the patterns of shopping behavior among e-consumers.

4. Results

The compilation and analysis of the variables utilized in the study facilitated the establishment of a typology of e-consumers. The typological procedure involves the arrangement and logical ordering of elements within a given set (such as objects or phenomena) based on a comparison of their characteristics with those recognized as types within the set. The objective of typology is to identify distinct types and reveal characteristic sets of features associated with each type. A type can be defined as a phenomenon, attribute, or configuration of phenomena or attributes pertaining to the objects, events, or processes under consideration, which is deemed sufficiently significant to warrant special attention and differentiation within the conceptual framework [72]. The process of typology entails the identification of homogeneous consumer types based on a set of criteria (i.e., selected variables from the questionnaire), determining their proportions, and characterizing the demographic, social, and economic aspects of the identified types.

The execution of a typology for Polish e-consumers posed a challenge. The attitudes and behaviors of the respondents intertwined across various dimensions, making it practically infeasible to distinguish discrete types. The authors endeavoured to establish a typology of Polish e-consumers based on their attitudes towards non-grocery shopping. Respondents were prompted to select one answer to the question: What is most important to you when shopping (excluding everyday grocery shopping)?

- Prioritizing the purchase of high-quality products
- Saving money
- Dedication of minimal shopping time
- Enjoying the shopping experience

The typology was conducted based upon the outcomes of the distribution of the respondents' responses in a cross-tabulation table. In this schema, the dependent variable

was the enquiry, “What is most important to you when shopping (excluding everyday grocery shopping)?”, whereas the independent variables encompassed questions pertaining to the respondents’ traits, attitudes, and purchasing behaviors. This identical analytical procedure was implemented in both 2010 and 2020.

Based on the dominant psychographic characteristics, attitudes towards oneself and others, behavioural patterns, and determinants of purchasing behavior, the identified consumer types were characterized. The typology was conducted based on research findings from 2010 and 2020. The types of Polish e-consumers were subjected to a comparative analysis spanning a decade. Four types of Polish e-consumers from analyzed group were distinguished:

- **HQ_type**: Those seeking the Highest Quality products
- **MS_type**: Those aiming to Save Money during shopping
- **LT_type**: Those dedicating the Least amount of Time to shopping
- **DP_type**: Those Deriving Pleasure from the shopping experience

In 2010, HQ_type comprised 35.1% of the respondents, whereas in 2020, this figure decreased to 30.1%. The proportion of MS_type was 37.5% in 2010 and 29.8% in 2020. LT_type accounted for 20.6% of the respondents, which increased to 27.8% in 2020. DP_type encompassed 6.7% of the respondents in 2010, rising to 12.3% in 2020 (Figure 1).

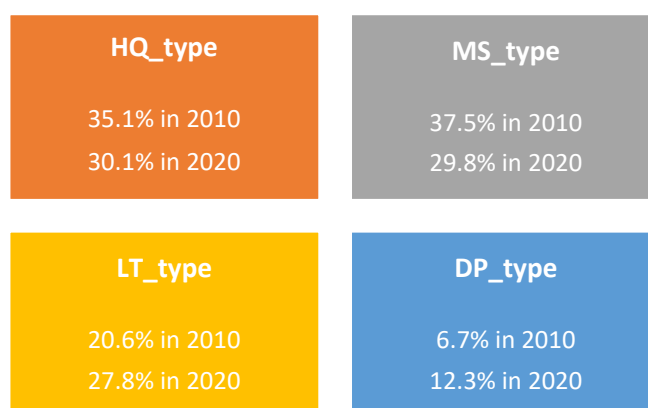


Figure 1. Types of Polish e-consumers. Source: own study.

The category of e-consumers characterized as the HQ_type, who seek products of the highest quality, primarily consists of men aged between 35 and 42 years, possessing higher educational qualifications, and they are actively employed. These individuals typically engage in formal employment contracts, commission-based work, or freelance arrangements, while also operating their own entrepreneurial ventures and deriving substantial capital gains, thereby yielding elevated incomes. Moreover, they are predominantly married and tend to represent households comprising two or more individuals. Notably, these discerning consumers exhibit traits such as resourcefulness, ambition, patience, loyalty, and optimism, distinguishing them markedly from their counterparts who typified this category a decade ago. Specifically, in the year 2010, the prevailing characteristics encompassed altruism, openness, patience, and innovation, whereas in 2020, the traits evolved to encompass resourcefulness, ambition, patience, loyalty, and optimism. Resonating with the trends observed in 2010, these consumers in 2020 continued to prioritize the aspects of product quality, brand reputation, and product attributes during their purchase decisions.

In 2010, the primary determinants of online purchases made by e-consumers seeking high-quality products were the comparatively lower prices of the available offerings and the ability to compare products originating from diverse manufacturers. However, by 2020, the key drivers behind online shopping experiences had shifted, with the convenience of round-the-clock access and time efficiency assuming paramount importance. Consequently, the significance of lower prices for the offered products exhibited a discernible decline (Figure 2).

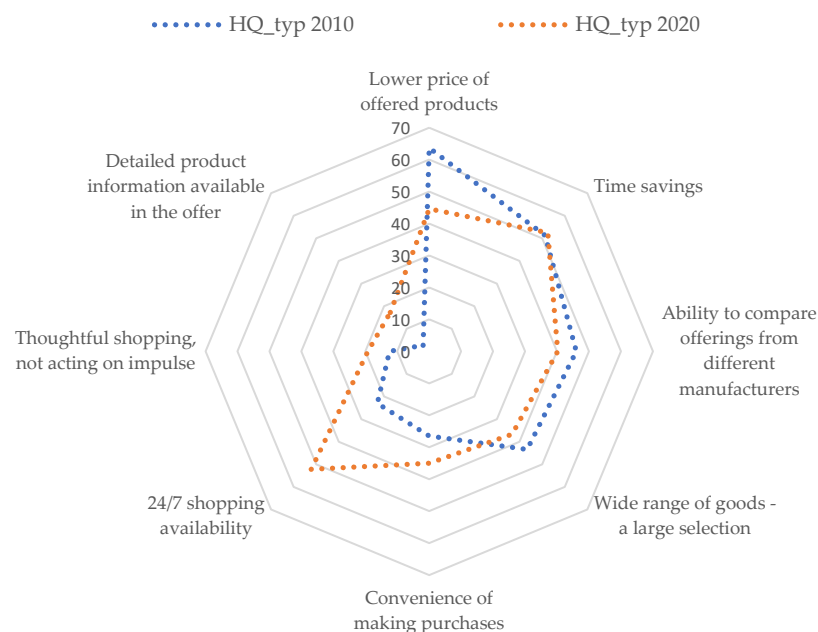


Figure 2. Determinants of online purchases by HQ_type in 2010 and 2020. Source: own study.

The category of e-consumers identified as the MS_type, characterized by their inclination to save money while making purchases, consists predominantly of women rather than men. They possess a secondary school education and are engaged in employment through formal employment contracts or receive pensions/retirement benefits. Typically, these individuals represent households with three members. They earn an average income. Notably, their character traits have undergone a transformation, as they have become more frugal and systematic in their savings habits, displaying a heightened focus on tasks and goals. A decade ago, they were characterized by traits such as openness, resourcefulness, innovation, and a sense of humour. During the product selection process, similar to both 2010 and 2020, they continue to be guided by price, whereas promotions hold less significance for them compared to a decade ago, with greater importance placed on the quality of the purchased product.

Consistently, this type of e-consumer primarily engages in online shopping due to the lower prices of products available on the Internet. In 2020, their motivations for online shopping were not as influenced by the wide product selection or access to detailed product information, as was the case in 2010. Instead, time savings and the ability to shop 24/7 throughout the week emerged as more compelling factors (Figure 3).

The category of e-consumers identified as the LT_type, characterized by their desire to minimize the time spent on shopping, primarily consists of men over the age of 43, with a secondary or higher level of education, engaged in employment and earning average incomes, mainly through employment contracts or their own businesses. They are married and represent households of three to four individuals. In 2010, individuals fitting this category were described as systematic, assertive, loyal, innovative, and hardworking. However, in 2020, the most prominent characteristic is diligence, while other personality traits are less pronounced. When selecting products in 2020, they prioritize brand, quality, and habit, which aligns with their preferences in 2010.

The main reason for engaging in online shopping remains consistent over time, namely, time savings. The significance of lower prices of the offered products, a wide product selection, and the ability to compare offerings from various manufacturers has diminished. In contrast, the ability to make purchases at any time of the day or week and the convenience of online shopping have gained prominence (Figure 4).



Figure 3. Determinants of online purchases by MS_type in 2010 and 2020. Source: own study.

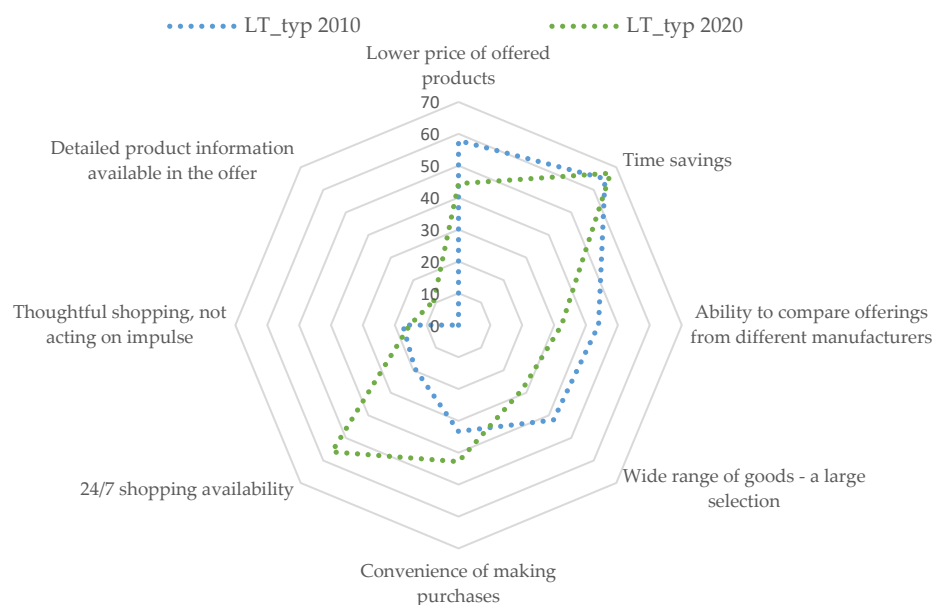


Figure 4. Determinants of online purchases by LT_type in 2010 and 2020. Source: own study.

The category of e-consumers who derive pleasure from shopping, referred to as the DP_type, primarily consists of women aged 35–42, with a secondary or higher level of education, employed under employment contracts, married, and representing households of 2–4 individuals. They earn average incomes. This type, which derives enjoyment from shopping, still practices occasional savings. They remain open-minded and systematic, but are less loyal and more focused, while exhibiting a greater sense of humour, innovation, altruism, truthfulness, and assertiveness. When selecting products, they continue to be influenced by fashion trends, and the importance of product quality has also gained significance.

The main reasons for engaging in online shopping in 2010 were the lower prices of the offered products and the ability to compare products from different manufacturers. In 2020, the primary motivations shifted towards the convenience of 24/7 shopping and time savings provided by online shopping (Figure 5).

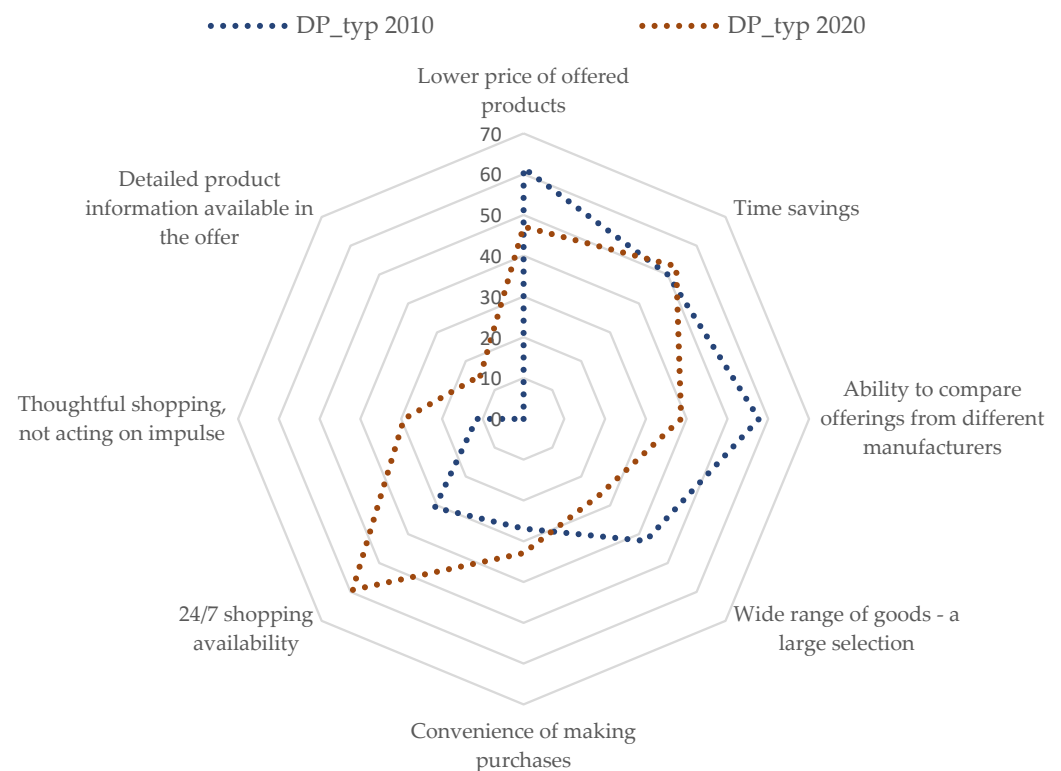


Figure 5. Determinants of online purchases by DP_type in 2010 and 2020. Source: own study.

Throughout their lives, consumers frequently change their attitudes and shopping behaviors. Attitudes refer to the mental and emotional states of readiness in an individual, shaped by experiences, which guide and organize their responses to specific objects and situations. Attitudes are related to objects and phenomena in the environment, and consumer buying behaviors are an expression of these attitudes [73]. Attitudes can result from the consumer's own experiences and actions or can be acquired from the environment through observations, for example. The Internet is a space where e-consumers increasingly shape their (positive or negative) attitudes, including those towards products, brand manufacturers, online stores, etc., and exchange thoughts and perceptions.

Over the past decade, the attitudes and shopping behaviors of the distinct types of e-consumers have changed. The HQ_type e-consumers, seeking products of the highest quality, have become more diligent and accomplish their tasks ahead of schedule. Previously, their decisions were based on rational criteria, whereas now they make decisions based on the situation. They have stopped worrying about what other people think of them. Other attitudes have remained unchanged, but their intensity has shifted. The HQ_type e-consumers have become more responsible and environmentally conscious (conserving energy, water, and recycling waste). They are more inclined to establish connections with other people and prefer doing things themselves rather than buying. They also prioritize healthier eating habits (Table 3). The MS_type e-consumers, focused on saving money during shopping, have overcome their difficulties in establishing connections with others over the past decade. They now make decisions based on the situation and no longer worry about what others think of them. Other attitudes have not undergone significant changes, but their intensity has shifted. The MS_type e-consumers have become more ecologically conscious and prefer doing things themselves rather than buying (Table 3).

Table 3. The attitudes of Polish e-consumers from Generations X and Y in 2010 and 2020.

Items	HQ_Type		MS_Type		LT_Type		DP_Type	
	2010	2020	2010	2020	2010	2020	2010	2020
I always complete my tasks ahead of time	48.0	55.7	53.8	60.0	50.0	57.0	66.7	57.6
I always leave everything until the last minute	52.0	44.3	46.2	40.0	50.0	43.0	33.3	42.4
I easily establish connections with other people	60.9	77.5	41.2	74.8	56.2	78.1	70.6	85.1
I struggle to establish connections with other people	39.1	22.5	58.8	25.2	43.8	21.9	29.4	14.9
I eat healthy and regularly	52.7	62.1	56.6	54.9	61.3	54.8	70.6	56.9
I eat unhealthy and irregularly	47.3	37.9	44.4	45.1	38.7	45.2	29.4	43.1
I take care of my physical fitness and regularly engage in sports	58.1	60.7	46.8	45.8	60.6	45.2	60.0	47.8
I neglect my physical fitness	41.9	39.3	53.2	53.2	39.4	54.8	40.0	52.2
I make decisions based on rational criteria	59.7	42.5	57.1	36.8	55.8	34.4	23.1	34.1
I make decisions depending on the situation	40.3	57.5	42.9	63.2	44.2	65.6	76.9	65.9
I worry about what other people think of me	50.6	44.2	57.9	47.3	52.9	36.3	62.5	51.8
I don't care about what other people think of me	49.4	55.8	42.1	52.7	47.1	63.7	37.5	48.2
I adapt easily to changes	61.8	66.9	52.0	52.4	52.8	59.0	61.1	60.7
I am reluctant to embrace any changes	48.2	33.1	48.0	47.6	47.2	41.0	38.9	39.3
I take care of the environment	63.6	90.0	51.4	84.1	54.3	85.3	58.8	87.1
I disregard the environment	36.4	10.0	48.6	15.9	45.7	14.7	41.2	12.9
I prefer to do things myself rather than buying them	58.7	68.7	56.8	72.3	60.8	67.8	76.2	67.6
I dislike doing things myself and prefer to buy them	41.3	31.3	43.2	27.7	39.2	32.2	23.8	32.4
I enjoy keeping up with current trends and fashion	59.2	59.3	50.0	54.1	41.2	45.6	76.5	73.9
I have no interest in new market trends	40.8	40.7	50.0	45.9	58.8	54.4	23.5	26.1

Source: own study.

The LT_type e-consumers, dedicated to minimizing the time spent on shopping, no longer make decisions based on rational criteria and do not prioritize their physical well-being as much. They have also stopped worrying about what others think of them. The intensity of some of their attitudes has changed. This type finds it easier to establish connections with others and pays more attention to the natural environment (Table 3). The DP_type e-consumers, who derive pleasure from shopping, have paid less attention to their physical well-being in the past decade. Their other attitudes have remained unchanged, but their intensity has shifted. They show a greater concern for the natural environment and find it easier to establish connections with others. They engage in healthy and systematic eating habits less frequently and worry less about what others think of them (Table 3).

As research indicates, over the past decade, e-consumers, regardless of their type, have become more environmentally conscious and find it easier to establish connections with others. They are more likely to make decisions based on the situation and worry less about others' opinions.

The HQ_type of Polish e-consumer consistently exhibits purchasing behavior focused on acquiring the perceived best products, regardless of their price. This group of e-consumers may resort to taking loans or borrowing money to facilitate the acquisition of more expensive items. They are meticulous in carefully evaluating different products, investing a significant amount of time in the selection process, and making decisions based on rational criteria.

There have been significant changes in the pattern of multiple sclerosis-type behavior over the past decade, while some aspects have remained the same. E-consumers, for whom saving money is a priority, still prioritize the purchase of essential items and try to manage their finances prudently. Before making a purchase, they meticulously assess their financial capabilities and carefully compare prices from different retailers, trying to ensure the most cost-effective options. Although they show less reliance on shopping lists, they maintain heightened awareness of their spending, recognizing the usefulness of such practices in managing their budgets effectively.

The behavioural patterns that characterize the LT_type have undergone significant changes over the past decade. While their preference for familiar products remains intact, the propensity to save money specifically for more expensive purchases has decreased. Tracking personal spending no longer features prominently in their practices, but they engage in the practice of creating precise shopping lists that outline their intended purchases.

It is worth noting that they put less emphasis on meticulous product research and instead opt for convenience and immediate availability.

The behavioural patterns exhibited by the DP_type have changed minimally over the last decade. This segment of consumers shows a spontaneous approach to consumption, willingly purchasing desired products without taking into account immediate affordability. Their passion for novelty fuels the desire to experiment with new products, and their reluctance to track spending stems from perceiving it as a burdensome task. In the retail environment, they make purchasing decisions quickly, with limited thought.

Overall, these findings shed light on enduring and evolving e-consumer behavior across typologies, providing valuable insights into the complex dynamics of conscious and sustainable consumption practices. Table 4 summarizes the percentages of all of the types of Polish e-consumer displaying the researched purchasing behavior.

Table 4. Shopping patterns of Polish e-consumers from Generations X and Y in 2010 and 2020.

Items	HQ_Type		MS_Type		LT_Type		DP_Type	
	2010	2020	2010	2020	2010	2020	2010	2020
I buy what is necessary, trying to manage money efficiently	78.8	75.8	99.1	91.0	94.7	84.8	80.8	78.9
I buy the best regardless of the price	21.2	24.2	0.9	9.0	5.3	15.2	19.2	21.1
If I want something, I buy it and don't think about whether I can afford it at the moment	15.0	26.0	8.8	19.0	17.5	27.9	23.1	28.8
Before buying something, I carefully check if I can afford it	85.0	74.0	91.2	81.0	82.5	72.1	76.9	71.2
I usually buy products that I have known for a long time	62.8	58.0	63.7	59.0	71.9	65.1	34.6	49.3
I like to buy new products to try them out	37.2	42.0	36.3	41.0	28.1	34.9	65.4	50.7
Before buying something expensive, I save money	96.5	88.5	94.7	92.0	98.2	91.0	80.8	89.1
I often take out a loan or borrow money to buy something expensive	3.5	11.5	5.3	8.0	1.8	9.0	19.2	10.9
I keep track of expenses because it helps me manage money	42.5	50.9	55.8	53.0	57.9	52.7	34.6	37.4
Managing bills is a waste of time and doesn't accomplish anything	57.5	49.1	44.2	47.0	42.1	47.3	65.4	62.6
I usually check prices at different stores and try to buy as cheaply as possible	80.5	85.0	85.8	85.8	80.7	81.1	76.9	76.9
I usually don't have time to compare prices at different stores	19.5	15.0	14.2	14.2	19.3	18.9	23.1	23.1
If what I bought doesn't suit me or has a defect, I return it to the store right away	72.6	78.7	59.3	69.0	71.9	78.6	69.2	74.2
I feel awkward when I have to return a purchased item to the store	27.4	21.3	40.7	31.0	28.1	21.4	30.8	25.8
I go shopping with a precise list of things I want to buy and only buy those	46.0	52.4	60.2	52.1	52.6	60.3	26.9	41.5
I decide what to buy only when I'm in the store	54.0	47.6	39.8	47.9	47.4	39.7	73.1	58.5
I carefully look at different products and take a long time to choose	90.3	82.5	92.0	81.9	82.5	75.4	80.8	81.5
I take whatever is convenient	9.7	17.5	8.0	18.1	17.5	24.6	19.2	18.5

Source: own study.

Behaviors that indicate conscious and sustainable consumption of e-consumers include effective management of their finances. Most of the surveyed Polish e-consumers show such behavior, with the largest group falling into the MS_type category. Another manifestation of sustainable consumption is the conscious purchase of products within the available funds, without resorting to expensive loans to meet “needs”. This behavior is dominant among all types of e-consumers, with the highest prevalence in the MS_type group. What is worrying, however, is that over the last decade the percentage of consumers who only buy products they can afford has decreased across all types of Polish e-consumers.

Analysing and tracking your budget are behaviors that indicate conscious consumption, as they help you manage your household finances. Such behavior is characteristic of every second Polish e-consumer in the HQ, MS, and LT types. A DP_type, who enjoys shopping, is less interested in their spending and does not actively manage it, considering it a waste of time. It is worth noting that over the years there has been a change in the approach of the HQ e-consumers in this area. The number of people who began to

pay attention to their expenses, analyse them, and try to manage them more effectively has increased.

Conscious and sustainable consumption results from carefully planned purchases. Creating a precise list of desired products and sticking to this list is a practice used by more than half of the Polish HQ_type, MS_type, and LT_type e-consumers. On the other hand, the DP_type, who enjoying shopping, decides what to buy only after reaching the store and does not plan their purchases in advance.

5. Discussions

With the technological advances that have boldly entered businesses in recent decades, the paradigm of sustainable consumption needs to be refined. This is due to the emergence of strong links between sustainable consumption and various facets of modern society and the economy, such as the digitalization of societies, personalization of information, products, marketing, smart manufacturing, and so forth. Within the much-promoted concept of Industry 4.0, a compelling question arises: “how sustainable is smart, and how smart is sustainable?” [74,75]. Sustainable consumption is one of the primary objectives of the green economy, and its concept also derives insights from the sharing economy, one of the latest trends in economics. Sustainable consumption can be viewed as an umbrella term encompassing various aspects like human needs, equity, quality of life, resource intensity, waste minimization, product lifecycle, health, safety, consumer sovereignty, etc. [2]. From this perspective, issues that are labelled ‘sustainable’ often become synonymous with vague and hard-to-define actions taken on behalf of the environment [76]. Given the sustainability initiatives of numerous global, governmental, and business organizations, it may be presumed that e-consumers are making efforts to consume as sustainably as possible. The concept of sustainable consumption is not static; it evolves in response to changes in consumption conditions, consumer awareness, and access to “green” infrastructure, thus making sustainable choices not only possible but often more rational than unsustainable alternatives. According to Reisch (1998), there are approximately two dozen definitions of sustainable consumption in the existing literature, and this plethora of interpretations has not been without criticism. The ambiguity surrounding the definition led Reisch (1998) [77] to term sustainable consumption a “fuzzy concept,” as issues such as scale, scope, reference point, and time horizon remain unclear. Consequently, the understanding of sustainable consumption is shifting towards a more holistic approach, aligning it with an integrated achievement of economic, environmental, and social development objectives [78].

Honesty and environmental sensitivity must be cultivated in the consumer’s mind. Such a consumer exhibits sustainable consumer behavior and makes appropriate purchases, functioning in various roles as a consumer of both tangible and intangible goods. The motives for e-purchasing differ, and e-consumption is influenced by a multitude of factors beyond individual behavior, including cultural, social, historical, and economic influences that can sway consumption decisions [79]. Our research has demonstrated that it is possible to distinguish four types of consumers who differ in their motivations for buying online. The evolution of each group of e-consumers is evident over time, with a decade of changes in the Polish e-consumer market serving as a notable example (Figures 2–5). A critical question posed in our abstract, “Do the types of e-consumers identified in our research contribute to sustainable consumption?” warrants a nuanced response. The answer is partly affirmative, as purchasing decisions influenced by product quality, shopping speed, and e-consumer satisfaction may align with sustainable consumption principles. Nonetheless, comprehensive exploration is needed to determine whether the choices made by e-consumers genuinely embody the essence of sustainability. Further questions such as the impact of e-consumer satisfaction on product utilization, and whether access to e-commerce leads to more frequent, even unnecessary, purchases require investigation in future research.

It is also worth emphasizing that our study focused on the consumers of Generations X and Y, while the emerging Generation Z is already entering the market. The preferences and

behavior of Generation Z consumers are currently under examination. Social media appear to be the main channel for reaching this generation, a space where they naturally share opinions, post reviews, comment on events or products, and engage in dialogue related to sustainable consumption [80]. Despite their awareness of ecology and environmental protection, with 77% of respondents ranking environmental protection highly in a survey by EY, not all members of Generation Z actively consider these factors [81]. They may perceive sustainable consumption as a complex subject, and their actions might be confined to daily habits like waste segregation. A recent Mediahub and Pollster Research Institute survey of Poles aged 16–24 revealed that ecology is not a primary criterion for making purchases. Although 72% believe in contributing to a better world, 56% feel that social problems are beyond their control. Other statistics show a considerable shift in consumer behavior, emphasizing the significance of sustainability in marketing to this eco-conscious generation [82]. A recent survey found that 73% of Gen Zs are willing to pay more for sustainable products, with 54% willing to pay 10% more, compared to 50% of millennials and just 23% of Baby Boomers [83].

It should also be noted that sustainable consumption, in the ongoing technological transition, is in strong symbiosis with sustainable production [84,85]. Sustainable production and consumption are essentially ‘two sides of the same coin’ [86]. Environmental aspects are at the core of determining the strategies of production companies and supply chains. E-consumers participate in the creation of products that are tailored. The personalization of products and services, with the development of smart factories, will evolve into hyper-personalization or mass personalization [52]. Personalization is based on trust between producer and consumer [8,87]. In e-commerce, applications, shopping criteria, modes of communication, etc., are personalized [15]. Will hyper-personalization eventually lead to the personalization of everything? Given the growing trend towards personalization, will the focus on sustainability continue to be necessary? In 2013, Assadourian and Prugh pondered this [88], and in 2023, the world is still building sustainability and even accelerating, as seen in the New Deal’s strategy of aiming for net zero carbon emissions by 2050 [89]. Is the consumer ordering personalized products more sustainable? As of today, we do not have a definitive answer, but what we do know is that sustainability takes on many forms. According to Balderjahn et al. (2018) [90], many segmentation studies focus on the environmental dimension and identify ‘green’ or ‘non-green’ segments for individual product categories (e.g., organic food), based on self-reported behavior or purchasing intentions. Therefore, these sustainable consumption typologies only take into account different levels of overall consumer concern for sustainability (power of consciousness), simply distinguishing between low and high levels of concern, and ignoring the existence of different patterns among the types of sustainable consumption behaviors. In light of this statement, the authors of this study hope that they have contributed, at least slightly, to a more detailed understanding of the choices made by e-consumers.

6. Conclusions

In the article, the behaviors of the identified types of Polish e-consumers from Generations X and Y were compared in 2010 and 2020. The purpose of this comparison was to diagnose the changes that have occurred in the behaviors of the following types:

- E-consumer who seeks the Highest Quality products (HQ_type)
- E-consumer who wants to Save Money during shopping (MS_type)
- E-consumer who dedicates the Least amount of Time to shopping (LT_type)
- E-consumer who derives Pleasure from the shopping experience (DP_type).

The results show that changes have occurred in the behaviors of e-consumers representing individual types, benefiting sustainable consumption. Polish e-consumers generally exhibit conscious and sustainable consumption behaviors such as effective financial management, which is especially visible in the MS_type group. They usually buy products within their means, avoiding expensive loans to satisfy their “needs”. However, concern-

ingly, the percentage of consumers who only buy what they can afford has fallen over the past decade across all consumer types.

Half of the e-consumers in the HQ_type, MS_type, and LT_type groups show an understanding of the importance of budgeting and tracking expenses for conscious consumption. In contrast, the DP_type, who enjoy shopping, tend to ignore active financial management, seeing it as a time-consuming task. Notably, a positive shift in the HQ_type's attitude towards expenditure management has been observed over the years.

A significant part of conscious and sustainable consumption is in planned shopping. Over half of the HQ_type, MS_type, and LT_type e-consumers stick to their pre-made shopping lists, while the impulsive DP_type often decides on purchases in-store without prior planning.

Comparing the numbers of individual groups of Polish e-consumer types from Generations X and Y in 2010 and 2020, there is a visible increase in the number of type groups for whom dominant values might (although they do not necessarily) contradict sustainable consumption. In 2020, the size of the group of e-consumers focused on deriving pleasure from online shopping nearly doubled (see Figure 1), and the number of those in the group for whom time-saving in shopping is a value increased.

In conclusion, the authors would like to draw attention to the possible theoretical and practical implications of the conducted longitudinal studies. The repeatability of research performed on large samples makes them a fundamental source of knowledge about the studied populations over time. They also constitute the only way to scientifically learn about changes in market (economic and social) phenomena and processes.

The research results can be useful for e-commerce managers in developing strategies for effective sales promotion and communication with customers representing different types of e-consumers.

7. Limitations and Future Research

The research was limited solely to Polish e-consumers from Generations X and Y. The authors are aware that expanding the study to include Generation Z would not so much alter the results of the research, but rather disrupt the concept of the conducted studies, which were designed ten years ago and repeated in the same methodological convention in 2020.

In the future, the authors' research will be directed towards exploring the behavior of e-consumers in relation to the emerging opportunities for personalization of products and services with the development of smart manufacturing.

The authors plan to conduct research aimed at comparing the behaviors of types of e-consumers in other European countries using the same research tool.

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References

- Jaciow, M.; Wolny, R. *Polski E-Konsument. Typologia, Zachowania*; Helion: Gliwice, Poland, 2011.
- Mont, O.; Plepys, A. Sustainable consumption progress: Should we be proud or alarmed? *J. Clean. Prod.* **2008**, *16*, 531–537. [CrossRef]
- Jaros, B. The concept of sustainable consumption—Problems of implementation in Poland. Ph.D. Thesis, Faculty of Economics, Management and Tourism, Wrocław University of Economics and Business, Wrocław, Poland, 2015. Available online: <https://wir.ue.wroc.pl/info/phd/WUTc98a41239d264848afb7414d37d6f1b9/> (accessed on 20 June 2023).
- Budak, A.; Ustundag, A.; Kilinc, M.S.; Cevikcanal, E. Digital Traceability through Production Value Chain. In *Industry 4.0: Managing the Digital Transformation*; Springer: Cham, Switzerland, 2018; pp. 251–265. [CrossRef]
- Kagermann, H. Change Through Digitalization—Value Creation in the Age of Industry 4.0. In *Management of Permanent Change*; Albach, H., Meffert, H., Pinkwart, A., Reichwald, R., Eds.; Springer Fachmedien: Wiesbaden, Germany, 2015; pp. 23–45.
- Hermann, M.; Pentek, T.; Otto, B. Design Principles for Industrie 4.0 Scenarios. A Literature Review. Working Paper No. 01. Technische Universität Dortmund Fakultät Maschinenbau. 2015. Available online: http://www.iim.mb.tu-dortmund.de/cms/de/forschung/Arbeitsberichte/DesignPrinciples-for-Industrie-4_0-Scenarios.pdf (accessed on 10 June 2023).
- Schlund, S.; Hämmerle, M.; Strölin, T. *Industrie 4.0 Eine Revolution der Arbeitsgestaltung—Wie Automatisierung Und Digitalisierung Unsere Produktion Verändern Wird*; Ingenics AG: Ulm, Germany; Stuttgart, Germany, 2014.
- Saniuk, S.; Grabowska, S.; Gajdzik, B. Personalization of Products in the Industry 4.0 Concept and Its Impact on Achieving a Higher Level of Sustainable Consumption. *Energies* **2020**, *13*, 5895. [CrossRef]
- Torn, I.A.R.; Vaneker, T.H.J. Mass Personalization with Industry 4.0 by SMEs: A concept for collaborative networks. *Procedia Manuf.* **2019**, *28*, 135–141. [CrossRef]
- Zhou, F.; Ji, Y.; Jiao, R. Affective and cognitive design for mass personalization: Status and prospect. *J. Intell. Manuf.* **2013**, *24*, 1047–1069. [CrossRef]
- DESI Report: Digital Economy and Society Index. 2022. Available online: <https://digital-strategy.ec.europa.eu/en/policies/desi> (accessed on 5 June 2023).
- Jaciow, M.; Wolny, R. *Polski e-Konsument. Dekada Zmian*; Helion: Gliwice, Poland, 2022.
- Barrera, R.B.; Carrión, G.C. Simultaneous measurement of quality in different online services. *Serv. Ind. J.* **2014**, *34*, 123–144. [CrossRef]
- Chang, H.H.; Wang, H. The moderating effect of customer perceived value on online shopping behaviour. *Online Inf. Rev.* **2011**, *35*, 333–359. [CrossRef]
- Camilleri, M.A. E-commerce websites, consumer order fulfillment and after-sales service satisfaction: The customer is always right, even after the shopping cart check-out. *J. Strategy Manag.* **2021**, *15*, 377–396. [CrossRef]
- Kumar, V.; Ramachandran, D.; Kumar, B. Influence of new-age technologies on marketing: A research agenda. *J. Bus. Res.* **2020**, *125*, 864–877. [CrossRef]
- Masuda, Y. *The Information Society as Post-Industrial Society*; The World Future Society: Washington, DC, USA, 1980.
- Digital 2020 Global Digital Overview. January 2020. Available online: <https://www.slideshare.net/DataReportal/digital-2020-global-digital-overview-january-2020-v01-226017535> (accessed on 2 June 2023).
- Report: Digital and Mobile on the World. 2020. Available online: <https://mobirank.pl/2020/01/31/raport-digital-i-mobile-na-swiecie-w-2020-roku/> (accessed on 20 May 2023). (In Polish)
- Tong, S.; Luo, X.; Xu, B. Personalized mobile marketing strategies. *J. Acad. Mark. Sci.* **2020**, *48*, 64–78. [CrossRef]
- Korena, Y.; Shpitalnib, M.; Guc, P.; Hu, S.J. Product Design for Mass-Individualization. *Procedia Cirp* **2015**, *36*, 64–71. [CrossRef]
- Lee, J.; Bagheri, B.; Kao, H. Research Letters: A Cyber-Physical Systems architecture for Industry 4.0-based manufacturing systems. *Manuf. Lett.* **2015**, *3*, 18–23. [CrossRef]
- Đurićin, D.; Herceg, I.V. Industry 4.0 and Paradigm Change in Economics and Business Management. In Proceedings of the International Conference on the Industry 4.0 Model for Advanced Manufacturing, Belgrade, Serbia, 5–7 June 2018; Springer: Cham, Switzerland, 2018.
- Ustundag, A.; Cevikcan, E. *Industry 4.0: Managing The Digital Transformation*; Springer: Berlin/Heidelberg, Germany, 2017.
- Rüßmann, M.; Lorenz, M.; Gerbert, P.; Waldner, M.; Engel, P.; Harnisch, M.; Justusset, J. *Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries*; Consulting Group: Boston, MA, USA, 2015; Available online: https://www.bcg.com/publications/2015/engineered_products_project_business_industry_4_future_productivity_growth_manufacturing_industries (accessed on 20 June 2023).
- Risch, D. Nutzung von Kundenprofilen im Electronic Commerce: Grundlagen und Erkenntnisse zur Verwendung von Kundenprofilen am Beispiel des B2C E-Commerce in der Schweiz. Ph.D. Thesis, Universität Fribourg, Fribourg, Switzerland, 2007. Available online: <https://doc1.bibliothek.li/abf/FLMA201906.pdf> (accessed on 20 June 2023).
- Adolphs, C.; Winkelmann, A. Personalization research in e-commerce—A state of the art review (2000–2008). *J. Electron. Commer. Res.* **2010**, *11*, 326–341.
- Osterrieder, P.; Budde, L.; Friedli, T. The smart factory as a key construct of industry 4.0: A systematic literature review. *Int. J. Prod. Econ.* **2020**, *221*, 107476. [CrossRef]
- Barrutia, J.M.; Paredes, M.R.; Echebarria, C. Value co-creation in e-commerce contexts: Does product type matter? *Eur. J. Mark.* **2016**, *50*, 442–463. [CrossRef]

30. Bawack, R.E.; Wamba, S.F.; André Carillo, K.D.; Akter, S. Artificial intelligence in E-Commerce: A bibliometric study and literature review. *Electron. Mark.* **2022**, *32*, 297–338. [CrossRef]
31. Jaffery, B. *Hyper-Personalizing the Customer Experience Using Data, Analytics, and AI*; Deloitte: Tokyo, Japan, 2023; Available online: <https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/deloitte-analytics/ca-en-omnia-ai-marketing-pov-fin-jun24-aoda.pdf> (accessed on 20 June 2023).
32. Fauscette, M.; Pringle, T. G2 Grid® for E-Commerce Personalization. Available online: <https://www.g2.com/categories/e-commerce-personalization> (accessed on 20 May 2023).
33. Zagajewski, A.; Saniuk, S. E-Commerce in the Era of Industry 4.0 Concept Development (Title in Polish: Systemy Wspomagania w Inżynierii Produkcji). *Multidiscip. Asp. Prod. Eng.* **2018**, *7*, 83–88. Available online: <https://www.sociomantic.pl/barometr-e-commerce2016/> (accessed on 20 May 2023).
34. Dennis, C.; Merrilees, B.; Jayawardhena, C.; Wright, L.T. E-Consumer behavior. *Eur. J. Mark.* **2009**, *43*, 1121–1139. [CrossRef]
35. Merdek, M. Use of agile methods in e-business and e-commerce education. In Proceedings of the 12th International Technology, Education and Development Conference, Valencia, Spain, 5–7 March 2018. [CrossRef]
36. Gefen, D.; Karahanna, E.; Straub, D.W. Trust and TAM in Online Shopping: An Integrated Model. *MIS Q.* **2003**, *27*, 51–90. [CrossRef]
37. McKnight, D.H.; Coudhury, V.; Kacmar, C. Developing and Validating Trust Measures for e-Commerce: An Integrative Typology. *Inf. Syst. Res.* **2002**, *13*, 334–359. [CrossRef]
38. Gefen, D.; Straub, D.W. Consumer trust in B2C e-Commerce and the importance of social presence: Experiments in e-Products and e-Services. *Omega* **2004**, *12*, 407–424. [CrossRef]
39. Yegina, N.A.; Zemsanova, E.S.; Anikina, N.V.; Gorin, V.A. Model of Consumer Behavior during the Digital Transformation of the Economy. *Ind. Eng. Manag. Syst.* **2020**, *19*, 576–588. [CrossRef]
40. Holmes, L. 7 Consumer Types for Successful Targeted Marketing, Euro Monitor International 2015. Available online: https://veilletourisme.s3.amazonaws.com/2015/02/WP_Seven_Survey_GCT_2015.pdf (accessed on 20 May 2023).
41. Euromonitor International 2019–2021. Available online: <https://go.euromonitor.com/white-paper-survey-220719-global-consumer-types.html> (accessed on 20 May 2023).
42. Harrison, L. 4 Different Types of Consumers & How to Market to Them. 19 February 2015. Available online: <https://www.linkedin.com/pulse/4-different-types-consumers-how-market-them-julia-tombak> (accessed on 20 May 2023).
43. Chang, H.H.; Wang, Y.H.; Yang, W.Y. The impact of e-service quality, customer satisfaction and loyalty on e-marketing: Moderating effect of perceived value. *Total Qual. Manag.* **2009**, *20*, 423–443. [CrossRef]
44. CFI Team. Types of Consumers. 14 March 2023. Available online: <https://corporatefinanceinstitute.com/resources/accounting/types-of-customers/> (accessed on 20 May 2023).
45. Islam, J.U.; Hollebeek, L.D.; Rahmanal, Z.; Khan, I.; Rasool, A. Customer engagement in the service context: An empirical investigation of the construct, its antecedents and consequences. *J. Retail. Consum. Serv.* **2019**, *50*, 277–285. [CrossRef]
46. Rasool, A.; Shah, F.A.; Islam, J.U. Customer engagement in the digital age: A review and research agenda. *Curr. Opin. Psychol.* **2020**, *36*, 96–100. [CrossRef]
47. Ecommerce Statistics. Available online: <https://www.sendcloud.co.uk/ecommerce-statistics/> (accessed on 20 May 2023).
48. Dujardin, A. (Blog) Ecommerce Trends: 5 Types of Consumer Behaviour Every Manager Should Know. 12 April 2022. Available online: <https://www.textmaster.com/blog/5-types-of-consumer-behaviour-every-manager-should-know/> (accessed on 20 May 2023).
49. Greci, R.T.; Watts, C.A. Maximizing customer value via mass customized e-consumer services. *Bus. Horiz.* **2007**, *50*, 123–132. [CrossRef]
50. Goy, A.; Ardissono, L.; Petrone, G. *Personalization in E-Commerce Applications*; This Paper Is Going to Appear in Adaptive Web-Based Systems; Brusilovsky, P., Kobsa, A., Nejdl, W., Eds.; Springer: Berlin/Heidelberg, Germany, 2007; Available online: <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=b2570605913b6dbaeaffecc4fdfacfd82916a2ad> (accessed on 20 May 2023).
51. Herder, E.; van Dijk, B. Personalized adaptation to device characteristics. In *Adaptive Hypermedia and Adaptive Web Based Systems*; LNCS 2347, Second Int. Conference (AH 2002); De Bra, P., Brusilovsky, P., Conejo, R., Eds.; Springer: Berlin/Heidelberg, Germany; New York, NY, USA, 2002; pp. 598–602.
52. Wang, Y.; Ma, H.-S.; Yang, J.-H.; Wang, K.-S. Industry 4.0: A way from mass customization to mass personalization production. *Adv. Manuf.* **2017**, *5*, 311–320. [CrossRef]
53. Le, M. Review of Consumers' Green Consumption Behavior. *Am. J. Ind. Bus. Manag.* **2020**, *10*, 585–599. [CrossRef]
54. Lorek, S.; Fuchs, D. Strong Sustainable Consumption Governance—Precondition for a degrowth path? *J. Clean. Prod.* **2013**, *38*, 36–43. [CrossRef]
55. Micheletti, M. Ethical Consumption. In *Encyclopedia of Consumer Culture*; Southerton, D., Ed.; Sage Publications: New York, NY, USA, 2011; pp. 1097–1100.
56. Lorek, S.; Fuchs, D. Sustainable Consumption Governance: A History of Promises and Failures. *J. Consum. Policy* **2005**, *28*, 261–288.
57. Neale, A. (Nie)przyjemności Zielonego Konsumeryzmu. In *Nowa droga do Zniewolenia? O życiu w Społeczeństwie Konsumpcyjnym*; Romaniszyn, K., Ed.; Wydawnictwo Uniwersytetu Jagiellońskiego: Kraków, Poland, 2007; pp. 115–142.

58. Kazdin, A.E. Psychological Science's Contributions to a Sustainable Environment: Extending our Reach to a Grand Challenge of Society. *Am. Psychol.* **2009**, *64*, 339–356. [\[CrossRef\]](#)
59. Wang, M.F. Philosophical Thinking on Green Consumption. Master's Thesis, Fujian Normal University, Fuzhou, China, 2006.
60. Myrseth, K.O.R.; Fishbach, A. Self-Control: A Function of Knowing When and How to Exercise Restraint. *Curr. Dir. Psychol. Sci.* **2009**, *18*, 247–252. [\[CrossRef\]](#)
61. Si, L.S. Empirical Research on Chinese Consumers' Green Consumption Concept and Behavior. *Consum. Econ.* **2002**, *5*, 39–42.
62. Pan, J.G. On Green Consumption and Sustainable Development. *J. Anhui Electr. Power Work. Univ.* **2003**, *4*, 113–116.
63. Rashid, L. Bursting the bubble: Why sustainability initiatives often lack adequate intention to action translation. *Small Bus. Econ.* **2022**, *59*, 1–9. [\[CrossRef\]](#)
64. Gosling, S. The Problem with Defining in: Sustainability—The Geography Perspective Sustainability. University of Nottingham. 2012/13. Available online: https://rdmc.nottingham.ac.uk/bitstream/handle/internal/188/Geography%20sustainability.old/14_the_problem_with_defining_sustainability.html (accessed on 20 May 2023).
65. Sagan, A. *Metodologia Badań Ekonomicznych*; Wydawnictwo Uniwersytetu Ekonomicznego w Krakowie: Kraków, Poland, 2016; p. 114.
66. Tomaselli, V.; Battiatto, S.; Ortis, A.; Cantone, G.G.; Urso, S.; Polosa, R. Methods, Developments, and Technological Innovations for Population Surveys. *Soc. Sci. Comput. Rev.* **2022**, *40*, 994–1013. [\[CrossRef\]](#)
67. Fang, J.; Wen, C. Predicting potential respondents' decision to participate in web surveys. *Int. J. Serv. Technol. Manag.* **2012**, *18*, 16–32. [\[CrossRef\]](#)
68. Zajac, J.M.; Batorski, D. Jak skłonić do udziału w badaniach internetowych: Zwiększanie realizacji próby. *Psychol. Społeczna* **2007**, *2*, 234–247.
69. Anduiza, E.; Galais, C. Answering Without Reading: IMCs and Strong Satisficing in Online Surveys. *Int. J. Public Opin. Res.* **2017**, *29*, 497–519. [\[CrossRef\]](#)
70. Meade, A.W.; Craig, S.B. Identifying careless responses in survey data. *Psychol. Methods* **2012**, *17*, 437–455. [\[CrossRef\]](#)
71. Saad, D. Nowe narzędzia i techniki zwiększające trafność badań internetowych. *Com. Press* **2021**, *1*, 106–121. [\[CrossRef\]](#)
72. Nowak, S. *Metodologia Badań Socjologicznych*; PWN: Warsaw, Poland, 1970; p. 92.
73. Jaciow, M.; Wolny, R. *E-Consumer in Poland. Behaviours and Typology*; UE: Katowice, Poland, 2011.
74. Shmeleva, I.A.; Shmelev, S.E. How sustainable is smart and how smart is sustainable? In *Sustainable Cities Reimagined. Multidimensional Assessment and Smart Solutions*; Shmelev, S.E., Ed.; Routledge: London, UK, 2019; pp. 316–328. [\[CrossRef\]](#)
75. Gajdzik, B.; Grabowska, S.; Saniuk, S.; Wieczorek, T. Sustainable Development and Industry 4.0: A Bibliometric Analysis Identifying Key Scientific Problems of the Sustainable Industry 4.0. *Energies* **2020**, *13*, 4254. [\[CrossRef\]](#)
76. Ehrenfeld, J.R.; Hoffman, A.J. *Flourishing: A Frank Conversation about Sustainability*; Stanford University Press: Stanford, CA, USA, 2013.
77. Reisch, L. *Sustainable Consumption: Three Questions about a Fuzzy Concept*; Working Paper; Research Group: Consumption, Environment and Culture; Copenhagen Business School, Department of Marketing; Copenhagen, Denmark, 1998; p. 13.
78. Bell, S.; Morse, S. Holism and understanding sustainability. *Syst. Pract. Action Res.* **2005**, *18*, 409–426. [\[CrossRef\]](#)
79. de Oliveira, U.R.; Gomes, T.S.M.; de Oliveira, G.G.; de Abreu, J.C.A.; Oliveira, M.A.; da Silva César, A.; Aprigliano Fernandes, V. Systematic Literature Review on Sustainable Consumption from the Perspective of Companies, People and Public Policies. *Sustainability* **2022**, *14*, 13771. [\[CrossRef\]](#)
80. Generacja Z w Polsce-bez buntu o lepszy świat, bez Konfliktu Pokoleń. 20 October 2020. Available online: <https://www.wirtualnemedia.pl/artukul/generacja-z-co-to-jest-bez-buntu-o-lepszy-swiat-bez-konfliktu-pokolen> (accessed on 21 May 2023).
81. EY Research. Available online: https://www.ey.com/pl_pl/news/2021/05/badanie-ey-pokolenie-z (accessed on 20 May 2023).
82. Wood, J. Gen Z Cares about Sustainability More than Anyone Else—And Is Starting to Make Others Feel the Same. World Economic Forum. 18 March 2022. Available online: <https://www.weforum.org/agenda/2022/03/generation-z-sustainability-lifestyle-buying-decisions/> (accessed on 20 May 2023).
83. Shaw, J. (Blog) Why Gen Z Values Sustainability: Tips for Marketing to the Eco-Conscious Generation. Kadence International. Available online: <https://kadence.com/why-gen-z-values-sustainability-tips-for-marketing-to-the-eco-conscious-generation/> (accessed on 20 May 2023).
84. Akenji, L.; Bengtsson, M. *Making Sustainable Consumption and Production the Core of the Sustainable Development Goals*; Institute for Global Environmental Strategies: Kanagawa, Japan, 2014.
85. Yagi, M.; Kokubu, K. A framework of sustainable consumption and production from the production perspective: Application to Thailand and Vietnam. *J. Clean. Prod.* **2020**, *276*, 124160. [\[CrossRef\]](#)
86. Connolly, J.; Prothero, A. Sustainable consumption: Consumption, consumers and the commodity discourse. *Consum. Mark. Cult.* **2003**, *6*, 275–291. [\[CrossRef\]](#)
87. Gajdzik, B.; Grabowska, S.; Saniuk, S. Key socio-economic megatrends and trends in the context of the Industry 4.0 framework. *Forum Sci. Oeconomia* **2021**, *9*, 5–22. [\[CrossRef\]](#)
88. Assadourian, E.; Prugh, T. (Eds.) *State of the World 2013. Is Sustainability Still Possible?* Island Press: Washington, DC, USA; Covelo, CA, USA; London, UK, 2013; Available online: <http://www.worldwatch.org/bookstore/publication/state-world-2013-sustainability-still-possible> (accessed on 20 May 2023).

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89. European Parliament Resolution of 15 January 2020 on the European Green Deal (2019/2956(RSP)). Available online: https://www.europarl.europa.eu/doceo/document/TA-9-2020-0005_EN.html (accessed on 20 May 2023).
 90. Balderjahn, P.; Peyer, M.; Seegebarth, B.; Wiedmann, K.-P.; Weber, A. The many faces of sustainability-conscious consumers: A category-independent typology. *J. Bus. Res.* **2018**, *91*, 83–93. [[CrossRef](#)]

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