

Article

Factors behind the Consumer Acceptance of Sustainable Business Models in Pandemic Times

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Abstract: A huge set of sustainable business models have emerged during recent decades to promote decarbonization, but the drivers of their consumer adoption remain somewhat unclear. This paper examines these drivers based on a sample of 622 university students during the second wave of COVID-19 at the end of 2020. Our research links business models to the theory of planned behavior and discusses their adoption from a consumer perspective. Using exploratory factor analysis, we identified five major and nine minor components of SBM adoption. Findings suggest that functional benefits, general attitudes, and habits may play a more important role in these factors than sustainability values during the second wave of pandemic. Still, sustainability values have neither lost nor gained momentum during hard times. Thrift, localization, and digitalization have become more dominant. We find that some SBM models are very strongly embedded in consumer culture, so the spread of SBM models does not necessarily lead to a reduction in environmental impacts.

Keywords: sustainable business models; consumer acceptance; theory of planned behavior; COVID-19



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1. Introduction

In recent years, a wide variety of business models have emerged to address the sustainability challenge [1] with a special focus on decarbonization. The challenges of decarbonization have implications for business models at the theoretical level [2] and in practice in some sectors [3]. Some of the new business models [4] seem to represent only a modest facelift of mainstream ones [5], while others are more revolutionary (e.g., frugal business [6,7]). Some have already started to sneak into mass markets, such as the sharing economy [8], while others have remained niche, such as slow fashion [9]. A wide range of literature classifies the huge set of sustainable business models (e.g., [10]), but the factors that influence their consumer acceptance remain somewhat unclear [11].

While the consumer acceptance of some sustainable business models (SBMs) has been studied [12–14], these analyses are not comprehensive in terms of covering multiple SBMs from a consumer perspective. This work is also important for seeing which SBMs can be supported by similar policy tools, are well-established in consumer society, and may yield the expected sustainability benefits.

Although a business model as such is originally a managerial approach to structuring and conceptualizing the way of doing business, and some specific details may be invisible for consumers, the wide variety of (S)BMs make a difference from a consumer perspective as well, as they receive substantially different value offers from organizations. Even from a consumer perspective, the huge set of SBMs (explained in detail later) go beyond simply perceiving different communication. In the approach of this paper, SBMs from a

consumer perspective are defined by how the value SBMs distinctively create and offer—through the lens of sustainability—for consumers is perceived by them. In other words, the sustainability aspects of business models are very relevant for consumers as well, albeit indirectly, and SBMs themselves also make a difference in consumer perception.

The COVID-19 pandemic hit the world at the beginning of 2020, affecting the global economy [15] and our day-to-day lives [16–18]. In this situation, some alternative models decreased in popularity [19], while others expanded [20]. However, it is not yet evident how these will prosper in the post-COVID world, especially as the pandemic is not over yet. COVID has also had an impact on consumer behavior, such as behavior towards fine dining restaurants [21], the purchase of wooden furniture [22], and the acceptance of recycled bags [23].

This paper examines what factors influence the consumer acceptance of SBMs in COVID times (and its changes as a result of the pandemic). The main novelty value of this study is in linking the originally managerial approach of SBMs to a consumer acceptance perspective and better understanding the factors behind the consumer acceptance of these models. Our study contributes to filling these research gaps.

For this, we undertook a literature analysis, as described in Section 2. Section 3 establishes a theory-of-planned-behavior (TPB)-based research model and the research design, grounded on a survey of 622 respondents. The results of the survey are presented in Section 4 based on principal component analysis of the shared factors behind the changes in 55 SBM-related consumer activities and are discussed in Section 5 based on the TPB-based model. Section 6 concludes.

2. Consumer Acceptance of Sustainable Business Models

Based on [24] (p. 6), an SBM can be described as follows: “a business model for sustainability helps describing, analyzing, managing, and communicating (i) a company’s sustainable value proposition to its customers, and all other stakeholders, (ii) how it creates and delivers this value, (iii) and how it captures economic value while maintaining or regenerating natural, social, and economic capital beyond its organizational boundaries”.

SBMs are classified in many different ways in the literature, with one of the most widely used approaches being that of Bocken et al. [25]. It differentiates three major streams—technological, social, and organizational—and eight archetypes altogether (as it is summarized in Table 1). In the following, we structure the literature on the consumer adoption of SBMs according to these categories. Significantly for this research, each of the SBM archetypes can facilitate decarbonization.

The authors of this model are continuously working on the development of the framework, looking for the limits of its applicability and possibilities for extension [26,27]. In our research, we follow the basic division shown in Table 1.

2.1. Technological Models

Technological models include archetypes with a dominant technological innovation component (e.g., manufacturing process and product redesign) [25]. Multiple factors influence the consumer acceptance of technology-based business models. Ref. [28] studied energy-saving measures in the Netherlands. The authors found that technical innovations were more readily accepted by consumers than behavioral changes on their side. This is an interesting finding that underlines the fact that individuals often prefer to pay rather than modify their lifestyles. This reminds us that green behavior can take many forms, and not all of them are attractive to everyone.

In a study that addressed consumer acceptance of energy-efficient appliances in China [29], it was found that perceived behavioral control, subjective norms, and environmental attitudes positively influenced consumer acceptance. However, the perceived usefulness of products did not seem to have an impact. The authors also note that consumers did not consider the price–performance ratio of the energy-efficient products to be appealing enough. On the contrary, based on a study of respondents from a variety of

European countries [30], the authors argued that the determinants of acceptance associated with energy-efficient and smart appliances were specific and difficult to generalize, but comfort and financial benefits were often identified as relevant factors. The latter can be seen as functional benefits and should be incorporated into our research model as well.

Table 1. The sustainable business model archetypes, based on Bocken et al. [25].

Groupings	Archetypes	Description
Technological models	Maximize material and energy efficiency	Improving products and processes to generate less waste and fewer emissions with respect to products that deliver similar functionalities
	Close resource loops	Transforming waste into valuable inputs, closing the loops of the renewable resources and/or non-renewable materials cycles
	Substitute with renewables and natural processes	Modifying products to include renewable (non-finite) resources, using environmentally friendly materials, and developing renewable energy solutions
Social models	Deliver functionality rather than ownership	Delivering functionality through pay-per-use rather than product ownership, allowing reduction in resource consumption and enhanced efficiency in the use and durability of products
	Adopt a stewardship role	Ensuring the long-term health and well-being of all stakeholders through the manufacture and provision of products/services, tackling sustainability along the supply chain, community development, and employee welfare
	Encourage sufficiency	Radically reducing overconsumption by improving product durability and longevity and implementing activities to educate consumers and enable second-hand consumption
Organizational models	Repurpose for society/environment	Maximizing the social and environmental benefits of full integration of the firm with all stakeholders and therefore aiming to drive global economic change
	Develop sustainable scale-up solutions	Developing sustainability solutions on a large scale for multinationals, which include franchising, licensing, and collaborative models

Environmental benefits were typically considered a positive side effect but, in most cases, an insufficient reason for buying energy-efficient or smart appliances. According to [31], the uptake of smart metering is being significantly hindered by low levels of public awareness. Some socio-demographic features (age, size of household, and level of income) and peer recommendations positively influence the acceptance of efficiency improvements.

In the case of SBM models of the circular economy, different factors emerge as well. Among the articles analyzing technological factors, studies on the circular economy stand out. It is one of the hot topics of the moment, both in science and in public policy. Based on a study of different schemes for reusable packaging and refilling options [32], it was found that finance- (the price of the first container and the refill), convenience- (difficulty of use, refilling, and technical parameters such as weight, compatibility, and hygiene), and belief-related factors (perceived environmental and financial benefits) influence consumer acceptance most. Similarly, functional benefits (durability, reliability, and ease of use and maintenance) are highlighted as acceptance factors of eco-design practices in the construction industry [33]. Based on a study by [12], the most important barriers to the acceptance of environmentally friendly packaging are the following: lack of knowledge and guidance (consumers consider it difficult to identify or understand what is environmentally beneficial) and lack of interest (negligible perceived financial and convenience benefits).

Again, these studies draw attention to the importance of functional benefits, which are sometimes overlooked in studies focusing on green consumer attitude.

A study by [13] addressed the consumer acceptance of recycled electronic gadgets in different Asian countries. The authors found that financial aspects (their cost compared to that of new products), quality (reliability), and the environmental consciousness of consumers affected acceptance the most. The study by [34] aimed to provide a quantitative assessment of the economic and environmental potential of pay-per-wash and refurbishment business models. The acceptance of refurbished mobile phones was also analyzed in [35]. Findings indicate weak acceptance due to the unfavorable share of perceived benefits and risks. However, better consumer education could improve the image of refurbished products. A study [36] highlighted the subjective aspects of the acceptance in relation to buying second-hand clothing, while [37] also found that subjective factors (trust and perceived benefits—hedonic, social, and economic) influence the acceptance of circular fashion. Participant trust was positively impacted by the revealed history of garments. Another study [8] analyzed responses from a representative population survey in Finland. The results show that area-specific strategies that promote circularity and consider the background of consumers are likely to be more effective than an all-encompassing approach. In the field of renewable electricity and smart grids [38], researchers found ease of use, considered functional benefit, and personal norms (a feeling of a moral obligation to accept renewables) to be the most important features of acceptance. A similar study in the Greek residential sector [39] highlighted high income and education as the most decisive determinants and thus suggested financial incentives for promoting renewable electricity. A study from Pakistan [40] highlighted that the real and perceived cost-benefit ratio of using renewable energy of households may differ; thus, subjective factors also play an important role in consumer acceptance.

All these pieces of research suggest that technological innovation is key from an SBM perspective and there are many objective and subjective factors influencing their acceptance from a consumer perspective.

2.2. Social Models

Social models include archetypes with a dominant social innovation component (e.g., innovations in value proposition, sharing instead of owning, changing consumer behavior) [25]. Beyond green technologies, lifestyle is also important from a sustainability perspective [41]. The first major type of social models includes those that replace ownership with functionality. This includes the entire sharing economy. A study [42] identified six aspects of behavioral intention in relation to using ride-sharing applications such as Uber. Self-efficacy was found to be a fundamental factor in defining value for consumers. Functional, emotional, and social values also played a critical role. On the other hand, learning costs and risks proved to be less significant determinants.

Another study [43] scrutinized accommodation sharing based on the factors of behavioral intentions and demography. Their study identified five segments: Pragmatic Novelty Seekers, Idealists, Opponents, Collaborators, and Premium Keepers. The authors point out the lack of strong alignment between consumer segmentation and host targeting, leading to potentially reduced efficiency.

A piece of research [44] found that tourists were attracted to Airbnb mainly because of the functional benefits it offered. Disruptive innovation tends to focus on objective functional performance. Nonetheless, innovations are more appealing if they are “compatible” with adopters’ values, beliefs, positive past experiences, and needs. While home benefits and pragmatic novelty seeking are mainly functional values, interaction, local authenticity, and premium keeping are emotional values, while the sharing economy ethos is mainly a social construction. All these findings suggest that, although various factors influence consumer acceptance of social innovations, consumers are highly open in this direction. A further study [45] warned that users of the sharing economy need to have a considerable amount of trust in both the person and the platform with which they deal. In

times of the COVID-19 pandemic, we need to trust that other users of shared things are taking precautions about our health by doing their best not to infect others. As the results of [46] highlight, sustainable consumption patterns, such as sharing schemes, are often accepted not instead of but in addition to previous, unsustainable patterns. Use-oriented product-service systems are considered a promising alternative to traditional business models based on ownership and have the potential to reduce the environmental impacts of consumption. However, their diffusion in consumer markets has been slow [47].

The second archetype of social business models is associated with stewardship. This is a strongly value-based approach, as it builds on responsible and careful purchasing behavior. The question here is how we can strengthen the sustainability and social values of individuals and society. It was also pointed out in one study that behaving in an environmentally friendly way in one type of situation (such as separating household waste) tends to spill over and lead to more environmentally friendly choices in a different situation (such as shopping) [48]. One implication is that it becomes less important what sustainability activity a hitherto passive person adopts, as long as the person starts to do something. Unfortunately, the study also detected a negative spillover effect from recycling to other environmental behaviors (moral licensing effect).

As the results of a study [49] show, in terms of energy conservation, higher-income individuals tend to invest in technological solutions, while lower-income individuals tend to change their behavior. For the latter, this behavior depends less on environmental awareness than economic coercion. For higher-income earners, on the other hand, changing behavior is far more difficult than purchasing new technological solutions. This finding implies that, beyond technological factors, other aspects also influence the consumer acceptance of SBMs.

Sufficiency is perhaps the most ambitious and challenging business model of the eight archetypes, as it runs counter to the individual desire to increase material well-being. There seem to be rather weak norms associated with sufficiency, both personal and social [50].

The seven major areas of activity associated with sufficiency are described as follows [51]: voluntary simplicity, downshifting, frugality, anti-consumption, mindful figu-consumption, slow consumption, and ethical and responsible consumption. Those streams involve varying levels of sacrifice on the consumer side—for example, slow consumption may not be cheap (e.g., slow fashion may be a premium option). Other streams require leading a modest lifestyle, such as engaging in voluntary simplicity or anti-consumption. A study [52] found that in addition to financial resources (i.e., consideration of the higher per-unit price of slow fashion garments), attitudes (towards quality) and norms (long-term or short-term perspective) play an important role in buying slow fashion. A piece of research [53] highlighted through the case of food waste that consumer acceptance of sufficiency does not come naturally in earlier lower income societies. The pandemic crisis may push consumers more into the direction of frugality.

Spangenberg and Lorek [54] introduced the Prism concept. The latter argue that any effective sufficiency strategy must address inhibiting factors and promote favorable ones in four spheres. Another study [55] highlighted the gaps between environmental knowledge, attitudes, and action, helping with understanding why relevant action is often lacking even when consumers are well-informed.

2.3. Organizational Models

The archetypes in the organizational models have a dominant organizational innovation component (e.g., changing the fiduciary responsibility of the firm) [25]. Consumer reactions are relatively less noticeable here. This is also reflected in the fact that there are significantly fewer studies on this issue compared to the previous two groups. Creating sustainable organizational business models is the biggest challenge for companies, because they fundamentally redefine what we consider to be value and how we create it. Such business models assume that a company wants not only to generate a profit but also to create value for society and/or the environment. Furthermore, it is assumed that the role

of society in this value creation involves individuals not only as passive consumers or company-controlled employees but also as active decision-maker-participants, sometimes even in the role of co-investors.

Social enterprises are good examples of how business value can be redefined to include social value. According to the authors of [56], social enterprises have not only changed the concept of how non-profit organizations operate but also played a major role in blurring the boundaries between society and business. These authors studied the behavioral intentions of consumers when they buy products and services from social enterprises. Results show that consumer behavioral intentions increase with the level of perceived behavioral control. Consistent with the findings of [57], this study also suggests that social enterprises can communicate service concepts and product relationships by emphasizing their altruistic nature. Indeed, in accordance with these research findings, pandemic times seem to increase the consumer acceptance of social enterprises.

The research of [56] also suggests that consumer trust is enhanced by organizational, operational transparency. Crowdfunding is also a good example of when members of society are actively involved in creating social value in the role of investors. Based on Activity Theory, a study [58] examined the critical success factors of community funding in terms of website acceptance, crowd awareness, and the reciprocity of donations. The results of the study distinguish between two psychological outcome variables: platform trust and crowdfunding readiness. Platform trust captures the user's general perception of the social information system. Crowdfunding readiness indicates behavioral willingness to participate in collaborative activities mediated by a technological solution.

According to [57], the success of crowdfunding campaigns is significantly influenced by paying attention to the nuances of language when pitching ideas. The willingness of funders to support a cause may simply depend on whether they "hear" the social entrepreneur's request. Successful campaign language is often intended to be interactive, demonstrating the entrepreneur's personal connection to the issue.

One approach to creating sustainability value in the context of organizational models is to (re)localize production and shorten supply chains (e.g., in the food industry). From a consumer acceptance perspective, it is important to understand how modified supply chains influence consumer habits [59]. As [60] highlighted, trust and convenience seem to be the major factors in acceptance.

A major challenge is determining how to scale up these solutions. Can the notion of triple value creation displace the business value creation concept of companies? Digitalization is being mainstreamed in many sectors now, especially services, creating opportunities and challenges for both companies and consumers. As [61] found, the convenience of the use of digital solutions and the opinions of peer consumers are key drivers of openness towards online shopping. Beyond these factors, the acceptance of online services is also driven by perceived risks or benefits and behavioral intentions [62]. This raises the further questions of whether scaling up organizational SBMs can be maintained or even accelerated in a post-pandemic world.

3. Methods and Materials

3.1. Research Model

Ajzen [63] (p. 179) states that "intentions to perform behaviors of different kinds can be predicted with high accuracy from attitudes toward the behavior, subjective norms, and perceived behavioral control". His model is referred to as the theory of planned behavior (TPB) and has been widely used in different research contexts [23,64,65]. According to the original model [57], the intention to undertake different types of behavior can be predicted at a high level of precision. Previous studies [54,55] suggested that the TPB model explains 42–47% of the variance in consumer behavior.

Some recent papers have applied the theory of planned behavior to organizational behavior, including knowledge sharing and organizational citizenship behavior. Knowledge sharing (KS) plays an important role in increasing organizations' efficiencies [65,66]. These

authors applied TPB for organizational knowledge sharing. They underlined the importance of personality traits with their enduring nature. In our research, we also hypothesized that the adoption of particular sustainability models is influenced not only by an individual's environmental awareness but also by their general behavioral attitudes as determined by personal traits, e.g., some people are more likely to make behavioral sacrifices, while others are more likely to make monetary sacrifices. This may affect the chances of green investments or behavioral changes to save energy. A further study [67] underlined that to maintain business success, organizations must continually satisfy customers' needs. They applied TPB for organizational citizenship behavior. For organizations to meet consumer needs, they must understand the factors and motivations that shape those needs.

To address the factors behind the consumer acceptance of SBMs, our research model is based on Bocken et al.'s [25] SBM archetypes, combined in the discussion with the TPB model. We collected studies that linked consumption acceptance factors to at least one of the sustainable business model archetypes (see Table 1). Then, these factors were grouped into more general categories that correspond to the TPB model categories. The first column in Table 1 shows the business model archetype according to Bocken et al. [25], the second column depicts the consumer acceptance factors based on each study, and the third column shows the place of each factor in the TPB model. Figure 1 depicts the original TPB model. According to previous studies [68,69]. The TPB model explains 42–47% of the variance in consumer behavior.

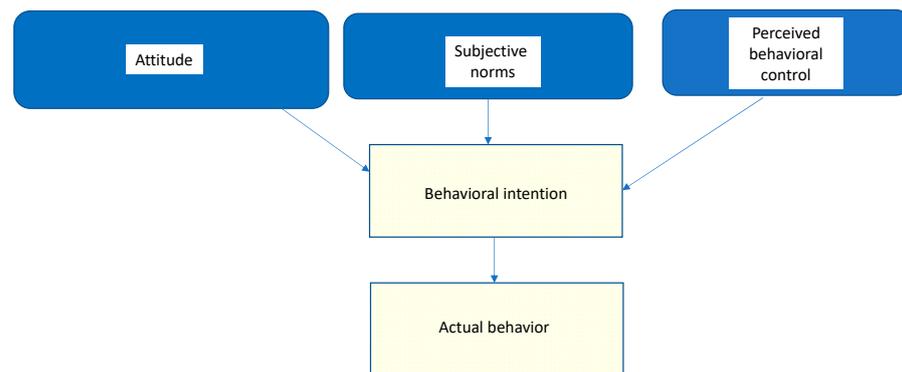


Figure 1. The original TPB model based on [63].

To evaluate and discuss the intentions behind behavior patterns (identified by principal component analysis), we used Ajzen's theory of planned behavior (TPB) model [63]. Our research model is based on Table 1 and the TPB model, which is shown in Figure 1. It is an extended version of the TPB model, which includes functional benefits and habits, as suggested by [34–36].

As the relationship between SBM types and TPB has not been previously investigated, we used an exploratory factor analysis (EFA). EFA provides the opportunity to query consumer behavior for all SBM types and look for the link to elements of TPB. We considered it important to explore which SBM types could be associated with similar consumer attitudes. Those for which this is true may be worth investigating in a confirmatory factor analysis (CFA) in the future. Unfortunately, all SBM attitudes and all elements of TPB cannot be examined simultaneously in a single survey, as the number of questions required would exceed what is acceptable to respondents. There are possible trade-offs in the adoption of SBM, as the adoption of one model may make the adoption of another model more difficult. It is therefore important that the related models are included together in the same study.

We assigned 55 questions on consumer behavior to the three main types and eight subtypes of SBM and investigated their change in response to the pandemic.

Our model is an economic model rather than a psychological one. We are interested in investigating changing behavioral patterns at a time of fundamental change in the economy rather than the motivation of individuals to act green in general. Before presenting our

research model, we summarize the link between the factors in our research model and the factors that have been identified to explain the consumer acceptance of individual SBM models, as revealed by the literature review (Table 2).

Table 2. Link between the research model and factors influencing consumer acceptance of sustainable business models.

	Selected References	Factors Influencing SBM Acceptance	Link to the TPB Model
Technological models	Energy-saving options [28,70]	investment is more acceptable than behavioral changes	behavioral attitude toward sacrificing money versus comfort
	Energy-efficient appliances [29]; circular economy [36]	environmental consciousness	subjective norms
	Circular economy, reusable packaging business models [32]	consumer reuse behavior	attitude–behavior gap
	Reusable packaging [30,32]	comfort, convenience, financial benefits	attitude toward sacrificing money versus comfort
	Smart metering [31]	public awareness	aspect of social norms
	Food packaging [12], circular consumption [35]	lack of knowledge	aspect of perceived behavioral control
	Smart grids, circular economy [13,38]	lack of interest (financial or convenience), benefits such as quality, convenience	attitude toward sacrificing money versus comfort, perceived benefits
	Eco-design and reusable packaging [32,35]	financial or functional benefits	functional values: perceived benefits or cost–benefit ratio
	Circular consumption [35]	risks versus trust	attitude towards risk taking
	Circular economy [36]	consumer habits	habits
Social models	Renewable energy [37]	income, cost	perceived behavioral control, attitude towards sacrificing money versus comfort
	Ride sharing [42]	learning cost, self-efficacy	attitude towards risk taking
	Accommodation sharing [43]	behavioral intentions, demographic factors	attitude towards risk taking
	Slow fashion and sharing economy [37,44]	pragmatic advances	perceived benefits
	Sharing economy [45,46]	trust, infrastructure	attitude towards persons and platforms
	Waste prevention and recycling norms [48]	environmental responsibility	subjective and social norm
	Behavior change in heating energy [49]	income	perceived behavioral control
	Sufficiency in clothing, travel [50,52]	sufficiency as a social norm	social norms
	Sufficiency in presumption [51]	attitudes towards sufficiency	attitude towards sacrificing comfort for well-being
	Sufficiency [52]	factors inhibiting sufficiency	perceived behavioral control
Organizational models	Fair trade [71]	costs, moral norms, self-identity	subjective norms, moral norms
	Pro-environmental behavior [72]	self-identity, personal norms	subjective norm
	Green purchasing [73]	value for money, personal norms, materialism, green practices, consumer innovativeness	perceived benefits, subjective norms, habits, attitude towards changing behavior
	Purchasing certified wood products [74]	ecolabel knowledge, general environmental attitudes, attitudes toward environmental certification, trust in certification	attitudes, perceived behavioral control
	Car sharing [75]	trendiness	subjective norms
	Social enterprise [56,76]	perceived behavioral control, attitudes	perceived behavioral control, attitudes
	Crowdfunding [57]	clear communication	perceived benefits
	Charity crowdfunding [77]	visual communication	behavioral beliefs
	Localization of food systems [59]	purchasing habits	habits
	Short food supply chains [60]	trust and convenience	attitudes and perceived functional benefits
Organizational models	Online grocery shopping [61]	ease of use, opinion of others	perceived functional benefits, subjective norms
	Fintech services [62]	perceived risks and benefits, perceived behavioral intention	perceived benefits, behavioral control
	Crowdfunding [58]	platform trust and crowdfunding readiness	attitudes

We also included two further factors in our TPB model: habits and perceived benefits (of more sustainable business models), which were suggested by several academic papers (see Figure 2).

Individual norms incorporate both social norms and individual beliefs. While for some a green value system is attractive, for others, a consumer society may be preferred.

In addition to values, attitudes toward certain behaviors also influence which of the SBM models we are drawn to as consumers. These are linked to personality traits. Even “greens” are not equally green. “Green” has many shades and forms. Some are more willing to sacrifice their money, while others are more willing to sacrifice their time or comfort.

Some consumers are attracted to technological innovation, while others prefer to follow a more conventional path. Even trade-offs between behaviors are possible.

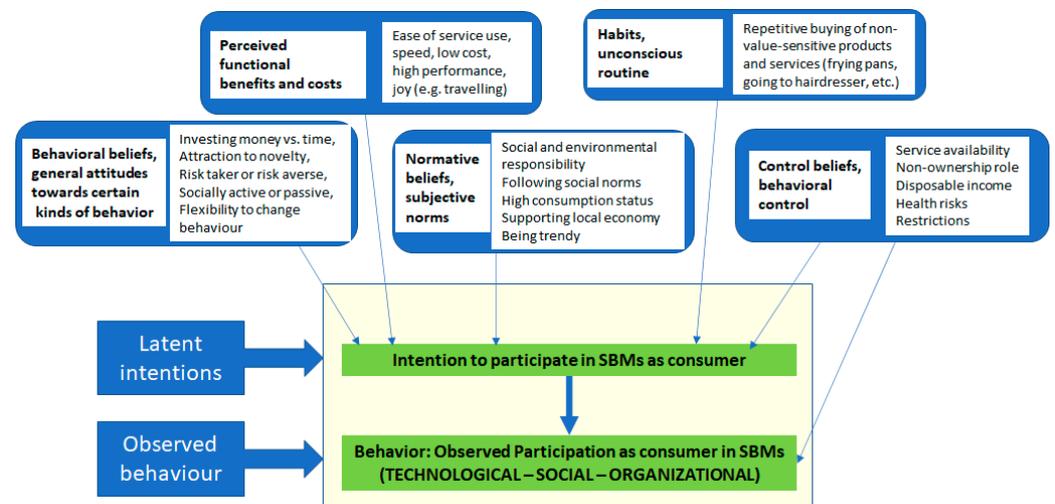


Figure 2. Extended research model based on the theory of planned behavior [63].

Finally, behavior control also significantly influences behavioral intent. The COVID situation has a significant mediating effect in this area. For example, green individuals may still not participate in various forms of electric ridesharing because shared vehicles can pose a health risk.

Together, behavioral attitudes, subjective norms, perceived behavior control, habits, and the perceived benefits of more sustainable business models determine the patterns of intent we explore. Latent variables can be explored based on SBM-related behavior patterns as they are observed.

3.2. Survey Design

Our survey targeted students and was carried out during the second wave of the COVID pandemic. Students were among those most strongly influenced by the pandemic in terms of their lifestyles [77]; they are one of the groups most open to accepting sustainable business models [29]; and their consumption patterns are important, as they will have an impact for many more decades. For this reason, their changing attitude towards sustainable business models is of utmost importance.

The eight archetypes of sustainable business models were covered by a total of 55 questions (4–12 questions per model depending on their complexity). The survey instrument was more detailed on factors related to value change (organizational models) and social models, while technology-related models were covered in less detail. The survey intended to measure changes in consumer acceptance of SBMs, and answers were rated on a five-point Likert scale as follows: the scale included “much less” (−2), “less” (−1), “similarly” (0), “more” (1), and “much more” (2). A pilot survey was carried out with the involvement of 3 further researchers and 30 students to improve clarity and reliability. The survey was sent out in November, 2020 in online form and was available to fill in for a week to ensure similar conditions—peak of wave 2—for all respondents. Implementing a face-to-face survey was not possible due to COVID-related restrictions. The online format limited the number of questions that could be asked compared to the face-to-face format.

After closing the survey and cleaning the data, we had 622 responses appropriate for further analysis. Compared to previous similar research [78], this is a significantly larger sample size. The distribution of the sample is characterized as follows:

- Gender: female 378 (61%), male 244 (39%);
- Budapest 124 (20%), outside of Budapest, the capital city: 498 (80%);
- Level of studies: Bachelor’s 429 (69%), Master’s 53 (8%), Postgraduate 140 (23%);

- Field of studies: business management and economics 398 (64%), (other) social studies 153 (25%), other (mainly engineers) 71 (11%).

After closing the survey and cleaning the data first, we identified SBM-related behavioral changes (observed behavior) based on the approach of Bocken et al. [25]. We then revealed similar behavioral patterns beyond observed behavior using principal component analysis.

The reason for choosing principal component analysis was to represent the adoption of SBM models with a smaller number of variables. It was assumed that SBM-adopting behavior from a consumer perspective is implemented in different behavioral combinations (components) than what the SBM concept from a corporate perspective depicts. The model can be set up in the following way:

$$C_i = w_1(Y_1) + w_2(Y_2) + w_3(Y_3) + \dots + w_{55}(Y_{55}),$$

where C_i represents the components, w represents the weights, and Y represents the variables.

The resulting model can be interpreted as consumer adoption factors of SBM.

4. Results of the Survey

We carried out a Kaiser–Meyer–Olkin (KMO) test the Bartlett’s test for testing sampling adequacy. The KMO value (0.761) and the Bartlett’s test (0.000) indicated that our sample is highly suitable for EFA.

We carried out the principal component analysis of the 55 behaviors related to SBM. We used factor rotation that transforms the initial factors into new ones that are easier to interpret. Varimax rotation maximizes the sum of the variance of the squared loadings. This usually results in high factor loadings for a smaller number of components that get highlighted. The remaining components get lower factor loadings.

As indicated in Table 3, sixteen components emerged from the original variables (consumer acceptance, attitudes, and behavior towards SBMs, explaining 60.5% of total variance). The rotated component matrix supporting our classification (and also indicating the original variables) is presented in Figure 3. Furthermore, Figure 3 also shows the variables used for the principal component analysis. Questions were asked for each of the eight archetypes of SBMs (see Table 1), with 4–8 questions per archetype depending on the complexity of the SBM. The questions asked were about the direction and magnitude of change for a given action during the COVID crisis, measured on a Likert scale.

Table 3. Components of the adoptions of sustainable business models—results of the factor analysis.

Component	Extraction Sum of Squared Loadings			Rotation Sums Do Squared Loadings		
	Total	% Variance	% Cumulative	Total	% Variance	% Cumulative
1. Intention to adopt novel sharing models	5.414	11.279	11.279	3.074	6.405	6.045
2. Intention to adopt digitalized services	3.075	7.718	18.997	2.182	4.546	10.951
3. Thrift	2.511	5.231	24.228	2.101	4.377	15.327
4. Intention to support the local economy	2.064	4.300	28.529	2.062	4.295	19.623
5. Environmental and social responsibility	1.659	3.456	31.984	2.024	4.217	23.839
6. Conscious transportation	1.565	3.261	35.246	1.857	3.868	27.707
7. Green in purchasing	1.449	3.018	38.263	1.837	3.827	31.538
8. Green in investment	1.361	2.836	41.100	1.822	3.796	35.330
9. Amateur economy	1.297	2.703	43.803	1.647	3.431	38.761
10. Maintenance	1.279	2.665	46.468	1.638	3.412	42.173
11. Self-sufficiency	1.239	2.581	49.049	1.535	3.197	45.370
12. Social norms	1.209	2.519	51.567	1.492	3.108	48.478
13. Secondhand purchasing	1.142	2.380	53.947	1.486	3.095	51.573
14. Long-term product use	1.090	2.270	56.217	1.467	3.055	54.629

Table 3. Cont.

Component	Extraction Sum of Squared Loadings			Rotation Sums Do Squared Loadings		
	Total	% Variance	% Cumulative	Total	% Variance	% Cumulative
15. Simple life	1.034	2.154	58.371	1.464	3.049	57.678
16. Reduced consumption	1.009	2.102	60.473	1.342	2.796	60.473

	Component															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
22. I usually use a car-sharing service.	.871															
23. I usually use a car-pooling service.	.851															
24. I usually use a bicycle-sharing service.	.798															
21. Instead of owning objects, I am satisfied with their use.	.446						.259					.206		.244		
52. I prefer to shop online (rather than physically).		.767														
53. I usually use a home delivery service.		.702														
9. I do what I can online.		.697	.206													
5. I can usually avoid wasting things.			.620													
34. I value food, I avoid food waste.			.598											.210		
29. I try to continue using my items and only replace them when necessary.			.572						.201			.220		.209		
15. I accumulate a lot, so a lot of things go to waste.			-								.400			.256		
33. I consider it important to always dress in the latest fashion.	.217		-	.210					.248			.327	.257	-	.295	
38. I try to buy local products.				.715												
39. I try to buy domestic products.				.708								.269				
47. I consider it important to revive old techniques.				.482					.423	.320						
37. I travel little for pleasure.				.431					.241			.273		.279		
25. I consider it important that the items I procure come from an ethical / socially responsible source.					.772											
26. I try to get to know about the environmental / social impacts of my purchases.					.658							.244				
27. I consider it important that my consumption patterns do not harm biodiversity.					.596											
48. When I work, I consider the social usefulness of the activity to be important in addition to income.				.211	.361			.243	.330					.310		
19. I try to drive more by car.							.820									
17. I try to travel more by public transport.						.774										
3. I strive to buy non-packaged products.							.737									
8. I try to buy packaged products as they are safer.								.678	.222		.215					
2. I strive to buy certified eco-friendly products.	.203				.279	.483	.277									
4. I consider energy efficiency improvements of my home to be important.								.730								
20. I consider it important that my household/ residence has solar panels.								.713								
1. I strive to buy energy-saving products.					.280	.338	.454									
30. I try to use hand-made products.	.204						.216	.594	.259							
49. I have a new domestic hobby.								.547			.200					.243
6. I can keep the energy consumption of my household low.	.217	.245						.217	.418							.265
18. I try to walk or ride a bike more.		.253				.396		.403								
11. I try to maintain and renovate my apartment (or residence).										.694						
10. I try to renovate and repair my belongings.			.229							.649						
16. I am more careful with buying or giving away used things.											.726					
12. I have postponed investments because I realized I can still use my old stuff.			.259								.560			.214		
51. I find it important to share my lifestyle ideas with others.				.204								.654				
50. I pay attention when something is advertised.								.237				.622			.208	
13. I am used to buying used products.													.724			
14. I try to find new owners for my worn-out things.													.684			
28. I try to buy durable products.			.246											.632		
35. I try to spend more time with my family members and friends.	.237										.233	.210	.387		.279	
7. If I were to buy a vehicle, I would consider environmental aspects to be of key importance.		.230	.239	.265			.205							.312		
54. I consider distance learning to be advantageous.															.746	
55. I consider digitalization to be important.		.274													.683	
31. I try to lead a simple life.				.293											.661	
46. I am involved in voluntary / non-profit activities.	.427			.202											.517	
32. I try to reduce my material consumption.			.304	.266							.314				.373	

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.^a
 a. Rotation converged in 29 iterations.

Figure 3. Rotated component matrix of the factor analysis (to improve readability and interpretability, only coefficients over 0.2 are shown).

The following components characterize the system in terms of changes in consumer acceptance:

- Component 1: adoption of sharing economy models is the strongest consumer component (linked to the social aspect of SBMs);
- Component 2: digitalization (linked to scale-up solutions—organizational models—of SBMs).

The first two components do not assume environmental values but describe models that are attractive to many segments of consumers. The further components can be described as follows:

- Components 3–7 describe different aspects of environmental and social responsibility and stewardship and can be linked to the social archetype of SBMs;
- Component 8 is related to investing in green technology (linked to the technological archetype of SBMs, renewable technology, and natural processes);
- Components 9–11 capture value changes and frugality aspects (again, related to the social archetype of SBMs);
- Component 12 is linked to stewardship (a subcategory of social business models);
- Components 13 and 14 are linked to participating in the circular economy (a subcategory of technological SBMs);
- Components 15 and 16 again are linked to value changes happening during the crisis.

In summary, from a consumer perspective, changes in the sharing economy and digitalization are the main drivers of behavioral change, but changes in values are also significant. Technological models have played a smaller role than social and organizational models.

The following section discusses the results through the TBP model introduced before.

5. Discussion

The five components that explain most of the variance in the principal component analysis are discussed in relation to the categories of our TPB-based research model (see Figure 1 earlier).

Component 1 (Figure 4) is related to potential openness towards sharing-economy schemes linked to SBMs. Dark blue rectangles indicate stronger effects, and light blue weaker (or nonexistent) ones. Participating in a sharing scheme is trendy and appealing. The sharing economy ethos [44] and its novelty value [43] may attract some young consumers. Peer impact may play a role as well [32].

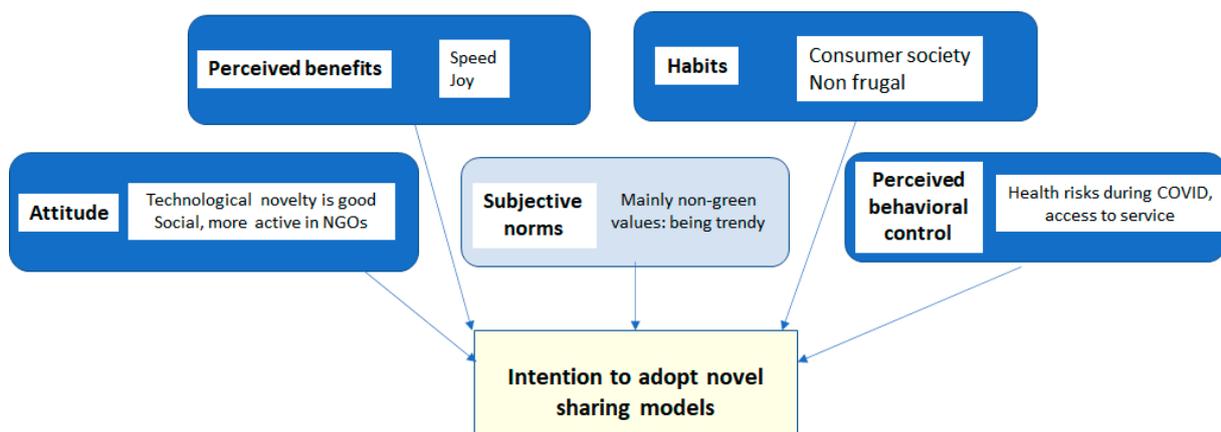


Figure 4. Physical sharing of innovative technologies (Component 1).

The attraction to technical novelty is dampened by the risks and constraints associated with COVID in the form of behavioral control factors. Sharing cars, bicycles, and public transport with strangers is a major health risk during a pandemic. Epidemiological restrictions have had a direct and immediate impact on behavior, in agreement with findings of [79]. Additionally, they may affect subjective norms [28,36].

This component was negatively correlated with energy saving or buying eco-labelled products in our study. The results of our cluster analysis showed that those with an intention pattern were strongly associated with the first component plan to make up for holidays they have missed in the future. Accordingly, the intentions associated with the first component imply a significant risk of rebound effects.

A study by [75] found that car sharing reduces annual mobility emissions by 3–18%, generating significant sustainability benefits. Our results suggest a more cautious approach, mainly due to the rebound effect and level of embeddedness of individuals in consumer society that is found with members of Component 1. A theoretical implication is that SBMs of sharing economy attract consumers with no green values as well. Presenting these models as sustainable models is questionable due to the high potential of rebound effect. Businesses should also reconsider whether they emphasize sustainability, novelty, or functional advantages of these models.

Our second component is related to organizational innovation in the SBM model. It captures attraction to scalable solutions such as digitalization and online services (Figure 5).

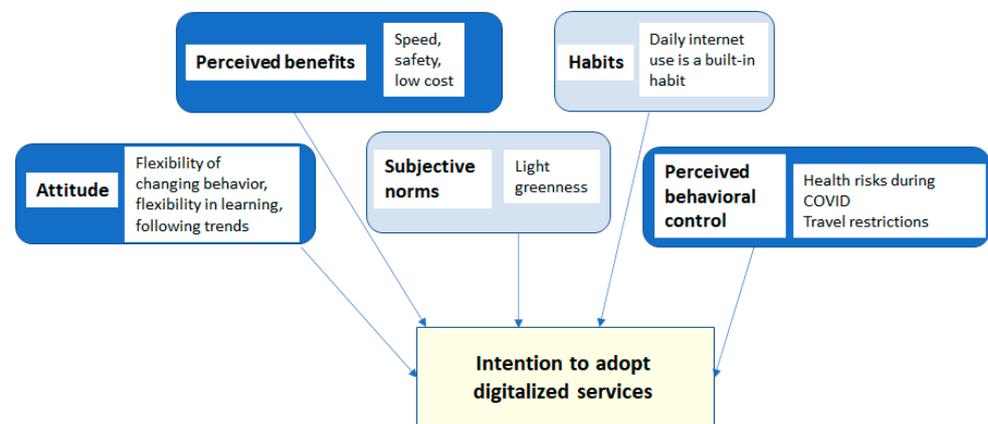


Figure 5. Adoption of digital services (Component 2).

This component is correlated neither to consumerism nor to environmental or social values. It is most probably triggered by functional values and convenience—a finding supported by [55,56] for similar services. This assumption, however, is still to be tested in a future confirmatory factor analysis (CFA). Accordingly, it seems that there is no need for value change with regard to online service SBMs.

Online shopping and conducting personal business online are beneficial to individuals in that they are quick and accessible and associated with lower health risks. This component is associated with COVID-related risk prevention. The convenience of online banking and administration may remain after the pandemic. Online services also offer sustainability benefits such as a reduced carbon impact due to reduced mobility. Businesses need not emphasize the sustainability benefits when selling these services.

The third component is thrift, a subcategory of social innovation (Figure 6).

This was positively correlated with avoiding waste, valuing food, postponing investments, keeping household energy use low, extended product use, and digitalization. It was negatively correlated with consumerism, including following fashion and material consumption. This tendency may be stronger in societies over the ‘catching up and overtaking’ level of capitalism [53]. This is the first component to embrace social and environmental responsibility. In accordance with [53], some members of this group perceive and appreciate the link between frugality and sustainability. As highlighted by [46], attitudes that have evolved in an emergency and archaic survival instincts are also present here. Forced frugality impacted subjective norms, and this effect might be persistent. The most frugal individuals want to maintain such habits in the long term, as indicated by our cluster analysis. The pandemic increased the social acceptance of frugality, further disseminating SBM models based on repair, renovation, replacement, and durability. Businesses as well

as policy makers can capitalize on this change by promoting models of extended product durability. Further research is needed to test the persistency of this value change.

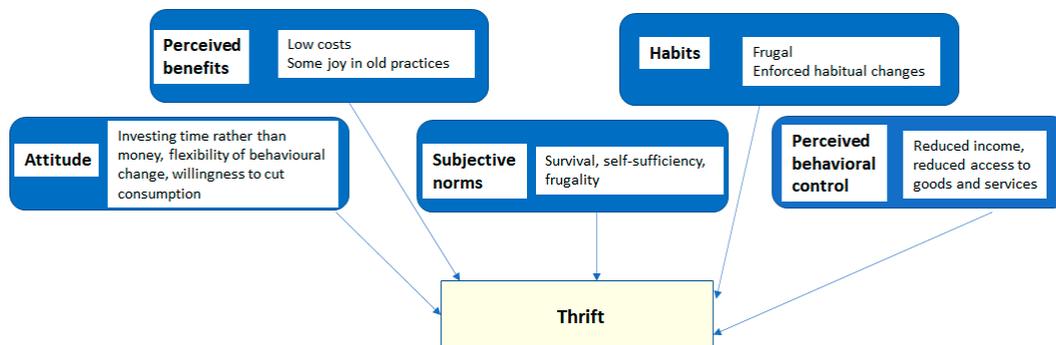


Figure 6. Consumer thrift (Component 3).

The fourth component incorporates localization and the revival of old practices (Figure 7).

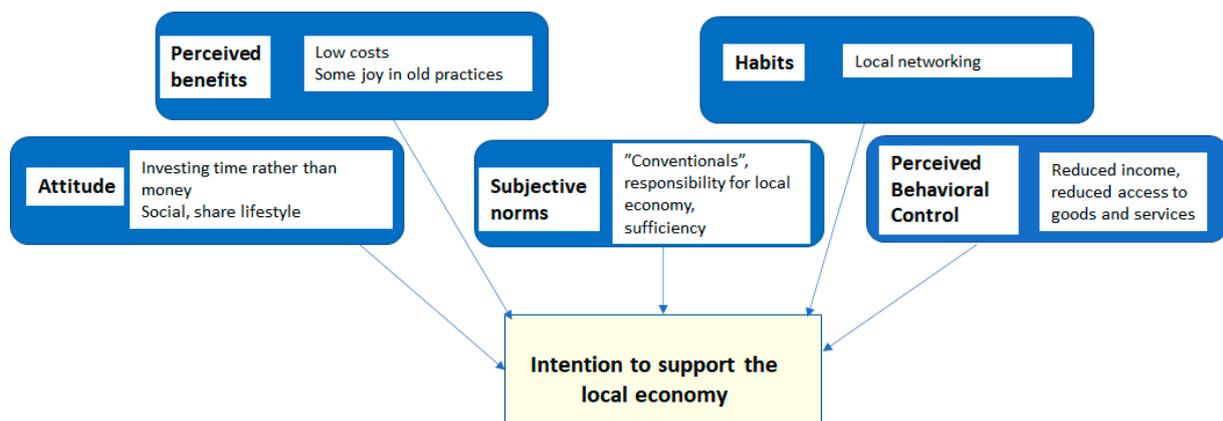


Figure 7. Conventional attitude (Component 4).

It also embraces a strengthening of social responsibility in the choice of workplace. Moreover, it is negatively correlated with following fashion. An acceptance of behavioral change is present here. The component is a good indication of the growing interest in localization (see also [59]). Members of the group with this component have attitudes that are very similar to those held by the conventional segment of the LOHAS model [80]. Local businesses can capitalize on this change in behavior and get some advantage over multinational companies.

The fifth component describes changes in environmental and social responsibility, including learning about the environmental and social impacts of products, reducing the impact of consumption patterns on biodiversity, choosing environmentally friendly products, and being socially responsible in terms of choice of workplace (Figure 8). This is where the subjective norms of sustainability are most evident.

This component, however, does not correlate with the frugality variable. This raises the concern that those who are happy to buy environmentally friendly products may also enjoy shopping in general. They are not necessarily the individuals who are willing to make serious behavioral changes for the sake of the environment. If this is the case, it has serious implications for the environmental impact of green purchasing. Are green consumers perhaps too embedded in consumerism? Further research is needed to answer this question.

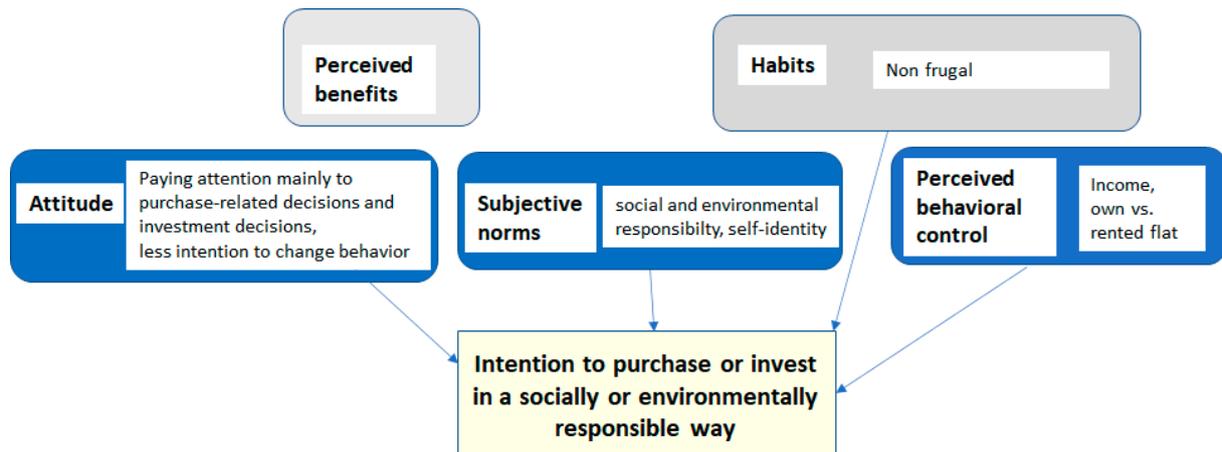


Figure 8. Environmental and social responsibility (Component 5).

The further eleven components explain only a small share of variance each. Some are more closely related to technological solutions (buying to be green), while some others involve value shifts. They are distinguished from the first five components by a general behavioral attitude. The fact that they appear as separate variables indicates the importance of such general attitudes in the adoption of SBMs, which are often more important than sustainability attitudes—e.g., a preference for alternative solutions to the same problems (investment, purchases, or behavior change). For example, some consumers may prefer to invest a larger amount of money into an electric car or solar panels, but do not want to change their day-to-day habits [64]. Similarly, some people may be happy to spend small amounts on green products but cannot invest large amounts into solar cells. Committed greens may be willing to live a simple lifestyle but cannot afford to make expensive investments.

In general, the value shifts created by the crisis have left their mark on most of the behavioral patterns. Thrift and self-sufficiency appear in most of the components that were explored. These factors are expected to decline in importance in the post-COVID world, but some changes can be expected to be more persistent.

One limitation of the research is the focus of the sample on a particular group (university students). Nonetheless, young people are particularly important in terms of sustainability, as they are typically more flexible and open to adapting new models, and their emerging consumption patterns will determine the status of sustainability in the longer term. Furthermore, as this study focused on better understanding the factors behind the consumer acceptance of SBMs, we applied an exploratory factor analysis instead of a confirmatory factor analysis (this latter can be the scope of a later study).

6. Conclusions

The pandemic has created changes in the adoption of SBMs. On the positive side, there has been an increase in the digitalization of services, opportunities for working from home and online education have expanded, and localization has strengthened, while sustainability values have not weakened. Some of these changes will become persistent and create sustainability benefits. On the negative side, some repressed consumer aspirations have been reinforced, for example, a strong desire to travel, so a rebound effect is expected. Analyzing the combined effect could be the subject of further research. A more sophisticated approach is needed to determine which SBM models enhance sustainability in the longer run and which ones rather promote a consumer society. Our study indicated that green shopping is perhaps too embedded in consumerism. This is an issue that will be worth analyzing in a future CFA study. General attitudes' influence on pro-environmental behavior should also play a greater role in future studies. Frugality-based SBMs gained momentum during the pandemic, together with digitalization that offered functional benefits.

Further research is needed to test the persistency of changes as well as the motivational factors behind SBMs. Overall, the diffusion of SBMs is likely to have strengthened, but their maintenance will need further policy support after the crisis.

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