

BEHAVIOURAL ECONOMICS IN CONSUMER SUSTAINABILITY CHOICES

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ABSTRACT

This research examines the efficacy of eco-nudging as a behavioral approach to promote sustainable consumer choices, taking into account ethical aspects, its applicability across various cultural settings, and its socio-economic effects. This research study utilizes a conceptual framework that integrates behavioral economics, ethical frameworks, and policy integration methods to assess the long-term sustainability of eco-nudging. Findings suggest that eco-nudging is an affordable, scalable approach that is effective, but primarily when consumers possess a degree of freedom, the intervention aligns with cultural norms, and the intervention is financially attainable. Personalization driven by AI and policy integration enhances its scope, yet issues surrounding data privacy, transparency, and the potential for allocation continue to raise concerns. Consequently, this research contributes to the theoretical development of eco-nudging, including its ethical considerations and cultural dimensions, while also providing practical recommendations for businesses, policymakers, and economists who support sustainability. Eco-nudging, consequently, can serve as a groundbreaking approach to influence long-lasting sustainable consumption behaviors, provided it promotes ethical transparency and is applied adaptively.

Keywords: Eco-Nudge, Digital and Physical Nudging, Ethical Considerations, Policy Integration, Sustainable Consumer Behaviour,

1. INTRODUCTION

Worrying worldwide environmental data unmistakably highlight the necessity for everyone to embrace sustainable consumption practices. The United Nations Environment Programme (UNEP) forecasts that worldwide waste production will rise by another 1.3 billion metric tons by 2050, totaling 3.4 billion metric tons each year; a significant portion of this waste is a result of excessive consumption habits (Korkmaz & Altan, 2023). Nations identified as significant sources of plastic waste include India and the United States on a national scale, with India's per capita plastic waste generation increasing by over 50% in the last five years (Amul Tamboli et al., 2023). Although more than 80% of consumers are concerned about climate change, typically only 30% consistently choose sustainable products (Baviskar et al., 2024). The gap between environmental concern and product selection has emerged as a significant problem that eco-nudging strategies aim to address by subtly shaping green consumer decisions.

Yet, considering the increasing environmental awareness, the continuation of unsustainable consumption patterns represents the central issue in achieving sustainable consumer behavior. Regrettably, the attitude-behavior gap has resulted in research indicating that consumers usually possess favorable views on sustainability, yet rarely engage in green shopping (Brdar, 2023). Several of these elements consist of ease of use, cost, perceived effectiveness of eco-friendly choices, and ambiguous information, which accounts for this gap (Hojnik et al., 2019). In digital commerce specifically, when sustainable choices require additional effort during the selection process (Michels et al., 2022). Consequently, it is crucial to implement a

systematic method of encouraging consumers towards sustainability, which inherently involves the application of behavioral economics.

The significance of this research is substantial for the sustainable implementation in the fields of consumer behavior and environmental policy development. The success of eco-nudges can inform in the initial scenario regarding the creation of interventions by companies, governments, and environmental groups to motivate consumers to choose more sustainable options without restricting their freedom (Wozniak et al., 2022). For instance, these behavioral strategies are essential to achieve large-scale, sustainable consumption, especially when the European Union aims to be carbon neutral by 2050. Addressing consumer pain points linked to the absence or hassle of eco-friendly options and the insufficient awareness of sustainability labels, eco nudge aims to make sustainable choices the norm rather than the exception.

This research presents fresh perspectives by integrating behavioral economics with sustainability studies to create a practical framework for eco-nudging. Previous studies have investigated consumer preferences for eco-friendly products (Jain et al., 2021), yet they have often neglected the psychological mechanisms that hinder action on stated environmental worries.

Consequently, this study aims to address that gap by investigating how digital and physical nudges (defaults, mechanisms, social norm signals) can consistently promote sustainable choices. Moreover, although many initiatives focused on eco-friendliness have emphasized corporate responsibility, this research highlights consumer empowerment by asserting that small, collective actions can significantly contribute to reducing major ecological changes (Jaiswal et al., 2022). This paper not only contributes to the academic conversation but also assists policymakers and marketers in pursuing a more sustainable future.

2. OBJECTIVES OF THE STUDY

1. To examine digital and physical nudging solutions for improving sustainable consumer behaviour via behavioural interventions.
2. to assess the ethical aspects and situational suitability of eco-nudging, with an emphasis on consumer freedom, openness, and cultural flexibility.
3. To undertake a SWOT analysis of eco-nudging to determine its strengths, weaknesses, possibilities, and problems in influencing green consumer choices.

3. REVIEW OF LITERATURE

As an effective way to guide sustainable consumer behavior, eco-nudging, drawing on behavioral economics, has come to life. This approach relies on such interventions that are also subtle: defaults, framing, social norms to promote environmentally responsible choices without depriving consumers of their freedom. As the literature has suggested, traditional regulatory techniques, such as taxes and subsidies are ineffective because of cognitive biases and decision-making heuristics (Petel, 2020). Therefore, behavioral strategies, which take into consideration bounded rationality and automatic decision-making, have been more effective in promoting sustainable consumption.

Digital and Physical Eco-Nudging Strategies New research shows why digital nudging is ramping up in e-commerce and online grocery shopping. Social norm messaging nudges and simplified eco labelling systems have been found to improve sustainable purchasing behavior (Milad Mirbabaie et al., 2021). Research also finds that, although poorly designed nudges can have unintended backfiring effects (Berger et al., 2020), combining conflicting nudges can

create unintended backfiring effects. In physical retail settings, product placement, eco-labels, as well as feedback mechanisms promote green consumption. One such use is real time energy consumption feedback which greatly improves energy saving behaviour (Skokov et al., 2024).

Eco-nudging has been shown to be effective yet scholars have cautioned that eco-nudging has ethical implications as well as a risk of long-term effectiveness. However, critics argue that nudging does not result in deeper behavior changes, but produces only temporary compliance (Petel, 2020). Additionally, the validity of nudging strategies becomes debatable, raise questions of transparency and the autonomy of the consumer, which should be further empirically validated (Markovych & Demkura, 2023).

4. RESEARCH METHODOLOGY:

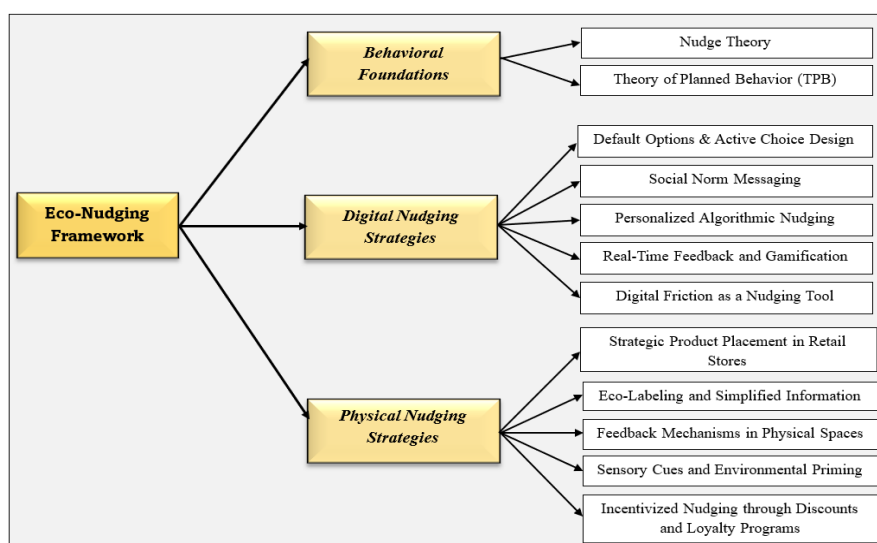
This exploratory conceptual paper uses a qualitative research approach that analyses literature and used theories in order to assess the ethical implications and relevance of eco-nudging. It combines the analysis of the field of behavioral economics, ethics, cultural adaptation areon the basis of quantitative and qualitative data in academic papers and policy papers from 2020-2025. To understand further the differences and similarities in effectiveness of employing eco-nudging in different socio-economic and cultural contexts, a comparative approach is taken to evaluate the trends and issues experienced by consumers. The outcomes will be geared towards the development of an effective, ethical, and culturally sensitive and consumer-friendly eco-nudging framework suitable for the global market.

5. ECO-NUDGING FRAMEWORK

For developing a comprehensive eco-nudging framework encompassing both digital and physical nudging strategies to enable long term sustainable consumer behavior, behavioural economics, persuasive technologies and digital interventions would be needed. Any framework for product/service evolution should be able to systematically invoke aspects like defaults, social norm, feedback mechanism and AI driven personalization to bring lasting change in consumer decision making.

The following figure 1 shows the eco-nudging framework of the study

Figure 1: Eco-Nudging Framework of the Study



Source: Developed by the Researcher

4.1. Behavioral Foundations of Eco-Nudging:

Being an offshoot of Thaler and Sunstein's Nudge Theory, Eco-nudging is about making use of subverted rewards and punishments in the choice architecture to affect a significant behavioral change without getting in the way of consumer autonomy. Additionally, it is related to the Theory of Planned Behavior (TPB), which explains that attitudes, subjective norms and the perceived behavioral control regulate consumer choices (Grisiute & Raubal, 2024).

5.2. Digital Nudging Strategies:

Digital nudging is defined as the use of decision strategies within the digital systems to help users opt for healthier choices. Further with the tendencies of buying goods and services through the internet, e-commerce, and digital payments, businesses and authorities employ choice architecture, default options, norms, and feedback to opt consumers towards sustainable choices (Wozniak et al., 2022).

- A). Default Options & Active Choice Design:** Among a range of digital nudge approaches, the default options and active choice design is a very useful technique which makes sustainable choice a standard. For instance, Michels et al. (2022) opinion that when carbon-neutral shipping is made the default choice in the online shop, the customers are more inclined to use this service. Other techniques of decision making involve making consumers select an unsustainable alternative other than having to select an environment friendly option such as active choice mechanisms.
- B). Social Norm Messaging:** The following messages are used by the digital platforms, "80% of people near you opt for eco-friendly packaging" or "most people prefer to procure sustainable products". As has been revealed before, this approach works within the context of prompting people to make more eco-friendly consuming decisions because it triggers the news norm compliance bias (Milad Mirbabaie et al., 2021).
- C). Personalized Algorithmic Nudging:** AI is also about digital nudging where consumers is provided with sustainability choices based on the individual pattern of consumption. This way, the online retailers employ AI to put the green options in focus when customers are exploring items that might have adverse impacts on the environment (Wozniak et al., 2022).
- D). Real-Time Feedback and Gamification:** Another way of providing feedback that may also fall into the realm of gamification is by using sustainability scores: Resulting in more consumer awareness regarding eco-friendly behaviors. It involves aspects by which the users are given an estimate of their carbon footprint with regards to their internet shopping in order to encourage them to make environmentally friendly decisions (Isensee et al., 2022). Also, customers' incentives, including eco-loyalty programs, special offers for sustainable shopping, and rankings include customer behavior that is environmentally friendly.
- E). Digital Friction as a Nudging Tool:** As for Digital friction it is about creating digital barriers intentionally to reduce certain behaviours thought of as unsustainable. For example, the practice of having mandatory confirmation of the consumer before going ahead with the most environmentally unfriendly choices, such as plastic packaging, effectively make sustainable choices the defaults (Mejtoft et al., 2023).

5.3. *Physical Nudging Strategies:*

Digital nudging relates to changing the behavior of people when they do something online, whereas physical nudging is where you change their environment in the retail or public space so that they make a sustainable choice. Eco labelling, product placement, sensory cues and feedback mechanisms are used by this strategy to make sustainability the more attractive and convenient option (Grisiute & Raubal, 2024).

- A) **Strategic Product Placement in Retail Stores:** These eco-friendly products are positioned to determine the level of purchase of the products. For instance, several studies link eye level or check-out counter placement of sustainable products to much higher consumer selection (Skokov et al., 2024). For example, placing eco-friendly items at the beginning of the aisles makes consumers put green in their minds as they are shopping in those aisles.
- B) **Eco-Labeling and Simplified Information:** Making sustainable choices is difficult for consumers because they are often faced with overload regarding their purchasing behavior. This gap can be bridged by providing clear, easy to understand eco labels. Entry label that provides carbon footprint, recyclability, or ethical sourcing labels colored or simplified to help consumer to make the right decision (Berger et al., 2020).
- C) **Feedback Mechanisms in Physical Spaces:** Supermarkets and other places with public areas can provide real time feedback displays that reinforce sustainable behaviors. For example, some stores keep an energy consumption daily monitor to see how much of this plastic waste has been cut by customers who have opted for reusable packaging. Like such public transport stations that show the statistics of emissions saved by commuters who choose the eco-friendly mode of travel are effective nudges (Thøgersen, 2023).
- D) **Sensory Cues and Environmental Priming:** Sensory cues like green lighting, eco-friendly backgrounds and calming music can be used to enhance physical nudging in eco-friendly shopping sections. Visual and auditory cues to environmental consciousness that trigger subconsciousness can influence consumers to make more sustainable option in their purchase, research have shown (Grisiute & Raubal, 2024)
- E) **Incentivized Nudging through Discounts and Loyalty Programs:** Discounts on eco-friendly products (e.g., lower prices on reusable bags or organic items). Loyalty points for green purchases, that can be turned into discounts or special rewards for the future (Isensee et al., 2022).

Digital as well as physical nudging strategies contribute to the development of the long-term sustainable consumer behaviour. Physical and digital nudging tap into using eco labels, product placement, and sensory cues to design malls in the real world and while using default settings, AI and feedback in online environments like stores. An effective eco-nudging framework combines the two approaches and makes it easy, desirable and rewarding for consumers to be sustainable at all touchpoints.

6. ETHICAL CONSIDERATIONS AND CONTEXTUAL APPLICABILITY OF ECO-NUDGING

Eco-nudging, in nature being an approach for reformation of consumer behavior towards sustainability policies, has ethical concerns of autonomy, informed decision and best interest, and transparency. Furthermore, its efficacy as well as its acceptance are dependent on socio-economic and cultural environments hence its usefulness and application best suited for a range of markets across the globe. This section analyses the potential ethical issues in the

The diagram is divided into two main sections: **Ethical Considerations** (left) and **Contextual Applicability** (right).

- Ethical Considerations** (light blue header box) includes:
 - Consumer Autonomy and Freedom of Choice
 - Transparency and Informed Decision-Making
 - The Risk of Paternalism
- Contextual Applicability** (light orange header box) includes:
 - Cultural Adaptation of Nudging Strategies
 - Socio-Economic Barriers to Eco-Nudging
 - Policy Integration for Effective Implementation

Figure 2: Ethical Considerations and Conceptual Applicability

- Ethical transparency includes:
- Explicit labelling of eco-friendly defaults.

- Consumer education about the environmental impact of their choices.

Measures to implement choice setting through which consumers are put in a position to make choices instead of the default. Consumers may become resistant if the rationales for nudging are not made clear: This means that if the concept inspiring nudging is not well explained, consumers shall resist the change. These sources indicate that the attempts to nudge the consumers, when they feel that they are being tricked, may actually lead to a negative reception of those sustainability efforts (Michels et al., 2022).

C) The Risk of Paternalism:

Eco-nudging per se presupposes some measure of enlightened self-interest in that organisation steering people's behaviour for what is perceived to be their benefit. However, the main focus is whether this soft type of pressure should be practiced. In this regard, other scholars have opined that green nudging is in the interest of the US populace to offer public benefit akin to seatbelt cases and anti-smoking campaigns (Petel, 2020). Some argued that nudging is manipulative at worse, due to the influence that could be placed in the hand of some organisations with a motive of enhancing their gains. The moderate approach is the notion that consumer welfare should be the ultimate goal. As it has been previously mentioned the Ethical nudging frameworks like FORGOOD suggests that the nudging strategies should:

- Fairness: Ensuring equity across different consumer groups.
- Openness: Clearly communicating nudging mechanisms.
- Trust: Self-organizations' decisions ensuring (LADES & DELANEY, 2022).

6.2. Contextual Applicability of Eco-Nudging Across Socio-Economic and Cultural Settings:

Eco-nudging also does not go about influencing behaviour without regard for the specific circumstances of the situation. There are always cultural, economic and social factors that determine how individuals or the public comport themselves to the given nudges.

A) Cultural Adaptation of Nudging Strategies: Research suggests that message heeded differs significantly depending on social expectation across the subject of concern. For instance: As a consequence, the rational-choice approach and financial incentives are more effective in Western individualistic cultures. These collectivist culture countries, like Asia and Latin America, show a more positive response to the social norm-based nudge in the form that utilizes sustainability for the community's good (Cordes & Henkel, 2022). For instance, Japanese style which has more to do with group harmony or collective conscience and appeal to one's civic etiquette tends to be more effective than financial rewards. However, in the USA, the justification of eco-nudging is most effective when associated with cost savings for a single person, or prices.

B) Socio-Economic Barriers to Eco-Nudging: The unethical decision that seems to stem from promoting and appealing to consumers from a lower income bracket is that consumers from such brackets are likely to consider green solutions as luxury pones hence the impacts of green nudges will be severely limited in such segments. Barriers include:

- There is a consideration that the prices of these sustainable products that are perceived to be environmentally friendly are higher than those of the conventional products.

- Inadequate availability of sustainable products and services in developing countries.
- Lack of IT literacy, which weakens the effectiveness of the measures of digital nudging.

To achieve socio-economic intention, therefore, policymakers ought to incorporate nudging with the structural encouragement like a subsidy for the sustainable goods and cheap green credit facilities, (Henkel & Schwesinger, 2020).

C) Policy Integration for Effective Implementation: The importance of anti-ecological sinning for countries and governments since the action plans and implementations can only be ethical and culturally sensitive. Best practices include:

- Promulgation of the law that prescribes disclosure requirements of green nudging policies.
- Some studies conducted internationally to propose intervention approaches for certain cultural areas.
- Integration will involve incorporating it into the state and national sustainability policies to delay behavior change. For example, the EU Green Deal integrates BE for climate change policies conducting that the EU Green Deal's nudging is conjunction with regulations (Siipi & Koi, 2022).

While eco-nudging constitutes a promising approach and application for the promotion of more sustainable behavioural change, the principles of ethically feasible interventions and sufficient context sensitivity of this concept deserve reflection. Assuaging autonomy, concerns, and lack of transparency and inclusiveness guarantees that nudging is an ethical tool of behavioral change as opposed to manipulation. Moreover, knowledge of culture and economic factors is relevant in the deployment of nudging to support global sustainable objectives. For effective implementation of nudging interventions, policymakers and business leaders as well as researchers need to design nudging frameworks that are understandable and just for all consumers and responsive to various markets and related populations.

7. SWOC ANALYSIS OF ECO-NUDGING: BEHAVIORAL STRATEGIES TO INFLUENCE GREEN CONSUMER CHOICES:

Eco-nudging relies on influencing consumers through indirect means in a way that does not limit their freedom of choice. An evaluation of its strengths, weaknesses, opportunities and challenges can be made using the SWOC analysis to determine whether the approach is effective, has shortcomings and the possibilities it has in enhancing consumer supportiveness of the green culture. The following table 1 depicts the SWOC Analysis.

Table 1: SWOC analysis.

STRENGTH
<ul style="list-style-type: none"> • Described as being most suitable for changing other people's behavior sustainably (Michels et al., 2022). • It can be said that it offers certain level of freedom of choice while maintaining environmental responsibility. • Cheap and does not need much intervention from the regulatory authority. It can be used in both online and traditional conventional business store environments. • Usually, great for various industries and for the different market segments.

WEAKNESSES
<ul style="list-style-type: none"> • Explains why it tends to contribute to only developing short term behavioral change as opposed to creating a habit (Petel, 2020). • It has an ethical risk of undermining the consumer's ability to make decisions and lack of consumers information. • Some drawbacks include inability to work well for the lower income earners since some of the products may be expensive. • All effectiveness depends on different cultural and social conditions when they are delivered and implemented. • The use of this form of advertising could make the customers develop contempt for the advert or any product associated with it which would be perilous for the company behind them.
OPPORTUNITIES
<ul style="list-style-type: none"> • Nudge effectiveness increases when executed with the aid of Artificial Intelligence. • This study established that integration of green marketing with the existing government policies can enhance sustainable consumption (Siipi & Koi, 2022). • Expansion into sectors like energy conservation, transportation, and food waste reduction. • As for the main part of this research effort, it has been demonstrated that more complex labelling and product positioning and placement initiatives hold much promise into engaging the green consumer as well.
CHALLENGES
<ul style="list-style-type: none"> • Regulatory scrutiny over ethical concerns and data privacy issues. Consumer skepticism toward green marketing initiatives. • There are different social and economic factors that might hinder access to sustainable products. • The concept of scalability also has to be adapted to the developing markets situation in the country (Nallur et al., 2024).

Source: Developed by the Researcher

The notion of Eco-nudging can be seen as a useful tool that can be implemented to foster the change of consumers' behaviour to more sustainable one; however, its effectiveness in long term will strongly depend on four factors – ethical nature of the intervention, cultural context, and the way it is integrated to policy making. Thus, it remains possible to solve all the existing actual non-technical regulatory concerns and, at the same time, extend these advantages of adaptive learning with the help of AI-driven personalization for a vast range of economic and social environments.

8. DISCUSSIONS:

The eco-nudging has evolved into a key behavioral strategy to promote green consumer choices through subtly interdicted consumption while leaving the consumer the autonomy. Eco-Nudging is informed by behavioral economics and choice architecture, and practices such as defaulting, social norms, feedback, and the utilisation of AI in personalization, to alter purchasing behaviors online and offline (Michels et al., 2022). However, while cost efficient and scalable, the ethical concerns regarding consumer autonomy, transparency, and the informed decision making remain about the aid of consumer autonomy very much be influenced by nudge (Petel, 2020). FORGOOD are such ethical frameworks such as fairness, openness and respecting autonomy can assuage these concerns (LADES & DELANEY, 2022). Similarly, cultural and economic differences give preference to financial incentives

over social norm nudges in individualistic societies and vice versa for societies in collectivist cultures (Cordes & Henkel, 2022). However, nudging effectiveness (Henkel & Schwesinger, 2020) is also limited by barriers that lower income consumers experience in taking eco-friendly option. Access to sustainable choices (Siipi & Koi, 2022) are enhanced by government policies and incentives, subsidies, etc. In addition, while AI-driven nudging enhances the efficiency, issues with data privacy and the ethical practice of AI (Nallur et al., 2024) must be addressed. Building an eco-nudging as a transformative tool for global sustainability with an integrated ethics transparency, policy and technological safeguards approach, can provide a balance of consumer right leave long term behaviour change.

9. CONCLUSION

The aim of this study was to explore the role of eco-nudging as an applied behavioural strategy in promoting sustainability, whilst evaluating the ethical bases upon which eco-nudging functions, socio cultural adaptability and long term effectiveness. This based on findings suggests that eco-nudging is a powerful, but not oppressive way to encourage the green transition of consumers. It is based on behavioral economics principles such as default settings, social norms, personalized feedback, and digital interventions and is successful. Yet, consumer trust-imposed concerns of autonomy, transparency, and manipulation to be dealt very cautiously. In addition, socio economic disparity and cultural difference affect how people react to nudging strategy, so it is important to customize nudging strategy to different regional or demographic contexts. Eco-nudging is an effective approach to encourage short term behavior changes, but not to create long term lasting habits solely by itself, which rather requires policy integration, financial stimuli and continuous engagement mechanisms.

10. PRACTICAL IMPLICATIONS

The practical implications of this study are significant to businesses, policymakers, environmental organizations that are looking for ways to drive sustainability without restrictive measures. Eco-nudging can be integrated into business at marketing level by AI-driven personalisation, strategic product placement and simple eco labelling making sustainable choices appear more appealing. This also means policymakers can help greatly by including nudging principles in the regulatory way, offering subsidies for the sustainable alternatives, and making the promises of corporate sustainability transparent. They also move beyond behavioral interventions in transport, energy consumption and waste management to promote eco friend behaviour at systemic level, while urban planners and public infrastructure development can avail this in their work. This study thus highlights further ethical concerns with responsible nudging practices and underlines the need for nudging practices to continue being responsible and to give consumers the room of choice to make their own decision.

11. SCOPE OF THE STUDY

This research examines the effectiveness of digital and physical eco-nudging strategies on sustainable consumer behavior in two different socio-economic and cultural contexts. The paper analyzes ethical aspects like consumer autonomy, transparency and manipulating risk, as well as the possibilities of policy integration and AI driven personalization in increasing eco-nudging's long-term effects. The study helps improve on sustainable interventions for businesses, policymakers and environmental organisations.

12. LIMITATIONS OF THE STUDY

It is a conceptual paper without empirical validation by real world case studies, or by consumer experiments. The scope of the application does not include region specific or industry specific analysis, due to which it would be applicable all over the markets. Theoretically discussion is made of ethical concerns without actual consumer perception surveys. The study also explores AI driven nudging but does not take into account the technical implementation challenges and the long-term regulatory implications.

13. FUTURE RESEARCH DIRECTIONS

Future research should direct towards the development of adaptive eco-nudging frameworks to personalize interventions based on societal and socio-economic differences to make the interventions work across different populations. For most of the eco-nudging designs, we need more empirical studies to get to the long-term behavioral impact of eco-nudging, especially related to habit formation and lifestyle sustainability. Furthermore, additional studies are needed on AI powered and done in real time behavioral nudging, which rests on the line of technological advancements with data privacy and ethical issues. Future research should also focus on integrating eco-nudging within a complementary use of financial incentives and education programmes to formulate a complete sustainability plan. Finally, consumer perception of nudging in different economic environments is studied, of factors affecting acceptance, resistance and the unintended backlash. In addressing these research gaps, the promise of eco-nudging as a globally scalable, ethically sound, and culturally adaptable modality to incentivize sustainable consumption serves to be maximized.

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