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THE INFLUENCE OF DIGITAL CONSUMERS' BEHAVIOUR ON ENVIRONMENTAL AWARENESS IN POLAND

Grzegorz SZOJDA

Department of Digital Economy Research, Faculty of Economics, University of Economics in Katowice;
grzegorz.szojda@ue.katowice.pl, ORCID: 0009-0003-4224-6017

Purpose: The aim of the article was to explore the influence of digital consumer behavior on their environmental awareness in Poland.
Design/methodology/approach: The research was conducted using a quantitative survey method via the SurveyMonkey platform. The sample included 1,243 Polish respondents of diverse age and gender, who assessed digital behaviors and environmental awareness using a five-point Likert scale.
Findings: The study confirmed a positive relationship between digital consumer behavior and environmental awareness. Younger and more digitally active respondents demonstrated higher ecological consciousness, with notable differences based on age and gender.
Research limitations/implications: The study was limited to a Polish sample, which may restrict the generalizability of findings to other cultural or technological contexts. Future research could include cross-national comparisons or qualitative insights.
Originality/value: The paper offers new insights into how digital consumer behavior shapes environmental awareness, particularly in the context of an emerging digital society. It highlights the role of demographic variables and suggests targeted digital education strategies.
Keywords: digital consumer behavior, environmental awareness, Poland.
Category of the paper: research paper.

1. Introduction

In recent years, environmental awareness has emerged as a significant factor shaping consumer behavior worldwide. As concerns about climate change, resource depletion, and environmental degradation continue to grow, individuals are increasingly incorporating sustainability considerations into their purchasing decisions. This shift is particularly evident in digital consumers' behavior, where online platforms provide both access to information and opportunities for conscious consumption. In Poland, a country undergoing dynamic digital transformation and growing environmental consciousness, these trends intersect in unique ways.

In the era of accelerating digitalization, consumer behavior is undergoing profound transformation. Technological advancements are not only reshaping purchasing habits, but also influencing how individuals perceive their responsibility toward the natural environment. As consumers increasingly shift their activity to online spaces—using e-commerce, digital services, and mobile applications—new challenges and opportunities emerge for fostering environmental awareness. The intersection of digital behavior and ecological consciousness becomes a critical area of investigation, especially in the context of sustainable development.

This paper presents original empirical findings based on a nationwide survey of Polish digital consumers, offering novel insights into the intersection of digital behavior and environmental awareness. By focusing on demographic dimensions such as age and gender, the study provides a unique contribution to the existing literature on sustainable digital consumption in the context of Poland's evolving digital landscape.

2. Literature review

2.1. Environmental Awareness

Scientific literature defines environmental awareness as the level of human concern for existing environmental problems and related issues (Zheng, 2010). Environmental awareness also represents the responsibility of the entire community—as an integral part of nature—to ensure that current and future generations can live in a clean, safe, and healthy environment while adhering to established ecological principles and norms (Lewis, 2018). It has been observed that the higher the level of environmental awareness, the more often consumers are motivated by financial factors and personal preferences aimed at improving the state of the natural environment (Szeberényi et al., 2022). However, it is worth noting that this does not always translate into eco-friendly actions. Ariffin et al. (2016) adds that environmental awareness also includes people’s understanding of problems occurring in the natural environment, as well as the need to resolve them or contribute to preventing harmful situations from arising in nature. Following this line of reasoning, it can be concluded that environmental awareness is not only the responsibility of an individual, but of the entire community, which can shape a shared way of thinking and work toward developing concrete actions in the context of environmental protection (Gajdzik et al., 2024a).

Environmental awareness is a key element in shaping people's ecological mindset. An ecological approach entails opposing the perception of humans as superior to nature—those who aggressively exploit the natural environment without concern for future generations and consider themselves as higher or better beings compared to other organisms. Environmental awareness can also be understood as being closely linked to the highest level of societal

engagement in environmental issues and the willingness to make sacrifices for environmental protection (Moon et al., 2016).

It is worth noting that the shift toward fostering environmental awareness among people is made possible through ecological solutions aimed at achieving sustainable coexistence between humans and nature (Baviskar et al., 2024). Environmental awareness can be developed through reliable environmental education and by informing consumers, and an increase in this awareness leads to the adoption of environmentally friendly actions (Ober et al., 2022). Alongside the advancement of modern technologies, there is a noticeable increase in economic awareness among consumers (Gajdzik et al., 2023a). New technological solutions bring a new dimension to efforts aimed at raising the level of environmental awareness among consumers and can help shape responsible digital consumer behavior.

2.2. Digital Consumers' Behavior

In today's world, technological development and its numerous effects accompany us every day in virtually all activities. Technological progress has shaped us into digital consumers. Many of us have adapted our daily lives to the digital reality. Nowadays, the Internet serves us on many levels—not only for leisure, but also for shopping, placing orders, communication, or handling official matters (Kim et al., 2023; Wolny, 2015). The possibilities offered by the Internet are virtually unlimited. Consumers often prefer to rely on information found online rather than on their own shopping experiences (Kucia, 2016). The need for consumers to adapt to digital reality fosters the development of specific digital behaviors.

The concept of digital consumer behavior should be understood as specific purchasing patterns and habits of consumers in the digital environment (Alkadrie, 2024; Yuruk-Kayapinar, 2020). This can be understood as an organized, sequential set of actions and responses to stimuli that occur in the digital space, driven by the desire or need to satisfy consumer needs (Jaciow et al., 2011). Understanding the digital consumer involves accepting innovative technological solutions such as chatbots, VR, AR, or widely applied artificial intelligence. It is also worth noting that the technological environment, including the Internet, significantly influences digital consumer behavior. Digital consumers demonstrate such behaviors by making purchasing decisions, shopping online, using online services, engaging with mobile (shopping) applications, and actively participating in digital consumer life (Van Nasir et al., 2024; Zhao et al., 2024). In recent times, it has been observed that e-services such as e-commerce, e-banking, e-government, and e-culture, as well as highly popular subscription-based services, have had a significant impact on shaping digital consumer behavior (Kol et al., 2024; Wolny, 2019; Mshvidobadze, 2024; Szojda, 2024). A number of positive factors—such as ease of use, 24/7 accessibility, and attractive pricing—undoubtedly play a key role in encouraging consumers to use digital technologies more frequently. Behaviors supported by digital technologies, artificial intelligence, and cloud-based solutions strongly influence consumer loyalty, as well as the patterns and level of their engagement (Gummerus et al., 2012).

Consumer behavior is also shaped by a range of individual factors, such as motives, attitudes, habits, and emotions (Jaciow et al., 2022). Moreover, digital consumer behavior is strongly influenced by external factors such as social norms and rules, the level of technological infrastructure development, or regulatory policies. These influences also contribute to the development of environmental awareness. The combination of individual and external factors can shape environmentally friendly consumer attitudes, which result from a sense of personal responsibility rather than solely from social pressure (Joshi et al., 2015).

3. Methods

In order to empirically explore the impact of digital consumer behavior on environmental awareness, a structured questionnaire was designed based on validated constructs from the reviewed literature and adopted to the context of Polish consumers. The digital consumer behavior measurement was adopted from Vatolkina et al. (2020), Fakieh et al. (2023) and Ma et al. (2022). The environmental awareness items were adopted from Barragan-Sanchez et al. (2020) and Laaber et al. (2023).

The study was conducted by the Research and Development Centre of the University of Economics in Katowice on the SurveyMonkey research platform, which has a database of approximately 10,000 potential respondents. It was carried out between 18 November 2024 and 27 January 2025. The research was conducted on a sample of 1243 respondents. The study comprised 51.1% women and 48.9% men. The largest age group among respondents was individuals aged 65 and older (23.4%), followed by those aged 35-44 (19.2%) and 45-54 (16.8%). The smallest age group comprised respondents aged 16-24 (11.0%). The majority of respondents had higher education (49.2%) or secondary education (38.1%). Participants with vocational and primary education accounted for 10.4% and 2.3% of the sample, respectively.

In the initial phase of the study, a pilot survey was conducted to ensure the quality of the research tool. A total of 20 respondents were selected to assess the preliminary version of the questionnaire, which allowed for evaluating the content and validity of the included questions.

Respondents evaluated each statement using a five-point Likert scale, ranging from “strongly disagree” (1) to “strongly agree” (5), allowing for consistent and scalable measurement of attitudes and behaviors.

After conducting the pilot study, minor linguistic corrections were made to improve the clarity and readability of the tool, which consequently enabled the enhancement of the questionnaire and enriched its content. Before the main study, participants were presented with a declaration of anonymity and confidentiality. The objectives of the study were outlined, along with the manner in which the results would be disseminated. Additionally, respondents were given the opportunity to contact the researchers via email.

The research findings used in this article are partially derived from the scientific studies conducted as part of the research project titled Digital Maturity of Market Entities in Poland, in which the author is a participant.

4. Results

The aim of the conducted study was to assess the level of environmental awareness among digital consumers in Poland and to examine how their behavior in the digital environment influences their perception of and willingness to engage in pro-environmental actions. The analysis of the data was carried out with consideration for demographic variables such as gender and age, which allowed for the identification of significant differences in attitudes toward environmental issues in the context of digital technology use. The results presented in eight tables provide a detailed overview of the relationship between digital activity and environmental awareness among contemporary consumers.

The majority of respondents (over 50%) recognize the impact of digital technologies on the environment, with men more likely than women to agree with this statement. It can be assumed that men's higher level of digital activity, more frequent use of modern technologies, and greater exposure to technological information positively influence their environmental awareness. In contrast, women more often express a lack of clear opinion, which may indicate limited access to specialized content or a lower level of engagement in digital communication channels related to ecology (Table 1).

Table 1.
Respondents' Awareness of the Impact of Digital Technologies on the Environment by Gender (in %)

Item	Total	Respondents by sex	
		Women	Men
Strongly disagree	9.0	10.6	7.4
Disagree	10.7	12.9	8.4
Neither agree nor disagree	28.3	28.8	27.8
Agree	39.3	37.3	41.3
Strongly agree	12.7	10.4	15.1

Source: own study.

Younger digital consumers – especially those aged 16-34 – demonstrate higher environmental awareness. These groups are more active in the digital environment, use applications, social media, and online content, which facilitates exposure to educational campaigns, green marketing, and eco-friendly products. In contrast, older individuals (65+) show lower levels of awareness, which may result from limited participation in the digital world or difficulties accessing modern information tools (Table 2).

Table 2.
Respondents' Awareness of the Impact of Digital Technologies on the Environment by Age (in %)

Item	Total	Respondents by age					
		16-24	25-34	35-44	45-54	55-64	up to 65
Strongly disagree	9.0	10.2	6.8	3.8	4.8	9.6	16.8
Disagree	10.7	10.9	12.5	12.6	9.6	11.9	7.9
Neither agree nor disagree	28.3	19.0	19.8	24.4	31.7	32.8	36.4
Agree	39.3	41.6	43.2	41.2	38.5	39.5	34.4
Strongly agree	12.7	18.2	17.7	18.1	15.4	6.2	4.5

Source: own study.

This table shows clear differences between women and men in their ability to identify environmentally harmful digital technologies. Men more frequently agree (29.4%) or strongly agree (8.4%) that they are able to indicate which technologies have the greatest environmental impact. In contrast, women more often disagree, with 23.8% strongly disagreeing. This may stem from the fact that men tend to use technology more extensively and are more exposed to technical sources of information. Digital behaviors such as reading specialized content online, participating in tech forums, or accessing industry reports contribute to higher environmental awareness (Table 3).

Table 3.
Respondents' Awareness of Identifying Technologies with the Greatest Environmental Impact by Gender (in %)

Item	Total	Respondents by sex	
		Women	Men
Strongly disagree	19.1	23.8	14.3
Disagree	18.4	20.9	15.8
Neither agree nor disagree	31.1	30.2	32.1
Agree	23.7	18.3	29.4
Strongly agree	7.6	6.8	8.4

Source: own study.

Age significantly affects the ability to recognize environmentally harmful technologies. The best results are observed among respondents aged 25-34 and 35-44, with around 30% agreeing they can identify such technologies. In older age groups (55+), the level of agreement drops considerably, with many respondents lacking knowledge in this area. Younger generations, active in the digital environment and using informational apps, webinars, and educational platforms, are more aware of the environmental effects of specific technological solutions (Table 4).

Table 4.
Respondents' Awareness of Identifying Technologies with Greatest Environmental Impact by Age (in %)

Item	Total	Respondents by age					
		16-24	25-34	35-44	45-54	55-64	up to 65
Strongly disagree	19.1	22.6	20.8	10.5	11.5	18.1	29.6
Disagree	18.4	11.7	15.6	19.7	19.2	17.5	22.3
Neither agree nor disagree	31.1	30.7	24.5	30.7	29.8	38.4	32.6
Agree	23.7	24.8	30.7	25.6	28.8	23.7	13.4
Strongly agree	7.6	10.2	8.3	13.4	10.6	2.3	2.1

Source: own study.

Men are more likely to view the Internet as a tool that increases their climate awareness – 25.8% agree and 9.2% strongly agree, compared to 21.1% and 5.7% of women, respectively. At the same time, women more frequently choose neutral or negative responses. This may suggest that women are less likely to use digital sources of environmental information, or that such content is less accessible or engaging for them. This highlights that the way people use the Internet – e.g., actively seeking educational content – affects their level of ecological awareness (Table 5).

Table 5.
Use of the Internet to Increase Climate Change Awareness by Gender of Respondents (in %)

Item	Total	Respondents by sex	
		Women	Men
Strongly disagree	17.0	19.4	14.5
Disagree	19.6	19.8	19.4
Neither agree nor disagree	32.6	34.0	31.1
Agree	23.4	21.1	25.8
Strongly agree	7.4	5.7	9.2

Source: own study.

Younger age groups (especially those aged 16-34) are much more likely to see the Internet as a source of climate change information. Among respondents aged 25-34, as much as 37.5% gave a positive response. In the 65+ age group, negative answers dominate – 28.2% strongly disagree and only 2.7% strongly agree. This demonstrates that digital activity and proficiency in using new technologies are key factors in accessing environmental knowledge. For younger users, the Internet serves as an informational and educational tool, while seniors are more often excluded from this digital ecosystem (Table 6).

Table 6.
Use of the Internet to Increase Climate Change Awareness by Age of Respondents (in %)

Item	Total	Respondents by age					
		16-24	25-34	35-44	45-54	55-64	up to 65
Strongly disagree	17.0	17.4	17.7	9.7	9.1	16.4	28.2
Disagree	19.6	21.2	16.7	21.4	20.7	17.5	19.9
Neither agree nor disagree	32.6	27.0	28.1	33.6	29.3	37.3	36.8
Agree	23.4	27.7	27.1	24.8	31.7	22.6	12.4
Strongly agree	7.4	6.6	10.4	10.5	9.1	6.2	2.7

Source: own study.

Research reveals that men are more confident in their ability to take action. 27.1% agree and 9.2% strongly agree that they can reduce the negative environmental impact of digital technologies. Women more often express a lack of belief in such influence, with 23.8% strongly disagreeing. This may be related to lower technological confidence or engagement in digital educational or environmental activities, which in turn reduces their sense of agency regarding environmental impact (Table 7).

Table 7.
Perceived Ability to Mitigate the Negative Impact of Digital Technologies on the Environment by Gender of Respondents (in %)

Item	Total	Respondents by sex	
		Women	Men
Strongly disagree	19.1	23.8	14.1
Disagree	19.2	21.1	17.3
Neither agree nor disagree	32.3	32.3	32.3
Agree	22.3	17.6	27.1
Strongly agree	7.2	5.2	9.2

Source: own study.

The highest sense of environmental agency is reported by people aged 35-44 – 44% give positive responses. This is a highly digitally active group, often engaged in professional and social life through online tools, which reinforces both awareness and responsibility. In contrast, in the 65+ group, only 2.1% strongly agree they can take action, while 29.9% strongly disagree. Limited digital activity among seniors directly correlates with low perceived agency and reduced engagement in pro-environmental behavior related to technology use (Table 8).

Table 8.
Perceived Ability to Mitigate the Negative Impact of Digital Technologies on the Environment by Age of Respondents (in %)

Item	Total	Respondents by age					
		16-24	25-34	35-44	45-54	55-64	up to 65
Strongly disagree	19.1	21.9	21.9	10.5	11.1	16.9	29.9
Disagree	19.2	16.1	14.6	20.6	16.3	19.8	24.4
Neither agree nor disagree	32.3	32.8	24.5	31.5	35.1	37.9	32.3
Agree	22.3	24.8	30.7	23.1	28.4	20.9	11.3
Strongly agree	7.2	4.4	8.3	14.3	9.1	4.5	2.1

Source: own study.

In conclusion, digital consumer behavior has a significant impact on environmental awareness. Individuals who are more active in the digital world—particularly younger generations and men—demonstrate a greater understanding of the environmental impact of technology and a stronger sense of responsibility for their consumer choices. The Internet and digital technologies represent not only a potential source of environmental risks but also a powerful educational and motivational tool. The research results highlight the need for a diversified approach to educational efforts—it is essential to support the digital competencies of women and seniors so they can actively participate in the digital transformation with sustainability in mind.

5. Discussion

The findings of the conducted study offer compelling evidence that digital consumer behaviors play a significant role in shaping environmental awareness in Poland. The data analysis reveals a clear correlation between the intensity of digital activity and the level of an individual's environmental awareness, which—when considered through variables such as gender and age—provides valuable insights in the socio-demographic context. These findings are consistent with the main objective of the article: to examine how behaviors in the digital environment influence environmental awareness and the willingness to engage in pro-environmental actions.

Firstly, it is evident that demographic characteristics, especially age and gender, substantially differentiate digital consumers in terms of their ecological awareness. Although researchers emphasize that digital consumer behaviors (including the level of environmental awareness) increasingly surpass traditional ones not only among the youngest age groups (Solis et al., 2023), it is the young respondents (16-34) who demonstrate the highest level of environmental awareness and the greatest activity in the digital environment. This group shows greater readiness to identify environmentally harmful technologies and utilize the Internet as a key source of information on climate change. This may result from their natural immersion in the digital ecosystem, which facilitates access to environmental campaigns, green content, and sustainable brand narratives. These findings are consistent with the results of the study by Jaciow et al. (2021), who found that Generation Z consumers, deeply embedded in digital communication channels, demonstrate a high level of ecological engagement.

Gender-based findings reveal an intriguing dynamic. Men consistently reported higher levels of environmental awareness linked to digital behavior, such as recognizing harmful technologies or believing in their individual ability to mitigate environmental impact through digital choices. This may stem from more frequent use of technical tools, exposure to specialized sources, or higher self-assessed digital competence. Conversely, women more often express uncertainty or disagreement, suggesting a potential gender gap in digital-environmental literacy that requires targeted educational strategies. Brough et al. (2016) arrived at interesting and notably different conclusions, suggesting that men are less likely to engage in pro-environmental actions due to perceiving them as "unmanly," while their environmental awareness is shaped by a range of contextual factors (e.g., innovation, functionality). When digital consumption is associated with utility, it becomes socially acceptable and thus easier for men to identify with ecological values. In contrast, women are much more likely to express their environmental awareness through social, emotional, and normative factors rather than through digital consumption itself (Zelezny, 2000; Hwang, 2020).

Furthermore, the data confirm that the Internet serves as both a tool and a barrier to environmental awareness. Modern technologies in themselves do not generate pro-environmental values — however, their use can facilitate the activation of such values. Developed digital consumer behaviors can support efforts aimed at reducing physical consumption (e.g., using e-services instead of material products) and promote decision-making aligned with ecological knowledge (Neza et al., 2023; Zia et al., 2022; Court et al., 2020). For many respondents—especially the younger cohort—it is a key platform for acquiring knowledge, raising awareness, and even engaging in climate-oriented activism. However, for older users (55+), the Internet remains an underutilized resource, largely due to digital exclusion or low digital literacy. This discrepancy reinforces the necessity of inclusive digital education, particularly for seniors, to ensure equitable access to environmental knowledge and participation in sustainable practices. The research findings are supported by the study of Laaber (2023), which demonstrates that digitally mature consumers navigate online environments more effectively and make more thoughtful, conscious decisions. Wolny et al. (2025) also confirmed that greater consumer engagement in digital services supports a more sustainable approach to environmental issues.

Another noteworthy point is the perception of individual agency. People who are more digitally active and technologically proficient—especially those aged 35-44—are more confident in their ability to reduce the environmental footprint of their online behavior. This sense of empowerment is crucial for turning awareness into action and is reflective of broader concepts in behavioral science suggesting that perceived behavioral control enhances sustainable choices (Joshi et al., 2015a). Lin et al. (2023) note that environmental awareness in digital environments strongly influences purchasing attitudes, especially when consumers perceive both the functional and ecological value of products. Hedonic motivation of consumers related to the intention to use modern technologies also becomes significant. Research confirms that consumers who derive pleasure from modern solutions are more likely to continue using them and to explore other similar innovations (Gajdzik et al., 2024b). Consequently, this also indicates a greater willingness among consumers to implement pro-environmental actions, provided they are associated with modern technologies. Patrzałek (2017), on the other hand, reached different conclusions, demonstrating in her research that environmental awareness among Polish consumers remains low despite their declared proficiency and high activity in the digital environment.

The mechanism explaining the relationship between constructs related to digital consumer behavior and environmental awareness requires further exploration in future research. A possible extension of this topic could involve the application of established behavioral models, such as the Theory of Planned Behavior (TPB), which posits that an individual's actions are shaped by attitudes, social norms, and perceived behavioral control. Applying this theory could help clarify how exposure to digital information (e.g., through e-services or ecological campaigns) influences ecological attitudes and, consequently, leads to actual pro-environmental

behaviors (Ajzen, 1991). Similarly, the Value-Belief-Norm (VBN) model could be used to conceptualize how personal values (e.g., altruism, biospheric concern) interact with beliefs about the environmental consequences of digital consumption, resulting in a moral obligation to act (Stern, 2000).

However, an important limitation of the study is the lack of critical analysis of the environmental costs associated with digital consumption itself. While digital tools may serve as channels for promoting ecological awareness and enabling sustainable lifestyles, they also generate significant environmental externalities. These include the carbon footprint of data centers, energy consumption associated with cloud services, and the growing problem of electronic waste (e-waste) stemming from short product lifecycles of digital devices. Ignoring these factors may lead to an overly optimistic assessment of the digital transition. As Court and Sorrell (2020) have shown, the digitalization of goods often leads to rebound effects, where efficiency gains are offset by increased overall consumption. Including a discussion on the double-edged nature of digital technology—as both a facilitator of sustainable behaviors and a contributor to environmental degradation—would provide a more balanced and comprehensive perspective. Future research should therefore explore the net environmental impact of digital consumer behavior, weighing both benefits and hidden costs.

Taken together, the findings emphasize that digital consumer behavior is not neutral—it has tangible implications for environmental engagement. This includes both passive influences, such as exposure to environmental content, and active ones, such as seeking out eco-friendly brands or engaging in online sustainability communities (Gajdzik et al., 2023a). Additionally, it is worth emphasizing that strong consumer engagement in digital activities contributes to the growth of environmental awareness (Dat et al., 2024).

6. Conclusions

The study, conducted on a representative sample of 1243 Polish respondents, confirmed that digital consumer behavior significantly influences environmental awareness. Younger individuals and men—who are generally more digitally active—demonstrated a higher level of ecological consciousness. Respondents who more frequently engage with digital tools such as online shopping, e-services, and educational platforms tend to exhibit stronger awareness of environmental issues and greater readiness to take action. The results also revealed that age and gender moderate this relationship: younger participants show greater trust in online information sources, and men are more likely to identify specific environmentally harmful technologies. However, the study also identified potential gaps in digital-environmental literacy among women and seniors, suggesting the need for inclusive digital education strategies.

The findings of the study confirm that digital consumer behavior plays a pivotal role in shaping environmental awareness. Technologically proficient and digitally active individuals are more capable of identifying ecological threats and are more willing to engage in pro-environmental behaviors. This demonstrates that digital environments are not only platforms for commerce, but also powerful tools for shaping sustainable mindsets. However, disparities based on age and gender emphasize the need for targeted support in developing digital competencies and ecological education. In an increasingly digital society, promoting responsible online consumer behavior is essential for fostering broad-based environmental awareness and advancing sustainability goals.

In future research, stronger theoretical anchoring is recommended to better explain the causal mechanisms underpinning the observed correlations. The integration of models such as the Theory of Planned Behavior (TPB) or the Value-Belief-Norm (VBN) theory could facilitate a more holistic understanding of how digital exposure influences not just awareness, but actual behavior. Furthermore, to present a balanced view, it is crucial to also consider the environmental footprint of digital infrastructure itself—including energy consumption, carbon emissions, and e-waste. Only by addressing both the opportunities and the trade-offs of digital consumerism can a truly sustainable digital transformation be envisioned.

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