Corporate Social Responsibility and Environmental Management

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RESEARCH ARTICLE OPEN ACCESS

Sustainable Development Goal-Related Innovations and Financial Performance: Evidence From European Grocery Retailers

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Received: 28 August 2024 | **Revised:** 2 April 2025 | **Accepted:** 27 May 2025

Funding: Zombor Berezvai's research was supported by the project identified by EKOP-CORVINUS-24-4 that was realized with the support of the National Research, Development, and Innovation Fund provided by the Ministry of Culture and Innovation, as part of the University Research Scholarship Program announced for the 2024/2025 academic year.

Keywords: Europe | financial performance | grocery retailing | innovation | sustainable development goals (SDGs)

ABSTRACT

The grocery retail industry is of great economic importance, with millions of people employed in the sector and billions of customers served. Consequently, the sustainability initiatives undertaken by retailers have a substantial impact. This paper explores the impact of innovations related to the Sustainable Development Goals (SDGs) on retailers' financial performance. The findings of this study indicate that the 18 largest European grocery retailers introduced 2701 innovations between 2007 and 2021, of which 783 were SDG-related. Furthermore, these SDG-related innovations impacted financial performance positively. Innovations related to SDG2 (zero hunger), SDG9 (industry, innovation and infrastructure), and SDG12 (responsible consumption and production) had a significant and positive effect on the financial performance of grocery retailers, thereby inspiring a new wave of sustainability-related practices in the industry. The present study contributes to the extant literature by demonstrating that profitable SDG-related innovations have been identified in all three areas of the triple bottom line approach.

1 | Introduction

Climate change is one of humanity's most severe and urgent challenges (Aibar-Guzmán et al. 2024). Both international organizations, such as the United Nations (UN), and countries have set targets to prevent catastrophic climate change and mitigate its impacts. The Sustainable Development Goals (SDGs) defined by the United Nations (2015) are some of the most complex and widely known targets in the world. The European Union is paving the way for the global transition towards a green and climate-friendly economy and is fully committed to delivering the 17 SDGs. Thus, all European Commission proposals, policies, and strategies should incorporate the SDGs (European Union 2023). Recognizing the crucial role of companies in achieving these goals, the EU has set progressive requirements for companies to move towards more sustainable operations (e.g., Directive 2003/87/EC on the Emissions Trading System,[1] Directive 2014/95/EU on the Disclosure of Non-Financial and Diversity Information,[2] and the Corporate Sustainability Reporting Directives[3] 2004/109/EC, 2006/43/EC, 2013/34/EU, 2022/2464/EU, and Regulation 2014/537). Therefore, several companies have started to include the SDGs in their corporate strategies (Domingo-Posada et al. 2024).

On the one hand, this transition to a sustainable business operation is not possible without innovations; consequently, SDG-related innovations are needed and expected (In et al. 2024; van der Waal et al. 2021). On the other hand, financial investors and corporate owners expect enhanced financial performance from all companies. This means that corporate management is under

pressure to simultaneously pursue sustainability and financial performance. Therefore, it is of the utmost importance to determine whether these two goals are mutually supportive and can be achieved simultaneously or whether they are mutually exclusive.

It is acknowledged that sustainable innovations not only enhance business performance but also improve environmental and social performance in the short and long term (Afeltra et al. 2023; Bos-Brouwers 2010). Nevertheless, academic research produced ambiguous findings regarding the impact of sustainable innovations on financial performance (Afeltra et al. 2023; Cillo et al. 2019). For example, the positive relationship between environmental innovation and profitability can only be found in certain types of innovation. While energy- and resource-efficient innovations (e.g., reducing material, energy use, and CO_2 emissions) have a positive effect on firm profitability (Ghisetti and Rennings 2014; Lee and Min 2015), externality-reducing innovations (e.g., reducing pollution) negatively impact firms' operating margins (Ghisetti and Rennings 2014). Although the SDGs provide an effective approach to classifying sustainable innovations, no research has been conducted to examine the relationship between SDG-related innovations and companies' financial performance (Azmat et al. 2023).

The relationship between sustainable practices and companies' financial performance has become a subject of growing interest among researchers since the adoption of the SDGs in 2015. Most studies examining the relationship between SDG-related practices and financial performance have focused on multiple sectors (Muhmad and Muhamad 2021). Given the distinct environmental, social, and financial impacts, as well as the diverse consumer expectations associated with different industries, industry-specific research is necessary to understand the relationship between SDG-related practices and innovations and financial performance (Afeltra et al. 2023; Azmat et al. 2023).

This study focuses on the grocery retail sector for two main reasons. First, food consumption is responsible for more than half of consumers' total environmental footprint in the EU (European Commission 2024), which indicates that food producers and grocery retailers have a distinct role to play in driving positive change and contributing to a sustainable future. Therefore, the EU Code of Conduct on Responsible Food Business and Marketing Practices plays a particularly important role in making food supply chains more sustainable, with retailers also being able to contribute voluntarily (European Commission 2021). Second, the retail sector is the largest employer in the European Union, accounting for 8.3% of employment in 2023.[4] Consequently, retailers not only engage with their customers on a regular basis but also exert a direct influence on the lives of millions of individuals. In this context, the sustainability and SDG-related activities of these organizations could be crucial.

In recent years, retailers have increased their investments in sustainability, introducing several SDG-related innovations. These include using more sustainable materials (e.g., recycled materials, lower-emitting products, less plastic material), enhancing energy efficiency (in buildings and applying new technologies), and developing climate-friendly products (Deloitte 2023). Despite these innovations and the related investments, the literature on the SDGs in the retail sector predominantly reports on sustainability disclosures (Vallet-Bellmunt et al. 2023), while the financial performance measurement is largely neglected.

The present study aims to address this research gap by analyzing the impact of SDG-related innovations on the financial performance of grocery retailers. The sample includes the 18 largest European fast-moving consumer goods (FMCG) retailers listed on the stock exchange between 2007 and 2021. The authors compiled the dataset from a variety of data sources. Retail innovations were operationalized based on executed innovation outcomes obtained from corporate publications and business journals. The panel dataset was analyzed using dynamic panel regression methods, which helped test the causal effect of innovations on performance. This approach enabled the analysis of how annual changes in innovation outcomes influence the time variability of retailers' profitability.

Compared to previous literature, the present study introduces three novelties. First, this study addresses a significant research gap by investigating the grocery retail industry, which has been largely ignored in previous research conducted in this area. To the best of our knowledge, the retail industry has yet to be studied with regard to the impact of SDG-related innovations on companies' financial performance. Second, the study focuses on all three aspects of sustainability (environmental, social, economic) in accordance with the triple bottom line (TBL) theory. Moreover, the innovations were classified according to the 17 SDGs; thus, the financial impact of each SDG-related innovation could be examined separately, which is a highly nuanced and detailed approach. Third, a distinctive database of retail innovations and financial metrics was used for the empirical analysis.

Our results demonstrate that SDG-related innovations can substantially improve the financial performance of grocery retailers. Environmental and social innovations, particularly those related to SDG2 (zero hunger) and SDG12 (responsible consumption and production), increased companies' financial performance the most. Innovations related to SDG9 (industry, innovation and infrastructure) also have a positive impact on profit, but the overall effect of economic sustainability-related innovations is not significant. The findings demonstrate that European grocery retailers can drive both sustainability and financial performance, satisfying their investors and other stakeholders.

The paper is structured as follows. Section 2 discusses the theoretical background of the research. Section 3 presents the research methodology along with the data used. The next Section 4 describes the main findings. The results are outlined in a distinct Section 5. In the final Section 6, we draw the main conclusions.

2 | Theoretical Background

2.1 | Corporate Sustainability and the Sustainable Development Goals

Sustainability is conceptualized as "meeting current needs without compromising the ability of future generations to meet their own needs" (United Nations 1987). Sustainability

emerged in the 1980s in response to environmental protection concerns. Stakeholders pushed companies to embrace eco-friendly practices. In this context, Freeman (1984) formulated the stakeholder theory, which states that a firm should consider the needs of a wider range of stakeholders and not just the profit requirements of its owners (Freeman 1984). Moreover, Freeman's (1984) stakeholder theory went beyond environmental protection. He stated that companies should also consider how their operations influenced society and the economy. This became a dominant approach in the sustainability literature (Coelho et al. 2023), and several sustainability frameworks included economic, social, and environmental dimensions.

One of them was the Triple Bottom Line theory (TBL), which captures all three dimensions of sustainability and evaluates corporations' economic, social, and environmental performance (Elkington 1998). Some companies report their sustainable activities voluntarily, while others are required to report. Since 2000, the Global Reporting Initiative (GRI) standards have provided another comprehensive framework for businesses of various sizes. GRI supports firms in reporting their impacts on the economy, the environment, and society (Global Reporting Initiative 1999). A more recent approach is the framework of Environmental, Social, and Governance (ESG) standards, which covers corporate governance.

The most comprehensive framework, however, was developed by the United Nations in 2015. The organization created a practical guide to sustainable practices by setting 17 SDGs (United Nations 2015). The objective was to encourage businesses and nations to engage in sustainable activities. The SDGs aim to manage the threats of climate change, reduce inequalities, eradicate poverty, cultivate peace, and help economies prosper. Ahmad and Buniamin (2021) categorized the 17 goals into the economic, social, and environmental domains of the TBL (Ahmad and Buniamin 2021). Most goals were related to the social domain, such as no poverty (SDG1), zero hunger (SDG2), good health and well-being (SDG3), quality education (SDG4), gender equality (SDG5), reduced inequality (SDG10), peace, justice, and strong institutions (SDG16), and partnerships to achieve the goal (SDG17). The environmental domain included seven goals: clean water and sanitation (SDG6), affordable and clean energy (SDG7), sustainable cities and communities (SDG11), responsible consumption and production (SDG12), climate action (SDG13), life below water (SDG14), and life on land (SDG15). Finally, the economic domain had only two main goals: decent work and economic growth (SDG8) and industry, innovation, and infrastructure (SDG9) (Appendix A). In 2015, other international organizations, such as CSR Europe, also called for companies to adopt social responsibility and sustainable development practices (CSR Europe 2015).

To enhance the implementation of sustainable practices, the SDGs should also be integrated into corporate goals (Sasaki et al. 2023). Information on social inclusion was found to boost the quality of SDG-related disclosures (Damiano and Di Maria 2024). Domingo-Posada et al. (2024) conducted a systematic review of the adoption of the SDGs and corporate strategies. Based on their analyses, they called for future research on the economic dimension of sustainability (Domingo-Posada et al. 2024).

2.2 | Retailers and the Sustainable Development Goals

Grocery retailers are important players in the global economy, selling a broad portfolio of products such as packaged foods, beverages, toiletries, cosmetics, cleaning supplies, and other low-cost household items (Deloitte 2008). Grocery retailers are the interface between many manufacturers and billions of consumers. In this position, they simultaneously influence consumer preferences and the supply chain's upstream actors (Crapa et al. 2024). Retailers can play a key role in promoting sustainable development in four ways: internal operations, supply chain management, customers, and other stakeholders. First, retailers can implement responsible business practices, like reducing greenhouse gases and other emissions, managing waste, and contributing to water conservation. Second, they can manage their local and global supply chains in a more sustainable way, promoting responsible sourcing, sourcing sustainable products, requiring sustainability certifications from suppliers, facilitating recycling, and organizing transportation efficiently. Moreover, retailers can interact with their customers to educate them about sustainable consumption and provide incentives for buying sustainable products. Finally, they can motivate other stakeholders (Jones and Comfort 2021; Naidoo and Gasparatos 2018) to pay attention to sustainability (i.e., employees and investors) (Table 1).

Unfortunately, the determinants of sustainability reporting were poorly explored in the food and beverage industries until 2020 (Arkoh et al. 2024). An emerging retail literature on sustainability took off in 2020 (Table 2). Unsurprisingly, retailers are motivated by economic benefits, such as cost savings, which have proved to be the most important drivers of sustainable actions (Naidoo and Gasparatos 2018). Therefore, operating expenses are reduced through energy conservation and greenhouse gas emission reduction. Preventing food waste and reducing/recycling packaging materials are also important.

Several researchers have used the SDG framework to assess retailers' sustainable activities (Butt et al. 2024; Jones and Comfort 2019, 2021; Rahdari et al. 2020; Malay 2021; Orr et al. 2023; Vallet-Bellmunt et al. 2023). Leading retailers have also disclosed their commitment to contribute to different SDGs. Some reported their commitment to all 17 SDGs, while others concentrated on specific goals where they could have a real impact. For example, Tesco identified eight SDGs, namely SDGs 2, 3, 7, 8, 12, 13, 14, and 15; Aldi emphasized its focus on nine SDGs, namely SDGs 2, 3, 5, 6, 8, 12, 13, 14, and 17. Carrefour reported that it focused on seven SDGs, namely 2, 3, 5, 12, 13, 14, and 15. Rewe prioritized a smaller number of SDGs, namely SDGs 2, 7, 8, 12, 14, and 15 (Jones and Comfort 2021).

Some studies concentrated on specific SDGs, such as food waste reduction (Cicatiello and Franco 2020; Orr et al. 2023) and logistics (Butt et al. 2024). Tadoori and Kiran (2023) studied the effect

TABLE 1 | Main types of sustainability-related activities in grocery retailing.

Internal operations	Supply chain management	Customers	Other stakeholders
Energy management & greenhouse gas (GHG) emission reduction	Sustainable sourcing (sustainable products, production)	Customer engagement (education for sustainable consumption)	Staff training
Integrated waste management	Certification	Incentives for eco-friendly products	Shareholder/ investor relations
Water conservation	Take-back mechanisms		
	Transportation efficiency		
	Water conservation		

Source: Adapted from Jones and Comfort (2021) and Naidoo and Gasparatos (2018).

TABLE 2 | Research related to the SDGs and grocery retailers.

Authors	Aim	Country/Period	Method: sample/data collection
Naidoo and Gasparatos (2018)	Drivers, strategies and performance measurement in the retail sector	2009–2017	Review (13 articles)
Jones and Comfort (2019)	A commentary on British retailers and the SDGs	British 2018	Commentary
Cicatiello and Franco (2020)	Measure the waste of nine food categories in supermarkets	Italy 2016–2017	– 13 supermarkets – Food waste data collected from stores
Rahdari et al. (2020)	Sustainability performance score (RILA, SEES)	US, UK, South Korea, France, Australia, Germany, Switzerland, Japan, The Netherlands 2014–2016	– Quantitative – 23 global retailers – Data from sustainability reports and websites
Jones and Comfort (2021)	SDG reporting by leading European retailers	Europe 2020	– Qualitative – Seven EU-based retailers: Schwarz, Aldi, Carrefour, Rewe, Tesco, Auchan, and J. Sainsbury – Google search: SDG + retailer's name
Malay (2021)	Assess the consistency between sustainability indicators at the national level and the business level	Belgium 2019	– Quantitative – Six global retailers and five pharma companies – National level – Data from annual or sustainability reports
Vallet-Bellmunt et al. (2023)	Report food retailers' contribution to SDG 12	Spain 2018–2019	– Quantitative – Ten food retailers – Data from the Non-Financial Information Statement (NFIS)
Butt et al. (2024)	Reverse logistics	2021 United Arab Emirates (UAE)	– Interviews – Four largest retailers (food, grocery, fashion, clothing, electronic appliances, etc.)
Orr et al. (2023)	Measure and reduce food waste in the German food wholesale and retail sectors (SDG 12)	2019–2020 Germany	– 17 retailers and six wholesalers – Food waste data from store records
Tadoori and Kiran (2023)	ESG disclosure performance & financial and market performance	India 2017–2021	– 11 FMCG companies – Data from S&P and Moneycontrol

of financial performance on sustainability disclosure. They analyzed the impact of the company's financial performance on the ESGD score and proved that financial performance was the main driver of sustainability strategies. However, we suggest that sustainable practices can also drive the firm's performance, which lies at the very heart of this paper.

2.3 | Research Questions: Sustainable Development Goals and Financial Performance

There is a large body of literature on corporate social responsibility and financial performance (Aftab et al. 2024; Coelho et al. 2023) or sustainability and financial performance (Muhmad and Muhamad 2021; Rahi et al. 2024). Although several researchers studied the impact of SDG practices on corporate performance (Table 3), they generated inconclusive findings. Some found a negative relation (Ahmad and Buniamin 2021; Lassala et al. 2021), while others found no effects (Chen et al. 2022; Galeazzo et al. 2023; Lassala et al. 2021; Ramos et al. 2022; Rosamartina et al. 2022). A few longitudinal studies revealed a positive impact (Bellostas et al. 2023; Chen et al. 2022; Galeazzo et al. 2023; Hussain et al. 2018; Rosamartina et al. 2022; Zhang et al. 2023). Similarly, the performance effects of specific SDGs also proved to be inconclusive. For example, activities related to SDG8 (decent work and economic growth) were found to have negative (Ahmad and Buniamin 2021), neutral (Ramos et al. 2022), and positive effects (Galeazzo et al. 2023) on corporate financial performance.

The inconclusive results could be explained by the fact that most studies used multi-industry samples (Hussain et al. 2018; Ahmad and Buniamin 2021; Lassala et al. 2021; Rosamartina et al. 2022), which do not offer the possibility to highlight sector-specific aspects. Therefore, there is a need for industry-specific studies to compare the SDGs.

Multinational retailers implement a large variety of environmental, social, and economic-related actions in order to achieve sustainability (Gil-Saura et al. 2024) and contribute to the SDGs (Jones and Comfort 2021). Unfortunately, the retail literature related to the SDGs mainly reports on sustainable disclosures (Vallet-Bellmunt et al. 2023), and the financial performance measurement is missing. From a management perspective, it is important to identify those SDG-related innovations that improve retailers' financial performance. Given this research gap, the following research questions were formulated:

R1. *How do SDG-related innovations influence the financial performance of grocery retailers?*

R2. *Do the performance outcomes of innovations vary according to the SDGs to which the innovation is related?*

3 | Research Method

3.1 | Sample

To measure the number of SDG-related retail innovations and assess their impact on corporate performance, we collected data from the largest European grocery retailers between 2007 and 2021. Large grocery retailers have significant resources for innovation activities, making them suitable subjects for this analysis.

The list of retailers was taken from Deloitte's annual Global Powers of Retailing reports (Deloitte 2008). These reports include the top 250 retailers in the world each year. This data source was used in several other studies, including those by Etgar and Rachman-Moore (2008), Etgar and Rachman-Moore (2011), Mohr and Batsakis (2014), and Ćuzović et al. (2017). The sample was filtered to include only publicly traded companies. This criterion was applied because listed companies are generally more transparent, communicate more with the public, and prepare and distribute annual reports. Also, financial and other data for these companies are widely available through Bloomberg or Thomson Reuters. Poddar et al. (2019) and Rosamartina et al. (2022) also examined publicly traded companies for SDG-related research. In total, our list included 18 retailers. The list included both Ahold and Delhaize Group, but the two companies merged in 2016, so only 17 companies were examined from 2016 onwards. In addition, the financial data of Distribuidora Internacional de Alimentación, S.A. (DIA) was not available for 2007. We collected data for each retailer on an annual basis, resulting in a total sample of 263 observations.

3.2 | Variable Operationalization

This research aims to investigate how SDG-related innovations impact the financial performance of European FMCG retailers. The two major concepts that need to be operationalized are SDG-related retail innovation and performance.

According to the Oslo Manual, innovation "is a new or improved product or business process (or combination thereof) that differs significantly from the firm's previous products or business processes and that has been introduced on the market or brought into use by the firm" (OECD and Eurostat 2018, 68). However, due to the distinct characteristics of retail innovation, commonly used innovation measures, such as R&D expenditures or the number of patents, underestimate the innovativeness of companies (Hristov and Reynolds 2015). R&D expenditures are not informative, since most retail innovations are created in cooperation with suppliers, customers and third parties (Brondoni et al. 2013). Therefore, the cost of innovation activities is only partially reflected in the R&D expenditures of the companies, and these costs often appear under operating expenses. Some researchers used patents as indicators of retail innovation (Pantano and Viassone 2014; Pantano et al. 2017, 2018). Patent analysis can be a useful tool for assessing technological innovations, but three main problems arise in this case. First, a patent reflects a potential future innovation, but there is no one-to-one relationship between a patent and an innovation visible to consumers (Pantano et al. 2017). Second, retailers typically apply new technologies, but they do not develop them; hence, the number of patents held by retailers is low (Pantano and Viassone 2014; Hristov and Reynolds 2015). Third, retailers roll out a number of non-technological innovations (Hristov and Reynolds 2007) that do not require patents.

Several studies (e.g., Cainelli et al. 2004; Mansury and Love 2008; Hervas-Oliver et al. 2018; Paula and Da Silva 2019) measured innovation using the Community Innovation Survey (CIS) or similar national surveys. CIS measures innovation with a binary (dummy) variable. This measurement is too general and unhelpful in estimating the financial impact of an additional innovation.

TABLE 3 | Research on the SDGs and corporate performance.

Authors	Country/Sample/Period	Independent/Dependent variables	Most used SDGs	Results
Hussain et al. (2018)	US / 100 Global Fortune 100/2007–2011	ESG (environmental, social, governance) / ROA, ROE, TOBINQ	—	Positive (ROA, ROE, TOBINQ): environmental, social Positive (TOBINQ): governance
Muhmad and Muhamad (2021)	Literature review	—	—	—
Ahmad and Buniamin (2021)	Malaysia / 320 publicly listed companies / 2019	SDGs in the annual reports/ROE	SDG8	Negative relationship
Lassala et al. (2021)	Spain / 35 companies listed on IBEX / 2018	Inclusion and implementation of the SDGs in a company's strategy / ROE	SDGs	Negative Neutral
Chen et al. (2022)	Global companies / 100 manufacturers (Eikon database) / 2005–2020	ESG (environmental, social, governance) / ROA	—	Positive: environmental Neutral: social, governance
Rosamartina et al. (2022)	USA/Fortune 500/2015–2019	Digital reputation; SDGs (moderator) (non-financial report) / FP (market price) NFP (reported information score)	—	Positive: digital reputation Moderator: SDG theme, concentration Neutral: no. of SDGs
Ramos et al. (2022)	Global companies/Corporate Knights' Index 21 firms (six industries) / 2020	SDGs (Annual Reports and Sustainability Reports) / ROE	SDG5 SDG8 SDG13	Neutral

(Continues)

TABLE 3 | (Continued)

Authors	Country/Sample/Period	Independent/Dependent variables	Most used SDGs	Results
Galeazzo et al. (2023)	Global companies / 100 most sustainable firms / 2017–2019	SDGs (Annual Reports) / ROA	SDG8 SDG12 SDG13	Positive: SDG 8, 12, 13 Neutral: social, environmental
Bellostas et al. (2023)	30 countries / 3420 companies / 2015–2020	ESG/ROA	SDG13	Low economic return in the short term
Zhang et al. (2023)	China/Stock Market & Accounting Research Database / 2019–2021	ESG / Financial constraints (WW Index, KZ Index)	—	Positive during the COVID-19 pandemic

Therefore, we turned to an alternative measurement and suggested that SDG-related innovation could be measured by the number of SDG-related innovation outcomes executed by the retailer each year. Innovation outcomes result from innovation processes (Siedschlag and Zhang 2015). Furthermore, the number of innovation outcomes shows only the executed innovations. The applied measure is analogous to the one used by Geroski et al. (1997) and conceptually similar to the number of patents, which has often been used in innovation literature (e.g., Atanassov 2013; Mishra 2017).

SDG-related innovation was, therefore, operationalized as executed SDG-related innovation outcomes executed by the given retailers. For all the 18 companies in our sample, we searched for innovation outcomes using two main types of sources:

- Corporate publications (corporate websites/press releases and annual reports),
- Business journal databases (MarketLine and Business Source Premier).

We searched for keywords ("new", "launch", "introduce", "introduction", "initiative", "initiate") commonly used in innovation announcements. The search terms were derived from previous studies (Chen et al. 2014; Hanson and Yun 2018), pre-tests, and definitions of retail innovation. In the case of annual reports, a search was conducted for these terms in the document file, and any relevant findings were copied into a separate file. With regard to corporate websites, the press release sections were searched, and the relevant ones were downloaded. For business journal databases, we used the search function and combined the abovementioned keywords with the name of the retailer.

Data collection started in 2016 for the period 2007–2015. The search was then repeated annually or biannually for the year(s) that had passed. The search returned 6207 items (964 from business journal databases and 5243 from corporate websites and annual reports), which were downloaded and saved. Two university professors independently categorized them based on their sustainability content and relationship to specific SDGs, as provided by the global indicator framework for the SDGs (UN Statistics Division 2022). During this review, some downloaded items were dropped because they did not meet the definition of innovation (according to the evaluators). In total, 2701 innovation outcomes were identified (i.e., 3603 downloaded items were classified as not being innovations). Of these, 783 were classified as SDG-related retail innovations.

Both evaluators categorized all the innovation outcomes. Intercoder reliability was assessed by Krippendorff's α using Hayes and Krippendorff's (2007) program. Krippendorff's α was equal to 0.966 when assessing whether the given innovation outcome had a sustainability element, and to 0.980 when assessing to which SDG the given innovation outcome was related. Both values indicate that the categorizations were deemed sufficient for use in further analyses. In the case of differing classifications, the innovation outcome in question was reassessed and discussed by the two evaluators until an agreement was reached.

TABLE 4 | Descriptive statistics.

Variable	*N*	Mean	Standard deviation	Minimum	Maximum
Return on sales (%)	263	2.19	3.73	−25.60	30.35
SDG-related innovations (#)	263	2.98	3.74	0	26
Number of countries (#)	263	11.84	15.61	1	100
Firm revenue (million euro)	263	24,332	22,592	123	87,356
Firm growth rate (%)	263	18.60	320.97	−95.84	5196.82
Trade volume growth (%)	263	1.65	3.13	−9.95	16.09
Private final consumption expenditure (million euro)	263	762,143	561,645	90,871	1,691,380

Furthermore, SDG-related innovation outcomes were classified according to the triple bottom line dimensions into social (SDG1, SDG2, SDG3, SDG4, SDG5, SDG10, SDG16, SDG17), environmental (SDG6, SDG7, SDG11, SDG12, SDG13, SDG14, SDG15), and economic (SDG8, SDG9) innovations.

Observation bias is a critical issue; we addressed it during data collection in two ways. First, we analyzed only stock exchange-listed companies, which are more transparent and provide more details to the public regarding their operations. Second, we used multiple data sources to obtain innovation outcomes.

Retail performance is widely measured using financial data (e.g., Assaf et al. 2012; Hogan 2023; Mohr and Batsakis 2014; Mandipa and Sibindi 2022; Oh et al. 2015; Ratajczak et al. 2024). This study used return on sales (ROS) as a performance indicator for two main reasons. Firstly, ROS is widely available for all companies. Secondly, the calculation methodology is simple and less affected by corporate strategies (e.g., differences in financing, asset management, and tax requirements). ROS was operationalized by dividing net income by net revenue, following Ratajczak et al. (2024). Financial data was examined using the Bloomberg database.

3.3 | Control Variables

Three different types of control variables were used in this study. Firm-level control variables included the geographical diversification of the firm, firm revenue, and the annual growth rate of firm revenue.

Geographical diversification can be measured by several variables (e.g., share of foreign revenue, share of foreign assets, number of countries, or entropy index). In this study, we used the number of countries where the retailer was present. We allowed for a quadratic relationship between geographical diversification and firm performance in line with previous research (Assaf et al. 2012; Berry and Kaul 2016; Qian et al. 2008). Data were collected from the Global Powers of Retailing reports. Where possible, corporate annual reports were utilized in the case of missing data.

Home market-related control variables contain trade volume growth and private final consumption expenditure for retailers' home markets (Berry and Kaul 2016). This data was collected from the OECD iLibrary database.

Finally, global macroeconomic events were controlled by year dummy variables. Descriptive statistics can be found in Table 4.

3.4 | Data Analysis and Regression Models

This paper employs a panel regression methodology to analyze the impact of SDG-related innovation on the performance of FMCG retailers, similar to Cao and Li (2015). Nevertheless, we applied dynamic panel models to account for two potential biases in the dependent variable, namely endogeneity and autocorrelation.

Endogeneity can arise from two different sources. First, firm-specific characteristics can influence the innovation activity of the retailer and, at the same time, affect the ROS. The fixed effect transformation can solve this omitted variable bias. However, this method does not eliminate the endogeneity of the explanatory variables arising from reverse causality or time-dependent omitted variables (Wooldridge 2002). These seem to be crucial problems as SDG-related innovation can affect performance. However, reverse causality can also be true, namely that more profitable companies have more resources for innovation. To account for this endogeneity, the system GMM estimator originally proposed by Blundell and Bond (2023) was applied (Blundell and Bond 2023). This method deals with the abovementioned problems by instrumenting the level of the variables with their lagged difference and by including a one-year lagged dependent variable as an explanatory variable, thus enabling one to make causal inferences. This panel GMM estimator works more efficiently in cases where explanatory variables are not strictly exogenous, and there is no serial correlation in the error term (Roodman 2009). A similar methodology was applied by Qian et al. (2008), Qian et al. (2010) and Oh et al. (2015) to study the linkage between retail diversification and performance.

To address the research questions, we estimated a model that allows both simultaneous and lagged effects of SDG-related innovation on ROS:

$$ROS_{it} = \alpha + \beta ROS_{it-1} + \gamma \log\left(Innov_{it-1}\right) + \Gamma X_{it-1} + \nu_i + u_{it}, \quad (1)$$

where ROS_{it} is the return on sales of retailer i in year t, $Innov_{it}$ is the SDG-related innovation measure, X_{it} contains the control variables (linear and squared geographical diversification, firm size, firm growth rate, home market trade volume growth, home market private final consumption expenditure, and year dummies), while v_i is the firm-specific effect of firm i, and u_{it} is the idiosyncratic error term.

4 | Results

4.1 | Descriptive Statistics

The study revealed that the 18 retailers investigated launched 2701 innovation outcomes between 2007 and 2021, of which 783 were related to the SDGs. This study revealed that multinational retailers contributed to 13 out of 17 SDGs, suggesting that European grocery retailers play an essential role in achieving the SDGs. This means, on average, about three executed SDG-related innovations per company and per year, with a substantial variation. Almost all the retailers launched innovations related to SDG12 (responsible consumption and production). However, other SDGs were also prioritized based on the number of innovations launched: SDG2 (zero hunger), SDG3 (good health and well-being), SDG7 (affordable and clean energy), SDG8 (decent work and economic growth), SDG9 (industry, innovation and infrastructure). The Finnish retailer Kesko stands out with the highest number of SDG-related innovations. Details of the sample are provided in Table 5 and Figure 1. Based on longitudinal data, the number of SDG-related innovations increased substantially after 2017.

These SDGs support Jones and Comfort's (2021) results regarding leading European retailers' commitment to the SDGs. Moreover, our research extends the list, revealing retailers' contribution to SDG9 (industry, innovation, and infrastructure).

4.2 | Regression Analysis

Table 6 presents the results of the hierarchical regression analysis of Equation (1). Column (1) contains only the control variables. The total number of SDG-related innovations was added in Column (2). Column (3) separates the innovations following the TBL approach, allowing for the differentiation of profit impacts for innovations related to environmental, economic, and social dimensions. Since the innovations were coded based on the SDG to which they belong, the profit impact can be estimated separately. Retail innovations were connected to 13 of the 17 SDGs. No retail innovation was found for SDG4 (quality education), SDG10 (reduced inequalities), SDG13 (climate action), and SDG17 (partnership for the goals). However, some SDGs were represented only by a small number of innovations. Therefore, we decided to investigate only those accounting for at least 5% of innovations (at least 40 innovations for all companies during the entire time horizon). Hence, we examined SDG2 (zero hunger), SDG3 (good health and well-being), SDG7 (affordable and clean energy), SDG9 (industry, innovation and infrastructure), and SDG12 (responsible consumption and production). Column (4) shows the results for these innovations separately.

Overall, the results indicate that SDG-related innovations contribute to the increasing profitability of grocery retailers. The estimated coefficient can be interpreted as doubling the number of SDG-related innovations, increasing the return on sales by 0.951 percentage points. This is a substantial increase since the average ROS in the sample is 2.2%. This impact is nonlinear, meaning that the incremental profit impact of an additional SDG-related innovation depends on the number of innovations that have already been executed; there is a diminishing return. Considering our first research question, our findings show that SDG-related innovations significantly improve the retailer's performance. However, this effect is only short-lived, as only the number of SDG-related innovations executed in the previous year matters.

To answer our second research question, we needed a deeper analysis distinguishing the innovations based on the SDGs. First, we applied the TBL approach and differentiated between the effects of economic, environmental, and social SDG-related innovations. The findings revealed that environmental and social SDG-related innovations increased ROS, and that environmental SDG-related innovations had the strongest profit effect. In turn, economic SDG-related innovations had an insignificant impact on ROS.

Analyzing the profit impact of innovations by SDG reveals some further interesting patterns. Innovations related to infrastructure and industry (SDG9) have the greatest profit impact, followed closely by innovations related to responsible consumption and production (SDG12), which have a significantly larger impact than innovations related to other SDGs. Finally, innovations related to zero hunger also have a positive profit impact, albeit somewhat lower than SDG9 and SDG12.

Based on the results, innovations related to good health and well-being (SDG3) and affordable and clean energy (SDG7) are not leading to improved profitability.

5 | Discussion and Implications

5.1 | Discussion

In this paper, we aim to investigate whether SDG-related innovations affect the financial performance of European grocery retailers and what kind of differences can be observed between the SDGs. One of the unique features of the paper is that we used a 15-year panel dataset, while other studies (e.g., Hussain et al. 2018; Galeazzo et al. 2023) looked at much shorter periods of time (mainly 3 to 5 years).

Our results confirm that SDG-related innovations contribute positively to the profitability of retailers, especially innovations related to SDG2, SDG9, and SDG12. Our findings are in line with previous studies that have demonstrated the positive impact of sustainable activities on corporate financial performance (Bellostas et al. 2023; Chen et al. 2022; Galeazzo et al. 2023; Hussain et al. 2018; Rosamartina et al. 2022; Zhang et al. 2023).

Our analysis also points to the different performance outcomes of innovations related to environmental, social, and economic

TABLE 5 | Retailers in the sample and their SDG-related innovation activities.

Retailer	Home country	Total number of innovations	Number of SDG-related innovations	Types of SDG-related innovations	Examples of SDG-related innovations
Ahold (later: Ahold Delhaize)	Netherlands	186	43	9 SDGs Priority: 3, 9, 12	Solar panel installation; Nutri-Score introduction
Axfood	Sweden	131	48	8 SDGs Priority: 12	New organic private label brand; launch climate-friendly packaging
Carrefour	France	217	67	9 SDGs Priority: 2, 3, 12	Intelligent waste collection systems in store car parks; open the first bio store
Casino Guichard-Perrachon	France	152	32	5 SDGs Priority: 3, 12	New bio store format at train stations; supporting emerging organic food companies
Colruyt Group	Belgium	109	31	8 SDGs Priority: 12	New fair trade private label brand; home delivery by cargo bikes
Delhaize Group	Belgium	74	10	6 SDGs Priority: none	Switching to renewable energy; zero waste to landfill stores
DIA	Spain	55	9	4 SDGs Priority: none	Community collection in online stores; new plant-based drink brand
Groupe Auchan	France	123	30	7 SDGs Priority: 3, 12	Carbon footprint diagnosis; 100% recycled plastic bags
ICA Gruppen	Sweden	139	58	8 SDGs Priority: 2, 3, 12	Website to help consumers reduce food waste; new retail service offering personalized healthy weekly menus and recipes
J. Sainsbury	UK	229	73	10 SDGs Priority: 2, 3, 7, 9, 12	Installation of bee hotels in stores; first store using sign language
Jerónimo Martins	Portugal	191	64	9 SDGs Priority: 3, 12	Used battery collection program; program to fight child obesity
John Lewis	UK	144	39	7 SDGs Priority: 3, 9, 12	Mobile app for buying unwanted clothes; eliminate plastic packaging for fruits
Kesko	Finland	159	82	9 SDGs Priority: 2, 3, 7, 8, 12	Vegetarian display cabinet; new animal welfare policy
Marks & Spencer	UK	137	40	9 SDGs Priority: 3, 12	Worldwide commitment to responsible fishing; co-branding program with Nobody's Child

(Continues)

TABLE 5 | (Continued)

Retailer	Home country	Total number of innovations	Number of SDG-related innovations	Types of SDG-related innovations	Examples of SDG-related innovations
Sonae	Portugal	139	25	7 SDGs Priority: 3, 12	Autonomous shopping cart for people with reduced mobility; recycling program for used electrical equipment
Tesco	UK	171	63	9 SDGs Priority: 2, 3, 12	Launch health program for staff; new range of ready-made plant-based meals with Beyond Meat
Wm Morrisons	UK	196	54	8 SDGs Priority: 1, 2, 3, 12	New private label brand for locally sourced seasonal food; refillable containers at meat and fish counters
X5 Retail Group	Russia	149	15	4 SDGs Priority: 12	Vegetable oil recycling program; sustainable packaging recommendations for suppliers

Note: SDG1: no poverty; SDG2: zero hunger; SDG3: good health and well-being; SDG7: affordable and clean energy; SDG8: decent work and economic growth; SDG9: industry, innovation, and infrastructure; SDG12: responsible consumption and production.

SDGs. Innovations that address environmental and social issues generate significantly higher profits for retailers. The impact is nonlinear and particularly large at the beginning, when zero or few innovations are implemented. Previous research on global firms supports this finding (Hussain et al. 2018) (Chen et al. 2022). Interestingly, some other studies have failed to confirm this relationship (Galeazzo et al. 2023).

In turn, the total number of innovations related to the economic dimension of sustainability did not improve the ROS of grocery retailers.

In a previous study analyzing the most sustainable firms, a single economic dimension, SDG8, was found to have a positive impact on firm performance (Galeazzo et al. 2023). Another study revealed a negative relationship for publicly listed companies in Malaysia (Ahmad and Buniamin 2021).

Finally, our research has highlighted which SDG-related innovations significantly improve the financial performance of retailers. European grocery retailers place a significant emphasis on five SDGs in their innovation activities: SDG2 (zero hunger), SDG3 (good health and well-being), SDG7 (affordable and clean energy), SDG9 (industry, innovation and infrastructure) and SDG12 (responsible consumption and production). Based on our findings, SDG2 (zero hunger), SDG9 (industry, innovation and infrastructure) and SDG12 (responsible consumption and production) contributed positively to retailers' profitability, while the others had no significant impact. More recently, Galeazzo et al. (2023) demonstrated that companies that support responsible consumption and production achieve higher financial performance. However, the performance-enhancing effects of SDG2 (zero hunger) and SDG9 (industry, innovation and infrastructure) innovations appear to be novel findings. These SDGs support the findings of Jones and Comfort (2021) on leading European retailers' commitment to the SDGs. In addition, our research expands the list and highlights the importance of SDG9 for retailers.

5.2 | Theoretical Contributions

This paper provides several theoretical contributions to Freeman's (1984) stakeholder theory, which dominates the sustainability literature (Coelho et al. 2023). According to this theory, a firm should create value for all stakeholders. Therefore, companies should focus not only on profitability but also on social and environmental issues (Elkington 1998). However, a classical view of stakeholder theory considers sustainable activities as philanthropic activities that require more expenses and therefore do not drive the financial performance of companies (Ahmad and Buniamin 2021). On the contrary, the latest research on sustainability argues that a sustainable approach that also considers the social and environmental aspects will drive financial performance (Coelho et al. 2023; Hussain et al. 2018).

It is important to outline that retailers could improve their financial performance with activities related to all three areas of the TBL: economic (SDG9), social (SDG2), and environmental (SDG12). This is an important finding because the social dimension has been less emphasized in previous research (Azmat et al. 2023).

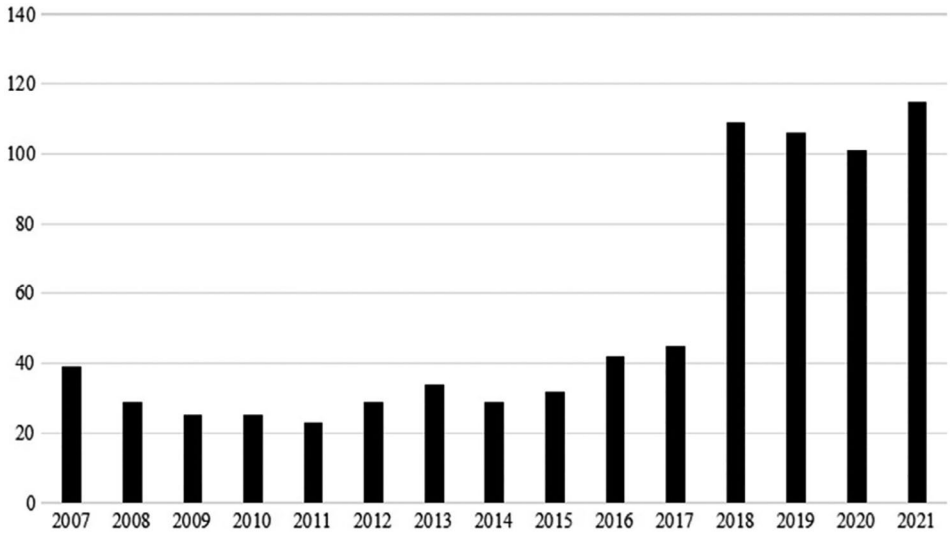

FIGURE 1 | Total number of SDG-related innovations per year.

Moreover, sustainable innovations have a significant impact on multiple stakeholder groups. Activities related to SDG9, such as innovations to reduce CO_2 emissions that affect human health and the environment, have the most significant impact on all stakeholders. Activities related to SDG12, such as reducing plastic waste and operating recycling facilities, have a similarly significant impact. In addition to activities that address the interests of all stakeholders, there are specific programs that target specific interest groups. Sustainable products related to SDG12 primarily target the interests of customers. Programs targeting local producers support the financial interests of suppliers (SDG2). At the same time, community needs are met through food donations (SDG2).

In addition to profitable innovation (SDG2, SDG9, and SDG12), retailers are implementing several other activities to support the interests of their stakeholders, such as providing electric vehicle charging services to communities, offering sustainable (e.g., plant-based) products to their consumers, improving the work environment and well-being of employees, and providing jobs for immigrants and people with disabilities. The positive impact of sustainable innovation cannot be measured in financial terms alone. These activities improve stakeholder relationships. They could influence customer participation behavior and customer citizenship behavior (Mubushar et al. 2024).

The research findings provide a valuable addition to the fields of sustainability and retail innovation. For example, the findings provide evidence that industry-specific SDG-related innovations can enhance the financial performance of firms. Finally, the findings pave the way for best practices in the retail sector that support the achievement of the SDGs while improving financial performance.

5.3 | Managerial Implications

The study highlights best practices in sustainable retail innovations that lead to improved financial performance. The most profitable innovations are related to SDG9, such as reducing CO_2 emissions through environmentally friendly logistics and stores. This is followed by activities related to SDG12, such as reducing plastic waste (packaging, bags), operating recycling facilities, introducing green/sustainable products and sustainable product labeling, creating food waste reduction programs, developing mobile apps with sustainability information, and so on.

Most of the companies surveyed have prioritized innovations related to responsible consumption and production (SDG12). Kesko has launched the largest number of innovations related to SDG12. However, only a limited number of companies have focused their efforts on SDG2 (Carrefour, ICA Gruppen, J. Sainsbury, Kesko, Tesco, and Wm Morrisons) and SDG9 (Ahold, J. Sainsbury, and John Lewis). In our sample, only one retailer, J. Sainsbury, prioritized all three profitable SDGs (SDG9, SDG2, and SDG12) in its innovation activities. Therefore, it can be concluded that J. Sainsbury is a potential model for developing a profitable and sustainable retail innovation portfolio.

However, these results are based on large multinational companies; small and medium-sized enterprises could also benefit from them. Digital platforms, such as food waste reduction platforms or marketplaces for special sustainable products, provide an opportunity for small and medium-sized enterprises to implement the SDGs (Isensee et al. 2024).

5.4 | Limitations and Future Research Directions

The paper has important theoretical and managerial contributions. However, the following limitations should be considered when interpreting the findings. In the literature, the SDGs are classified into economic, social, and environmental categories in various ways (Ahmad and Buniamin 2021; Barta et al. 2023; Boar et al. 2020; D'Adamo et al. 2021). These classifications differ in where they include SDG7, SDG10, SDG11, and SDG12. From the current research perspective, SDG12 is of great importance. This research is based on the classification of Ahmad and Buniamin (2021), who considered SDG12 as an environmental dimension, while Barta et al. (2023), Boar et al. (2020), and

TABLE 6 | Unstandardized regression coefficients, dependent variable: Return on $sales_{it}$.

Variables	(1)	(2)	(3)	(4)
Return on $sales_{it-1}$	−0.038	−0.004	−0.001	0.018
	(0.045)	(0.043)	(0.042)	(0.041)
log(Total number of SDG-related $innovations_{it-1}$)		0.951		
		(0.246)***		
log(Economic SDG-related $innovation_{it-1}$)			0.258	
			(0.387)	
log(Social SDG-related $innovation_{it-1}$)			0.488	
			(0.289)*	
log(Environmental SDG-related $innovation_{it-1}$)			0.980	
			(0.267)***	
log(SDG 2-related $innovation_{it-1}$)				0.791
				(0.432)*
log(SDG 3-related $innovation_{it-1}$)				0.184
				(0.323)
log(SDG 7-related $innovation_{it-1}$)				0.417
				(0.524)
log(SDG 9-related $innovation_{it-1}$)				1.149
				(0.508)**
log(SDG 12-related $innovation_{it-1}$)				0.952
				(0.281)***
Number of $countries_{it-1}$	−0.064	−0.010	0.008	0.030
	(0.080)	(0.055)	(0.041)	(0.036)
Number of $countries_{it-1}^2$	0.000	0.000	−0.000	−0.000
	(0.001)	(0.001)	(0.001)	(0.000)
log($sales_{it-1}$)	0.360	−0.031	−0.067	−0.150
	(0.308)	(0.282)	(0.263)	(0.250)
Sales $growth_{it-11}$	0.005	0.005	0.005	0.005
	(0.001)***	(0.001)***	(0.000)***	(0.000)***
Home market trade volume $growth_{it-11}$	−0.016	−0.061	−0.118	−0.181
	(0.081)	(0.074)	(0.067)*	(0.065)***
log(Home market private final consumption $expenditure_{it-1}$)	−4.302	−1.016	−0.758	−0.847
	(0.954)***	(0.562)*	(0.414)*	(0.345)**
Observations	245	245	245	245
Number of firms	18	18	18	18
Wald Chi^2	198.58	205.58	236.91	263.03

Note: Standard errors in parentheses. All regressions include constant and year dummies; * significance level < 0.10; ** significance level < 0.05; *** significance level < 0.01.

D'Adamo et al. (2021) classified SDG12 as an economic dimension. Based on an extensive literature review of SDG reporting, Lukács and Rickards (2023) emphasized that SDG12 is very important for the environment, supporting the approach used in this study.

Considering that innovations related to sustainable consumption and production (SDG12) are the most numerous, this category requires a detailed analysis. The following subcategories should be studied: sustainable consumption, sustainable production patterns, information on sustainable development, sustainable management and efficient use of natural resources, food waste, and reduction of waste generation (through prevention, reduction, recycling, and reuse). Abbate et al. (2024) call for sustainable practices to maximize the value of raw materials and reduce waste streams. Retailers, through their suppliers, are in a position to improve the circular economy in many industries.

Finally, it should be noted that the study period (2007–2021) covers nine years prior to the formal establishment of the SDGs in 2015. However, during the period 2007–2015, the vast majority of activities captured by the SDGs already achieved significant importance. These were also largely captured by the eight Millennium Development Goals (MDGs), albeit with a primary focus on basic human needs such as poverty reduction and health, as opposed to the environment.

6 | Conclusions

This study analyzes the impact of SDG-related innovations on the financial performance of the largest European grocery retailers. The results show that SDG-related innovations have a significant and positive impact on retailers' financial performance. Furthermore, the most profitable innovations are those related to the environment, followed by those related to social issues. The economic SDG-related innovations were found to have no impact on profitability. However, profitable innovations related to the given SDGs were identified in all three areas: economic (SDG9), social (SDG2), and environmental (SDG12). Transitioning to green stores and green transportation has proven to be a profitable initiative for retailers (SDG9). In addition, supporting local producers, promoting animal welfare, and donating food to those in need (SDG2) are valuable practices that can contribute to a retailer's success. Finally, retailers have improved their financial performance by implementing various practices, including environmentally friendly product assortments, carbon labeling, food waste reduction, and holistic recycling efforts (SDG12).

Acknowledgments

Zombor Berezvai's research was supported by the project identified by EKOP-CORVINUS-24-4 that was realized with the support of the National Research, Development, and Innovation Fund provided by the Ministry of Culture and Innovation, as part of the University Research Scholarship Program announced for the 2024/2025 academic year. Open access publishing facilitated by Anelis Plus (the official name of "Asociatia Universitatilor, a Institutelor de Cercetare – Dezvoltare si a Bibliotecilor Centrale Universitare din Romania"), as part of the Wiley - Anelis Plus agreement.

Endnotes

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[2] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0095.

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[4] https://ec.europa.eu/eurostat/databrowser/view/lfsa_egan22d__custom_12686498/bookmark/table?lang=en&bookmarkId=516f0e21-e648-4847-aef8-c282d1e8e535.

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Appendix A

The Sustainable Development Goals and Examples of Related Retail Innovations

SDG	Definition	Examples of related retail innovations
Economic		
G8—Decent work and economic growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Well-being program for employees; Jobs for immigrants, people with disabilities, furloughed employees
G9—Industries, innovation and infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Reducing CO_2 emission with environmentally friendly logistics or environmentally friendly stores
Social		
G1—No poverty	End poverty in all its forms everywhere	Charity activities for vulnerable people
G2—Zero hunger	End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Supporting local farmers; Supporting sustainable agriculture; Food donation
G3—Good health and well-being	Ensure healthy lives and promote well-being for all at all ages	Healthy products; Healthy food labeling; Programs for healthy eating
G4—Quality education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	—
G5—Gender equality	Achieve gender equality and empower all women and girls	Supporting women; Supporting gender equality; Supporting diversity
G10—Reduced inequalities	Reduce inequality within and among countries	Diversity and inclusivity campaign
G16—Peace, justice and strong institutions	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Human Rights Report; Donation for Social Justice
G17—Partnership for the goals	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development	—
Environmental		
G6—Clean water and sanitation	Ensure availability and sustainable management of water and sanitation for all	Reuse of wastewater
G7—Affordable and clean energy	Ensure access to affordable, reliable, sustainable and modern energy for all	Green energy production; Charging points for hybrid and electric cars
G11—Sustainable cities and communities	Make cities and human settlements inclusive, safe, resilient and sustainable	Autism-friendly store; Shopping cart for people with disabilities and children
G12—Responsible consumption and production	Ensure sustainable consumption and production patterns	Reducing plastic waste (packaging, bags); Recycling facility; Environmentally friendly/sustainable products; Sustainability labeling on products; Food waste reduction program; Mobile apps with sustainability information
G13—Climate action	Take urgent action to combat climate change and its impacts	—
G14—Life below water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Commitment to responsible fishing
G15—Life on land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	—