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Responsıble Consumptıon And Productıon In Türkiye: Overvıew And Key Trends

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Türkiye'de Sorumlu Tüketim ve Üretim: Genel Bakış ve Anahtar Trendler

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Abstract

This study evaluates Türkiye's performance in achieving the 12th Sustainable Development Goal on Responsible Consumption and Production. According to the Sustainable Development Report 2024, Türkiye ranks 72nd globally with an SDG index score of 70.5, performing below the OECD average of 77. While Türkiye demonstrates relative success in only the no poverty goal, classified under the challenges remain achievement status, the remaining goals are categorized as significant challenges and major challenges. Based on insights from global sustainability datasets, the study examines key indicators, including raw material use, marine eutrophication, fossil-fuel subsidies, municipal waste recycling, and renewable energy generation. Türkiye's progress is assessed relative to global averages and selected country groups, revealing both achievements and areas for improvement. While Türkiye has shown improvements in some areas, such as renewable energy capacity and municipal waste recycling, challenges persist, particularly in hazardous waste management and sustainable public procurement practices.

Anahtar Sözcükler: Sustainable Consumption, Sustainable Production, Green Economy, Turkish Economy, Environmental Impact, Climate Policies, Resource Efficiency

Öz

Bu çalışma, Türkiye'nin 12. Sürdürülebilir Kalkınma Hedefi olan Sorumlu Tüketim ve Üretim hedefindeki performansını değerlendirmektedir. Sürdürülebilir Kalkınma Raporu 2024'e göre Türkiye, 70,5 puanlık SKH endeks skoru ile küresel sıralamada 72. sırada yer almakta ve 77 olan OECD ortalamasının altında bir performans sergilemektedir. Türkiye yalnızca "yoksulluğa son" hedefinde göreli bir başarı gösterirken, bu başarı da "zorluklar devam ediyor" kategorisinde yer almaktadır. Diğer tüm hedefler ise "önemli zorluklar" ve "büyük zorluklar" olarak sınıflandırılmaktadır.

Çalışma, küresel sürdürülebilirlik veri setlerinden elde edilen bulgulara dayanarak hammadde kullanımı, deniz ötrofikasyonu, fosil yakıt sübvansiyonları, belediye atık geri dönüşümü ve yenilenebilir enerji üretimi gibi temel göstergeleri incelemektedir. Türkiye'nin ilerlemesi, küresel ortalamalar ve seçilmiş ülke grupları ile karşılaştırmalı olarak değerlendirilmekte; hem elde edilen başarılar hem de iyileştirilmesi gereken alanlar ortaya konmaktadır. Türkiye bazı alanlarda, örneğin yenilenebilir enerji kapasitesi ve belediye atıklarının geri dönüşümü gibi konularda ilerleme kaydetmiş olsa da, özellikle tehlikeli atık yönetimi ve sürdürülebilir kamu alımları uygulamalarında önemli sorunlar sürmektedir.

Keywords: *Sürdürülebilir Tüketim, Sürdürülebilir Üretim, Yeşil Ekonomi, Türkiye Ekonomisi, Çevresel Etki, İklim Politikaları, Kaynak Etkinliği*

1. Introduction

Global climate change, the growing waste problem, and the loss of biodiversity are among the most significant challenges facing the planet. The Sustainable Development Goals (SDGs), established to achieve sustainable development by 2030, serve as essential benchmarks and criteria for addressing these issues. Among these, the goals for sustainable consumption and production are the most critical and complex.

Achieving sustainable production and consumption requires addressing a range of interconnected economic, social, and environmental relationships. Due to the complexity and urgency of the issue, proposing and implementing transformative innovations and changes in production and consumption patterns is imperative. These solutions must be addressed across various layers (public sector, private sector, households) and development levels (developed countries, developing countries, and least developed countries). Moreover, collective rational actions must be taken without delay.

The UN's 17 global goals for sustainable development, a universal call to action to protect our planet, transform our world, and promote prosperity and peace, are composed of interconnected objectives, where progress in one goal can trigger advancement in others. Within this dynamic structure, which includes measurable national sub-goals alongside the global targets, progress in achieving the 17 goals is crucial, as it often necessitates the setting or revision of new goals at both national and international levels.

The 12th SDG, "Responsible Production and Consumption," aims to ensure sustainable production and consumption patterns by 2030. It includes 11 sub-targets and 15 indicators designed to reduce pressure on natural resources, the atmosphere, and the planet, while establishing, monitoring, and financing sustainable production and consumption habits.

The continuously expanding global consumer population and the transformation of consumption patterns increasingly intensify the tension between consumption freedom and environmental and social costs. Regulations related to sustainable development indicators, the Paris Agreement, and COP28 present concrete roadmaps, policy recommendations, and research on sustainable production and consumption to policymakers and society. However, challenges in collective decision-making, national interests, and short-term perspectives unfortunately result in insufficient actions.

This study has two objectives: (i) to assess Türkiye's performance in policy areas related to SCP based on SCP-HAT data, and (ii) to conduct a situational analysis of the Turkish economy by comparing it with country groups and individual countries using the indicators under the 12th goal of responsible production and consumption, one of

the 17 global goals for sustainable development supported by the United Nations Development Programme (UNDP).

2. Conceptual Framework and Literature Review

As one of the fundamental pillars of sustainability, the concept of 'sustainable consumption' provides a comprehensive perspective that includes both production and consumption, as evidenced by various definitions in the literature (McLaren, 2007). While the concept reflects a certain inconsistency between 'sustainability' and 'consumption,' it shares common concerns with sustainable development within the context of sustainability. The negative outlook and developments in sustainable development goals indicate the necessity of altering production and consumption patterns of goods and services. Thus, it is considered that the boundaries of sustainability can be defined through sustainable consumption. The transition to a consumption perspective is clearly emphasized in the section on ''sustainable production and consumption for sustainable development'' in Agenda 21, an outcome of the United Nations Conference on Environment and Development (Rio Summit) 1992, which highlights the need to move away from traditional consumption by altering consumption patterns.

In the Rio 1992 Summit, the boundaries of sustainable production and consumption were addressed within the framework of development levels, emphasizing that unsustainable consumption patterns vary according to countries' levels of development. Within this context, it is highlighted that the problems of an unsustainable way of life are shared universally, and the importance of global partnership and the individual responsibility of humanity is underscored. "The use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emission of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations" (IISD, 1994).

Sustainable production and consumption is a comprehensive concept that brings together multiple issues. This concept aims to conserve natural resources, minimize negative environmental impacts, and enhance societal well-being. The United Nations Environment Programme (UNEP) outlines the fundamental principles of sustainable production and consumption as follows:

- Improving quality of life without exhausting resources for future generations and while protecting the environment,

- Growing without damaging the environment:

    -Reducing material and energy intensity in economic activities,

    -Minimizing emissions and waste from mining, production, consumption, and waste disposal processes,

- Shifting consumption habits toward goods and services with low energy and material intensity without compromising quality of life,

- considering the life cycle approach in production and consumption,

- Ensuring that efficiency gains achieved in production are not offset by increases in consumption (UNEP, 2016).

Phipps et al., define sustainable consumption as "consumption that optimizes the economic, social, and environmental dimensions of acquiring, using, and disposing of goods simultaneously to meet the needs of future generations "(Phipps et al., 2013). This definition integrates economic, social, and environmental dimensions into the concept. Mont, on the other hand, explains the concept through the quantity and quality of consumption, emphasizing the need to assess the level of consumption to set its boundaries and to evaluate how consumption occurs to define its nature (Mont, 2004). The United Nations Commission on Sustainable Development's definition of sustainable consumption focuses on the goals of equity and quality. Within this framework, sustainable consumption aims to provide humanity with a higher quality of life while considering the fair distribution of resources both within the current generation and across generations. Thus, sustainable consumption reflects both global wastefulness and the concern for future generations. It is sustainable only if the consumption of present generations is constrained by the needs of future generations. (Marchand and Walker 2008) explain sustainable consumption from the perspective of individual initiative through four key target elements:

Abstention: Reducing consumption or avoiding unnecessary consumption.

Attitude: Viewing unnecessary consumption negatively.

Awareness: Choosing products based on their ecological characteristics.

Alternative: Identifying substitutes for traditional consumption patterns.

It is predicted that sustainable consumption can only be achieved to the extent that awareness of alternative consumption patterns is created, and the quantity and quality of consumption are assessed. However, the opportunities or traps presented by the age of technology overshadow the goal of sustainable consumption and allure individual consumption culture. The environmental, economic, and social issues arising from individual consumption in developed countries have reached alarming levels. Similarly, the scarcity of resources and consumption tools in less developed countries does not prevent the formation of a consumption culture (Ritzer, 2000). Thus, the consumption culture emerging from the scale of needs and the diversity of desires represents a global issue. According to Ritzer, in consumer-driven societies, various "cathedrals of consumption" created by consumption culture (such as shopping malls and other large-scale consumption centers) are described as magical places for consumers, perpetuating the cycle of consumption. These cathedrals of consumption, equipped with features like speed and efficiency and housing various consumption tools that mutually reinforce each other's use, have the potential to manipulate consumers into exceeding consumption limits. In this scenario, it is foreseen that not only will consumption persist, but its boundaries will be exceeded,

and the consumption cycle will remain unbroken (e.g., Disney World, large cruise ships, Las Vegas casinos).

Ritchie et al., define sustainable production and consumption as "… promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all. Its implementation helps to achieve overall development plans, reduce future economic, environmental and social costs, strengthen economic competitiveness and reduce poverty" (Ritchie et.al., 2018). This definition once again highlights the challenges of the goals.

The Sustainable Development Report prepared by Sachs et al. 2024, is a significant study summarizing the SDG performance of UN member states. Türkiye's overall performance across 17 SDG goals is summarized in Table 1 and Figure 1. While creating the table, the analysis focused on the top five countries in the SDG Index Rank and countries with populations exceeding 85 million people. Finland ranks first with an SDG index score of 86, while Germany, with a population of 83 million, ranks fourth with a score of 83.

Türkiye, with a score of 70.5, ranks 72nd and performs below the OECD average of 77. In the international spillovers score, Türkiye ranks 97th with a score of 88. Türkiye's spillovers score indicates negative cross-border effects, such as pollution or carbon emissions, which could adversely impact neighboring ecosystems and hinder other countries' ability to achieve their SDG targets. It is noteworthy that, as highlighted in the summary table, China performed better overall than Türkiye in 2024.

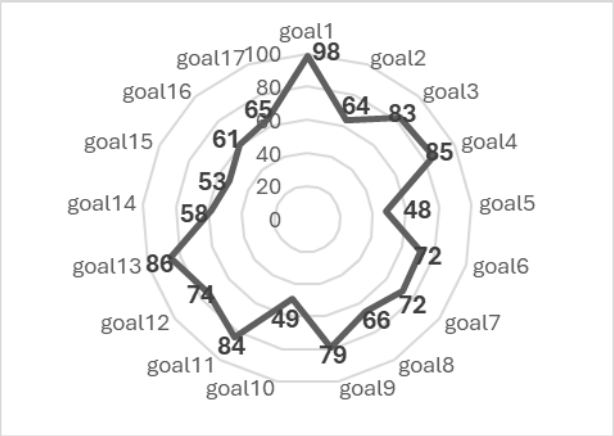
Table 1. Sustainable Development Report Summary by Selected Countries

Country	2024 SDG Index Score	2024 SDG Index Rank	International Spillovers Score (0-100)	Regional Score (0-100)	International Spillovers Rank	Regions used for the SDR	Population in 2023 (million)
Finland	86,4	1	67,2	77,2	139	OECD	5,5
Sweden	85,7	2	63,4	77,2	144	OECD	10,6
Denmark	85,0	3	58,1	77,2	155	OECD	5,9
Germany	83,4	4	63,2	77,2	146	OECD	83,3
France	82,8	5	62,5	77,2	147	OECD	64,7
Japan	79,9	18	74,3	77,2	124	OECD	123,6
United States	74,4	46	61,8	77,2	148	OECD	339,1
Brazil	73,8	52	96,0	70,1	22	LAC	215,8
Vietnam	73,3	54	89,9	66,5	86	East & South Asia	98,5
Russian Federation	73,1	56	85,0	70,6	108	E. Europe & C. Asia	144,7
China	70,9	68	90,3	66,5	81	East & South Asia	1425,8
Türkiye	***70,5***	***72***	***87,8***	***77,2***	***97***	***OECD***	***85,6***
Indonesia	69,4	78	95,6	66,5	30	East & South Asia	276,4
Mexico	69,3	80	90,2	77,2	82	OECD	128,0
Egypt, Arab Rep.	69,1	83	94,0	65,6	57	MENA	111,8
Iran, Islamic Rep.	69,0	86	87,7	65,6	98	MENA	88,8
Philippines	67,5	92	95,6	66,5	31	East & South Asia	116,5
Bangladesh	64,3	107	97,0	66,5	10	East & South Asia	172,1
India	64,0	109	95,7	66,5	27	East & South Asia	1422,0
Pakistan	57,0	137	95,0	66,5	41	East & South Asia	238,1
Ethiopia	55,2	145	95,1	53,7	39	Sub-Saharan Africa	124,9
Nigeria	54,6	146	96,5	53,7	16	Sub-Saharan Africa	221,2
Congo, Dem. Rep.	48,7	161	94,0	53,7	56	Sub-Saharan Africa	100,6

Source: This table has been generated from (Sachs et al., 2024).

From the perspective of the 17 Goals, Türkiye's relatively successful target, classified under the "challenges remain" achievement status, is Goal 1: No Poverty. On the other hand, the targets categorized under "significant challenges" include Goal 2: Zero Hunger, Goal 3: Good Health and Well-Being, Goal 9: Industry, Innovation, and Infrastructure, Goal 11: Sustainable Cities and Communities, and Goal 17: Partnership for the Goals. The remaining goals fall under the "major challenges" achievement status.

Figure 1. Average Performance by SDG, Türkiye, 2023



Source: This figure has been generated from (Sachs et al., 2024).

3. Analyzing Turkish Economy Using the Hotspot Analysis Tool for Sustainable Consumption and Production

The Hotspot Analysis Tool for Sustainable Consumption and Production (SCP-HAT), developed under the guidance of the UN Environment Programme by the Life Cycle Initiative, One Planet Network, and International Resource Panel, aims to identify hotspots of unsustainable production and consumption. Its purpose is to support the prioritization of national sustainable production, consumption, and climate policies. SCP-HAT combines environmental and social indicators at the national level with trade data to estimate environmental pressure and impact indicators. This open-source data tool analyzes data from 164 countries and 120 sectors, covering the years 1990–2024, enabling cross-country comparisons and supporting informed decision-making. (UNEP, 2019).

The SCP-HAT platform publishes data on environmental categories related to the SCP performance of countries. Within this framework, indicators are monitored in categories such as raw material use, Greenhouse Gas emissions (GHG), air pollution, land use, water use, energy use, and water pollution. Additionally, sector-based comparisons are conducted on the platform.

Raw material extraction and usage are among the primary sources of environmental problems. SDG 12 aims to increase efficiency and productivity in raw material use. As countries' growth rates increase, the goal is to achieve decoupling, where the growth of raw material extraction and usage rises at a slower pace than economic growth. Table 2 compares Türkiye's raw material use between 2000 and 2024. The raw material use of domestic production increased by 301%, rising from 558 million tons in 2000 to 2,236 million tons in 2024. In contrast, the consumption footprint grew by a comparatively lower 185%, increasing from 662 million tons to 1,889 million tons during the same period. The fact that the consumption footprint exceeds production indicates that Türkiye has a negative raw material use trade balance, meaning Türkiye is a net exporter of raw material usage. Under this definition, Türkiye's trade balance shows a deficit of -346 million tons in 2024.

Table 2. Raw Material Use and Decoupling Summary Table, Türkiye

	2000	**2024**	**% Change**
Domestic Production (million tons)	558,44	2236,75	301%
Consumption Footprint (million tons)	662,38	1889,82	185%
Raw Material Use Trade Balace (million tons)			
	2000	**2024**	**% Change**
Export	-107,33	-847,99	690%
Import	211,26	501,07	137%
Balance	103,93	-346,92	-434%
Decoupling of Raw Material Use (Change Compared to 1990)			
	2000	**2022**	
Material Footprint	6,0%	252,7%	
GDP (Constant)	43,3%	313,7%	

Kaynak: This table has been created from (UNEP, 2019)

In 2022, when Türkiye's raw material use is examined in terms of the consumption footprint for international comparison, it ranks 30th among 49 countries with a per capita value of 19.8 tons, which is above the Europe and Central Asia average of 17.23 tons. A summary of this data is presented in Table 3.

Table 3. Raw Material Use, 2022 Consumption Footprint by the Selected Countries in Europe and Central Asia

Rank	Country	tons/capita
1	Luxemburg	74,69
2	Belgium	44,51
3	Switzerland	39,54
29	Slovenia	20,51
30	Türkiye	19,8
31	Hungary	19,41
	Europe and Central Asia	17,23

Kaynak: This table has been created from (UNEP, 2019)

Water pollution is one of the significant environmental problems and is reflected in SDG 2: Zero Hunger, SDG 12: Responsible Consumption and Production, and SDG 6.5: Integrated Water Resources Management. Excessive fertilizer use in agriculture, untreated wastewater, and industrial discharge have disrupted global nitrogen and phosphorus cycles, leading to the crossing of safe thresholds and widespread nutrient pollution. This has triggered eutrophication (imbalanced nitrogen and phosphorus accumulation), which degrades water quality in rivers, lakes, and oceans. Eutrophication results in decreased oxygen levels in water, reduced water quality, and loss of biodiversity (Savic et al., 2022). The goal of responsible production and consumption also includes reducing eutrophication, commonly referred to as water pollution. Increased industrial and agricultural production must be balanced with environmental protection to lower eutrophication levels. In Türkiye, the domestic marine eutrophication level increased by 46% between 2000 and 2024, reaching 3,982 kt N-eq. From the perspective of production, foreign trade, and total consumption, the marine eutrophication footprint rose by 57%, reaching 4,268 kt N-eq. during the same period.

Water pollution from the perspective of eutrophication in foreign trade, as can be seen in Table 4 Türkiye’s exports increased by 70% between 2000 and 2024, while imports rose by 118%, resulting in a eutrophication trade deficit of 286 kt N-eq. This indicates that Türkiye is a net importer of eutrophication, meaning it generates less environmental pressure domestically compared to what is caused abroad.

Compared to the base year of 1990, the marine eutrophication footprint increased by 88% in 2022, whereas GDP in constant prices rose by 314%. These figures suggest the presence of positive decoupling in marine eutrophication, demonstrating that economic growth has outpaced environmental impact.

Table 4. Marine Eutrophication and Decoupling Summary, Türkiye

	2000	2024	% Change
Domestic Marine Eutrophication (kt N-eq.)	2735,52	3982,23	46%
Marine Eutrophication Footprint (kt N-eq.)	2726,48	4268,12	57%
Marine Eutrophication Trade Balance (kt N-eq.)			
	2000	2024	% Change
Export	-637,56	-1085,56	70%
Import	628,53	1371,46	118%
Balance	-9,03	285,9	-3266%
Decoupling of Marine Eutrophication (Change Compared to 1990)			
	2000	2022	
Marine Eutrophication Footprint	26,30%	87,80%	
GDP (Constant)	43,30%	313,70%	

Kaynak: This table has been created from (UNEP, 2019)

In the Europe and Central Asia region, Türkiye's per capita eutrophication consumption footprint is 48 kg N-eq., ranking 20th among 49 countries. This value is below the regional average of 50 kg N-eq.

Table 5. Marine Eutrophication, 2022, Consumption Footprint by Selected Countries in Europe and Central Asia

Rank	Country	kg N-eq./capita
49	Luxemburg	213,22
48	Switzerland	100,7
47	Norway	95,66
	Europe and Central Asia	49,81
21	Latvia	51,69
20	Türkiye	47,72
19	Croatia	45,34

Kaynak: This table has been created from (UNEP, 2019)

From the perspective of responsible production and consumption, when examining sector-based hotspots in Türkiye, the construction sector, followed by agriculture, holds significant weight in terms of raw material use. Table 6 presents a comparison of Türkiye's raw material use by sector consumption footprint for 2000 and 2024. In 2024, the construction and construction material extracting sectors together accounted for 927 million tons, representing 43% of the total raw material use. The agriculture sector ranks second with 171 million tons and a 13% share, followed by fabricated metals in third place with 142 million tons and an 8% share. When compared to 2000, the share of construction in total has consolidated with a 6% increase, while the share of agriculture declined by 11%.

Table 6. Raw Material Use (Consumption Footprint) by the Sector, Türkiye

	2000 Million Tons	2024 Million Tons	% Share in 2000	% Share in 2024	% Difference
Construction	209	649	31%	30%	-2%
Construction material quarrying	33	278	5%	13%	8%
Agriculture	129	171	19%	8%	-11%
Fabricated metals	24	142	4%	7%	3%
Nutrition	58	132	9%	6%	-3%
Financial intermediation and business activities	20	103	3%	5%	2%
Basic metals	3	100	0%	5%	4%
Electricity, gas and water	23	69	4%	3%	0%
Transport equipment	11	67	2%	3%	1%
Wholesale and retail trade	10	52	2%	2%	1%
Other manufacturing	16	52	2%	2%	0%
Public administration	9	52	1%	2%	1%
Transport	13	46	2%	2%	0%
Textiles	7	45	1%	2%	1%
Coal, oil & gas mining	39	41	6%	2%	-4%
Education, health and other social work activities	14	39	2%	2%	0%

Kaynak: This table has been created from (UNEP, 2019)
Note: Values below 2% have not been included in the table.

The hotspot sectors from the perspective of the Marine Eutrophication consumption footprint are summarized in Table 7. The sector with the highest consumption footprint is agriculture. In 2024, agriculture accounted for 1,636 kt N-eq., representing 36% of the total footprint. This is followed by the nutrition sector, which contributed 1,461 kt N-eq. and 32% of the total footprint.

Table 7. Marine Eutrophication (Consumption Footprint) by the Sector, Türkiye

	2000 kt N-eq.	2024 kt N-eq.	% Share in 2000	% Share in 2024	Difference
Agriculture	1084	1636	39%	36%	-4%
Nutrition	827	1461	30%	32%	2%
Hotels and restraurants	162	251	6%	5%	0%
Transport	138	199	5%	4%	-1%
Textiles	63	191	2%	4%	2%
Construction	150	183	5%	4%	-1%
Electricity, gas and water	55	148	2%	3%	1%
Public administration	42	98	2%	2%	1%

Kaynak: This table has been created from (UNEP, 2019)
Note: Values below 2% have not been included in the table.

From the perspective of domestic production, the sectoral distributions of raw material use, and marine eutrophication show similar trends. In 2024, construction material extracting accounted for 1,773 million tons, representing 79% of the total raw material use. The second-largest sector was agriculture, with 237 million tons and an 11% share. While the share of raw material uses in agriculture decreased by approximately 23% compared to 2000, the share of construction material extracting increased by 32%. (See Table 8).

Table 8. Raw material use (Domestic Production) by the Sector, Türkiye

	2000 Million Tons	2024 Million Tons	% Share in 2000	% Share in 2024	% Difference
Construction material quarrying	267	1773	48%	79%	32%
Agriculture	190	237	34%	11%	-23%
Coal, oil & gas mining	66	93	12%	4%	-8%
Ore mining	8	84	1%	4%	2%
Ceramics	13	26	2%	1%	-1%
Forestry and logging	8	15	1%	1%	-1%
Nutrition	4	5	0,8%	0,2%	-0,6%
Wood and Paper	2	4	0,3%	0,2%	-0,1%
Chemical products		0,5	0,0%	0,0%	0,0%
Fishing	0,5	0,4	0,1%	0,0%	-0,1%
Total	558	2237			

Kaynak: This table has been created from (Programme, 2019)

The Marine Eutrophication values from the perspective of Domestic Production are presented in Table 9. Similar to the consumption footprint, agriculture and nutrition have the highest values. In 2024, agriculture accounted for 2,395 kt N-eq., while nutrition contributed 861 kt N-eq. Together, these two sectors made up 80% of the total marine eutrophication.

Table 9. Marine Eutrophication (Domestic Production) by the Sector, Türkiye

	2000 kt N-eq.	2024 kt N-eq.	% Share in 2000	% Share in 2024	Difference
Agriculture	1717	2395	63%	59%	-3%
Nutrition	559	861	20%	21%	1%
Transport	204	337	7%	8%	1%
Electricity, gas and water	123	268	4%	7%	2%
Construction	33	42	1%	1%	0%

Kaynak: This table has been created from (UNEP, 2019)

Note: Values below 1% have not been included in the table.

The SCP-HAT platform provides insights beyond the indicators of raw material use and marine eutrophication discussed in this article within the scope of responsible production and consumption goals. It also monitors additional indicators, including GHG emissions, air pollution, land use, water supply, and energy use.

To briefly summarize, in 2024, from the perspective of domestic production in Türkiye:

• GHG emissions: The sector with the highest contribution is electricity, gas, and water at 34%.

• Air pollution: The largest contributor is also electricity, gas, and water at 36%.

• Land use: Agriculture dominates with 82%.

• Blue water consumption: Agriculture accounts for 87%, while for water scarcity, agriculture contributes 92%.

In terms of carbon footprint, the largest contributor is electricity, gas, and water, making up 16%. For the air pollution footprint, agriculture contributes 16%, and for the land use footprint, nutrition has the largest share at 24%. Regarding the blue water consumption footprint, agriculture stands out as the most critical sector with 45%, while electricity, gas, and water lead in the energy footprint with a share of 23%. These sectors, which provide the largest contributions, are referred to as "hotspot sectors" (UNEP, 2024). They emerge as the sectors most in need of monitoring and transformation.

From the perspective of domestic production, the material uses environmental indicator shows that in 2022, the world's three largest polluters were China, United States, and India, with values of 33,242 million tons, 7,896 million tons, and 7,671 million tons, respectively. Türkiye ranked ninth in this category, with a value of 2,061 million tons. In the same year, in terms of per capita material use, Australia, Qatar, and Canada topped the rankings with values of 102, 77, and 65 million tons, respectively, while Türkiye ranked 19th, with 24 million tons per capita (Programme, 2019).

For the marine eutrophication indicator under the domestic production perspective, the top three polluters in 2022 were again China, India, and the United States, with values of 48,353 kt N-eq., 30,741 kt N-eq., and 20,889 kt N-eq., respectively. Türkiye ranked 11th, with 3,927 kt N-eq.. In terms of per capita marine eutrophication, the top three countries were Brunei Darussalam, New Zealand, and Mongolia, with values of 9,106, 219, and 210 kg N-eq./capita, respectively. Türkiye ranked 34th, with 46 kg N-eq./capita.

For other environmental indicators under the domestic production perspective, the rankings of the top three polluting countries in 2022 were as follows:

- Air pollution: China, India, and Pakistan
- Blue water consumption: India, China, and USA
- Climate change: China, USA, and India
- Fossil fuels depletion: China, USA, and Russia
- Land use: Russia, USA, and China
- Mineral depletion: Russia, China, and Finland
- Water scarcity: China, India, and Egypt

In these categories, Türkiye ranked 7th, 11th, 15th, 43rd, 17th, 18th, and 8th, respectively. The data were sourced from (Programme, 2019), and the rankings were calculated based on these data.

It is evident that major fossil fuel producers and large manufacturing countries are leading polluters. On the other hand, Türkiye, as one of the world's top 20 largest economies, also ranks high in many environmental indicators. This issue will be

explored in more detail in the section on Türkiye's comparative responsible production and consumption indicators

4.Türkiye's Comparative Responsible Production and Consumption Indicators

The modern world faces the dual challenge of transforming production processes while meeting and reshaping growing consumer demands. This necessity not only calls for the creation of more value-added output but also emphasizes reducing costs without causing environmental harm. When environmentally friendly, efficient, and effective production processes are combined with high-value-added production, it becomes possible to protect the environment and natural resources, manage waste, and prevent pollution. Responsible production and consumption, the twelfth of the 17 global goals supported by the United Nations Development Programme for sustainable development, encompasses 11 targets and 57 indicators. This section will analyze Türkiye's responsible production and consumption targets in comparison with other countries and/or country groups. The country grouping is based on the World Bank's income-level classification (World Bank, 2023). Additionally, for certain subcategories, selected countries are used for comparison based on the nature of specific targets and indicators. From the 57 indicators, a selection will be made based on data availability and representativeness of the targets, and not all indicators will be analyzed. Details of the 11 targets and 57 indicators for Responsible Consumption and Production are provided by UN Statistical Division (Division, 2025).

The SDG data were obtained from the United Nations SDG Indicators Database. The dataset includes data for the years 2000–2022. For some countries, data are incomplete. Under these constraints, indicators were selected, and comparisons were made accordingly (Division, 2024).

The indicator countries with SCP national action plans, related to the target Implement the 10-Year Sustainable Consumption and Production Framework (12.1), is summarized in Table 10. This measure simply examines whether countries have a national action plan in place. It does not provide insights into the scope, strength, or implementation of these plans. As of 2022, 62 out of 266 countries worldwide have action plans. Among high-income countries, 34% have such plans, while only 4% of low-income countries have implemented them. Türkiye has been among the countries with a national plan since 2021, whereas 11 EU countries still lack an action plan.

Table 10. Countries with SCP National Action Plans as of 2022

Country or Group	2022	Number of Countries	% Share in Total Country Group
Low Income	2	45	4%
Lower Middle Income	13	68	19%
Upper Middle Income	23	73	32%
High Income	27	80	34%
Türkiye	1		
EU	16	27	59%
World	62	266	23%

Source: This table has been generated from (Division, 2024), with calculations by the author.

One of the indicators under the Sustainable Management and Use of Natural Resources (12.2) target is Material Footprint per Capita. This indicator, previously discussed in Table 2, analyzed Türkiye's data for the Europe and Central Asia region using the related metric of raw material use tons per capita. Table 11 summarizes material footprint values on a global scale. In 2019, the global material footprint amounted to 95.9 billion tons, representing a 68% increase compared to 2000. While the material footprint per unit of GDP appears to have remained unchanged over these 19 years, the material footprint per capita increased from 9.3 tons in 2000 to 12.4 tons in 2019, reflecting a 34% increase per capita. Although the stability of the per unit of GDP value indicates signs of decoupling, the overall global material footprint burden continues to grow.

Table 11. Sustainable Management and Use of Natural Resources (World)

	2000	2019	2000-2019 Absolute Change	2000-2019 % Change
Material footprint per capita, by type of raw material (tons)	9,3	12,4	3,1	34%
Material footprint per unit of GDP, by type of raw material (kilograms per constant 2015 United States dollar)	1,19	1,14	-0,04	-4%
Material footprint, by type of raw material (billion tons)	57,1	95,9	38,8	68%

Source: This table has been generated from (Division, 2024), with calculations by the author.

Another indicator under the 12.2 target, Domestic Material Consumption (DMC) per unit of GDP, is summarized in Table 12, comparing Türkiye with country groups. A lower DMC per unit of GDP is preferable, as it indicates higher resource efficiency. This means an economy produces more economic output while consuming fewer raw materials, reducing environmental impacts such as carbon emissions, pollution, and resource depletion, thereby promoting sustainability and aligning with circular economy practices. Türkiye's DMC value of 1.85 kg per US dollar reflects a moderate level of resource efficiency. While it performs better than lower-income groups, Türkiye still lags behind high-income countries and the EU, suggesting significant room for improvement. Over the 19-year period analyzed, the percentage change in DMC shows a 6% reduction globally, a 24% reduction in low-income countries, a 17% reduction in the upper-middle-income group (to which Türkiye belongs), and a 30%

reduction in the EU. However, Türkiye experienced a 23% increase, signaling a negative divergence from global trends.

Table 12. Domestic Material Consumption Per Unit of GDP (kilograms per constant 2015 US Dollars)

Country or Group	2000 (kg/Per US $)	2019 (kg/Per US $)	2000-2019 Absolute Change	2000-2019 % Change
Low Income	7,01	5,29	-1,7	-24%
Lower Middle Income	4,33	3,76	-0,6	-13%
Upper Middle Income	2,83	2,34	-0,5	-17%
High Income	1,28	0,72	-0,6	-44%
Türkiye	**1,51**	**1,85**	0,3	23%
EU	1,02	0,72	-0,3	-30%
World	1,20	1,13	-0,1	-6%

Source: This table has been generated from (Division, 2024), with calculations by the author.
Note: Average values for country groups are provided.

By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses (12.3) is another SCP target. Table 13 presents data for 2019, including total food waste, percentage share in total food waste, and food waste per capita (kg). As of 2019, global food waste amounted to 931 million tons, with 179 million tons produced by China, 128 million tons by India, and 47 million tons by Nigeria. These three populous countries collectively account for nearly 40% of the global total. Türkiye ranks 15th, producing 11 million tons of food waste annually. The global food waste per capita stands at 120 kg. Türkiye, with 136 kg per capita, is above the global average, while China produces 125 kg, India 94 kg, and Nigeria 232 kg of food waste per capita. It can be observed that high-income countries tend to generate relatively less food waste per capita.

Table 13. Food Waste, 2019

Rank	Country or Group	Food waste (Million Tonnes)	% Share in Total	Food Waste Per Capita (KG)
	First 15 Countries			
1	China	179	19%	125
2	India	128	14%	94
3	Nigeria	47	5%	232
4	USA	45	5%	138
5	Indonesia	33	4%	121
6	Pakistan	25	3%	117
7	Brazil	22	2%	103
8	Mexico	18	2%	137
9	Ethiopia	15	2%	135
10	Philippines	14	2%	130
11	Bangladesh	14	1%	84
12	Egypt	13	1%	134
13	Dem. Rep. of the Congo	13	1%	146
14	Viet Nam	12	1%	119
15	Türkiye	11	1%	136
	Group of Countries			
	World	931	-	120
	Low Income	84	9%	135
	Lower Middle Income	361	39%	134
	Upper Middle Income	348	37%	124
	High Income	146	16%	117
	EU	48	5%	113

Source: This table has been generated from (Division, 2024), with calculations by the author.
Note: Average values for country groups are provided.

Another target under Responsible Management of Chemicals and Waste (12.4) includes two indicators. The first is the percentage of Parties Meeting Their Commitments and Obligations in Transmitting Information as required by international environmental conventions on hazardous waste and other chemicals. The second relates to hazardous waste generated. As shown in Table 14, as of 2020, Türkiye has fulfilled its commitments and obligations in transmitting information under the Basel, Minamata, and Montreal Conventions on hazardous waste and other chemicals. For the Rotterdam Convention, the fulfillment rates are 50% and 75%, respectively. When compared to the EU and high-income countries' averages, Türkiye is in a good position in terms of meeting its obligations for transmitting information.

Table 14. Parties Meeting Their Commitments and Obligations in Transmitting Information as Required by International Environmental Conventions on Hazardous Waste, and Other Chemicals (%) as of 2020

Country or Group	Basel Convention	Minamata Convention	Montreal Protocol	Roterdam Convention	Stokholm Convention
Low Income	44	58	100	62	43
Lower Middle Income	53	52	100	72	46
Upper Middle Income	61	60	100	72	51
High Income	78	56	100	90	61
Türkiye	*100*	*100*	*100*	*50*	*75*
EU	91	60	100	96	61
World	61	100	100	75	50

Source: This table has been generated from (Division, 2024), with calculations by the author.
Note: Average values for country groups are provided.

For the Hazardous Waste Generated indicator, it is important to note significant data gaps in the database (Division, 2024), particularly for countries in Africa, Australia, and North (USA, Canada) and South America, where data is unavailable. However, a summary table is provided to illustrate general trends. Kazakhstan and the Russian Federation stand out as the largest generators of hazardous waste. According to 2018 data, these countries generated 150 million tons and 128 million tons, respectively. In comparison, Türkiye's hazardous waste generation in the same year was 15 million tons. Among the countries with available data, Türkiye exhibits the highest increase in hazardous waste generated per capita. Between 2012 and 2018, per capita hazardous waste generation in Türkiye rose by 240%, from 53 kg to 180 kg. As of 2018, former Eastern Bloc countries such as Estonia, Kazakhstan, Serbia, and the Russian Federation lead in per capita hazardous waste generation, while the EU average stands at 688 kg.

Table 15. Hazardous Waste Generated

	Hazardous Waste Generated (Million tons)	**Hazardous Waste Generated, Per Capita (Kg)**				**% Change in Hazardous Waste Generated, Per Capita from 2012 to 2018**
	2018	**2012**	**2014**	**2016**	**2018**	
Kazakhstan	*150*	20812	19180	8374	8089	-61%
Russian Federation	*128*	791	862	677	876	11%
*EU**	*102*	*584*	*631*	*643*	*688*	18%
Germany	*24*	270	266	280	292	8%
Serbia	*15*	1904	1786	2299	2066	8%
Türkiye	*15*	*53*	*44*	*69*	*180*	240%
Bulgaria	*13*	1790	1656	1839	1887	5%
France	*12*	179	170	172	188	5%
Estonia	*11*	6925	7919	7358	8229	19%
Italy	*10*	149	147	161	169	13%
Netherlands	*5,1*	289	285	300	297	3%
Belgium	*3,9*	253	265	337	342	35%
Sweden	*2,9*	282	263	239	284	0%
Belarus	*2,2*	136	178	168	227	66%
Denmark	*2,1*	217	304	352	363	67%
Finland	*1,9*	306	366	435	344	13%
Czechia	*1,7*	141	111	103	160	14%
Norway	*1,6*	271	310	310	308	14%
Austria	*1,3*	126	149	144	149	18%
Armenia	*0,5*	161	199	215	180	12%
Luxembourg	*0,4*	594	427	611	708	19%
Montenegro	*0,3*	331	427	516	538	63%
Cyprus	*0,2*	27	147	133	184	585%

Source: This table has been generated from (Division, 2024), with calculations by the author.

***** Average for per capita values, total for million tons

For the target Substantially Reduce Waste Generation (12.5), the indicator Proportion of Municipal Waste Recycled is summarized in Table 16. In 2020, Türkiye, with a recycling rate of 12%, ranked among the countries with the lowest levels of municipal waste recycling globally. In comparison, Germany achieved a recycling rate of 70%, while the EU average stood at 43%. Although Türkiye has shown slow progress, increasing its recycling rate from 9% in 2016 to 12% in 2020, its waste management policies are still far from robust. Additionally, Türkiye's status as a significant importer of plastic waste in recent years suggests that its waste policies require substantial improvement.

Table 16. Proportion of Municipal Waste Recycled (Selected Countries and Groups) (%)

Country or Group	2016	2017	2018	2019	2020
Germany	67	67	67	67	70
Bulgaria	32	35	31	35	65
Austria	58	58	58	58	62
Slovenia	55	58	59	59	59
Netherlands (King. Of The)	53	55	56	57	57
Switzerland	52	53	52	53	53
Luxembourg	49	49	49	49	53
Italy	46	48	50	51	51
Belgium	54	54	54	55	51
Slovakia	23	30	36	39	45
Lithuania	48	48	53	50	45
Denmark	48	48	50	52	45
Finland	42	41	42	43	42
France	40	40	41	41	42
Norway	38	39	41	41	41
Ireland	41	40	38	37	41
Spain	34	36	35	38	41
Türkiye	*9*	*9*	*11*	*12*	*12*
EU-27	*38*	*39*	*39*	*41*	*43*

Source: This table has been generated from (Division, 2024), with calculations by the author.

For the target 12.6 Encourage Companies to Adopt Sustainable Practices and Sustainability Reporting, the indicator Number of Companies Publishing Sustainability Reports is presented in Table 17. In 2021, 1,169 companies in the United States published sustainability reports, while the global total was 6,522. In Türkiye, only 77 companies released such reports. It is evident that corporate participation in sustainability reporting remains low worldwide. Furthermore, the scope, accuracy, and consistency of these reports are likely to become a significant area of research in the future.

Table 17. Number of Companies Publishing Sustainability Reports with Disclosure by Dimension, by Level of Requirement (Number)

Country	2016	2017	2018	2019	2020	2021
United States of America	356	402	499	711	935	1169
China	102	241	293	520	681	891
UK and Northern Ireland	239	250	275	305	433	492
Japan	265	274	296	327	340	367
Australia and New Zealand	118	132	150	199	241	287
Australia	99	111	124	170	205	242
Sweden	46	56	99	132	197	217
Canada	88	99	119	159	195	237
Germany	59	86	120	135	181	195
India	80	87	93	134	150	213
France	81	89	118	123	138	150
China, Hong Kong	70	95	107	130	132	143
Switzerland	50	57	80	95	119	130
Thailand	32	34	39	78	110	157
South Africa	93	91	94	103	104	107
Italy	26	35	66	68	89	94
Singapore	19	26	33	66	79	84
Türkiye	*21*	*25*	*40*	*50*	*67*	*77*
Norway	18	21	42	49	67	68
Malaysia	41	52	55	61	63	262
World	2276	2696	3315	4266	5280	6522

Source: This table has been generated from (Division, 2024), with calculations by the author.

Target 12.7: Promote Sustainable Public Procurement Practices focuses on the indicator Countries Implementing Sustainable Public Procurement Policies and Action Plans, which have been analyzed based on the level of implementation and summarized in Table 18. According to the data, only the USA has achieved a high level of public procurement policy implementation. It is observed that many countries either lack implementation or do not provide data, leading to their exclusion from the indicator. For this indicator, there is no available data for Türkiye. Public procurement policy is also a topic addressed under WTO regulations, where significant differences in viewpoints exist between developed and developing countries.

Table 18. Countries Implementing Sustainable Public Procurement Policies and Action Plans by Level of Implementation, 2022

Low level of implementation	*Medium-low level of implementation*	*Medium-high level of implementation*	*High level of implementation*
Trinidad and Tobago	Philippines	Poland	USA
Singapore	Malaysia	Latvia	
Uganda	Japan	Switzerland	
Czechia	Canada	Austria	
Spain	Norway	Netherlands	
El Salvador	Chile	Belgium	
Tunisia	United Kingdom	Slovenia	
Morocco	Colombia	Bulgaria	
Panama	Argentina	Italy	
Kenya	Cyprus	China	
	New Zealand	Malta	
	Estonia	Costa Rica	
	Peru	Paraguay	
	Germany	Croatia	
	Serbia	Portugal	
	Greece	Finland	
	Israel	South Korea	
	Uruguay	France	
		Ireland	
		Lithuania	

Source: This table has been generated from (Team, 2023).

Target 12.8: Promote Universal Understanding of Sustainable Lifestyles is tracked through four indicators: global citizenship education, education for sustainable development in curricula, in national education policies, in student assessment, and in teacher education. A summary, including the overall average, is presented in Table 19. Türkiye, with an overall average of 0.94, demonstrates performance on par with Germany and Slovenia. Türkiye appears to have achieved the goals under the categories of national education policies and student assessment. The top-performing countries across all categories are France, Romania, and Cuba, which occupy the top three spots.

Table 19. Extent to Which Global Citizenship Education and Education for Sustainable Development are Mainstreamed, 2020

Country	Income Level	In Curricula	In National Education Policies	In Student Assesment	In Teacher Education	Overall Average
France	High Income	0,99	1,00	1,00	1,00	1,00
Romania	High Income	0,97	1,00	1,00	1,00	0,99
Cuba	Low Income	1,00	1,00	1,00	0,95	0,99
Bahrain	High Income	0,94	1,00	1,00	1,00	0,99
India	Lower Middle Income	0,92	1,00	1,00	0,95	0,97
Ukraine	Upper Middle Income	0,92	1,00	1,00	0,95	0,97
Spain	High Income	0,91	1,00	1,00	0,95	0,96
Brazil	Upper Middle Income	0,94	1,00	0,92	1,00	0,96
San Marino	High Income	0,94	1,00	1,00	0,90	0,96
Latvia	High Income	0,86	1,00	1,00	0,95	0,95
Malawi	Low Income	0,91	1,00	1,00	0,90	0,95
Slovenia	High Income	0,93	1,00	1,00	0,85	0,95
Türkiye	*Upper Middle Income*	*0,88*	*1,00*	*1,00*	*0,90*	*0,94*
Germany	High Income	0,90	1,00	0,92	0,95	0,94
Lithuania	High Income	0,85	1,00	1,00	0,90	0,94
Myanmar	Lower Middle Income	0,90	1,00	0,83	1,00	0,93
Colombia	Upper Middle Income	0,88	1,00	1,00	0,85	0,93
Cambodia	Lower Middle Income	0,82	1,00	1,00	0,90	0,93
Republic of Korea	High Income	0,88	1,00	0,83	1,00	0,93
Poland	High Income	0,80	1,00	1,00	0,90	0,93

Source: This table has been generated from (Division, 2024), with calculations by the author.

For the target support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production (12-a), the indicator installed renewable electricity-generating capacity has been analyzed, and the results are summarized in Table 20. In 2008, Türkiye generated 215 watts per capita of renewable energy, which increased by 205% to 656 watts per capita in 2021. This places Türkiye among the top-performing countries and aligned with developing regions. The highest performer, Iceland, generated 7,722 watts per capita of renewable electricity in 2011. The European average for the same year was 1,026 watts per capita. Although Türkiye has shown a clear upward trend in recent years, it still has significant room for improvement in renewable energy generation.

Table 20. Installed Renewable Electricity-Generating Capacity (watts per capita)

Country or Group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	% Change from 2008 to 2021
Iceland	7.690	7.721	7.983	7.922	8.184	8.098	8.027	7.920	7.891	8.109	7.954	7.853	7.775	7.722	0%
Norway	6.229	6.186	6.184	6.249	6.299	6.277	6.241	6.266	6.301	6.475	6.715	7.063	7.293	7.296	17%
Sweden	2.370	2.420	2.479	2.542	2.554	2.619	2.728	2.794	2.802	2.871	3.034	3.091	3.306	3.606	52%
Canada	2.380	2.391	2.430	2.437	2.475	2.528	2.676	2.699	2.698	2.703	2.682	2.675	2.733	2.779	17%
Austria	1.901	1.934	1.991	1.976	2.027	2.087	2.137	2.213	2.227	2.305	2.339	2.375	2.478	2.620	38%
Northern America	606	635	661	709	728	757	809	863	899	937	980	1.056	1.147	1.217	101%
United States	413	444	468	519	536	562	604	661	700	739	789	873	968	1.040	152%
Europe	468	503	555	602	635	663	697	727	759	792	843	890	950	1.026	119%
Türkiye	*215*	*237*	*257*	*295*	*334*	*358*	*396*	*425*	*472*	*510*	*532*	*585*	*627*	*656*	205%
Eastern and South-Eastern Asia	128	143	160	178	208	238	272	305	343	379	415	488	546	612	377%
Developing regions	95	102	109	117	129	141	155	169	186	203	217	243	267	293	209%

Source: This table has been generated from (Division, 2024), with calculations by the author.

Under the target develop and implement tools to monitor sustainable development impacts for sustainable tourism that create jobs and promotes local culture and products (12-b), the indicator implementation of standard accounting tools to monitor the economic and environmental aspects of tourism is summarized in Table 21. Türkiye, with only one standard accounting table implemented, is among the lowest-performing countries for this criterion. Australia and New Zealand implemented 17 tables, while Colombia and Denmark implemented 11 tables each, achieving the highest levels of implementation. The use of standard accounting tables is crucial for assessing the sustainability of tourism activities, as it provides a structured approach to evaluating both economic contributions and environmental impacts. Countries with higher implementation levels are better positioned to design evidence-based policies that support sustainable tourism practices.

Table 21. Implementation of Standard Accounting Tools to Monitor the Economic and Environmental Aspects of Tourism (number of tables), 2019

Countries	Number of Tables	Level of Implementation	Countries	Number of Tables	Level of Implementation	Countries	Number of Tables	Level of Implementation
Aus. and N.Zeal.	17	Highest	Bahrain	7	Middle	Azerbaijan	5	Lower Middle
Colombia	11	Highest	Bermuda	7	Middle	Chile	5	Lower Middle
Denmark	11	Highest	Bhutan	7	Middle	Côte d'Ivoire	5	Lower Middle
Australia	10	High	Ecuador	7	Middle	Jamaica	5	Lower Middle
Ireland	10	High	Finland	7	Middle	Uruguay	5	Lower Middle
Mexico	10	High	Japan	7	Middle	Viet Nam	5	Lower Middle
Slovenia	10	High	Latvia	7	Middle	China, Macao SAR	4	Lower Middle
Croatia	9	High	Malaysia	7	Middle	Georgia	4	Lower Middle
Czechia	9	High	New Zealand	7	Middle	Togo	4	Lower Middle
Germany	9	High	Puerto Rico	7	Middle	Brazil	3	Low
Hungary	9	High	Qatar	7	Middle	Guam	3	Low
Italy	9	High	Rwanda	7	Middle	Monaco	3	Low
Lithuania	9	High	Saudi Arabia	7	Middle	Uzbekistan	3	Low
Luxembourg	9	High	Sierra Leone	7	Middle	Cyprus	2	Low
Philippines	9	High	South Africa	7	Middle	Estonia	2	Low
Portugal	9	High	Spain	7	Middle	Greece	2	Low
Slovakia	9	High	Thailand	7	Middle	Lao PDR	2	Low
Sweden	9	High	UK and N. Ireland	7	Middle	Malta	2	Low
Austria	8	High	USA	7	Middle	Palau	2	Low
Canada	8	High	Argentina	6	Middle	Serbia	2	Low
Costa Rica	8	High	Belgium	6	Middle	Switzerland	2	Low
Iceland	8	High	Bulgaria	6	Middle	Antigua & Barbuda	1	Lowest
Kazakhstan	8	High	China, Hong K. SAR	6	Middle	Belarus	1	Lowest
Norway	8	High	Fiji	6	Middle	India	1	Lowest
Romania	8	High	Indonesia	6	Middle	Israel	1	Lowest
			Morocco	6	Middle	Marshall Islands	1	Lowest
			Mozambique	6	Middle	Myanmar	1	Lowest
			Netherlands (K.of the)	6	Middle	Russian Federation	1	Lowest
			Oman	6	Middle	Trinidad & Tobago	1	Lowest
						Türkiye	*1*	*Lowest*
						US Virgin Isl.	1	Lowest

Source: This table has been generated from (Division, 2024), with calculations by the author.

For the target remove market distortions that encourage wasteful consumption (12-c), the indicators fossil-fuel subsidies as total amount and fossil-fuel subsidies as a proportion of total GDP are presented in Table 22, Table 23, and Figure 2. According to 2021 data, Iran provided the highest fossil-fuel subsidies globally, amounting to 58.9 billion USD, which is nearly 8% of the global total. It was followed by Saudi Arabia with 41 billion USD and the Russian Federation with 29 billion USD, collectively making up approximately 18% of global subsidies. These numbers highlight the massive financial support these countries allocate to fossil fuels, reflecting their significant dependence on these energy sources. Türkiye ranks lower, with subsidies totaling 4.1 billion USD in 2021, accounting for roughly 0.56% of the global total. However, between 2010 and 2021, Türkiye recorded a 307% increase in fossil-fuel subsidies, demonstrating one of the fastest growth rates globally. Globally, the total fossil-fuel subsidies amounted to 732 billion USD in 2021, equivalent to the GDP of a medium-sized economy.

Table 22. Fossil-Fuel Subsidies (Consumption and Production) (Billions of Nominal US Dollar)

Country or Region	Ranking as of 2021	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	% Change from 2010 to 2021
Iran (Isl. Rep. of)	1	82,7	74,9	88,3	86,7	81,3	47,4	28,4	47,1	68,3	89,6	34,7	58,9	-29%
Saudi Arabia	2	52,6	70,6	79,4	76,4	73,7	51,5	33,8	40,3	39,2	31,2	17,9	40,9	-22%
Rus. Federation	3	5,9	7,7	8,6	9,2	6,7	6,3	8,0	12,3	20,8	25,5	11,0	29,0	388%
Egypt	4	18,3	26,9	28,8	29,4	24,6	16,9	13,7	21,6	26,4	17,5	9,7	27,0	48%
China	5	18,6	22,2	39,6	40,0	46,5	46,8	28,3	29,5	29,7	27,4	23,1	24,8	33%
Algeria	6	13,4	17,0	21,2	22,4	20,7	12,2	6,7	9,1	17,1	13,3	8,7	23,6	76%
Mexico	7	7,2	16,8	18,5	8,6	3,3	4,9	18,6	4,6	4,4	19,8	11,6	23,4	224%
Indonesia	8	15,1	30,7	33,8	30,5	29,6	10,3	11,3	10,2	15,2	15,2	12,5	14,9	-1%
Italy	9	7,7	10,0	11,9	12,9	13,3	11,5	11,1	9,7	11,0	11,4	10,3	12,4	62%
France	10	3,6	6,0	6,2	6,2	6,0	5,6	6,3	7,4	10,1	10,1	9,3	9,9	175%
USA	11	15,1	10,8	11,4	11,2	10,3	8,7	6,6	6,7	9,3	10,5	8,8	9,5	-37%
Aus. & N. Zeal.	12	5,4	6,7	5,8	5,5	5,2	4,4	7,1	7,6	7,4	7,3	7,3	9,3	74%
Australia	13	5,3	6,6	5,7	5,5	5,2	4,4	7,1	7,6	7,4	7,3	7,3	9,3	75%
Germany	14	13,6	12,8	11,9	11,5	11,8	9,7	10,3	9,6	10,0	8,8	9,6	7,9	-42%
Brazil	15	28,0	34,4	36,4	34,7	30,3	17,7	14,3	10,7	10,6	9,0	6,6	7,2	-74%
Türkiye		*1,0*	*1,1*	*1,1*	*1,1*	*4,7*	*4,4*	*4,5*	*5,4*	*4,7*	*3,5*	*2,8*	*4,1*	307%
EU		44,5	47,7	47,2	47,5	47,1	47,6	48,6	51,5	58,0	55,8	54,4	50,2	13%
World		621,2	767,8	844,8	831,3	739,9	526,7	465,7	518,1	656,8	557,7	374,6	731,6	18%

Source: This table has been generated from (Division, 2024), with calculations by the author.

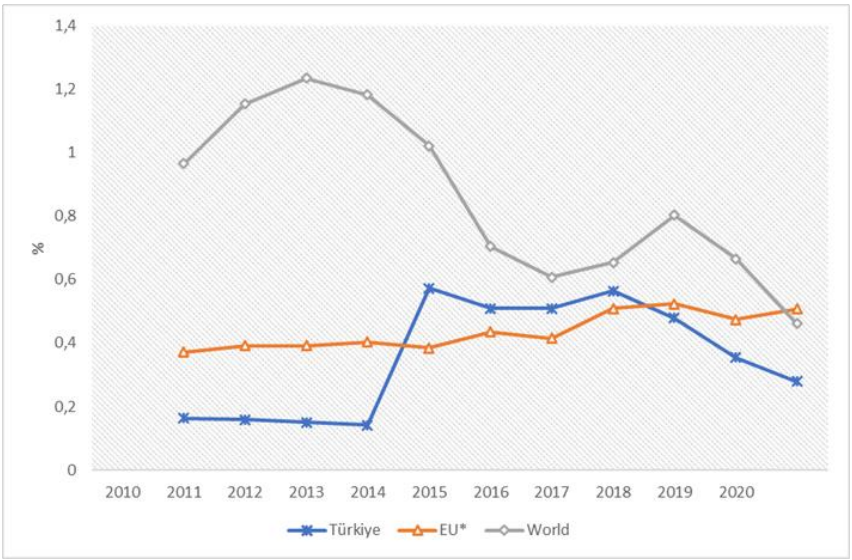
In 2020, based on fossil-fuel subsidies as a proportion of total GDP, Lebanon ranked first with an astonishing 905%, followed by Libya and Iran, with values of 8.1% and 7.6%, respectively. Türkiye, with a value of 0.3%, remained below both the EU average and the global average, both of which stood at 0.5%. As shown in Figure 2, the global level of fossil-fuel subsidies as a proportion of GDP has been on a declining trend since 2012. Similarly, Türkiye has experienced a decreasing trend since 2018. This reflects Türkiye's gradual efforts to align its energy subsidies with sustainability goals, although the pace of reduction remains slow. In contrast, countries like Lebanon and Libya demonstrate extreme reliance on fossil-fuel subsidies, highlighting structural economic challenges and energy dependencies.

Table 23. Fossil-Fuel Subsidies (Consumption and Production) as a Proportion of Total GDP (%)

Country or Region	Ranking as of 2020	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Change from 2010 to 2020
Lebanon	1	3,1	3,9	4,1	4,7	4,5	9,4	7,9	10,1	12,7	13,2	9,5	6,5
Libya	2	6,6	13,8	9,4	11,9	14,6	7,4	6,8	6,1	7,3	7,3	8,1	1,4
Iran (Isl. Rep. of)	3	20,2	17,6	21,6	21,5	19,2	11,4	6,3	10,1	15,0	20,3	7,6	-12,6
Tajikistan	4	2,0	2,6	3,3	3,9	3,3	6,3	6,2	6,6	5,6	6,0	5,8	3,8
Venezuela	5	6,2	7,6	8,4	9,3	7,8	5,2	4,8	6,6	9,1	8,7	5,6	-0,7
Algeria	6	9,5	11,7	14,1	14,5	12,9	7,3	3,9	5,3	9,7	7,5	5,2	-4,3
St. of Palestine	7						3,2	2,3	4,2	7,0	6,3	5,1	-
Kyrgyzstan	8	6,5	13,1	16,8	16,7	14,1	6,5	4,7	6,8	6,8	7,0	4,7	-1,7
Bulgaria	9	0,0	0,0	0,0	0,0	0,0	3,6	2,3	4,7	5,3	4,4	4,5	4,5
Suriname	10	0,0	1,6	1,7	1,7	1,7	4,7	4,4	3,0	3,5	3,6	4,5	4,5
Turkmenistan	11	25,4	25,8	26,4	27,6	24,4	13,9	10,0	10,0	12,0	8,1	4,3	-21,1
Uzbekistan	12	22,9	21,8	17,8	14,9	11,6	6,7	4,5	6,7	8,4	5,2	3,5	-19,4
Mauritania	13	0,6	0,9	0,9	0,8	0,9	1,5	1,3	1,6	2,9	3,0	2,9	2,3
Timor-Leste	14	0,0	0,0	0,0	0,0	0,0	2,1	0,7	2,3	4,6	4,7	2,8	2,8
Ukraine	15	2,0	2,3	4,5	2,8	2,3	1,1	1,9	2,7	2,6	1,9	2,8	0,8
Türkiye		*0,2*	*0,2*	*0,1*	*0,1*	*0,6*	*0,5*	*0,5*	*0,6*	*0,5*	*0,4*	*0,3*	*0,1*
EU-27		0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,5	0,5	0,5	0,5	0,1
World		1,0	1,2	1,2	1,2	1,0	0,7	0,6	0,7	0,8	0,7	0,5	-0,5

Source: This table has been generated from (Division, 2024), with calculations by the author.

Figure 2. Fossil-Fuel Subsidies (Consumption and Production) as a Proportion of Total GDP (%)



Source: This figure has been generated from (Division, 2024), with calculations by the author.

In 2024, the Sustainable Development Report prepared by (Sachs et al., 2024) includes calculations assessing the SDG performance of UN member states. Türkiye's overall performance for Goal 12 is summarized in Table 24 and Figure 3. According to the report, Türkiye's Goal 12 score is 75, placing it in the significant challenges achievement status category. Additionally, its trend in this category is classified as stagnating.

Türkiye's performance is similar to that of the Russian Federation and China but lags behind countries with relatively lower income levels and industrialization, such as Ethiopia, Nigeria, and Congo. This suggests that SCP scores are inversely proportional to the level of industrialization. For instance, Germany, with a score of 49.3, is categorized under major challenges and also shows a stagnating trend, indicating a much lower performance than Türkiye for Goal 12. However, as previously mentioned, Germany ranks 4th globally in the overall SDG total score.

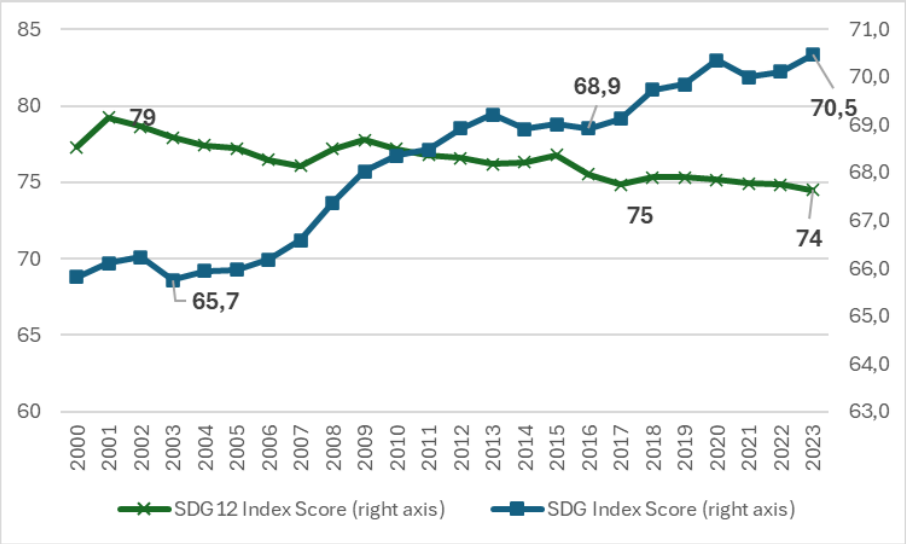
Table 24. Sustainable Development Report Goal 12 Summary by Selected Countries, 2024

Country	2024 SDG Index Score	2024 SDG Index Rank	Goal 12 Trend	Goal 12 Score	Goal 12 Achievment Status
Finland	86,4	1	Decreasing	56,4	Major challenges
Sweden	85,7	2	Stagnating	54,7	Major challenges
Denmark	85,0	3	Stagnating	36,6	Major challenges
Germany	83,4	4	Stagnating	49,3	Major challenges
France	82,8	5	Stagnating	58,9	Major challenges
Japan	79,9	18	Moderately Increasing	67,3	Major challenges
United States	74,4	46	Stagnating	59,1	Major challenges
Brazil	73,8	52	Moderately Increasing	80,4	Major challenges
Vietnam	73,3	54	Stagnating	83,4	Significant challenges
Russian Federation	73,1	56	Stagnating	75,8	Significant challenges
China	70,9	68	Stagnating	74,5	Significant challenges
Türkiye	***70,5***	***72***	***Stagnating***	**74,5**	***Significant challenges***
Indonesia	69,4	78	Stagnating	87,8	Challenges remain
Mexico	69,3	80	Moderately Increasing	80,3	Significant challenges
Egypt, Arab Rep.	69,1	83	Moderately Increasing	87,9	Challenges remain
Iran, Islamic Rep.	69,0	86	Stagnating	84,1	Significant challenges
Philippines	67,5	92	Stagnating	91,1	Goal Achievement
Bangladesh	64,3	107	Stagnating	93,0	Challenges remain
India	64,0	109	Stagnating	82,6	Significant challenges
Pakistan	57,0	137	Stagnating	88,6	Challenges remain
Ethiopia	55,2	145	Moderately Increasing	97,5	Goal Achievement
Nigeria	54,6	146	Moderately Increasing	95,4	Goal Achievement
Congo, Dem. Rep.	48,7	161	Stagnating	97,3	Goal Achievement

Source: This table has been generated from (Sachs et al., 2024).

Türkiye's performance in the Goal 12 SCP category has been declining over the period 2000–2023. As shown in Figure 3, Türkiye's score in this category decreased from 79 in 2001 to 74 in 2023. From the perspective of the 17 Goals, Türkiye's relatively successful targets, classified under the "challenges remain" achievement status, are Goal 1: No Poverty and Goal 7: Affordable and Clean Energy. On the other hand, targets categorized under "significant challenges" include Goal 2: Zero Hunger, Goal 3: Good Health and Well-Being, Goal 9: Industry, Innovation, and Infrastructure, Goal 11: Sustainable Cities and Communities, and Goal 17: Partnership for the Goals. The remaining goals fall under the "major challenges" achievement status. Despite the decline in Goal 12 SCP performance, Türkiye's SDG overall score improved from 66 in 2001 to 71 in 2023, reflecting progress in other areas.

Figure 3. SDG Overall and SDG 12 Scores by the Year, Türkiye



Source: This figure has been created from (Sachs et al., 2024).

In the study by (Sachs et al., 2024), it is important to note that the following indicators were used for Goal 12: Electronic waste, production-based air pollution, air pollution associated with imports, production-based nitrogen emissions, nitrogen emissions associated with imports, exports of plastic waste, and non-recycled municipal solid waste. Among these, the indicators that lowered the average score for 2023, ranked from lowest to highest, are electronic waste (57), production-based air pollution (59), and production-based nitrogen pollution (63). On the positive side, the indicator making the most significant contribution is non-recycled municipal solid waste, with a score of 99.

5.Conclusion

Globally, there is little time left to achieve the United Nations' 17 SDGs by the 2030 target. As the window for meaningful action narrows, countries are under increasing pressure to evaluate their current patterns, close performance gaps, and strengthen their institutional and policy responses. The 17 SDGs are deeply interconnected, meaning that underperformance in one area can undermine progress in others.

It's clear that the world's major fossil fuel producers and large manufacturing economies are among the leading contributors to environmental pollution. Türkiye, as one of the 20 largest economies globally, also ranks high in several key environmental indicators. This study takes a closer look at the 12th Sustainable Development Goal—Responsible Consumption and Production—through a comparative analysis of statistical indicators. Türkiye has made progress in certain areas under Goal 12, particularly in expanding renewable energy capacity and improving municipal waste recycling. However, serious challenges remain in areas such as hazardous waste management, fossil fuel subsidies, and sustainable public procurement. Moreover, Türkiye's raw material use, especially from domestic production, has been increasing rapidly.

With an SDG Index score of 70.5 and a global ranking of 72nd, Türkiye is currently performing below the OECD average of 77. Over the past two decades, the country's performance under Goal 12 has declined, and the overall trend has remained stagnant. These findings underline the urgent need for targeted strategies and concrete actions to change course.

Key environmental indicators, such as raw material use and marine eutrophication, reveal that sectors like agriculture and construction are critical areas requiring focused interventions. Although Türkiye has shown potential for aligning with global sustainability goals, particularly in renewable energy, further efforts are essential to enhance policy frameworks and strengthen international collaboration. Addressing these challenges effectively will enable Türkiye to make meaningful progress and take a leading role in sustainable production and consumption within its region.

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