

Agri-food policy trends and state of sustainable food system in Türkiye

AHMET ALI KOÇ*, AHMET BAYANER**, GÜLÇİN KOÇ***

DOI: 10.30682/nm2403b

JEL codes: Q01, Q18, Q56

Abstract

Over last two decades, the research and evaluation paradigm in agri-food sector has shifted towards comprehensive perspective called sustainable food system. The heavy pressure on earth bio-capacity and massive environmental externalities, biodiversity loss, climate change impacts on agricultural supply and food security, food safety and health issues, and consumers' cultural concern are major factors induced to change the perspective from agri-food supply chain to sustainable food system. Although the sustainable food system perspective has become important paradigm in researches and impact evaluation studies on agri-food system recently, the studies at this perspective are missing in Türkiye. The aim of this study is to fulfil this gap in literature and provide evidences for policy makers. This study evaluates the food system and agri-food policies in Türkiye consisting of the state of the agri-food sector, historical evaluation of agri-food policy transform, climate change policies and environment, rural development measures, agri-food policy impact studies, and the performance level of sustainable food system indicators. Türkiye initiated the process of transformation of food systems in 2019 with an aim "to create sustainable, resilient and equitable food systems". National Program for Agricultural Support Policy is announced each year as a Presidency Decision. The scope of agricultural support measures and its relative importance in GDP has not considerable changed much for over three decades. Nevertheless, it has been observed a positive development in most of the sustainable food system indicators. However, especially food and nutrition indicators have not considerable improved and it has been even worsened in some subcategories during the last decade. Although national policy agenda and documents cover the transition towards sustainable food system, monitoring-evaluation system and assessment of national agri-food policies considering sustainability dimension data and indicators is lacking.

Keywords: Food system sustainability, Food system monitoring and evaluation, Sustainability dimension of food system.

1. Introduction

Over the last 50 years, food systems worldwide have shifted from predominantly rural to industrialized and consolidated systems, with impacts on diets, nutrition and health, liveli-

hoods, and environmental sustainability (Ambikapathi *et al.*, 2022). Recently, the focus of agricultural and food policies has shifted from predominantly supply-side to overcome issues of supply chain, and finally to food system ap-

* Akdeniz Universitesi, Department of Economics, Antalya, Türkiye.

** Akdeniz University, Department of Business Administration, Antalya, Türkiye.

*** Non-affiliated, Konyaalti, Antalya, Türkiye.

Corresponding author: alikoc@akdeniz.edu.tr

proach to achieving sustainable development goals. According to FAO (2018), “food systems encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption, and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal, and natural environments in which they are embedded”. In other words, food systems are defined as the sum of actors, sectors, and interaction along the value chains from pre-farm production (such as R&D and input supply) to post-consumption (waste disposal) stages. The system encompasses massive environmental externalities, climate change, health, enabling policy environments and cultural norms (Fan, 2021). The systems consist of everybody and everything that involves in bringing food from “farm to fork” (Fanzo and Davis, 2021). The food systems are a perspective that consists of numerous interlinked activity areas including the natural, technical, economic, and social aspects. It covers all the supply chain activities, externalities and valorisation from primary production and input use to consumption and waste reduction at each stage of the system and their linkages with each other (EC, 2023). Social dimension of food system has multifacet elements consisting of human health, healthier diet, the fight against overweight, obesity, diet-related diseases, food availability and affordability, fair return, fostering competitiveness, assuring occupational health and safety, workers’ social rights, respecting human rights, promoting fair trade, and enhancing animal welfare. Environmental dimension includes reducing carbon footprint, achieving global climate targets and biodiversity commitments and effectively respond to the world triple environmental crisis consisting of climate change, biodiversity, and pollution. Building better operators’ capacity to produce adequate amount of nutritious and diverse food for world population at an affordable price is an important element of economic dimension of the system. In addition, fairer economics return for primary producers and SMEs enterprises and fair distribution of value-added among supply chain actors are part of economic dimension.

The economic dimension also covers fostering job opportunities, competitiveness of supply sector, and consumer access to healthy diet at affordable price (EC, 2023). Globally, food system is a major driver of climate change and biodiversity loss which is responsible for 30% of the greenhouse gas (GHG) emissions of the world. The UN held a Food System Summit in 2021 to increase the awareness that food system transformation is urgent. Several countries have designed National Pathways having the priority actions for the transformation towards more resilient and sustainable food systems (EU, 2023). A sustainable food system provides everyone easy access to healthy, environmentally sustainable, culturally appropriate, and nutritious diets in all times. Meantime it protects and restore of natural resources and ecosystems. Therefore, all food system actors’ representatives, at every level of governance, must involve in the development and management of a sustainable food system (Food Policy Coalition, 2023).

Transformation of food system depends on achieving potential yield (reducing yield gap) and by changing land use from calorie-rich to nutrient-dense food production activities, as well as opportunities improving incomes. The escape of labour from agriculture to non-agriculture sectors has contributed income improvements. This transformation has affected farm size, use of natural resources and income disparity between urban and rural peoples. Resilient and inclusive food system requires radical changes in all components of the system encompassing production, consumption, trade, and governance (Ruben *et al.*, 2021). The recommended diet affordability has improved over time in the countries, on the other hand, food systems are could not deliver optimal nutrition and health outcomes, environmental sustainability, inclusion and equity for all (Ambikapathi *et al.*, 2022).

Béné *et al.* (2021) determined food system drivers based on literature survey and analysed their correlation with the dimensions of food system. These drivers were categorised into demand/consumer, production/supply, and trade/distribution. Demand/consumer side drivers include demographic transition, rising income of the consumers, urbanisation and associated lifestyle, and

attention increasingly paid to diet. Production/supply side drivers consists of innovation technology, intensification of agricultural production, improved access to infrastructure, degradation in agro-ecological conditions, and climate change. Trade/distribution related drivers cover policies facilitating trade, internalisation of private investment and growing concern about food safety.

Türkiye prepared a report on food systems, initiated the food systems transformation in 2019. The National Pathway was defined with an aim “to create sustainable, resilient and equitable food systems with concrete actions in order to make a significant contribution to the realization of the vision of the 2030 Agenda for Sustainable Development” (MoAF, 2021a). Although, transition towards sustainable food system has taken place in national policy agenda and documents, assessment of national agri-food policies from food system perspective considering sustainability dimension indicators is lacking. The aim of this study is to fulfil this gap in literature and provide evidence for policy makers.

The focus of the study is to provide a synthesis of agri-food policy transitions towards to a sustainable food system in Türkiye. The third section of this study provides a brief information about current state and policy transformation trend towards sustainability in agri-food sector considering economic, environmental, and social dimensions of food system. In the section four, the impact of the policies and progress towards to a sustainable food system are evaluated based on indicators and empirical evidence. Final section concludes with some policy recommendation regarding EU green deal policy and climate change action to accelerate transition to sustainable food system.

This study primarily uses national policy documents and report published on agricultural policies and statistical data to evaluate and analyse agri-food policy changes (by the chronological order) and transition to a sustainable food system. The study uses comparative static analysis of agri-food statistical data to demonstrate trend in and performance of the agri-food sector in beginning part. Secondly, main policy documents governing agri-foo policies are discussed and main result of the policy impact assessment

studies and reports are summarised in the study. Finally, an evaluation based on the food system sustainability indicator used in the literature including economic, environmental, social, and food/nutrition dimensions (Béné *et al.*, 2020) are presented. The food system sustainability evaluation does not cover all the food system sustainability indicators since some of them are not readily available or exist in both national and international data sources. Thus, limited but most important major indicators are considered and discussed. As a matter of fact, it was highlighted by Valls Bedeau *et al.*, (2021) for the Mediterranean countries that sound data analysis can play important role for shaping policies and investment plans, and identifying leverage points in food system. Thereby better resource allocation can be achieved to obtain significant and better sustainable impact.

2. Current State and Transformation Trend Towards Sustainability in Agri-Food Sector

2.1. Current State of Agri-food Sector

Türkiye, an upper-middle-income country, is among the first-twenty largest economies in the world, with a GDP of about \$1.119 billion in 2023. Turkish economy experienced high rates of average annual GDP growth rate (5.5%) between 2003 and 2023 (TurkStat, 2024a). Key macroeconomic, demographic, agri-food indicators including food security and food related health indicators corresponding last two decades is presented in Table 1.

In terms of agricultural value-added and food export value, Türkiye has important place in the world. However, as of 2020, Türkiye realized \$US 67.8 billion (measured by 2015 constant US dollar) agricultural value-added which contributed 1.9% of the world and 20.4% Europe agricultural value-added in the same year. Moreover, Türkiye realized \$US 18.8 billion food export (\$US 6.7 billion net-export value) and placed as 24th (18th in net-export) among the food exporting countries in ranking in 2020 (FAO, 2022).

The share of agriculture in GDP has continued to exhibit a declining trend over last 20 years. Its contribution to GDP was measured as 10%,

Table 1 - Key macroeconomic, demographic and agri-food sector indicators.

<i>Economic and demographic</i>	2000	2013	2023
GDP (billion USD)	273	958	1,119
Population (million)	64.7	76.7	85.4
Population density (inhabitants/km ²)	83	102	110
GDP per capita (USD)	4,249	12,582	13,110
Trade volume as % of GDP	30.1	30.6	55.0
<i>Agriculture in the economy</i>			
Agriculture in GDP (%)	10.0	6.9	5.2
Agriculture in employment (%)	36.0	21.0	14.6
Agri-food exports (% of total exports)	12.8	11.2	10.9
Agri-food imports (% of total imports)	3.3	5.0	5.7
<i>Characteristics of the agricultural sector</i>			
Agricultural Land (thousand ha)	40,479	38,423	38,559
Share of arable land in agricultural land (%)	58	54	52
Crop share in total agricultural production value (%)*	62	49	45
Livestock share in total agricultural production value (%)*	38	51	55
<i>Food security and food related health indicators</i>			
Food and non-alcoholic beverage in household expenditure (%)**	27.5	19.9	22.8
-The lowest quintile in the parenthesis	(41.4)	(30.4)	(39.3)
Persistent at-risk-of-poverty-rate (%)		13.0	12.3
Severe material and social deprivation rate (%)***		19.2	14.4
Obesity rate of 15+ population (%****)	15.2	19.9	20.2
Poverty rate***** (60% of the median income)	25.4	22.4	21.7
-Rural poverty rate in the parenthesis	(41.1)	(37.2)	

Source: TurkStat (2023a). *2020, **2002 and 2022, ***2015 and 2023, ****2008, 2014 and 2022 and *****2006 and 2013.

6.9% and 5.2% respectively in 2000, 2013 and 2023. It can easily be observed from annual data that very high variability of agricultural value-added from one year to another reflects very high dependency on climatic factors or weak resilient of food supply to climate change. As a matter of fact, agricultural value-added growth rate has fluctuated from 8.7% to -5.9 during 2003-2023 period and annual average of growth rate has realized as 2.4 percent. Agriculture still plays an important social role in Turkish economy with about 15% employment share and being a key to the rural economy: generating most of the farm household income and employment. Rural population in Türkiye is among the most disadvantaged and vulnerable groups in terms of living standards and food inequalities. However,

unidimensional (multidimensional) poverty rate as average of 2006-2016 was calculated for 14% (40%) and 25% (51%) respectively for urban and rural areas (Öztornacı and Şengül, 2019). Considerably high level of rural poverty contributed migration from rural areas to urban areas, therefore major source of urban poverty has been migration of rural poor population. In addition, government policies penalizing agriculture and neglecting social and physical infrastructure development in rural areas has contributed both rural and urban poverty (Türkecul *et al.*, 2017). Family-owned farms are dominant with a large number of small farms in agricultural production, and most of the farm labor is provided by the family members. The agriculture structure is characterised by many small and highly fragmented

Table 2 - The average yield and production of some agricultural products.

	2001-2003	2011-2013	2021-2023
	Yield (Tonnes/hectare)		
Wheat	2.07	2.73	2.94
Rice	5.94	8.18	7.88
Corn	4.40	7.82	9.20
Grapes		9.10	10.00
	Production (Thousand metric tonnes)		
Red meat	773	1,045	1,458*
Raw milk	9,505	16,894	22,756*
Chicken meat	728	1,698	2,331
Organic agriculture**	310	900	1,128
Good Agricultural Practices***		2007: 56	2022: 5 336
Tomato	9,232	11,391	13,132
Citrus		3,814	5,984

*2020-2022 average and **2002-2003, 2012-2013, 2021-2022 averages.

Source: TurkStat, 2023a. www.tarimorman.gov.tr/a

farms. Farmer registry system records hold by Ministry of Agriculture and Forestry (MoAF) indicated that the number of farmers was 2.7 million in 2003 and 2004, thereafter, the number of farmers has steadily declined to around 2.2 million, with a total of 15 million hectares of land cultivated (www.verikaynagi.com). The indicators of the productivity growth and the input use in agriculture are presented in Table 2 and Table 3. Productivity growth has played an important role in the growth of agricultural value-added for beginning of green revaluation, particularly from 1980s and onwards with productivity enhancing inputs including high-yielding seeds,

heifer, quality feed ingredients, chemical inputs and mechanisation.

The productivity improvement may be connected to increased amount of irrigated area, agricultural R&D expenditure, high-yielding agricultural seed use and cows-cattle feeding, cattle breeding, upgrading farm holdings structures, farm size growth, land consolidation, and agricultural extension (i.e., in advance weather condition information through cellular phone, knowledge sharing among farmers via WhatsApp).

Land distribution in Türkiye is not highly skewed, farm size is small, and farmers are predominantly cultivating on their own land.

Table 3 - Input use in agriculture.

	2001-2003	2011-2013	2021-2022
Fertilizer (N+P+K equivalent) use per hectare (Kg)	70.50	89.30	100.30
-Nitrogen	57.40	72.70	81.40
-Phosphorus	10.20	12.30	13.70
-Potasium	2.90	4.30	5.50
Pesticide use per hectare (Kg)*	2.14	2.07	2.62
Traktor (hectare area per tractor)	22.00	16.70	13.70
Feed production (thousand metric tons)**	5,403	14,536	26,802
Seed distribution (thousand metric tons)	112	694	1,303

*2006-2008 and **2021-2023

Source: TurkStat, 2023a. www.tarimorman.gov.tr/a

However, about 80% of agricultural enterprises cultivates 60% of the total land and 17% of the landowner's lease land. The enterprises cultivate on lease land in only 3% of total land. About 83 percent of farms has less than 10 hectares of land¹ and 65 percent of farms have less than 5 ha. National average farm size was 6.8 hectares and only about 6 percent of all farms cultivate more than 20 ha. Contrary to the large number of small farms, commercial farms have also emerged during last two decades. The land ownership pattern varies regionally due to the differences in geography and the crops produced (TurkStat, 2020). A significant number of farm holdings also carry out animal husbandry. Specialised farms are generally located in the Mediterranean and Aegean regions. The average land parcel size has decreased, due to the inheritance laws. However, the inheritance law changed in 2012 indicating parcels under 2 ha in dry areas (1 ha in irrigated areas, 0.5 hectare in case of orchards and 0.3 hectares in case of greenhouses) are not allowed to be divided among heirs (MoAF, 2021b).

Türkiye has 78 million hectares total land area of which 38.6 million hectares are utilized agricultural area (UAA). The UAA consist of 20.2 million hectares arable land, 3.7 million hectares permanent crops land, and 12.7 million hectares permanent meadows and pastures land. Fallow land account for about 13.9 percent of total arable land. Forest land covers 20 million hectares (TurkStat, 2024a). The registered total irrigated area is about 6.7 million hectares with a 4.41 million hectares having modern irrigation network (MoAF, 2021a). Arable crops cover about 52% of the total utilized agricultural area. Permanent meadows and pastures account for 38% of the UAA. Fruit, vegetable and ornamental crops is covering 11.5% of the utilized agricultural area.

Crops value accounted for about 45% of the total agricultural production value in 2023, of which, fruit (37%) and vegetables (19%) make up 56% of crops. Livestock and animal production value accounted about 55 per cent of agri-

cultural production value in 2023. Arable farming value-added accounts for about 69% of the total agricultural GDP of which, fruit and vegetables make up 44% of crops. Livestock sector production value constitute 26 percent, forestry production value constitutes 2 percent and aquaculture production value constitute 3 percent (TurkStat, 2023a).

An adequate climate, high soil fertility, and relatively better rainfall in some regions permit a wide variety of crops that grow in Türkiye. Thus, according to the latest three-year average, 42.2 million tonnes of cereals, 34.9 million tonnes of vegetables, 24.2 million tonnes of fruit, 21.5 million tonnes of milk, 2.33 million tonnes of poultry meat and 1.46 million tonnes of red meat has produced in Türkiye. The major industrial crops produced in Türkiye are cotton, sugar beets and tobacco (TurkStat, 2023a).

Türkiye has implemented intervention policies in agriculture since the early 1930s. Particularly, import substitution policy started in early 1960s to until 1980s. In addition, agriculture was tightly under control to meet the general policy objectives including increasing yields and production, maintaining price stability, and developing exports. Some agricultural products have been taxed, and some received subsidies. In summary, agricultural support was directed towards import-competing farm products between 1980 and 2000 (OECD, 2023a).

A variety of policy measures had been implemented to fulfil these objectives before 2000s. In this period, agricultural support measures were consisted of domestic support (input and output price support, subsidised credits) and border measures included quantitative import restrictions, and tariffs. The input support measures consisted of farm inputs subsidies including credit, fertilizers, pesticides, and investments in infrastructure. The output support measure consisted of generally intervention price and intervention buying managed by Grain Board and Unions of Agricultural Sales Cooperatives (ASCUs). Regional programmes were implemented to reduce regional disparities

¹ Average farm holding size was 6.1 hectare in 2001 (Farm Census 2001) and 7.6 hectare in 2016 (Farm Structure Survey 2016).

in term of income and technology. Government still funds the agricultural R&D, extension, and training services. The general veterinary services, milk and suckler cow premiums, animal disease control, and border measures (prohibitively high ad-valorem tariff) were main policy measures for livestock sector.

It had criticised by many stakeholders, including international institutions such as OECD that the policies have been inefficient, failed to enhance productivity, heavy burden on consumers and taxpayers and been a source of Türkiye's macroeconomic instabilities such as budget deficit, current balance deficit and high inflation. The Government embarked a restructuring programme called "agricultural reform and implementation programme (ARIP)" in 2001. Commodity price support carried out by ASCUs on behalf of the government, subsidies for farm inputs and credit were all phased out with the ARIP program. Most of the state economic enterprises (SEE) have been privatised and agricultural sales cooperatives' unions was released to their autonomy that reduced the government involvement in the processing and marketing of agricultural products covering cotton, tobacco, sugar beet, oilseeds, hazelnuts, and olive.

Furthermore, the regulatory and supervisory authorities established for sugar and tobacco sectors to control over supply and reduce excess carry-over stocks. As an alternative policy measure, de-coupled direct income support scheme was put in place in 2001. Premium payments for oilseeds have been implementing since mid-1990s and tea pruning has fully compensated to control excess supply over years. Farmer diverting from over-produced hazelnuts and tobacco were granted to cover the costs. Farmer also granted for pruning one seventh of tea plantation. Agricultural sales cooperatives and their unions (ASCUs) were provided financial aid for restructuring and transformation from under the public authority to autonomy. On the other hand, in parallel to ARIP, Türkiye has tried to harmonise institutional framework and its agricultural policies with the EU since mid-1990s, after Custom Union agreement and full membership negotiations started in 2005. The need to reform the country's agricultural policies stems

both from harmonisation of policies with the EU Common Agricultural Policy, as Turkey is a candidate country, and from the changing domestic macroeconomic policy environment (disinflation policy) and bilateral-multilateral trade relationships such as WTO commitments.

Following ARIP, the several state-owned economic enterprises (SEEs) including Turkish Grain Board (TGB), tobacco monopoly (TEKEL), sugar enterprise (TŞFAO), the Meat and Fish Board (EBK) previously carried out agricultural policies for decades were privatised (except TGB) and restructured by the mid-1990s and early 2000s. ASCUs and SEEs became more exposed to market forces. Under the ARIP, the budget for supports procurement carried out by TGB started to determine within central government budget, instead of borrowing from commercial banks during intervention buying period, subject to approved by the parliament.

The Turkish Grain Board, the Meat and Milk Board (re-established and structured) and Bank of Agriculture are still active and has important role in the agri-food sector and markets. In addition, the Agricultural Credit Cooperatives is playing an active role in farm inputs distribution including fertilisers, pesticides, animal feed, farm equipment and machinery, credit and the marketing.

Under ARIP, direct income support payments as de-coupled and coupled compensatory payments implemented during 2001-2008, thereafter support policy has re-orientated towards to the interventionist style policies such as extension of intervention buying and abolished de-coupled direct payment. However, high tariff rate for many agri-food products remained in place, but compatible with WTO commitments.

In conclusion, Turkish agricultural policy has not changed notably over time. According to Agricultural Law put in place in 2006, the primary policy objectives are to (1) ensure the food security, (2) enhances productivity growth and reduce vulnerability to adverse weather conditions, (3) improve self-sufficiency, (4) raise stable farm incomes, (5) enhance competitiveness, (6) develop rural areas, and (7) ensure food safety and harmonise policies and institutions with those of the EU.

Table 4 - Key legal, strategic and programming document related with agri-food system.

<i>Document</i>	<i>Key goal and objectives</i>
Law on agriculture (no: 5488), 2006	The law aims to develop and implement the necessary policies to improve the agriculture and rural areas in accordance with the development plans and strategic papers. Agricultural support programmes must be financed from budgetary and external sources, resources allocated from the national budget must not be less than 1% of the gross national product.
Strategic Plan: 2019-2023 Revised in 2022	Agricultural policy objectives set are to increase the welfare of rural people and to ensure a stable high quality food supply.
11 th Development Plan: 2019-2023	The Eleventh Development Plan presents a long-term perspective based on the vision of “stronger and more prosperous Türkiye that produces more value-added and shares more fairly”. The main objective is to create an efficient agricultural sector that is environmentally, socially, and economically sustainable, internationally competitive with its production structure that considers supply and demand balances as well as adequate and balanced nutrition of the people.
3 rd Agriculture and Forestry Council, 2019	The aim is to develop plans for the sector. Actions to be taken are i) Agricultural production and supply security, ii) Food safety, iii) Rural development and marketing, iv) Fisheries and aquaculture, v) Soil and water resources, vi) Biological diversity and climate change, vii) Forest, and viii) Institutional capacity. Council specifically addresses that agricultural policies will be designed using a holistic approach by considering of the principles of the sustainability for at least five-year period based on the development plans.
National Strategy for Agriculture and Rural Development: 2019-2023	NRDS aims to correctly determine the development dynamics of rural areas that fall relatively behind the national welfare level and to mobilize the economic and human resource potential in these areas within the framework of the determined strategies.
IPARD 2021-2027	IPARD III aims to improve the rural vitality to invest in agriculture and related areas.
National Program for Agricultural Support Policy	Presidency Decision, adopted each year, aims to increase the competitive capacity of the sector, productivity, and quality, develop new technology with national recourse, protect the genetic resources, apply environmentally friendly agricultural practices and to boost the efficiency of the agricultural policies for ensure the agricultural production and supply security.

Source: Koç and Bayaner, 2022.

The objectives of the policies were clearly stated and defined in policy and policy related papers of the government. There are several policy-related regulations and strategic documents on which the design and implementation of the policies are based on. Some of the regulations are “law on agriculture, organic farming, agricultur-

al producer unions, protection of plant breeder’s rights for new plant varieties, agricultural insurances, soil protection and land use and seed growing”. In addition, there are several other strategic documents related to different aspects of the agriculture in general and the policies. These are development plans, ministry strategic

plan and strategic action plan, rural development strategic plan, agriculture and forestry council, water action plan, climate action plan, green deal paper and EU harmonization paper.

National Program for Agricultural Support Policy is announced each year as a Presidency Decision. The program for 2023 is basically the same as the one announced in 2022. The scope of agricultural support measures has not changed for over last three decades much however the amount of payments budget changes in nominal monetary terms (Official Gazette, 2021 and 2023). The agricultural policy objectives are set by development plans and official documents. Key legal, strategic, and programming document are given in Table 4. The Eleventh Development Plan: 2019-23 layout the main agricultural policy objective to develop an efficient agricultural sector compatible with the EU agricultural policies, that is environmentally, socially, and economically sustainable which reflects the main dimensions of sustainable food system.

The objectives of the agricultural policy set in the Strategic Plan: 2019-23, compatible with the Development Plan is to increase the rural welfare, to ensure a stable and a high quality food supply, and to achieve a sustainable and more competitive agricultural sector while considering the EU CAP and the WTO rules.

Agriculture and Forestry Council was formed by the stakeholders in 2019, addressing an agricultural policies designed using a holistic approach by considering of the principles of the sustainability for at least five-year period. The main pillars of “Türkiye Agricultural Drought Strategy and Action Plan”: 2018-22, are to develop a capable institutional structure and make the agriculture resilient to drought.

Several laws and regulations regarding agri-food and rural development have enacted over last two decades which are generally aligned with the EU counter parts and corresponding to the food quality and safety, environmentally friendly production, and reducing environmental degradation and negative externalities, fair competitiveness in the markets, reducing excess supply and risk mitigation.

The latest agricultural support programme,

called basin-based support system not fully compatible with that of EU’s CAP, was put in place in 2017. There are 941 agricultural basins based on the soil characteristics and climatic conditions. Nineteen crops strategically important for food security, import dependency, regional economy and competitiveness were determined. The focus of this program is to diversify agricultural production, increase productivity and reduce the planted area of water-intensive crops in draught prone areas. As part of the new program, Turkish Grain Board is not allowed to procure crops through intervention buying if they are not on the subsidized crop list of their specific agricultural basin” (Koç *et al.*, 2019). This program was a main step in direction towards sustainable food production since support payments considered environmental and climate changes issues such as drought and water availability in the agricultural basins, contributing environmental sustainability.

A risk management program in agriculture with the objective of providing income stability by protecting farmers against all types of natural disasters was put in place in mid-2000s. The law on agriculture insurance (No. 5363) enacted in 2005, provides a comprehensive state-supported agricultural insurance system. An agricultural insurance pool (TARSIM) was formed for collecting premiums paid by farmers and government premium support and compensates farmers’ losses. Government premium payments is put in the agricultural support budget. Participation in program is voluntary. The risk management program has reformed from covering yield risk to income risk recently. This revenue-protection insurance, covering 70% of insured farm revenue scheme, was introduced in 2022. Producers receive additional support and grants for the natural disasters resulting yield losses and price variations (www.tarsim.gov.tr). Reducing farmers’ risk (either yield or income) is a main policy tools to protect (enhance) farm income and also incentive for farm specialisation and productivity growth, therefore fall in economic dimension of food system sustainability.

Rural development projects were implemented in various regions and provinces in order to better utilize natural resources and to eliminate so-

cio-economic differences observed in rural areas until mid-2000. Rural development projects generally aimed to improve infrastructure in rural areas, employment possibilities, increase the income of the rural population, raise their living standards, improve crop and animal production and mobilize the rural population. What makes rural development projects different was that they were multi-purpose, integrated, generally “one size fits all” style, politically decided location or region specific projects and partially funded by international institutions. However, they were not flexible to explore potential of individual or collective enterprise capabilities. These projects had also several other shortfalls: i) requirements of local target stakeholders and appropriate financial planning were not taken into account, ii) they failed to ensure coordination between organizations in projects and frequent changes in the main implementing organizations emerge as a lack of organization, iii) they did not conduct a comprehensive and detailed socio-economic analysis and thoroughly examine the potentials of the locations or regions such as natural resources, agriculture, industry and workforce before the preparation of the projects has not clearly revealed what can be done in the short, medium and long term, iv) processing and marketing of the increased production did not adequately considered, v) comprehensive monitoring and impact assessment (ex-ante and ex-post) were not carried out. In short, these rural development projects were like a one-time injection and neither the purpose nor the permanent rural improvement had been achieved (Anonymous, 2004). Although rural development project vision has gradually changed during last several decades, the radical change was introduced during mid-2000s with the EU funded IPARD programs. Measures have been implemented in the area of investments in physical assets, processing and marketing, agriculture-environment climate and organic agriculture, leader approach and diversification of farm activities and business development. Rural development supports paid from central government budget expenditure account for about 7% of total agricultural and rural supports (MoTF, 2024).

In order to align with IPARD, the “national rural development strategy for 2007-2013” first set out the priorities which is an important step toward social, economic, and environmental dimension of sustainable food system. These priorities are also covered in the strategy paper (2014–2020), categorised under five pillars: “the rural economy, the rural environment, rural settlements, rural society and rural capacity development” (MoAL, 2015), the priorities are: (i) “increasing employment and income generating activities in rural areas, (ii) strengthening the capacity for the efficient utilisation of natural resources, (iii) increasing the living standards of the rural population through the adoption of modern agricultural techniques, (iv) creating employment opportunities in diverse livelihoods (including tourism, textiles, handicrafts and forestry products) and promoting these in disadvantaged areas, (v) promoting small and medium-sized enterprises and providing support for micro-finance and marketing and (vi) reducing inter- and intra-regional disparities, reducing the migration flow from rural areas and strengthening participatory approaches through vocational training, extension and consultancy services”.

IPARD programmes of the EU facilitates Türkiye’s alignment with the *acquis* in the rural development. The Agriculture and Rural Development Support Institution (TKDK), having coordination offices in 42 provinces, implements the rural development programmes in agricultural holdings (producing red meat, milk, poultry meat, and eggs), processing and marketing activities (milk and dairy products, red meat and products, poultry meat and products, seafood, and fruits and vegetables), farm diversification, diversification of plant production, processing and packaging, beekeeping and production, processing and packaging of bee products, craftsmanship and value-added local products, aquaculture, machine parks, renewable energy investments, and rural tourism (TKDK, 2023).

Türkiye moved away from the principles of the reformed CAP thanks to the agricultural law of 2006. Payments were linked for many products. Commodity output support increased, decoupled direct income payments gradually decreased and were abolished in 2009. Direct payments are

fully coupled. Area-based payments for “fertiliser” and “diesel” based on cultivated land differentiated according to the product groups have been increasing. Import protection remains unchanged. Other forms of support payments are premium payments, compensatory payments for farmer transition, livestock support at various forms, insurance, rural development, and environmental set-aside (Agricultural Land Conservation Program for Environmental Purposes called CATAK), ended in 2018 (MoAF, 2021d).

Farmers in the National Farmer Registration System (NFRS) are eligible to receive support payments. Compensatory payments are provided as a premium for products such as oilseeds, cereals, pulses, cotton, olive, and milk. Coupled area payments are granted to farmers for producing organic farming, fodder crops, using good agricultural practices, and certified seeds-saplings. So-called “diesel payment” and “fertilizer payment”, non-decoupled area-based payment, are given separately. Producers receive payments for soil testing and analyses. Payments are granted to animal producer and breeder in about 30 different areas. Farmers are promoted to use biological and biotechnical practices to reduce the chemical use and residues. Electricity used for irrigation in agriculture has subsidized in some years and some provinces. Payments are granted for the rehabilitation of the traditional olive orchards. Fresh fruit and vegetable production, floriculture, and aromatic plant producers under 0.5 hectares, except for tea and hazelnut producers, receive small scale farm business payment. Those who are living or committing to live in rural areas graduated from the related departments of agriculture, animal husbandry, forestry, food, and aquaculture education are granted for farming. Agricultural enterprises and farmers enjoy interest rate concessions (Official Gazette, 2023).

“Export subsidies are applied to 14 commodity groups, out of the 19 groups eligible under Turkey’s WTO commitments. This included processed fruit and vegetables, poultry meat and eggs. Export subsidies are granted in the form of reductions of the exporters’ debts to public corporations (for example, for taxes, and telecommunications or energy costs). Production quo-

tas are applied at the farm level for sugar beet” (OECD, 2023a).

2.2. Climate change policies and environment

Türkiye prepared the Green Deal Action Plan to support green transformation in all relevant policy areas. Plan aims to establish Türkiye’s compliance with the European Green Deal to strengthen Türkiye’s transition to a resource-efficient, more sustainable, and green economy (MoT, 2021). The Action Plan was developed aiming at reducing the pesticides use, chemical fertilisers and anti-microbials; increasing renewable energy use; further developing organic production; sustaining water use and reuse of wastewater; and reducing food loss. Türkiye signed the Paris Agreement and developed necessary regulations to comply with it. Although there are no current policies and specific targets for agriculture, Türkiye offers to reduce agricultural emissions by fuel savings resulting from land consolidation, grazing lands rehabilitation, controlling fertilizer use, implementation of modern farming practices and encouraging the use of minimum tillage techniques in its Nationally Determined Contributions (NDCs).

Land consolidation has been implemented in Türkiye since 1961. Total consolidated area has reached 6.34 million hectares by 2023 (www.tarimorman.gov.tr,b). Agricultural areas sensitive to erosion has identified and efficient erosion control methods has been implementing in these areas (MoAF, 2021c).

It has been determined that the total amount of surface and groundwater that can be consumed technically and economically is about 112 billion m³ per year. With the studies carried out to date, only 44 billion m³ (39%) of this reserve can be utilized (Former Ministry of Development, 2018). The share of agriculture in water use was measured as 74.1% in 2012 and 77% in 2022, the average of last decade is 72% (Ministry of Environment, Urbanization and Climate Change, 2024). The water footprint of production in Türkiye was calculated as 139.6 billion m³ per year which consist of 64% green, 19% blue and 17% grey water footprints. Agriculture

Table 5 - Productivity and environmental indicators.

	<i>Türkiye</i>		<i>International comparison</i>	
	<i>1993-2002</i>	<i>2011-2020</i>	<i>1993-2002</i>	<i>2011-2020</i>
			World	
TFP annual growth rate (%)	0.9%	1.6%	1.7%	1.1%
			OECD average	
Environmental indicators	2000*	2021*	2000*	2021*
Nitrogen balance, kg/ha	27.8	37.9	32.2	30.4
Phosphorus balance, kg/ha	8.0	9.2	3.3	3.0
Share of agriculture in total energy use (%)	5.0	4.5	1.7	2.0
Share of agriculture in GHG emissions (%)	14.2	14.0	8.6	10.5
Share of irrigated land in AA (%)	8.0	11.7	-	-
Share of agriculture in water abstractions (%)	75.4	72.1**	46.6	49.7
Water stress indicator	18.6	26.1	8.3	7.4

Note: * The closest available year; ** The number is average of 2012-2022 period which obtained from the relevant Ministry water use indicators (Ministry of Environment, Urbanization and Climate Change, 2024).

Source: OECD, 2023a.

accounts for the largest share with 89% from the water footprint (WWF, 2014).

A “Program on Enhancing Efficiency of Water Use in Agriculture” was introduced in 2015 aiming to decrease the underground water use and increase the “water-saving irrigation technology” adaptation. Türkiye will continue to invest in modern irrigation systems through rural development project and credit support. Sectoral Water Allocation Plans (SWAPs), “a scenario-based evaluation of water resources, considers the usable water potential, the needs of each sector and the economic outputs of water use of the sectors under the changing socio-economic and environmental indicators”. In SWAPs, projections of the water demand for the agriculture were produced (MoAF, 2021c).

National Climate Change Strategy: 2014-2023 (NCCS) was implemented to fully integrate climate change-related objectives into its development policies (MoECC, 2012). The “Strategy and Action Plan for Combating Agricultural Drought”: 2023-27 was declared in 2022. The action plan was designed to implement drought-combatting activities and to minimise the effects of drought (MoAF, 2022). The

General Directorate of Agricultural Research and Policies co-ordinates and support research on sustainable use of soil and water resources and climate-friendly agriculture.

Water stress in Türkiye is increasing and currently above the OECD average. Average rainfall is expected to decline due to climate change, and the increasing pressure on the hydrological system. Nitrogen and phosphorus balances have been increasing, and phosphorus balance is above the OECD average. Currently, agriculture uses 4.5% of total energy and accounts for 14% of the national GHG emissions (Table 5) (OECD, 2023a).

2.3. EU approximation in agri-food and rural development measures

Türkiye has been harmonising agricultural and rural policies with the EU CAP since mid-1990s and particularly since 2005 with starting of membership negotiations, but not fully accomplished. CATAK, designed to compensate farmers for environmental degradation to shift to permanent crops, has a limited alignment with the environmental acquis. EU’s Common

Table 6 - Total budgetary support to agriculture.

	2000-02	2020	2021	2022 _p
Total value of production (at farm gate)	22,169	52,251	53,410	68,491
Of which: share of MPS commodities (%)	71.38	79.81	87.87	85.89
Total value of consumption (at farm gate)	22,577	56,854	62,502	74,329
Producer Support Estimate (PSE)	6,045	13,995	8,957	9,699
Support based on commodity output	5,158	6,501	7,086	7,891
Market Price Support	4,836	5,588	6,165	7,056
Payments based on output	321	913	922	835
Payments based on input use	426	6,422	748	803
Percentage PSE (%)	25.54	23.07	15.94	13.63
General Services Support Estimate (GSSE)	3,507	1,076	1,952	3,650
Agricultural knowledge and innovation system	29	64	47	34
Inspection and control	67	13	11	14
Development and maintenance of infrastructure	513	807	1,408	1,892
Marketing and promotion	2,888	192	486	1,710
Percentage GSSE (% of TSE)	36.34	7.14	17.89	27.34
Consumer NPC	1,25	1,09	1,12	1,07
Total Support Estimate (TSE)	9,552.27	15,071	10,909	13,349
Transfers from consumers	4,893	4,763	6,527	4,705
Transfers from taxpayers	4,999	11,017	5,876	8,655
Percentage TSE (% of GDP)	3.91	2.09	1.33	1.51
Total Budgetary Support Estimate (TBSE)	4,716	9,483	4,745	6,293

Source: OECD, 2023b.

external tariff will be adopted for every agricultural product. Support payments will be linked to cross-compliance standards. Veterinary policies need to fully be aligned with the EU acquis. Legislation of Common Market Organisation (CMO) should be developed and aligned. Türkiye still needs to develop a strategy for agricultural statistics and align agricultural support policy (European Commission, 2019).

An Integrated Administration and Control System (IACS) was put in place. The FADN (farm accounting data network) was integrated with the registration system. As part of rural development program, 25 local action groups under the LEADER programme were established. The intellectual property law, further implementing

regulations quality policy were adopted. Organic farming legislation was aligned. There has been some progress regarding food safety, veterinary and phytosanitary policy. Food establishments fully be upgraded. Bovines and small ruminants have been identified and registered. Measures for disease outbreaks have been applied. The administrative capacity of official controls has improved. Food safety rules have been aligned. Progress on the specific rules for feed is limited. Phytosanitary policy should further be strengthened. Rules for new foods and for GMOs need to be aligned. Türkiye should adopt a fisheries and aquaculture law compatible with the EU acquis. Institutional capacity has improved further (European Commission, 2019).

The report published by OECD on support measures shows that Türkiye transfers about 16% of gross farm receipts to agricultural producers which is near the OECD average in 2020-22. This indicates a decline of transfers from 25% in 2000-02 (OECD, 2023b). However, OECD estimates that the amount of market price support (MPS) about 57%, resulted from reductions of exporters' debts and tariffs. Producer prices were approximately 11% above the border prices in 2020-22. This is primarily the result of support for beef, sunflowers, poultry, and eggs. Prices of other commodities are more aligned with reference border prices. Premium payments to producers of specific commodities are also provide. Area-based payments are granted as crop insurance and the fertiliser and diesel cost. The details of OECD estimates of agricultural support are presented in Table 6 (OECD, 2023).

General Service Support Estimate (GSSE) accounts for 4.3% agricultural production value in 2020-22, above the OECD average. The largest components of this are for development and maintenance of infrastructure, and marketing and promotion. Total Support Estimate (TSE) was 1.6% of GDP in 2020-22 (Table 6). The consumer nominal protection coefficients (NPC) declined from 1.27 in 2000-2002 average to 1.07 in 2022 indicating that consumer's access to food with a price close to the world reference prices (OECD, 2023a).

Türkiye's agricultural support budget has steadily decreased in terms of euros since 2016. However, the GDP share of the budget has been oscillated between 0.4-0.6%, less than 1% target set out in the agricultural law. Agricultural budget accounts for approximately 2.0% to 3.0% of the central government budget. According to "Agricultural Policy Model" (APM) classification, market and direct producer support payments account for the largest proportion from agricultural supports. The share of structural and rural development payments has varied between 8 and 21 percent. Market and producer support includes direct payments and input subsidies. Direct payments account for about 47% and input subsidies make up of 44% of the total payments. Other payments account

for about 9% of the total payments. About 55% of the payments under the structural and rural development measures are paid for competitiveness measures. Payments for rural economy and rural population are about 35-50% of the payment on average. Environmental and societal services account for about 6% of total payments, on average. These transfers also include IPARD payments (Koç and Bayaner, 2022).

3. Policy impacts and state of food system sustainability

3.1. Agri-food policy impacts on performance

In literature on policy impact analysis, there are limited studies focused on economic performance of agri-food system including performance of agricultural value-added growth and competitiveness. The result of this studies is given below.

Aramyan *et al.* (2024) carried out a competitiveness study comparing five IPARD countries: "Albania, Montenegro, North Macedonia, Serbia, and Türkiye with five neighbouring EU countries: Bulgaria, Croatia, Greece, Hungary, Romania and the EU-average". In the study large number of indicators for 2015-2021 used to measure country and sectoral level competitiveness. The agri-food sector competitiveness performance of Türkiye relative to EU average (z-score) are found as -1.20, -0.84, -0.80, -0.57, -1.29, -0.22 respectively for conditions of resource and factor, demand, competition and firm dynamic, innovation-and-entrepreneurship, relating a supporting industry, and government. These results indicate aggregated level competitiveness of agri-food sector in Türkiye is relatively week comparing its main trade partner EU average. But, revealed comparative advantage (RCA) score indicates that all but milk and dairy products, cattle meat, wheat, and maize are well above threshold score level. However, RCA score is 8.2, 2.7, 3.2, 1.9, 3.4, 5.1 and 1.8 respectively for eggs, chicken meat, fruit, vegetable, tomato, pulses and processed cereal products and preparation.

Koç *et al.* (2019) estimated a spatial produc-

tion function with province level panel data including land, capital, labor, chemical inputs, policy support measures and credit use per hectare, for periods covering 2004-2014. The empirical results indicates that agricultural value-added growth depend not only on its production factor endowment, but also the agricultural supports, agricultural credits use and agricultural growth in neighbouring provinces. It was found that the main inputs improving provincial level agricultural value-added growth were fertilizer, pesticide, and agricultural credits, while agricultural supports measure has significant negative impact due to the spillover effect. Thus, domestic supports or subsidies linked to selected commodities (e.g. dairy or cotton) without considering spillover effect can potentially produce a negative impact on performance of agriculture.

3.2. Food system sustainability indicator

The food system sustainability drivers; economic, environmental, social, and food/nutrition dimension base on Béné *et al.* (2020) classification is given in Table 7. Some of the indicators are presented on three-year-averages to understand the evolution of the sustainability.

There is a positive development in most of the food system sustainability indicators such as irrigated land, biodiversity index, dietary energy supply adequacy and protein supply. Greenhouse gas emission has dropped slightly in percentage term while considerable increased in absolute term. Percentage of irrigated land and national park area have increased. Türkiye is one of the plant gen centres in the World, however there are 12,141 vascular plants recorded. Average dietary energy supply adequacy and average protein supply indicators have also improved during last decade. All the population have access to improved water resource and to electricity. However, especially food and nutrition indicators have not exhibited considerable improvement and it has even been exhibited slightly worsening trend in some sub-food categories during last decade. However, the share of animal origin in dietary supply was 24.3 percent in 2000-2002 and 39 percent in 2020-2022 on average (FAO, 2023). In ad-

dition, household spending on food away from home has increased from about 4% in 2003 to 5.9% in 2023 (TurkStat, 2024b).

4. Discussion and Conclusion

Although, Turkish economy experienced high rates of average annual GDP growth rate for last two decades, the GDP share of the agriculture and rural development budget has been oscillated between 0.4-0.6 percent during last 20 years. Türkiye's agricultural support budget has steadily decreased in terms of euros since 2016. OECD reports that Türkiye transfers about 16% of gross farm receipts to agricultural producers. Agricultural policy measures are dominantly coupled with production and rural development programs. Rural development support measures have radically changed and increased in monetary term with IPARD. Yields of some crops and animal production have increased considerably in parallel to the increase in the input use and technological advance. Total factor productivity has also increased. Food security and food system sustainability indicators are show an improvement.

Determination of the future pathway of the agro-food policies in Türkiye will be a complex process since it requires an interaction between different actors, stakeholders and institutions in decision-making process. However, the future policy context is expected not to change remarkably.

Agro-food policies need to develop around four key themes: improving food safety and quality; transition to sustainable production system via efficient use of resources; increasing access to affordable food; and conserving soil, water, and biodiversity. Türkiye has various structural bottlenecks, such as the large number of small-sized farms and high number of plots per farm, aging farm population, capital constraints for young farmers and weak collective action among farmers.

The objectives of the Turkish agricultural policy have not changed over time. The objectives are to meet the food security, improve self-sufficiency levels, increase productivity, raise farm incomes, enhance competitiveness, develop rural areas, and harmonise policies and institutions with those of the EU.

Table 7 - Food system sustainability indicators.

Environment	Air quality	Greenhouse gas emission (%) ¹ 2001-2003 and 2019-2021 average	13.6 13.4	
	Water quality	Water pH ²	7.0 - 8.5	
	Water use	Agricultural water withdrawal (%) ³	74	
	Soil and land quality	Soil carbon content (ton C ha ⁻¹ for land under cultivation) ⁴	35.96	
		Agricultural land use as % of arable land	62.0	
Percent of irrigated land area (2006 and 2016)		24.1 - 31.4		
Biodiversity	Wildlife (plants, animals)	Benefit of biodiversity index (national park area, million km ²) (2014 and 2023) ⁵	21.7 24.4	
	Agrobiodiversity index dimensions	Average of 80 countries by dimension: status 56, action: 47.8 and commitments 21.4 ⁶	61.97, 54.32 and 10.27	
	Crop diversity	Crop diversity index (vascular plants) ⁷	12,141	
Energy	Use	Agricultural and forestry energy used as % of total energy use ⁸	4.5	
Economic	Financial performance	Agricultural value added per worker (\$) in 2003 and 2023	3,425 12,648	
	Employment rate	Agricultural under-employment (%)	46.1	
	Economic distribution	Gini index for land distribution	0.09	
Social	Gender / equality	Labor force participation rate, female (%)	34.5	
	Inclusion (national)	-Number of cooperatives (Pakdemirli, 2019) -Number of cooperative members(thousand)	11,982 3,931	
		Employment in agriculture (%)	16.0	
Food & Nutrition	Availability	Average dietary energy supply adequacy (percent) (average of 2000-2002 and 2020-2022) ⁹	156 159	
	Availability	Average protein supply (g/cap/day) (average: 2000-2002 and 2020-2022, in the parenthesis is share of animal origin) ⁹	103.7 (24.3) 110.7 (39.0)	
	Access (Affordability)	Food share in total household expenditure (%)	26.0	
	Physical accessibility	Rail lines density (total route in km per 100 square km of land area) (2000-2002, 2010-2012 and 2018-2021) ⁹	1.10 1.20 1.30	
		Utilization (Water)	Access to improved water resource (%)	98.8
		Utilization (Energy)	Access to electricity (%)	100.0
	Stability (Economic)	Price volatility index (yearly CPI-2024)	67.07	
	Stability (Supply)	Per capita food supply variability (kcal/pc/d) (average of 2000-2002 and 2018-2021) ⁹	33.67 28.33	
Food Safety	Number of cases of food-borne illness	Percentage of children under 5 years affected by wasting (%), (2004 and 2022) ⁹	1.10	
			1.70	

Food waste & use	Loss and waste	Food loss per capita (kg/year) ¹⁰	931
Nutrition	Diet	Diet diversification	
	Undernutrition	Stunting (percentage of the population unable to afford a healthy diet, 2017-2021 average) ⁹	6.82
	Overnutrition	Prevalence of obesity (%) in 2008 and 2022 (female in parenthesis)	15.2 (18.8) 20.2 (23.6)
	Nutrient deficiency	Vitamin A supply (retinol equivalents) (µg/cap/d) (average of 2010-2012 and 2019-2021) ⁹	4.67 4.33
	Fruits and vegetables consumed	Number of non-consumed person as percentage of population aged 15+ (2014 and 2022) ¹¹	33.6 53.6

Sources: 1. OECD, 2023a; 2. Sert, 2019; 3. Ministry of Environment, Urbanization and Climate Change, 2024; 4. <https://webdosya.csb.gov.tr>; 5. OGM, 2023; 6. Jones et al., (2021); 7. <https://nuhungemisi.tarimorman.gov.tr>; 8. OECD, 2023a; 9. FAO, 2023; 10. www.tugis.org.tr; 11. TurkStat, 2023b.

Note 1: There are a total of 13 404 taxa in Turkey, 24.4% of which are endemic and 12 141 of which are vascular plants.

Note 2: indicators without references are taken from <https://data.tuik.gov.tr> and <https://tarimorman.gov.tr>.

The policies for food, health, climate, and the environment are interconnected. Therefore, a strategy should be developed at the viewpoint of the sustainable food systems approach. Policies for food and health; food, climate, and environment; and domestic and international commitments should be coherence. Future planning must take into account of the possibility of systemic risks for the future, including possible other pandemics and regional-global food security issues and climate change impact.

Designing the future agri-food and rural development policies should be based on an holistic approach that must considers international agreements and commitments, decoupling agricultural payments, improving and strengthening institutional capacity, the role of the private sector, considering health of consumer and farm workers, environmentally friendly agricultural practices, a participatory and a science-oriented approach and promoting young farmers joining to agriculture and rural development initiatives.

Agriculture in Türkiye has been seriously affected by climate change over last decades, Türkiye faces an increasing aridity and frequency of severe droughts. Current policies aim to reduce the vulnerability of agriculture to drought while encouraging the production of

water-intensive crops. More support should be given to research and development (R&D) of drought-resistant varieties and water use efficiency. Total factor productivity growth can be enhanced by gradually increasing the farm size, better farm management, and innovation through R&D, extension and consultancy services, farm income risk management and ensuring commodity price stability.

Agricultural policies strongly influence the production decisions of farmers. State enterprises are still important in the agri-food marketing system for some commodities. Planning agricultural production and commodity-specific coupled support should be replaced by decoupled policies that improve the competitiveness, efficiency, and sustainability of production for a sustainable food system.

There are several policy documents in Türkiye. However, a need assessment for support policy development is still required based on the international agreements and the current situation of agriculture and farm holdings. Areas of required legal arrangements, intervention, improvement, and competitiveness should be determined and policy should be developed to close the gap. Payment or incentives should be directed to main structural problem areas instead of dividing it to so many different purposes. EU

policy frame can be a reference guide for this.

Nearly all the “United Nations Sustainable Development Goals (SDGs)” are linked either directly or indirectly to the food system: food security, responsible consumption and production, climate action, life below water, and life on land related directly to environmental sustainability. As a result, agri-food policy should address these goals effectively.

Although there is a positive development in most of the food system sustainability indicators, especially some of the indicators such as food and nutrition indicators need to be improved. Existing policy evaluation and impact assessment system and data base should be further improved and updated for monitor and evaluate sustainable food system.

References

- Ambikapathi R., Schneider K.R., Davis B., Herreiro M., Winters P., Fanzo J.C., 2022. Global food systems transitions have enabled affordable diets but had less favourable outcomes for nutrition, environmental health, inclusion and equity. *Nature Food*, 3(9): 764-779.
- Anonymous, 2004. *II. Tarım Şurası (II. Agricultural Council)*, 2004. Former Ministry of Agriculture and Rural Affairs (Mülga Tarım ve Köyişleri Bakanlığı).
- Aramyan L., Galen M., Logatcheva K., Hecceglic N., Stamenkovska I.J., Koç A.A., Kovacevic V., Markovic M., Stojceska A.M., Zhllima E., 2022. *Comparative Analysis of Agricultural Sectors and Rural Areas in The Pre-Accession Countries: Agricultural Policy Developments, Situation of The Agri-Food Sector and Economic Context Study II. Main Report (D4 - Final Report)*. Brussels: European Commission.
- Béné C., Fanzo J., Prager S.D., Achicanoy H.A., Mapes B.R., Alvarez Toro P., Bonilla Cedrez C., 2020. Global drivers of food system (un)sustainability: A multi-country correlation analysis. *PloS one*, 15(4): e0231071.
- Béné C., Prager S.D., Achicanoy H.A., Toro P. A., Lamotte L., Cedrez C.B., Mapes B.R., 2019. Understanding food systems drivers: A critical review of the literature. *Global Food Security*, 23: 149-159.
- European Commission, 2019. *Commission Staff Working Document: Turkey 2019 Report, Communication on EU Enlargement Policy*. SWD (2019) 220 final. Brussels: European Commission.
- European Commission, 2023. *The EU Pathway Towards Sustainable Food Systems Transformation*, https://knowledge4policy.ec.europa.eu/publication/eu-pathway-towards-sustainable-food-systems-transformation_en (Accessed: 15 January 2024).
- Fan S., 2021. Economics in food systems transformation. *Nat Food*, 2, 218-219 (2021), <https://doi.org/10.1038/s43016-021-00266-0>.
- Fanzo J., Davis C., 2021. *Food Systems, Food Environments, And Consumer Behavior. In Global Food Systems, Diets, and Nutrition: Linking Science, Economics, and Policy*. Cham: Springer International Publishing, pp. 9-28.
- FAO, 2018. *Sustainable Food System: Concept and framework*, <https://www.fao.org/3/ca2079en/CA2079EN.pdf> (Accessed: 15 January 2024).
- FAO, 2022. *World Food and Agriculture – Statistical Yearbook 2022*. Rome: FAO, <https://doi.org/10.4060/cc2211en> (Accessed 15 January 2024).
- Food Policy Coalition, 2023. *Sustainable Food Systems Law Policy Recommendations for a Meaningful Transition*. <https://foodpolicycoalition.eu/wp-content/uploads/2023/05/SUSTAINABLE-FOOD-SYSTEMS-LAW-Recommendations-for-a-meaningful-transition.pdf> (Accessed: 12 February 2024).
- Former Ministry of Development, 2018. *II. Development Plan 2019-2023 (Özel İhtisas Komisyonu Raporu)*. https://www.sbb.gov.tr/wp-content/uploads/2020/04/SuKaynaklariYonetimi_ve_GuvenligiOzeIhtisasKomisyonuRaporu.pdf (Accessed: 25 April 2024).
- Jones S.K., Estrada-Carmona N., Juventia S.D., Dulloo M.E., Laporte M.A., Villani C., Remans R., 2021. Agrobiodiversity Index scores show agrobiodiversity is underutilized in national food systems. *Nature food*, 2(9): 712-723.
- Koç A.A., Bayaner A., 2021. *Agricultural policy developments in Türkiye*. In: Martinovska Stojcheska A., Kotevska A., Ciaian P., Ilic B., Pavloska-Gjorgjieska D., Salputra G. (eds), *Recent Agricultural Policy Developments in The Context of the EU Approximation Process in the Pre-Accession Countries*, EU Commission, JRC Technical Report.
- Koç A.A., Yu T.E., Kıymaz T., Sharma B.P., 2019. Effects of government supports and credits on Turkish agriculture: A spatial panel analysis. *Journal of Agribusiness in Developing and Emerging Economies*, 9(4): 391-401.
- Ministry of Environment, Urbanization and Climate Change, 2024. *Environmental Indicators*. <https://cevreselgostergeler.csb.gov.tr/su-kullanimi-i-85738> (Accessed: 25 April 2024).
- MoAF, 2021a. *Ministry of Agriculture and Forestry*.

- <https://www.tarimorman.gov.tr/sgb/Belgeler/Sag-MenuVeriler/BUGEM.pdf> (Accessed: 1 April 2022).
- MoAF, 2021b. *National Rural Development Strategy (2021-2023)*, Ministry of Agriculture and Forestry. November. <http://www.uka.org.tr/Content/belgeler/UKKS-3-EN.pdf> (Accessed: 25 March 2022).
- MoAF, 2021c. *Towards Sustainable Food Systems. National Pathway of Turkey*. Ministry of Agriculture and Forestry. https://www.tarimorman.gov.tr/ABDGM/Belgeler/Uluslararası%C4%B1%20Kuru-lu%C5%9Flar/NATIONAL%20PATHWAY%20OF%20TURKEY_29%20Kas%C4%B1m.pdf (Accessed: 14 March 2022).
- MoAF, 2021d. *Ministry of Agriculture and Forestry*. <https://www.tarimorman.gov.tr/Konular/Tarimsal-Destekler/Diger-Tarimsal-Amacli-Destekler/Catak-Destegi>. (Accessed: 14 March 2022).
- MoAF, 2022. *Türkiye Tarımsal Kuraklıkla Mücadele Stratejisi ve Eylem Planı (2023-2027)*. <https://www.tarimorman.gov.tr/TRGM/Belgeler/0TARIMSAL%20%C3%87EVRE%20VE%20DO%C4%9EAL%20KAYNAK-LARI%20KORUMA%20DA%C4%B0RE%20BA%C5%9EKANLI%20EI/Yay%20B1nlar%20B1m%20B1z/Tar%20B1msal%20Kurakl%C4%B1kla%20Mu%CC%88cadele.pdf> (Accessed: 8 January 2024).
- MoAL, 2015. *Ulusal Kırsal Kalkınma Stratejisi: 2014-2020 (National Rural Development Strategy of Turkey)* (Accessed: 12 January 2022).
- MoECC, 2012. *National Climate Change Action Plan 2011-2023*. Ministry of Environment and Urbanization, https://webdosya.csb.gov.tr/db/iklim/editor-dosya/iklim_degisikligi_eylem_plani_EN_2014.pdf. (Accessed: 25 March 2022).
- MoFT, 2024. *2023 General Government's Financial Statistics*, Ministry of Treasury and Finance, <https://en.hmb.gov.tr/general-government>.
- MoT, 2021. *Green Deal Action Plan*. Ministry of Trade, <https://ticaret.gov.tr/data/60f1200013b876eb28421b23/MUTABAKAT%20YE%C5%9E%C4%B0L.pdf> (Accessed: 22 March 2022).
- OECD, 2023a. *Agricultural Policy Monitoring and Evaluation 2023: Adapting Agriculture to Climate Change*. https://www.oecd-ilibrary.org/sites/b14de474-en/1/3/3/24/index.html?itemId=/content/publication/b14de474en&_csp_=a209f942fdf89c2476c9ec400d75ef2f&itemIGO=oecd&itemContentType=book (Accessed: 17 December 2023).
- OECD, 2023b. *Policies for the Future of Farming and Food in the European Union*, <https://www.oecd.org/publications/policies-for-the-future-of-farm-ing-and-food-in-the-european-union-32810cf6-en.htm> (Accessed: 13 January 2024).
- Official Gazette, 2021. *2021 Yılında Yapılacak Tarımsal Desteklemeler ve 2022 Yılında Uygulanacak Sertifikalı Tohumluk Kullanımı Desteğine İlişkin Karar:11 Kasım 2021*. Sayı: 31656. <https://www.resmigazete.gov.tr/eskiler/2021/11/20211111-5.pdf> (Accessed: 3 February 2024).
- Official Gazette, 2023. *2023 Yılında Yapılacak Tarımsal Desteklemeler ve 2024 Yılında Uygulanacak Sertifikalı Tohumluk Kullanımı Desteğine İlişkin Karar: 14 Eylül 2023*. Sayı: 32310, <https://www.resmigazete.gov.tr/eskiler/2023/09/20230915-3.pdf> (Accessed: 3 February 2024).
- OGM, 2024. *2023 Yılı İdare Faaliyet Raporu*. <https://www.ogm.gov.tr/tr/e-kutuphane-sitesi/FaaliyetRaporu/Orman%20Genel%20M%C3%BCd%C3%BCr%C3%BC%C4%9F%C3%BC%202023%20Y%C4%B1%20Faaliyet%20Raporu.pdf> (Accessed: 28 March 2024).
- Özturnacı B., Şengül H., 2019. Türkiye’de Çok Boyutlu Kırsal Yoksulluk. *Turkish Journal of Agricultural Economics*, 25(2).
- Pakdemirli B., 2019. Tarımsal kooperatiflerin dünya ve Türkiye’de mevcut durumunun karşılaştırılması. *ANADOLU Ege Tarımsal Araştırma Enstitüsü Dergisi*, 29(2): 177-187.
- Ruben R., Cavatassi R., Lipper L., Smaling E., Winters P., 2021. Towards Food Systems Transformation—Five Paradigm Shifts for Healthy, Inclusive and Sustainable Food Systems. *Food Security*, 13: 1423-1430.
- Sert Ç., 2019. *Amanos Dağları’nda Bazı Doğal Su Kaynaklarının Su Parametrelerinin Araştırılması*. Yüksek Lisans Su Ürünleri Anabilim Dalı İskenderun Teknik Üniversitesi Mühendislik ve Fen Bilimleri Enstitüsü. <http://openaccess.iste.edu.tr/xmlui/bitstream/handle/20.500.12508/1357/cetin-sert.pdf?sequence=1&isAllowed=y> (Accessed: 12 March 2024).
- TKDK, 2023. *Tarım ve Kırsal Kalkınmayı Destekleme Kurumu 2014-2020 IPARD Programı (IPARD II Dönemi)*, https://www.tkd.gov.tr/Content/File/Duyuru/files/IPARD%20II%2013_%20Ba%20c5%9fvuru%20c3%87a%20c4%9fr%20c4%b1%20c4%b0lan%20c4%b1-15_08.pdf (Accessed: 12 February 2024).
- Türkekel B., Gençler F., Gül A.U., 2017. *Rural Poverty in Turkey: The Role of Agriculture*, Proceedings of ISER 96th International Conference, Istanbul, Turkey, 22nd-23rd December 2017.
- TurkStat, 2020. *Kır/Kent Tanımının Revizyonu*, www.

- resmiistatistik.gov.tr/detail/subject/kir-kent-tanimi-nin-revizyonu/ (Accessed: 7 June 2020).
- TurkStat, 2023a. <https://data.tuik.gov.tr/Kategori/GetKategori?p=tarim-111&dil=1> (Accessed: 8 January 2024).
- TurkStat, 2023b. *Health Statistics*, <https://data.tuik.gov.tr/Kategori/GetKategori?p=saglik-ve-sosyal-koruma-101&dil=1> (Accessed: 15 April 2024).
- TurkStat, 2024a. *National Accounts*, <https://data.tuik.gov.tr/Kategori/GetKategori?p=ulusal-hesaplar-113&dil=1> (Accessed: 8 January 2024).
- TurkStat, 2024b. *Household Consumption Expenditure Statistics*, <https://data.tuik.gov.tr/Kategori/GetKategori?p=gelir-yasam-tuketim-ve-yoksuluk-107&dil=1> (Accessed: 4 July 2024).
- Valls Bedeau J., Rezaei M., Pera M., Morrison J., 2021. Towards food systems transformation in the Mediterranean region: Unleashing the power of data, policy, investment and innovation. *New Medit*, 20(3), <https://doi.org/10.30682/nm2103a>.
- WWF, 2014. *Türkiye'nin Su Ayak Izi Raporu: Su, Üretim ve Uluslararası Ticaret İlişkisi*.
http://awsassets.wwftr.panda.org/downloads/su_ayak_izi_raporweb.pdf (Accessed: 10 January 2024).
<https://nuhungemisi.tarimorman.gov.tr> (Accessed: 20 March 2024).
- <https://www.tarimorman.gov.tr,a/Konular/Bitkisel-Uretim> (Accessed: 15 January 2024).
- <https://www.tarimorman.gov.tr,b/Haber/5616/Toplulastirilan-Arazi-Buyuklugunun-2023te-85-Milyon-Hektara-Ulasmasi-Hedefleniyor#:~:text=T%C3%BCrkiye'de%20arazi%20toplula%C5%9Ft%C4%B1rma%20%C3%A7a1%C4%B1%C5%9Fmas%C4%B1,5%20milyon%20hektara%20ula%C5%9Ft%C4%B1r%C4%B1lmas%C4%B1%20planlan%C4%B1yor> (Accessed: 08 February 2024).
- <https://www.tarsim.gov.tr/staticweb/krm-web/mevzuatlar/tarife-ve-talimatlar/2022/gks-tarife-talimatlar.pdf> Accessed 02 February 2024 (Accessed: 08 January 2024).
- <https://www.tugis.org.tr/tugis-baskani-necdet-buzbas-kisi-basina-93-kiloyla-dunya-ucuncusuyuz/#:~:text=D%C3%BCnyada%20%C3%BCretilen%20yakla%C5%9F%C4%B1k%204%20milyar,g%C3%BCn%20enerji%20de%C4%9Ferde%20besin%20t%C3%BCketiliyor> (Accessed: 12 March 2024).
- <https://www.verikaynagi.com/grafik/cksde-kayitli-ciftci-sayisi/> (Accessed: 03 February 2024).
- <https://webdosya.csb.gov.tr/db/cem/icerikler/karbon-proje-27eylul2018-20211104152537.pdf> (Accessed: 20 March 2024).