Prof. Dr. Celal TAŞDOĞAN Ensuring the Sustainability of Agricultural Inputs to Combat Food Insecurity in OIC Member Countries The 21 st Meeting of the COMCEC **Agriculture Working Group** October 12-13, 2023 Ankara, Türkiye



### Methodology

To help assess the major challenges for OIC countries, the "Club Convergence Method", a method that takes into account the degree of convergence of a total of 57 countries for each variable were utilized. It helps identify common problems and propose common solutions to create opportunities for cooperation by dividing OIC member countries into clubs.

The data used in the analyses in the study were obtained from FAOSTAT. Relevant data is obtained through countries submitting it into the international Sustainable Development Goals (SDG) database.





### Sustainable Agricultura l Variables

Water	Fertilizers and Manure	Infrastructure and Government Expenditure	
Land	Seed	Emissions and Forest Land	
Labor	Pesticides	Trade	

### The Principles of Sustainable Agriculture

#### 01

Integrating biological and ecological processes into food production processes

#### 02

Reducing the use of nonrenewable inputs

03

Reducing external costs by increasing the know-how of human capital







#### 04

Efficient use of collective capacities to solve common problems in agriculture and natural resources



### Water



- The study assesses water, one of the most important agricultural inputs, first by measuring water stress and second by measuring water use efficiency.
- The Club convergence analysis shows that 3 OIC member countries (Libya, Saudi Arabia, United Arab Emirates) face severe water stress, while 12 other member countries, including Algeria, Azerbaijan, Egypt, Niger, Oman, Pakistan, Qatar, Syria, Tunisia, Türkiye, Uzbekistan, Uzbekistan and Yemen face water stress problems in the 2000-2020 period.
- Water use efficiency refers to the change in water use efficiency over time at the national level as an indicator in the SGD 6 group. This indicator, which should be assessed together with the level of water stress, expresses the changes in the ratio of agricultural value added to the volume of water used. In this respect, according to the results of the Club convergence analysis, 18 OIC member countries (Albania, Algeria, Bahrain, Benin, Egypt, Jordan, Kuwait, Lebanon, Malaysia, Oman, Qatar, Saudi Arabia, Suriname, Türkiye, United Arab Emirates, Uzbekistan and Yemen) perform better in terms of water use efficiency compared to other members.

### Convergence Clubs



Clubs	Countries
Club 1 (3 Members)	Libya   Saudi Arabia   United Arab Emirates
Club 2 (12 Members)	Algeria  Azerbaijan   Egypt   Niger   Oman   Pakistan   Qatar   Syrian   Tunissia Türkiye   Uzbekistan   Yemen
Club 3 (10 Members)	Afghanistan   Bahrain   Indonesia   Iran   Iraq   Jordan   Kyrgyzstan
	Morocco   Somalia   Tajikistan
Club 4 (2 Members)	Kazakhstan   Palestine
Club 5 (2 Members)	Mauritania   Senegal
Club 6 (10 Members)	Albania   Benin   Burkina Faso   Ivory Coast   Gabon   Guinea
	Mozambique   Sierra Leone   Suriname   Uganda
Not convergent	Brunei-Darrussalam   Cameroon   Chad   Comoros   Djibouti  Gambia
Group	Guinea-Bissau   Guyana   Kuwait   Lebanon   Malaysia   Mali   Nigeria
(15 Members)	Togo   Türkmenistan

#### Level of Water Stress

	Countries
lembers)	Albania   Algeria   Bahrain   Benin   Egypt   Jordan   Kuwait   Lebanon
	Malaysia   Oman   Qatar   Saudi Arabia   Suriname   Türkiye   United
	Arab Emirates   Uzbekistan   Yemen
embers)	Ivory Coast   Mauritania   Pakistan   Tajikistan   Tunissia
embers)	Indonesia   Nigeria
embers)	Azerbaijan   Gabon   Guinea-Bissau   Türkmenistan
embers)	Afghanistan   Comoros   Iraq   Kyrgyzstan   Sierra Leone
embers)	Burkina Faso   Gambia   Mozambique   Senegal   Syria
embers)	Cameroon   Chad   Guinea   Kazakhstan   Mali
embers)	Libya   Niger   Togo
ent Group	Iran   Morocco   Somalia

#### Water Use Efficiency

# Relative Transition Paths of Clubs







### Level of Water Stress

#### Water Use Efficiency

## Land Use



- The surface area of countries and the areas of agricultural production may not be proportional to each other.
- Some countries have large geographical areas but have deserts and agricultural production may take place in a small part of the country's territory.
- For example, Libya, Egypt, Sudan, Saudi Arabia, Syria, Iraq, Turkmenistan, Uzbekistan, Kazakhstan and Pakistan are OIC member countries with deserts on their borders. Some countries, such as Kyrgyzstan, are extremely mountainous and have relatively little flat land for agricultural production.
- Some countries have very fertile and arable land, but suffer from frequent natural disasters and continuous crop and soil loss. Others may have overpopulated agricultural land that is dedicated to other uses, such as construction.
- As a result, there is often a mismatch between the size of the country and its agricultural production area.

# Convergence Clubs & Relative Transition Paths of Clubs



Clubs	Countries		
Club 1 (2 Members)	Indonesia   Nigeria		
Club 2 (3 Members)	Chad   Iran   Niger		
Club 3 (4 Members)	Algeria   Mali   Mozambique   Somalia		
Club 4 (3 Members)	Afghanistan   Pakistan   Türkiye		
Club 5 (2 Members)	Ivory Coast   Yemen		
Club 6 (3 Members)	Guinea   Libya   Uganda		
Club 7 (2 Members)	Burkina Faso   Syrian		
Club 8 (6 Members)	Bangladesh   Cameroon   Iraq   Kyrgyzstan   Malaysia   Tunisia		
Club 9 (5 Members)	Azerbaijan   Benin   Egypt   Sierra Leone   Togo		
Club 10 (3 Members)	Guinea-Bissau   Jordan		
Club 11 (2 Members)	Gambia   Lebanon		
Not Convergent Group	Albania   Bahrain   Brunei-Darussalam   Comoros   Djibouti   Gabon		
	Guyana   Kazakhstan   Kuwait   Maldives   Mauritania   Morocco   Oman		
	Palestine   Qatar   Saudi Arabia   Senegal   Suriname   Tajikistan		
	Turkmenistan   United Arab Emirates   Uzbekistan		



# Pesticide Use



- Pesticide use in the OIC region shows an average increase of 27.56 percent since the beginning of the analysis period.
- This increase is 30 percent for the world average and 4.18 percent for the EU average.
- Although the reasons for each of countries' use of pesticides' changes are different:
- The financial situation of the country
- The pesticide prices
- The type of crops grown
- The national regulatory practices have an impact on the level of pesticide use.

# Convergence Clubs & Relative Transition Paths of Clubs



Clubs	Countries		
Club 1 (6 Members)	Burkina Faso   Cameroon   Kazakhstan   Malaysia   Togo   Türkiye		
Club 2 (4 Members)	Bangladesh   Morocco   Oman   Saudi Arabia		
Club 3 (5 Members)	Algeria   Egypt   Pakistan   Tunissia   Türkmenistan		
Club 4 (17 Members)	Albania   Azerbaijan   Brunei-Darrussalam   Gambia   Guyana   Indonesia		
	Jordan   Kyrgyzstan   Lebanon   Libya   Maldives   Mozambique  Palestine		
	Senegal   Suriname   Syria   Tajikistan		
Club 5 (12 Members)	Bahrain   Chad   Ivory Coast   Guinea   Guinea-Bissau   Iraq   Kuwait		
	Mauritania   Niger   Qatar   Uganda   Yemen		
Club 6 (2 Members)	Comoros   Mali		
Not convergent Group	Iran		



# Fertilizer r and Manure



- Agricultural producers use two types of fertilizers: animal manure and chemical fertilizer.
- The phosphate and nitrate in manure applied directly to the land without treatment pollutes ground and surface water, acidify soils and damage biodiversity.
- To address environmental and global warming concerns, manure is being processed into new energy sources or bio-based products.
- Even when farmers changed their manure with fertilizer, there are limits to how much they can use.
- The availability and price of chemical fertilizers.
- Although fertilizer use in the OIC group is generally increasing in line with increasing production and agricultural land, it is still well below the world average.
- In 2017, the world average of fertilizer use per hectare was 141.9 kg, while the OIC average was 85.9 kg.
- Fertilizer, which is associated with productivity growth, is the most heavily subsidized agricultural input by governments.
- The situation in terms of productivity should be evaluated together with agricultural mechanization, and the advantageous situation of the OIC group compared to the world average in terms of its impact on climate change should be taken into account

### Convergence Clubs



Clubs	Countries		
Club 1 (5 Members)	Azerbaijan   Benin   Indonesia   Nigeria   Pakistan		
Club 2 (6 Members)	Bangladesh   Egypt   Gabon   Mali   Senegal   Tajikistan		
Club 3 (5 Members)	Afghanistan   Iran   Kazakhstan   Türkmenistan   Uzbekistan		
Club 4 (14 Members)	Albania   Algeria   Burkina Faso   Cameroon   Ivory Coast  Guinea   Guyana		
	Iraq   Jordan   Malaysia   Morocco   Mozambique   Saudi Arabia   Tunissia		
Club 5 (13 Members)	Kuwait   Kyrgyzstan   Lebanon   Libya   Maldives   Niger   Oman   Suriname		
	Syria   Togo   Uganda   United Arab Emirates   Yemen		
Club 6 (2 Members)	Bahrain   Qatar		
Club 7 (3 Members)	Brunei-Darrussalam   Gambia		
Not Convergent Group	Türkiye		

Clubs	Countries		
Club 1 (5 Members)	Albania   Bangladesh   Benin   Guinea   Malaysia		
Club 2 (12 Members)	Burkina Faso   Ivory Coast   Egypt   Guyana   Kuwait   Morocco		
	Nigeria   Pakistan   Senegal   Togo   Türkiye   Uzbekistan		
Club 3 (12 Members)	Algeria   Azerbaijan   Cameroon   Gabon   Iran   Iraq   Mali		
	Mozambique   Oman   Saudi Arabia   Uganda    United Arab Emirates		
Club 4 (6 Members)	Jordan   Kazakhstan   Lebanon   Tajikistan   Tunissia  Türkmenistan		
Club 5 (6 Members)	Brunei-Darrussalam   Libya   Niger   Suriname   Syria   Yemen		
Club 6 (2 Members)	Bahrain   Gambia		
Not Convergent Group	Indonesia		

Potash

### Nitrogen

Clubs	Countries
Club 1 (6 Members)	Bangladesh   Benin   Gabon   Guinea   Indonesia   Pakistan
Club 2 (7 Members)	Afghanistan   Ivory Coast   Egypt   Kazakhstan   Mali   Nigeria  Uzbekistan
Club 3 (13 Members)	Albania   Algeria   Burkina Faso   Cameroon   Iran   Iraq   Malaysia   Morocco   Mozambique   Saudi Arabia   Senegal   Togo   Tunissia
Club 4 (13 Members)	Brunei-Darrussalam   Guyana   Jordan   Kuwait   Kyrgyzstan   Libya   Niger   Oman   Suriname   Syria   Tajikistan   Uganda   United Arab Emirates
Club 5 (2 Members)	Bahrain   Gambia
Not Convergent Group	Azerbaijan   Türkiye

#### Phosphate

# Relative Transition Paths of Clubs







#### Potash

### Nitrogen

#### Phosphate

# Food Price Index



- In terms of the food price index, the world average is 3.90, the EU average is 2.40 and the OIC average is 8.36. This increase has become more pronounced after the Covid-19 pandemic.
- In 2019, the OIC average for the food price index is 6.07%, while in 2020 and 2021, the OIC average is 21.68% and 22.29% respectively.
- For the same periods, the EU average is 1.03 and 4.46 per cent, while the world average is 5.75 and 11.02 per cent, respectively.

Food Price Index (%)	2019	2020	2021
Lebanon	9,77	402,25	438,65
Sudan	63,28	206,47	191,60
Syria	39,13	172	44,3
Türkiye	10,89	20,61	43,80
OIC average	6,07	21,68	22,29
EU average	1,91	1,03	4,46
World average	5,35	5,75	11,02

# Convergence Clubs & Relative Transition Paths of Clubs



Clubs	Countries
Club 1 (3 Members)	Iran   Lebanon   Syria
Club 2 (8 Members)	Afghanistan   Egypt   Guinea   Libya   Nigeria   Sierra Leone   Türkiye  Uzbekistan
Club 3 (9 Members)	Albania   Azerbaijan   Gambia   Kazakhstan   Mozambique   Pakistan   Tajikistan   Tunissia   Yemen
Club 4 (32 Members)	<ul> <li> Algeria   Bahrain   Benin   Brunei-Darrussalam   Burkina Faso   Cameroon</li> <li> Chad   Comoros   Ivory Coast   Djibouti   Gabon   Guinea-Bissau  </li> <li>Indonesia   Iraq   Jordan   Kuwait   Kyrgyzstan   Malaysia   Maldives   Mali</li> <li> Mauritania   Morocco   Niger   Oman   Palestine   Qatar   Saudi Arabia  </li> <li>Senegal   Somalia   Togo   Uganda   United Arab Emirates  </li> </ul>
Not convergent Group	Suriname



### Trade



- Trade volumes between OIC member countries are analyed in this section.
- Although import and export values differ, a holistic analysis shows that Afghanistan, Benin, Comoros, Gambia, Jordan, Lebanon, Mali, Niger, Oman, Somalia, Sudan, Suriname, Syria, Tajikistan, Togo and Yemen have intra-OIC trade shares above 40 per cent.
- Guyana, which has the lowest share of intra-OIC trade, is located in a geographically disadvantaged region.
- Albania, Bangladesh, Comoros, Gabon, Guinea and Libya have the lowest export shares, while Nigeria, Kazakhstan and Suriname have the lowest import shares.

Trade in Agricultural Sector among OIC Member Countries

Country (2021)
()
Afghanistan
Albania
Algeria
Azerbaijan
Bahrain
Bangladesh
Benin
Brunei
Burkina Faso
Cameroon
Chad
Comoros
Ivory Coast
Djibouti
Egypt
Gabon
Gambia
Guinea
Guinea-Bissau
Guyana
Indonesia
Iran
Iraq
Jordan
Kazakhstan
Kuwait
Kyrgyz
Republic Lebanon
Libva
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Export (%)	Import (%)	Country	Export (%)	Import (%)
K <sub>OIC</sub>	M <sub>OIC</sub>	(2021)	X <sub>OIC</sub>	M <sub>OIC</sub>
6.13	58.72	Malaysia	10.60	13.35
.84	20.46	Maldives	3.19	39.54
2.81	15.05	Mali	30.82	54.36
3.41	28.94	Mauritania	5.61	29.08
2.61	21.50	Morocco	8.23	19.06
1.71	25.72	Mozambique	6.09	15.85
21.34	63.29	Niger	53.81	17.01
0.76	30.27	Nigeria	12.17	4.33
6.71	23.82	Oman	51.90	52.12
5.13	20.49	Pakistan	20.65	45.49
33.29	29.95	Palestine	9.56	21.04
7.43	56.08	Qatar	14.33	14.57
26.16	27.97	Saudi Arabia	23.24	19.85
36.82	40.99	Senegal	40.25	15.56
34.85	26.15	Sierra Leone	10.99	23.44
7.53	12.20	Somalia	88.31	31.79
59.95	52.04	Sudan	65.06	37.16
7.89	17.65	Suriname	43.60	3.19
6.30	39.45	Syria	85.91	20.17
3.72	3.61	Tajikistan	51.00	36.63
3.59	13.71	Togo	67.82	22.37
1.30	31.29	Tunusia	13.28	18.13
5.76	40.31	Türkiye	25.30	11.08
1.19	36.54	Turkmenistan	16.78	40.51
4.74	6.63	Uganda	8.79	22.74
1.94	23.05	UAE	19.11	20.48
15.17	18.51	Uzbekistan	28.44	24.18
51.72	26.82	Yemen	79.53	46.61
5.98	34.40			

# **Survey Results**

#### Approach Towards Sustainable Agriculture

To measure the sentiment towards sustainable agriculture which plays a critical role in combating food insecurity, a survey was created and disseminated through online channels who are employed in various areas in sector closely related to agricultural production. A total of 398 responses were statistically analyzed.

A total of 398 responses were statistically suitable for further analysis. The descriptive statistics are reported in the following table. The duration of employment metrics reveal the extent to which individuals with varying levels of experience in the agricultural sector and their current employers engage with sustainability practices while the age distribution can provide information about the generational perspectives on sustainable agriculture.



# **Highlights from Survey Results**

#### **Selected Data**



92.7% of the respondents strongly agreed that soil and water should be protected. There is a strong support for the idea of strict protection of vital resources like soil and water. The mean score of 4.74 (out of 5) in the relevant statement reflects a clear concern about the negative effects of agricultural chemicals.



Pest control can be considered as a debatable topic as a little over 50 percent (54,8%) agreed with the use of pesticides but a much higher agreement level was observed regarding biological control as 79.9% supported biological control with a mean score of 4.22.

### 84,4 USEOF CHEXICALS

84.4% of the respondents believed that the uncontrolled use of chemicals harms nature. In addition, those who agree that agriculture should be done in harmony with nature and that new technology and machinery should be adopted are the statements with the highest percentage of agreement.

Issues to be Tackled Major Challenges Faced by OIC Countries





## Key



- Non-existent of modern finance
- Lack of rural roads' network and accessibility
- Lack of the irrigation system, electricity facilities
- Climate Change
- Needs to decrease GHG emissions in agriculture

### Charter agricultural resource management Charter inputs ges

- Inefficient land market
- Lack of sufficient infrastructure