25th MEETING OF THE COMCEC AGRICULTURE WORKING GROUP

Strengthening the Resilience of Family Farmers and Small-scale Producers in the Agriculture and Food Sector in OIC Member Countries

Haluk Gedikoğlu
Division of Applied Social Sciences
University of Missouri

Mohammad Ansarian
Department of Economics
Necmettin Erbakan University

September 22^{nd}, 2025

Outline

- Objective of the Study
- Defining and Measuring Resilience
- Conceptual Framework and Methodology
  - Regression Analysis
  - Principal Component Analysis
- Data Collection
- Policy Recommendations

Objective

- The objective of this study is to measure the resilience and identify the factors that influence the resilience of the family farms and small-scale producers in the OIC member countries.
- With the identified factors policy recommendations are provided to strengthening the resilience of the family farmers and small-scale producers.

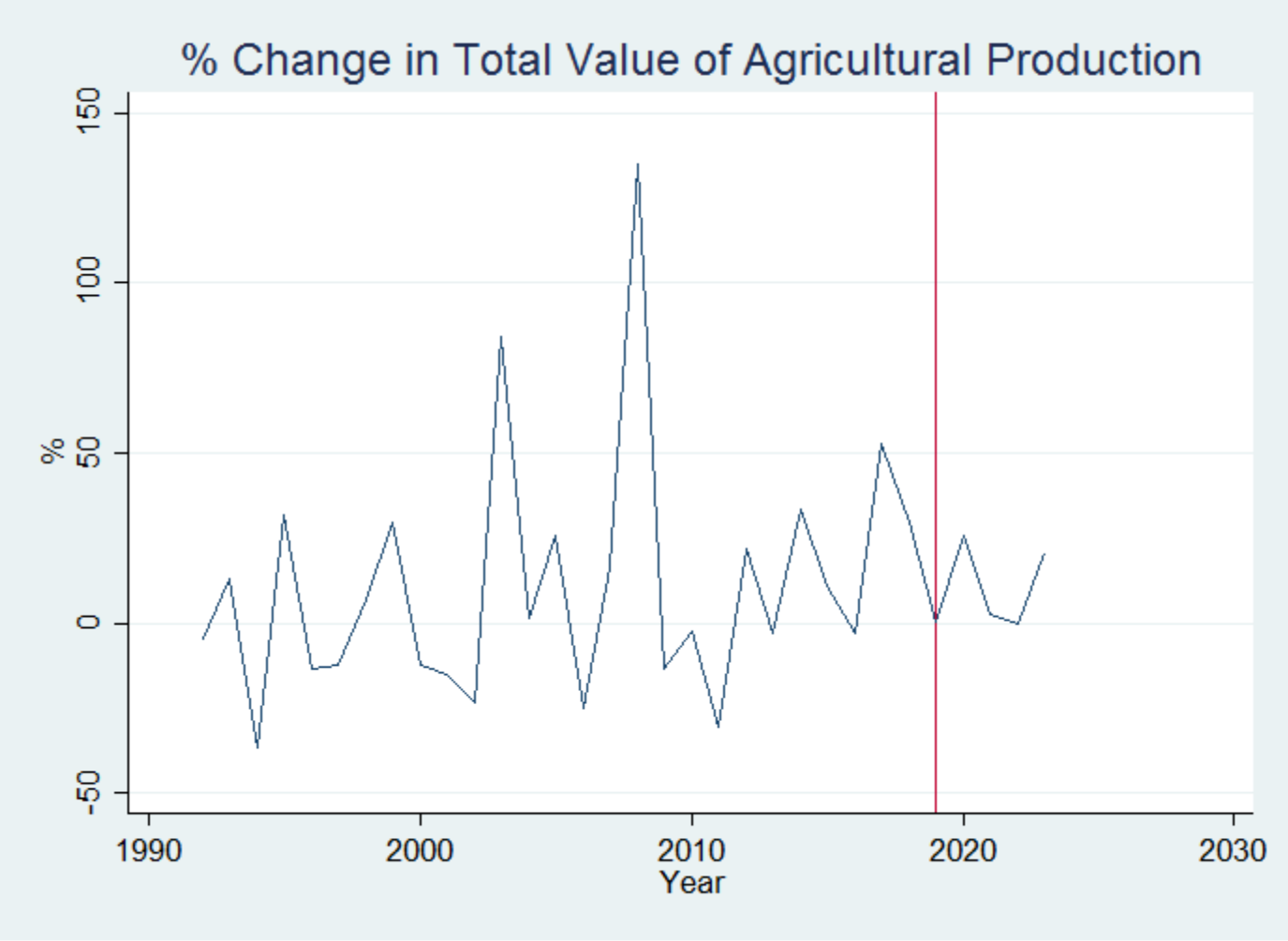
Resilience

- Resilience is defined as the capacity of the farmers to continue to produce agricultural products in the face of negative external shocks.
- We measure the continuation of agricultural production with total value of agricultural products produced and the value of agricultural production per hectare.
- We specifically use the yearly percentage change of total value of agricultural production and the yearly percentage change of value of the agricultural production per hectare to see if the system is resilient.
- Non-negative changes in the face of shocks imply resilience.

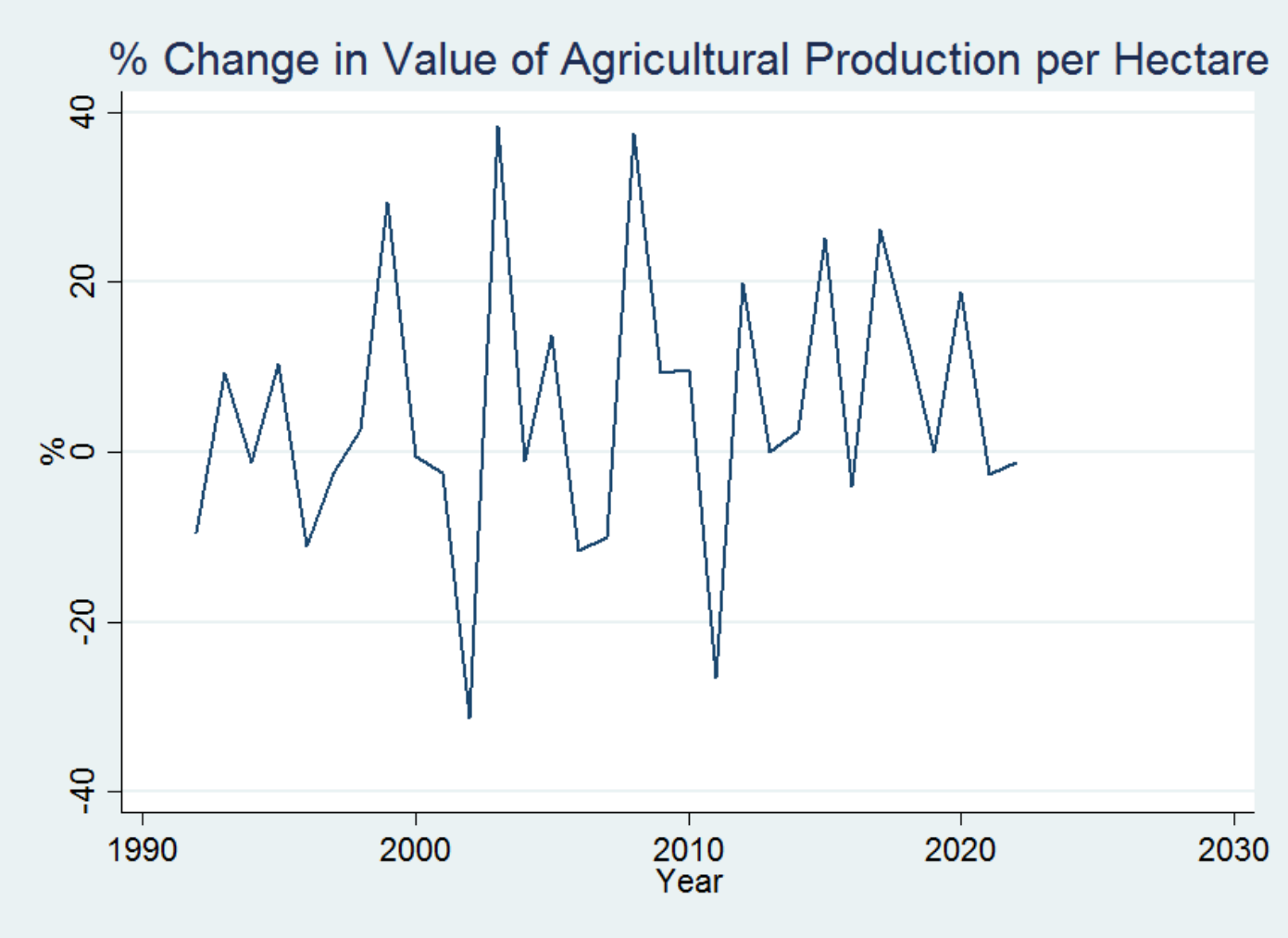
Resilience

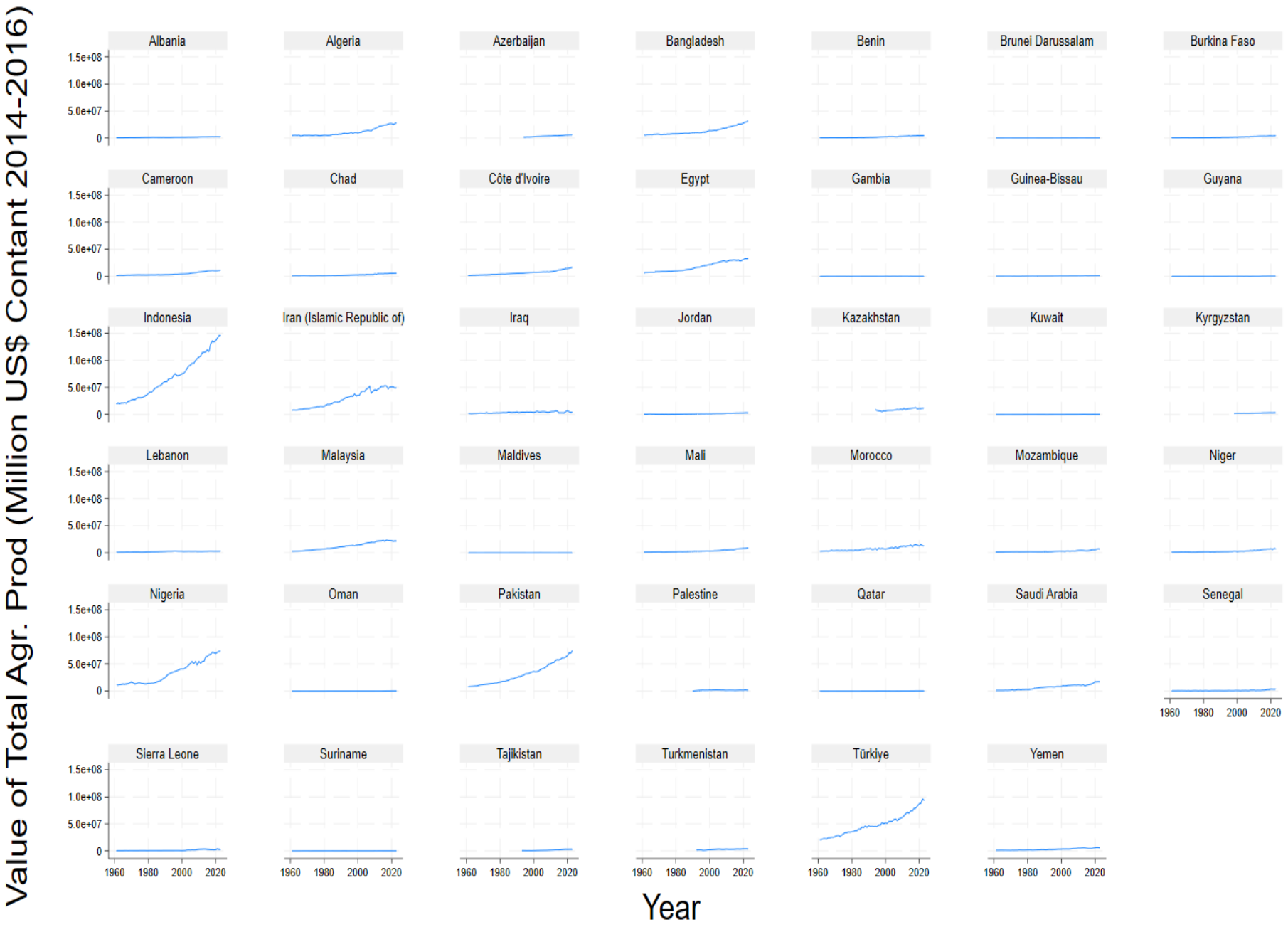
- % Change in the Value of Agricultural Production = $\frac{y_t - y_{t-1}}{y_{t-1}} * 100$
- t: $1960, . . , 2023$
- % Change in the Value of Agricultural Production per Hectare = $\frac{v_t - v_{t-1}}{v_{t-1}} * 100$
- Positive % Change -> Resilient
- Zero % Change -> Resilient
- Negative % Change -> Non-resilient

Resilience: Senegal



Resilience: Senegal




Value of Total Agr. Prod (Million US$ Contant 2014-2016)
Albania
Algeria
Azerbaijan
Bangladesh
Benin
Brunei Darussalam
Burkina Faso
Cameroon
Chad
Côte d'Ivoire
Egypt
Gambia
Guinea-Bissau
Guyana
Indonesia
Iran (Islamic Republic of)
Iraq
Jordan
Kazakhstan
Kuwait
Kyrgyzstan
Lebanon
Malaysia
Maldives
Mali
Morocco
Mozambique
Niger
Nigeria
Oman
Pakistan
Palestine
Qatar
Saudi Arabia
Senegal
Sierra Leone
Suriname
Tajikistan
Turkmenistan
Türkiye
Yemen
1.5e+08
1.0e+08
5.0e+07
0
1960
1980
2000
2020
Year
Graphs by OIC Memeber Country

Change in Value of Total Agricultural Production

Graphs by OIC Member Country

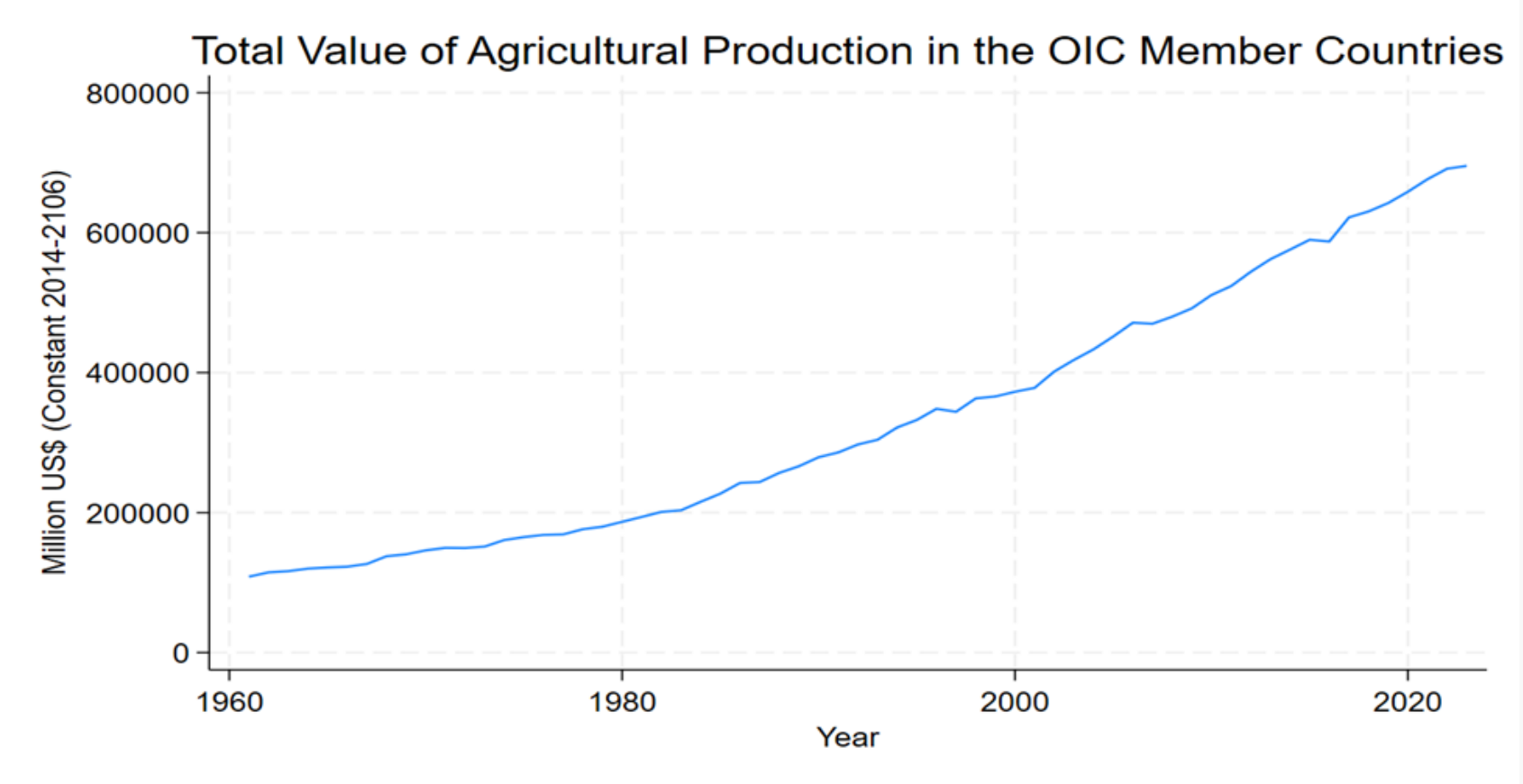
Ranking of OIC Member Countries Based on Number of Negative Percentage Changes in Total Value of Agricultural Production since 1995

Ranking	Country	Number of Negative Changes
1	Indonesia	3
2	Azerbaijan	4
3	Bangladesh	4
4	Cameroon	4
5	Cote d'Ivoire	4
6	Kyrgyzstan	4
7	Pakistan	4
8	Algeria	5
9	Mali	6
10	Tajikistan	6
11	Guinea Bissau	7
12	Nigeria	7
13	Türkiye	7
14	Benin	8
15	Mozambique	8
16	Turkmenistan	8
17	Egypt	9
18	Iran	9
19	Malaysia	9
20	Saudi Arabia	9
21	Albania	10
22	Brunei Darussalam	10
23	Burkina Faso	10
24	Gambia	10
25	Jordan	10
26	Kazakhstan	10
27	Kuwait	10
28	Niger	10
29	Qatar	11
30	SierraLeone	11
31	Guyana	12
32	Oman	12
33	Yemen	12
34	Chad	13
35	Iraq	13
36	Morocco	13
37	Suriname	13
38	Maldives	14
39	Senegal	14
40	Lebanon	15
41	Palestine	15

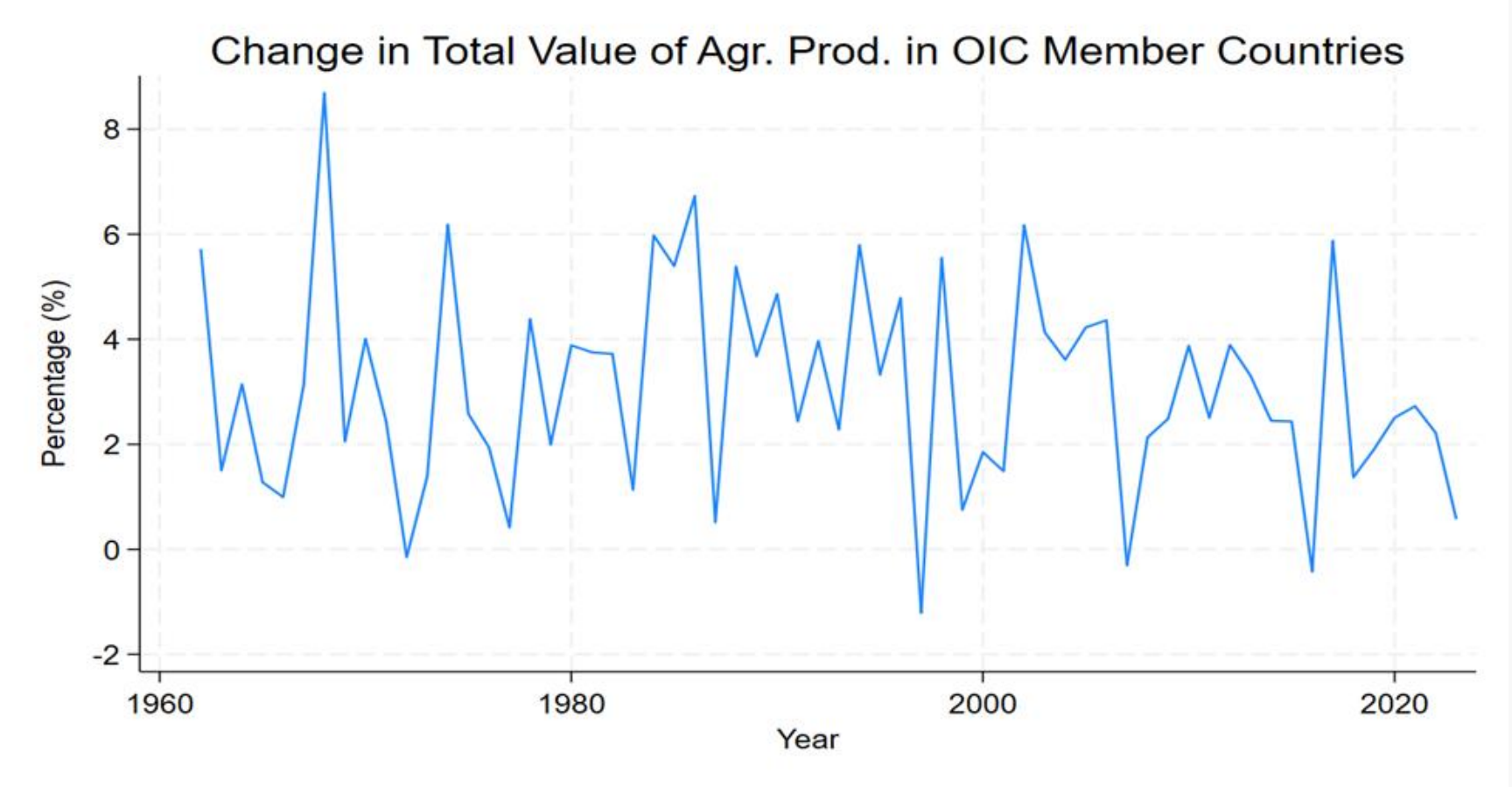
Ranking of OIC Member Countries Based on Largest Negative Percentage Change in Total Value of Agricultural Production since 1995

Ranking	Country	Largest Negative Change
1	Pakistan	-2%
2	Kyrgyzstan	-4%
3	Azerbaijan	-6%
4	Cote d'Ivoire	-6%
5	Indonesia	-6%
6	Egypt	-6%
7	Malaysia	-7%
8	Türkiye	-7%
9	Bangladesh	-9%
10	Albania	-10%
11	Cameroon	-10%
12	Burkina Faso	-13%
13	Mali	-13%
14	Yemen	-13%
15	Suriname	-14%
16	Nigeria	-14%
17	Benin	-15%
18	Mozambique	-16%
19	Tajikistan	-16%
20	Palestine	-17%
21	Guinea-Bissau	-18%
22	Chad	-19%
23	Kazakhstan	-20%
24	Lebanon	-20%
25	Brunei Darussalam	-22%
26	SierraLeone	-22%
27	Iran	-23%
28	Oman	-23%
29	Niger	-26%
30	Guyana	-27%
31	Algeria	-31%
32	Gambia	-31%
33	Morocco	-32%
34	Saudi Arabia	-36%
35	Senegal	-37%
36	Turkmenistan	-38%
37	Jordan	-43%
38	Iraq	-50%
39	Qatar	-55%
40	Kuwait	-68%
41	Maldives	-78%

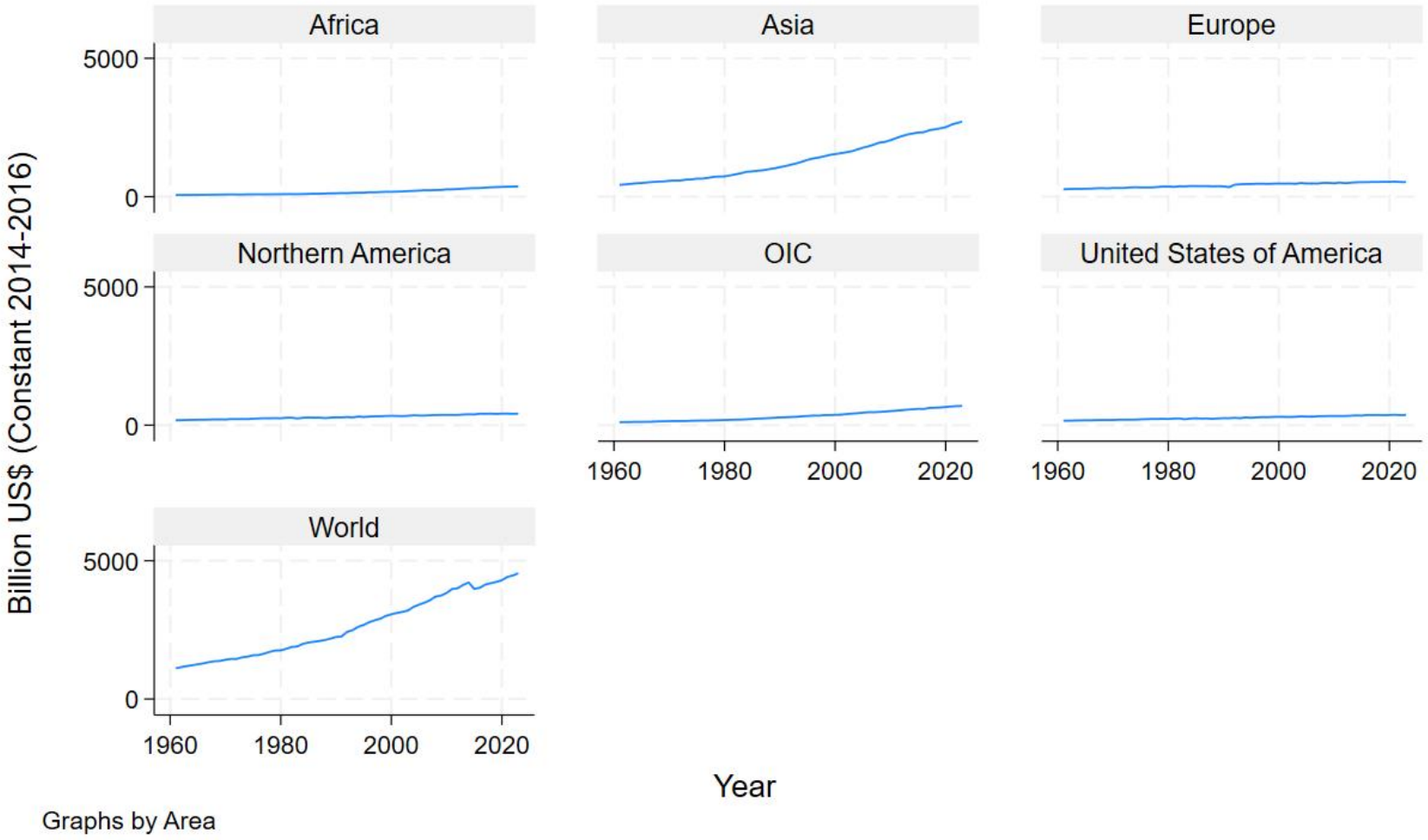
Total Value of Agricultural Production in the OIC Member Countries



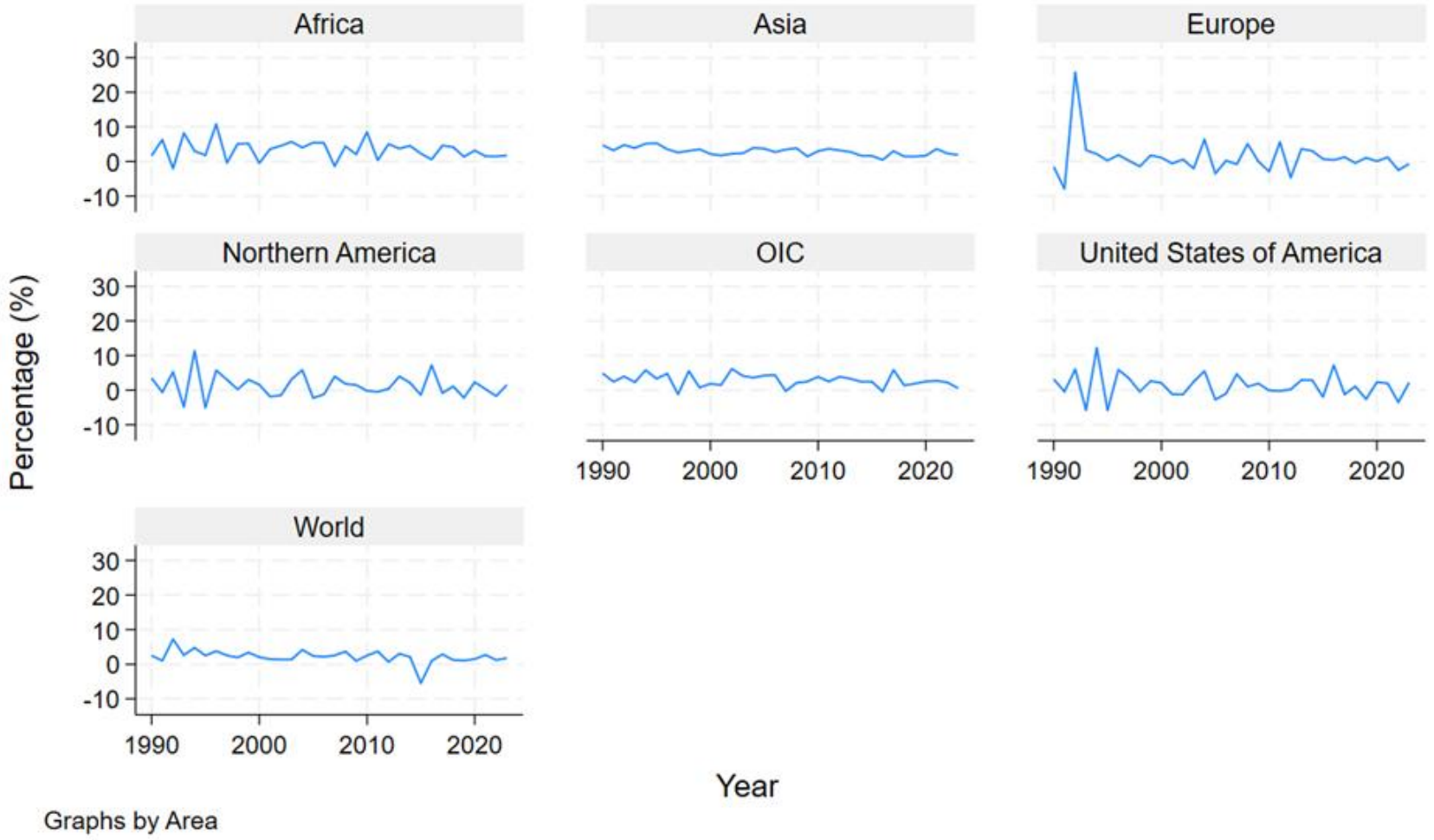
Change in Total Value of Agricultural Production in the OIC Member Countries



Total Value of Agricultural Production in the World and OIC Member Countries



Change in Total Value of Agricultural Production in the World and OIC Member Countries



Conceptual Framework and Methodology

- **Regression Analysis**
  - We used regression analysis to determine the factors that have influence on resilience of countries.
  - This allowed us to produce policy recommendations to increase the resilience of farmers in the OIC member countries.
- **Principal Component Analysis**
  - We also used principal component analysis for the highly correlated factors to determine those that have high influence on the resilience capacity of a country.
  - We also looked at the sub-groups of these factors.

Regression Analysis: Senegal

Dept. Variable: % Change in Value of Total Agricultural Production				
Variable	**Coeff.**	**Std. Err.**	**t-Stat**	**p-Value**
Δ **Credit**	- 0.090	0.137	-0.66	0.522
Δ **Capital**	1.424	0.296	8.17	0.000
Δ **Cattle**	0.050	0.002	0.22	0.832
Δ **ArableLand**	0.067	0.514	3.99	0.012
Constant	-0.045	0.057	0.44	0.442
N	19			
Adjusted R^2	0.745			
F(4,14)	36.87			
p-Value	0.000			

Regression Analysis

- **Regression Results**
  - As access to farm fixed capital (e.g. building, equipment, machinery) increases, the resilience increases.
  - As access to more arable land increases, the resilience increases.
- **Policy Implications**
  - Financial support programs, such as cost share programs, can be established for farmers to accumulate farm fixed capital.
  - Farmers access to arable land can be increased through government support programs, such as rent cost sharing, and long term rental contracts through leasing.

Principal Component Analysis: Senegal

Variable	Comp1	Comp2
Credit	0.470	-0.254
Capital	0.471	-0.355
Cattle	0.478	-0.119
ArableLand	0.439	0.042
FertilizerN	0.366	0.890
Component	**Eigenvalue**	**Proportion**
Comp1	4.11	0.82
Comp2	0.54	0.11
N	20	

Regression Analysis & Principal Component Analysis

Dept. Variable: % Change in Value of Total Agricultural Production				
Variable	**Coeff.**	**Std. Err.**	**t-Stat**	**p-Value**
Δ PC1: Productive Assest	0.241	0.077	3.11	0.007
Δ PC2: Variable Inputs	-0.101	0.047	-2.12	0.050
Constant	-0.014	0.044	-0.32	0.442
N	19			
Adjusted R^2	0.322			
F(2,16)	5.27			
p-Value	0.017			

Regression Analysis

- **PCA Results**
  - As access to productive assets/inputs in agriculture increases, the resilience increases.
  - As use variable inputs (import dependent) increases, the resilience decreases.
- **Policy Implications**
  - Financial support programs, such as cost share programs, can be established for farmers to access productive assets / inputs (e.g. building, equipment, machinery).
  - Farmers reliance on especially import dependent variable input can be decreased through alternative production systems, such as organic farming.
  - Use of manure instead of import dependent fertilizer can be encouraged through financial support programs.

Data Collection

- Resilience Analysis in OIC Member Countries Based on the International Databases and the Review of the Literature
  - FAO Statistics, World Bank Statistics
- Measurement of Resilience
  - % Change in Market Value of Agricultural Production and Value per Hectare
- Factors Influencing the Resilience Capacity
  - Access to Credit and Productive Assets
  - Access to Technology
  - Demographic Factors and Adaptive Capacity

Data Collection

- **Desk-Based Case Studies**
- An analysis of one non-OIC (e.g. Unites States) and two OIC Countries (e.g. Senegal and Türkiye) as case studies, based on desk research, was conducted.
- These case studies addressed the resilience of family farmers and small-scale producers and cover the topics included in the survey designed.
- Overall, linkages were formed between field-visits and desk-based studies to better form resilience of the family farmers and small-scale producers.

Data Collection

- **Field Visit Case Studies**
- Field visits to Morrocco and Azerbaijan countries were conducted to conduct an in-depth analysis of the history and current situation of resilience of family farmers and small-scale producers.
- Detailed face-to-face interviews were conducted with the public sector representatives to learn more about the existence of policies to enhance resilience of farmers in the corresponding country.
- At the end of each visit, an assessment of the resilience of family farmers and small-scale producers was conducted and applicable policy recommendations were developed.
- These policy recommendations are specific and target oriented, and address the problem areas and barriers to the resilience of family farmers and small-scale producers.

Data Collection

- **Survey**
- An agricultural household survey was constructed to identify the factors those influence
  - limited access to markets,
  - technology,
  - financial resources
  - identify the resilience of the family farmers and small-scale producers.
- The survey was be designed based on the literature review conducted (Dillman, 2000).
- The survey was conducted with 50 farmers.

Policy Recommendations

- **Policy Recommendation 1:** Financial support programs, such as cost share programs, can be established for farmers to accumulate farm assets, such as building, equipment, and machinery.
- **Rationale:** Especially during negative shocks to agricultural production, farmers can retain production through owned asset and also use those as a leverage to obtain finance.
- Farmers' asset ownership has been shown to influence their easier access to new technology, finance, and information.
- Multi-year cost share programs and supporting educational programs can be established by the OIC member countries' governments to increase the resilience of family farms and small-scale producers.

Policy Recommendations

- **<u>Policy Recommendation 2:</u>** Farmers' access to arable land can be increased through government support programs, such as rent cost sharing, and long-term rental contracts through leasing.
- **Rationale:** Farmers' access to more arable land can increase their resilience through increasing their efficiency and benefiting from economies of scale.
- Larger farms have easier access to new technologies that require fixed investment cost, through benefitting from economies of scale.
- Larger farms also have easier access to finance as they have more land to use as leverage. Institutional arrangements and government security can be given to establish long term land rental and leasing.
- However, care should be taken not to cause deforestation. Another option is to establish institutions to collect farmland of farmers at different locations into one location.

Policy Recommendations

- **Policy Recommendation 3:** Farmers' reliance on especially import dependent variable inputs, such as nitrogen fertilizer, can be decreased through alternative production systems, such as organic farming and use of manure as fertilizer.
- **Rationale:** With increasing concerns over economic and environmental quality problems, reliance on use of import dependent fertilizers can be decreased by providing financial and educational support to farmers.
- Multi-year cost share programs can be developed to help farmers with the cost of organic production and yield decreases due to use of manure.
- Organic production is crucial for sustainable agriculture and provides a niche marker premium for the farmers, which enhances revenues generated. Organic production is not input intensive but relies on market premium to become profitable.

Policy Recommendations

- **Policy Recommendation 4:** Off-farm income opportunities should be generated to provide alternative income sources for the farmers. Investment incentives can be given to private companies to invest in rural areas to generate employment opportunities to farmers.
- **Rationale:** Farmers' reliance on one source of agricultural income should be decreased through providing off-farm income opportunities.
- With having alternative sources of income, farmers' resilience towards negative shocks to agricultural production can be increased.
- Farmers with off-farm income are shown to be more likely to adopt new technologies with the additional income they have. This additional income can also help farmers to finance farm expenses and get credit when needed.
- Hence, OIC member countries should provide incentives to private companies to invest in rural areas. Producer cooperatives can also be supported to establish production facilities in the rural areas to generate off-farm employment opportunities for farmers.

Policy Recommendations

- **Policy Recommendation 5:** Social capital should be enhanced within the community to generate support for farmers to each other during negative economic, environmental, or social negative shocks.
- **Rationale:** Existence of social capital (i.e. productive relationships) among farmers can enhance farmers' resilience towards economic, environmental, or social negative shocks by making farmers help each other or providing community support.
- The existence of social capital has been shown to increase farmers' access to financial sources, adoption of new technologies, and sustainable use of natural resources.
- Government educational and financial support programs, such as those in the European Union, can be established for farmers to work together managing land or using natural resources or even just sharing their experiences and problems, which then can lead to increased social capital.
- Another approach would be to give government financial support to a group of farmers or cooperatives to promote enhancement of relationships among farmers.

Policy Recommendations

- **Policy Recommendation 6:** Effective Agricultural Extension systems should be established by providing direct links from universities to farmers in the field to promote the spread of new information to the farmers.
- **Rationale:** Farmers' access to new information and having their problems solved is critical in increasing their resilience towards negative economic and environmental shocks.
- Change in farmers' behavior to increase their resilience relies on effective extension programs. Hence, government funds should be provided to universities to generate extension programs with direct link to the farmers in the field.
- Area based responsibilities can be generated among universities within a country and certain members within the university can be responsible from generating extension programs.

25th MEETING OF THE COMCEC AGRICULTURE WORKING GROUP

Thank You!

Email: haluk.gedikoglu@missouri.edu