**ÇUKUROVA ÜNİVERSİTESİ**

**FEN BİLİMLERİ ENSTİTÜSÜ**

**LİSANSÜSTÜ TEZ KONUSU BİLDİRİM FORMU**

**Tarih: ……. / …… / …….**

**1. LİSANSÜSTÜ TEZ BİLGİLERİ**

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| **Anabilim Dalı** | Tarim Ekonomisi |
| **Tez Programı**  **(Yüksek Lisans / Doktora)** | Yüksek Lisans |
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| **Öğrencinin Numarası** | 2019911466 |
| **Teze Başlama Tarihi** |  |
| **Tezin Adı** | **Türkçe:** Küresel Gıda Sistemlerinin Sürdürülebilir Beslenme Güvenliği Ölçütlerine Göre Sınıflandırılması: Çok Değişkenli Tekniklerin Uygulanması. |
| **İngilizce:** Categorizing Global Food Systems Based on Sustainable Nutrition Security Metrics: Application of Multivariate Techniques. |

**2. TEZ ÖNERİSİNİN ÇUKUROVA TTO TARAFINDAN DEĞERLENDİRİLME BEYANI**

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| Tez Önerisinin, Çukurova Teknoloji Transfer Ofisi (Çukurova TTO) tarafından, bilimsel araştırmalar neticesinde ortaya çıkan buluş ve yenilikçi ürünlerin ticarileşmesi; bunların toplumun, ülke ekonomisinin ve üniversitenin faydasına dönüştürülmesi amacıyla değerlendirmesini onaylıyorum / onaylamıyorum.  ***Not:*** *Onay verilmesi durumunda Tez Program Özeti PDF formatında [fenbilens@cu.edu.tr](mailto:fenbilens@cu.edu.tr) adresine gönderilmelidir.* |
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1. **ÇALIŞMANIN ÖNEMİ VE AMACI**

A food system analysis is a broad concept that not only encompasses the functional relationships of enourmous number of actors in the food system value chain, but also the normative goals that a food system aims to achieve (von Braun et al., 2020). In the work written to address the 2020 food system summit, (Von Braun et al., 2020) stipulates that any real world food system analysis has to start with the normative approach of creating goals based on value judgement, use the positive appoach to see if the functional relationships that exist in the food system can actualize these goals and then design the food system to achieve these goals. According to the same study, the positive and normative approaches cannot be used independently of one another as the first runs into the danger of collapsing on the sheer hugeness of relationships within the food system and the latter into wishful thinking, that is, creating goals that are unachievable.

Basing on this understanding then, this study is an attempt to use multivariate statistical techniques to categorize global food systems based on the seven metrics of sustainable nutritional security as proposed by (Gustafson et al., 2016). These metrics measure the first goal of the *Five Action Tracks,* five system-wide objectives for global food systems set by the UN’s Food Summit of 2020 (von Braun et al., 2020). The five action tracks include:

1. Ensuring Access to Safe and Nutritious Food for All (enabling all people to be well-nourished and healthy);
2. Shifting to Sustainable Consumption Patterns (promoting and creating demand for healthy and sustainable diets, reducing waste);
3. Boosting Nature-Positive Production at Sufficient Scale (acting on climate change, reducing emissions and increasing carbon capture, regenerating and protecting critical ecosystems and reducing food loss and energy usage, without undermining health or nutritious diets);
4. Advancing Equitable Livelihoods and Value Distribution (raising incomes, distributing risk, expanding inclusion, creating jobs); and
5. Building Resilience to Vulnerabilities, Shocks and Stresses (ensuring the continued functionality of healthy and sustainable food systems).

(von Braun et al., 2020)

(Von Braun et al., 2020) rightly stipulates that pursuing any one of the five action tracks alone will not cover the whole scope of the food system concept, but he also does recognize that the first action track is an overarching system goal and should be pursued in relation to the remaining goals as they also relate to one another. The seven metrics proposed by (Gustafson et al., 2016) do just that. They account for all the remaining action tracks while measuring the overarching action track number 1. Therefore, although this study ***will not*** assess all the dimensions of a good and supposedly well-functioning food system, it will certainly assess one part of it that is almost at the center of everything. The following are the objectives of this study:

1. To apply multivariate statistical methods in categorizing the global food system based on the seven metrics of Sustainable Nutrition Security developed by Gustafson et al., (2016).
2. To compare the country groups in the food systems according to the size of their economies in order to test the hypothesis put forward by Louis Malassis, (2003), that food systems differ according to the size of the economy they operate in.
3. To check the effect of the size of an economy on the seven metrics of sustainable nutrition security and identify the points of difference between different economies.

The study started with a premise from Louis Malassis, (2003) that food systems are different according to the size of economy they operate in. Malassis, (2003), like Von Braun et al., (2020), uses the standard definition of a food system as a system of how food is produced, processed, transported, stored and consumed. They explain that a food system itself is one component among aggregate components that make an economic system. Von Braun et al., (2020) stipulates that a food system is connected to three major systems of an economy; the health system, the energy system and the ecology system. The metrics used in this study cover connections to these systems at country level through a number of indicators.

As an outcome, the study will provide a general and cross-sectional look on situation of food security and nutrition as it was immediately before the COVID-19 pandemic. It will also hopefully provide insights to which economies would’ve been hit harder by the pandemic and which countries need to concentrate on which policy objectives in order to facilitate sustainable nutrition security for their people.

1. **MATERIAL AND METHODS**
   1. **Materials**

The study will use the seven metrics of sustainable nutrition security as developed by Gustafson et al., (2016). The metrics have been chosen due to their well-roundedness. As stipulated by (Von Braun et al., 2020), the metrics not only take into account the variables related to nutritional security but also the ones related to ecological sustainability, social-cultural wellbeing and resilience to shocks. This makes them ideal for a study like this where the normative qualities of food systems as they are understood globally matters (INDDEX, n.d.). The metrics are as shown in the table below:

|  |  |  |  |
| --- | --- | --- | --- |
| The Metric | Indicators | What They Measure | Source of Data |
| Food Nutrient Adequacy | Non-Staple Food Energy | Nutrients From Non-Staple Food | FAO’s Food Balance Sheets  (*FAOSTAT*, n.d.) |
| Shannon Diversity | Nutrient Diversity Available in the Food System | Will Not be measured |
| Modified Functional Attribute Diversity | FAO’s Food Balance Sheets  (*FAOSTAT*, n.d.) |
| Nutrient Density Score |
| Population Share with Adequate Nutrients | Proportion of Population with Adequate Nutrients | FAOSTATS |
| Ecosystem Stability | Ecosystem Status | Ecosystem Status | Environmental Performance Index, Yale Center for Environmental Law and Policy.  [(*Downloads » Environmental Performance Index, 2020 Release: Environmental Performance Index (EPI) | SEDAC*, n.d.)] |
| Per-Capita Greenhouse Gas (GHG) Emissions | Eco-Efficiency | United Nations Framework Convention on Climate Change  [(*Documents | UNFCCC*, n.d.)] |
| Per-Capita Net Freshwater Withdrawals | (*Data Collections | SEDAC*, n.d.) |
| Per-Capita Non-Renewable Energy Use |
| Per-Capita Land Use |
| Food Affordability & Availability | Food Affordability | Food Availability and Affordability | (*Global Food Security Index (GFSI)*, n.d.) |
| GFSI Food Availability Score |
| Poverty Index | (United Nations, 2021) |
| Income Inequality |
| Social Cultural Wellbeing | Gender Equality |  | (*Global Gender Gap Report 2020 - Reports - World Economic Forum*, n.d.) |
| Extent of Child Labor |  | (ILO, 2020) |
| Respect for Community Rights |  | (*Home | Environmental Democracy Index*, n.d.) |
| Animal Health & Welfare |  | Not Measured  (Insufficient Data) |
| Resilience | ND-GAIN Country Index | Nation’s Vulnerability to Climate Change | (*Country Index // Notre Dame Global Adaptation Initiative // University of Notre Dame*, n.d.) |
| Food Production Diversity | Shares of Agricultural Food Production in The Country | (*FAOSTAT*, n.d.) |
| Food Safety | Food Borne Disease Burden |  |  |
| GFSI Food Safety |  |  |
| Waste and Loss Reduction |  |  |  |

245 countries out of 290 geographical regions defined by the United Nations’ Statistics Division under the [Standard Country or Area Codes for Statistical Use (M49)](https://unstats.un.org/unsd/methodology/m49/) will be used as the population for this analysis. Data for classification of country economy sizes will be taken from The World Bank Group (The World Bank Group, 2019). According to Hair et al., (1998), this amount of data points is enough for all of the multivariate analyses that will be carried out henceforth.

* 1. **Methods**

The first task of the analysis will be to categorize the countries according to their score on all indicators of the seven metrics. A series of cluster analyses will be applied to each of the seven metrics and group countries according to the indicators found in each metric. Each cluster solution will then be dissected to have four clusters in it and then a visual inspection of each cluster solution will be made to check if the countries found in each of the four groups are similar in all seven metrics. An aggregate cluster analysis will then be done which will combine indicators from all seven variables at once, then its results compared to the former cluster results, also under a four-group structure. Depending on how different these two results will be, the groups from either the former or the later analysis will be used for the later stage.

The second stage of the analysis will involve comparing the cluster results from the previous analysis to the country classification done by the World Bank group based on size of economy. A visual analysis will be done to confirm whether the countries in the grouped food systems corresponds to their classification by the world bank as developed, developing or under-developed. A MANOVA analysis will then be done to see if the size of the economy causes a statistically significant difference on the indicators and if so, which ones. The following null hypothesis will be tested:

Where: to = variate means created in each group by the dependent variables

and

Where:

µ*i = Yi =* variate of the scores created in each group by the metrics

*Xn* = ‘n’ the number of metrics or indicators used for each metric

*i =* any of the groups in the independent variable

This part of the analysis will fulfill the requirements of the second and third objective of the research. The report will then be written based on these findings.

1. **ÇALIŞMA PLANI**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Activity | 2022 | | | | | | | | | |  | 2023 | |
|  | **Months** | | | | | | | | | |  |  |  |
|  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| Data Collection and Cleaning | X | X | X | X |  |  |  |  |  |  |  |  |  |
| Statistical Analysis |  | X | X | X | X | X |  |  |  |  |  |  |  |
| Report Writing |  |  |  |  | X | X | X | X | X | X |  |  |  |
| Reviews |  |  |  |  |  |  |  |  |  | X | X | X |  |
| Final Submission |  |  |  |  |  |  |  |  |  |  |  | X | X |

1. **KAYNAKLAR**

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