

# **25TH INTERNATIONAL CONGRESS OF TURKISH REGIONAL SCIENCE ASSOCIATION**

**IN COLLABORATION WITH  
21ST INTERNATIONAL CONFERENCE OF  
THE MIDDLE EAST ECONOMIC ASSOCIATION**

## **ABSTRACT BOOK**

**MARMARA UNIVERSITY  
ISTANBUL, TÜRKİYE  
NOVEMBER 29-30, 2025**



***25th International Congress of Turkish Regional Science Association***

**Abstract Book**

**Host**

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Center for Regional Development  
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November 29-30, 2025

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**Editors**

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## Preface

It is with great pleasure that we present the Abstract Book of the 25th International Congress of the Turkish Regional Science Association. Reaching the 25th edition of our congress is a significant milestone, representing a sustained tradition of academic excellence and continuous dialogue in the field of regional science. For decades, these gatherings have served as the primary platform for scholars to debate the evolving dynamics of regions, cities, and spatial economies in Türkiye and beyond.

Hosted by Marmara University in Istanbul, this year's congress features a diverse array of research, ranging from the economic foundations of urban proximity and resilience to the geography of logistics and the technological transformation of strategic sectors. The contributions in this volume reflect the depth of our community's inquiry into governance, development, and the complex challenges facing modern regional economies.

This year's event acquires special significance through our collaboration with the 21st International Conference of the Middle East Economic Association (MEEA). This partnership has greatly enriched our scientific program, allowing for a broader intersection of regional science with the economic perspectives of the Middle East and North Africa.

We extend our sincere gratitude to the Marmara University Center for Regional Development (MACRED) for hosting this event and for their dedicated efforts in its organization. We also wish to thank the Middle East Economic Association (MEEA) for their valuable collaboration, which has strengthened the international scope and impact of this congress.

We hope that the insights shared in this Abstract Book will inspire future research and contribute to evidence-based policymaking. We thank all the authors and participants for their contributions to the success of this 25th Congress.

Prof. Dr. Tüzin Baycan

Director

Turkish Regional Science Association



**BÖLGE BİLİMİ TÜRK MİLLİ KOMİTESİ**  
TURKISH NATIONAL COMMITTEE OF REGIONAL SCIENCE



**25TH REGIONAL SCIENCE AND REGIONAL PLANNING CONGRESS**

**in collaboration with**

**21ST INTERNATIONAL CONGRESS OF MIDDLE EAST ECONOMIC ASSOCIATION (MEEA)**

# CONGRESS PROGRAM



**29-30 NOVEMBER 2025**

**MARMARA UNIVERSITY, GÖZTEPE CAMPUS, İSTANBUL**

[meea2025-conference.marmara.edu.tr](https://meea2025-conference.marmara.edu.tr)  
<https://www.turkishregionalscience.org>

## Turkish Regional Science Association

### 25th Congress of Turkish Regional Science Association

#### SHORT PROGRAM – SATURDAY

**10:30-12:00**

[Regional Science: Governance and Development 1 \(A118\)](#)

**15:30-17:00**

[SPECIAL SESSION: Turkish Regional Science Association \(A110\)](#)

**17:15-18:45**

[Regional Science: Governance and Development 2 \(A118\)](#)

#### SHORT PROGRAM – SUNDAY

**10:30-12:00**

[Regional Science: Development \(A118\)](#)

**15:15-16:45**

[Regional Science: Defence Economics \(A118\)](#)

**17:00-18:30**

[Regional Science: Governance and Development 3 \(A118\)](#)

**PARALLEL SESSION: Regional Science: Governance and Development 1 (A118)**

November 29, 2025 10:30-12:00

Session Chair: *Fatih Altuğ*

**Economic Determinants of the Probability of Cultural Impoverishment at Regional Level in Turkey**

*Eser Çapık*

**An Analysis of Spatial Parameters Affecting Female Employment: The Case of Türkiye**

*Fatih Altuğ*

**Economic Foundations of the 15-Minute City: Rethinking Urban Proximity and Sustainable Growth**

*Meltem Parlak Mavitan*

**SPECIAL SESSION: Regional Science (A110)**

November 29, 2025 15:30-17:00

*in collaboration with Turkish Regional Science Association*

Session Chair: *Tüzin Baycan, ITU*

Invited Speakers

*Ahmet Şimşek, Ministry of Industry and Technology of Türkiye*

*Murat Ali Dulupçu, Süleyman Demirel University*

*Sedef Akgungor, Dokuz Eylül University*

**PARALLEL SESSION: Regional Science: Governance and Development 2 (A118)**

November 29, 2025 17:15-18:45

Session Chair: *Tüzin Baycan*

**Exploring the Macroeconomic Impact of Pharmaceutical Patents in Türkiye: Analyses of Economic Growth and External Trade**

*Alper Akpınar*

*Mert Abay*

*Mahir Tosunoğlu*

*Sedef Akgüngör*

*Bülent Kılıç*

**Urban Identity and Heritage in Transition: Strategies of Preservation in Historic Gulf Cities**

*Raya Atour*

*Tüzin Baycan*

**The Role of Digital Transformation on Regional Economic Growth: A Case of İzmir, Türkiye**

*Sadullah Aksoy*

*M. Emirhan Karaman*

*Ecem Engin*

*Zeynep Elburz*

**PARALLEL SESSION: Regional Science: Development (A118)**

November 30, 2025 10:30-12:00

Session Chair: *Suat Tuysuz*

**Local and Sectoral Impacts of Natural Disasters: A Case Study on the Manufacturing Industry in Elbistan**

*Fatih Altug*

*Volkan İlmaz*

**Assessment of Vulnerability and Resilience of the Agricultural Supply Chain in Türkiye in Response to the Kahramanmaraş Earthquakes**

*Tüzin Baycan*

*İbrahim Tuğrul Çınar*

*Suat Tuysuz*

*Semanur Soyyiğit*

**Using Geographical Indications as a Tool for Regional Economic Development: Analysis of Spatial Production Patterns, Regional Specialization and Rural Development in Türkiye**

*Sena Ergül*

*Tüzin Baycan*

**Soft power and more: Analyzing regional connectivity between airports in Africa and Türkiye**

*Umut Erdem*

*Tüzin Baycan*

**PARALLEL SESSION: Regional Science: Defence Economics (A118)**

November 30, 2025 15:15-16:45

Session Chair: *İbrahim Tuğrul Çınar*

**Defence-Related Technologies and Technology Intensive Exports in the Turkish Defence Industry**

*Alper Akpınar*

*Necmettin Çelik*

**Evaluation of Industry 4.0 Technology Components in Turkish Defence Industry**

*Aslı Duman*

*Necmettin Çelik*

**Innovative Competitiveness in Turkish Defence Industry: An Evolutionary Perspective**

*Necmettin Çelik*

*İbrahim Tuğrul Çınar*

*Suat Tuysuz*

**The Spin-in Patterns of Dual-Use Technologies in The EU Defence Geography**

*Necmettin Çelik*

**PARALLEL SESSION: Regional Science: Governance and Development 3 (A118)**

November 30, 2025 17:00-18:30

Session Chair: *Necmettin Çelik*

**An Evaluation of Spatial Characters and the N-Minute City Model in Ankara**

*Selva Sözen*

*Çiğdem Varol*

**Geography of Logistics Clusters in Türkiye**

*Tüzin Baycan*

*Aslı Duman*

*Necmettin Çelik*

**Macroeconomic Effects of International Migration: A Study for Level 2 Regions in Türkiye**

*Yeşim Kuştepeli*

*Yaprak Gülcan*

*Sedef Akgüngör*

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# ABSTRACTS

## **ECONOMIC DETERMINANTS OF THE PROBABILITY OF CULTURAL IMPOVERISHMENT AT REGIONAL LEVEL IN TURKEY**

Eser ÇAPIK<sup>1</sup>

Poverty, one of the most important problems of the economy, is a deep and multidimensional problem in the social, economic and cultural dynamics of societies. The reduced access of individuals to cultural services, educational opportunities and artistic activities due to poverty leads to a serious contraction in the cultural development opportunities of individuals and thus societies. Since such activities are generally accessible to those with higher economic status, individuals living in poverty are excluded from cultural activities and social inequality deepens. When such a tragic situation is combined with factors such as modernization, globalization, cultural assimilation, media, technological developments and war, the erosion of education, art, knowledge and social values may become inevitable. In other words, “cultural impoverishment” is actually emerging. Cultural impoverishment can be defined as the process by which a society's local traditions, languages, arts, crafts and other cultural elements begin to disappear or lose value due to factors such as globalization, digitalization and modernization. Cultural impoverishment can lead to individuals and societies becoming alienated from knowledge, art and social values, and after a certain period of time, it can also bring about negative consequences such as the weakening of the collective memory of society, the loss of traditions and the erosion of common values. For example, traditional holidays, ceremonies or rituals begin to lose their meaning; society becomes alienated from its own cultural values such as clothing, music, dance, theater; interest in traditional handicrafts decreases and the number of craftsmen engaged in these crafts begins to decline; global popular culture begins to dominate instead of local cultures, The destruction of cultural heritage sites due to reasons such as urbanization or war, the replacement of historical buildings with modern structures, the loss of the meaning of cultural activities for commercial gain, and many other factors are sad facts that show that society is heading towards cultural impoverishment. As in many developing countries, individuals' access to cultural services, educational opportunities and artistic activities in Turkey is largely dependent on their economic status. This situation reveals a cycle in which socioeconomic inequalities lead to cultural inequalities. In particular, individuals living in low-income groups have difficulty in participating in cultural and artistic activities due to economic difficulties. Moreover, the fact that cultural activities are increasingly perceived as a luxury consumption further deepens these inequalities. Various authors have addressed the devaluation and identity erosion that local cultures suffer in their efforts to adapt to global standards (Jeffrey 2000, Mattelart 1994, McMillin 2003, Miller 1998, Rajagopal 1993, Stahlberg 2002, Tinic 2003, Wilk 1995), or consumer brands and their advertising (Davila 1997, Foster 2002, Kemper 2001, Mazzarella 2003, Miller 1997, Moeran 1996a, Watson 1997). This is because popular culture is spreading rapidly across the world with the influence of modern communication tools and globalization, leaving deep impacts on local cultures. This process can lead to the weakening of cultural identities and traditional values, especially in developing countries such as Turkey. Income level has a significant impact on this situation. Although low income level triggers cultural impoverishment by creating obstacles to access to cultural, social and traditional activities, high income level also paves the way for cultural impoverishment by increasing the demand for imported products. This is because with easier access to the internet and higher income levels, imported products are seen as prestigious and more easily accessible, which can have devastating effects on local production, making it difficult for local producers to compete with imported products in terms of price or quality, thus reducing traditional production and leading to the gradual disappearance of some crafts.

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Today, when economic poverty is at the forefront, the effects of impoverishment, which emerges as a consequence of poverty, on culture, which shapes the identity of societies, have made the examination of this issue an important and current issue. In this context, this study aims to analyze the economic determinants of the phenomenon defined as cultural impoverishment in Turkey and to reveal the dynamics of this process. The contribution of the research to the literature is twofold. First, it is the first study to investigate the driving forces of cultural impoverishment in Turkey. Second, it provides a theoretical basis for cultural impoverishment. In order to examine the economic determinants of the probability of cultural impoverishment in Turkey, Level 2 regions TR1 (Istanbul), TR2 (Western Marmara), TR3 (Aegean), TR4 (Eastern Marmara), TR5 (Western Anatolia), TR6 (Mediterranean), TR7 (Central Anatolia), TR8 (Western Black Sea), TR9 (Eastern Black Sea), TRA (Northeastern Anatolia), TRB (Central Eastern Anatolia) and TRC (Southeastern Anatolia) are analyzed. This study utilizes data from the Information and Communication Technologies and Communications Organization and the Household Expenditure Survey conducted by the Türkiye Statistical Institute (Tuik), holding the year 2023 constant. Since there is no study that directly focuses on the concept of cultural impoverishment, an original model was created. In the study where logit regression analysis is applied, the number of moviegoers / per capita household expenditure is categorically used as the dependent variable representing the cultural impoverishment variable. Demographic variables such as age, gender and education as well as information and communication technologies indicators as the rate of globalization were used as control variables. Economic variables such as poverty rate, household expenditure per capita, gini coefficient, crisis and public expenditures were used to represent the variable of interest. The possible results of the study show that the gini coefficient, the poverty rate in the country, public expenditures and per capita household expenditure significantly increase the probability of cultural impoverishment in Level 2 regions.

**Keywords:** Cultural Impoverishment, Türkiye, Logit regression analysis

## Exploring the Macroeconomic Impact of Pharmaceutical Patents in Türkiye: Analyses of Economic Growth and External Trade

Alper Akpınar<sup>2</sup>, Mert Abay<sup>3</sup>, Mahir Tosunoğlu<sup>4</sup>, Sedef Akgüngör<sup>5</sup>, Bülent Kılıç<sup>6</sup>

The pharmaceutical products sector is a key driver of high-value-added production and innovation in Türkiye. Enhancing patent output through R&D investments aims to increase sustainable growth and international competitiveness. The aim of the study is to reveal the effects of pharmaceutical patent applications on foreign trade and national income. The study involves two stages. The first stage investigates the effects of pharmaceutical, medical, and health patent applications on total imports, total exports, pharmaceutical imports, and pharmaceutical exports. The second stage examines the effects of pharmaceutical, medical, and health patent applications on national income.

The data consists of annual data for Türkiye between 1977 and 2020. National Income is obtained from the World Bank, patent applications from the OECD, and export and import data from the TÜİK databases. The econometric analysis involves testing for the variables' stationarity, followed by a bounds test for cointegration to identify long-term relationships among non-stationary variables. The analysis concludes with the estimation of long-run coefficients using an ARDL model.

The findings indicate that total patent applications have no significant impact on imports but are positively associated with both exports and national income. Pharmaceutical patents have a negative impact on both total and pharmaceutical imports, with no significant effect on total exports, but a positive influence on pharmaceutical exports and national income. Medical patents do not significantly affect total imports and exports, but negatively impact pharmaceutical imports, pharmaceutical exports, and national income. In contrast, health patents reduce total and pharmaceutical imports while positively influencing total exports, pharmaceutical exports, and national income. The results highlight the differentiated impact of various types of patents on trade and economic performance, implying the strategic importance of targeted innovation policies in the pharmaceutical and health sectors to enhance Türkiye's economic growth and global trade position.

**Keywords:** Health economics, pharmaceutical trade, patent

**JEL Classifications:** I10, C32, F10

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## MACROECONOMIC EFFECTS OF INTERNATIONAL MIGRATION: A STUDY FOR LEVEL 2 REGIONS IN TÜRKİYE

Yeşim Kuştepe<sup>7</sup>, Yaprak Gülcan<sup>8</sup>, Sedef Akgüngör<sup>9</sup>

International migration refers to the movement of individuals across national borders in pursuit of better living conditions, employment opportunities, or safety. These migration flows significantly impact the sending and receiving regions' economic, social, and demographic structures. For example, while migrants' participation in the labor force may provide cheap labor in certain sectors, it can also increase informal employment in some areas. Population growth is often observed in regions that receive migrants, whereas regions that send migrants may experience population decline and accelerated aging. In areas with high migrant concentrations, the demand for access to social services increases. From the regional development perspective, international migration causes structural changes in local labor markets. Migrants tend to be employed in low-skilled jobs, while the local population may shift towards higher value-added occupations. However, increasing informal and low-wage jobs may negatively affect competition in specific sectors. On the other hand, an increase in the young migrant population can support labor supply, accelerate urbanization, and raise demand for housing and infrastructure.

Given its geographic location and socio-political context, Turkey is a key country of origin, transit, and destination in global migration. The impacts are obvious in major cities and border provinces, while others—like Central Anatolia—experience more limited effects. Following the Syrian civil war, Southeastern and Eastern Anatolia became key migrant destinations, whereas migrant labor is prevalent in agriculture and tourism in coastal regions.

This study examines the relationship between international migration and regional development across Turkey's NUTS-2 regions from 2009 to 2023. The data used in the study will be obtained from the Geographical Statistics and Regional Statistics portals of the Turkish Statistical Institute (TURKSTAT). Using regional data, panel data analysis is employed to assess the relationship between the volume of international migration (number of incoming migrants and migration rate) and macroeconomic indicators such as education, employment, unemployment, GDP per capita, and entrepreneurship. While previous research has primarily focused on national-level impacts or refugee-specific labor market effects, this study is unique in its regional and longitudinal scope. Applying panel data analysis to capture both spatial and temporal variation contributes new empirical evidence on the territorial uneven effects of international migration in Turkey. It addresses a critical gap in the literature on migration and development in middle-income transit countries, where regional disparities and policy responses remain underexplored.

**Keywords:** Agricultural Economics, Regional Innovation, Rural Development

**JEL Classifications:** O18, Q13, R58

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## **Triangulating Complexity, Relatedness, and Governance: A Three-Dimensional Smart Specialization Framework for Türkiye's NUTS-2 Regions**

İbrahim Tuğrul Çınar<sup>10</sup>, Tüzin Baycan<sup>11</sup>

Smart specialization has emerged as a transformative framework for regional development, emphasizing place-based innovation strategies grounded in the unique capabilities and knowledge assets of regions. This study adapts and extends the relatedness–complexity framework originally developed by Balland et al. (2019) by introducing institutional quality as a third analytical dimension, offering a novel three-dimensional perspective on regional diversification potential. Unlike prior studies that omit governance considerations, our research operationalizes this framework at the NUTS-2 regional level in Turkey, using data spanning from 2011 to 2019. To capture both the supply and demand sides of regional technological and industrial capacity, we conduct parallel analyses based on patent and export data. First, we calculate global complexity scores using IPC (four-digit) patent data for 23 European countries, and subsequently derive regional patent complexity and relatedness density metrics for Turkish NUTS-2 regions using TÜRKSTAT data. Similarly, using the CEPII BACI dataset, we compute global product complexity indices, which are then used to calculate export complexity and relatedness measures for Turkish regions based on SITC Rev.3 export data from TÜRKSTAT. Institutional quality is incorporated using standardized regional indicators from the University of Gothenburg's Quality of Government EU Regional Dataset. This approach not only allows us to integrate governance capacity as a critical third axis in the smart specialization framework, but also helps mitigate structural biases. Standardizing institutional quality indicators reduces the influence of the fact that more developed regions and countries tend to score higher on governance metrics, while the use of globally derived complexity values minimizes local bias inherent in country-specific innovation profiles. The Euclidean distance from the origin in this three-dimensional space (complexity, relatedness density, and institutional quality) serves as a composite indicator of regional smart specialization potential. Our findings uncover marked spatial heterogeneity across Turkish regions. Regions with higher institutional quality exhibit stronger coherence between technological capabilities and institutional readiness, making them better positioned to translate innovation potential into effective policy action. This study not only empirically substantiates the importance of governance in the smart specialization paradigm, as emphasized by Balland et al. (2019), Rigby et al. (2022), and Pinheiro et al. (2022), but also fills a critical gap by incorporating institutional quality directly into the analytical framework. In doing so, it offers a more context-sensitive and policy-relevant approach to regional innovation strategy.

**Keywords:** Smart specialization, Economic complexity, Institutional quality

**JEL Codes:** O25, O33, R58

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## The Role of Digital Transformation on Regional Economic Growth: A Case of İzmir, Türkiye

Sadullah Aksoy<sup>12</sup>, M. Emirhan Karaman<sup>13</sup>, Ecem Engin<sup>14</sup>, Zeynep Elburz<sup>15</sup>

The digital transformation of sub-provinces is increasingly recognized as a key driver of regional economic growth, with varying levels of technology adoption shaping sub-provincial economic dynamics. This study examines the relationship between digital transformation and regional economic growth in İzmir, emphasizing the role of technoparks and innovation hubs in fostering technology adoption and high-tech entrepreneurship, while also considering the contextual factors and ecosystem dynamics that shape their impact. By analyzing these interactions, the study aims to deepen the understanding of how digital transformation unfolds across sub-provinces and influences regional economic trajectories. The research is structured around identifying the drivers of digital transformation and examining the role of knowledge spillovers, innovation hubs, and technoparks in the diffusion of digital technologies in İzmir, employing a mixed-method approach that integrates theoretical analysis with an empirical investigation of İzmir's sub-provinces. The empirical analysis is based on a longitudinal assessment of digital transformation levels in relation to technological and digital infrastructure, R&D and innovation capacity, human capital and demographic factors, sectoral dynamics, and their relationship with regional economic growth, utilizing both classical and spatial econometric techniques to effectively capture spillover effects. The findings are expected to demonstrate that İzmir's sub-provinces have undergone a gradual yet uneven digital transformation, characterized by varying levels of technology adoption across different sectors, and to reveal a statistically significant yet context-dependent relationship between digital transformation and regional economic growth. Unlike previous studies that explore digitalization and economic growth either at the sectoral level or across entire regions, this research adopts a sub-provincial perspective within regions, highlighting intra-regional disparities and the differentiating role of technoparks in digital transformation and economic development, ultimately offering valuable insights for policymakers, technopark managers, and regional development planners seeking to design more targeted strategies for leveraging digital technologies to drive sustainable economic growth.

**Keywords:** technopark; regional economic growth; spill-over effect

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## INNOVATIVE COMPETITIVENESS IN TURKISH DEFENCE INDUSTRY: AN EVOLUTIONARY PERSPECTIVE

Necmettin Çelik<sup>16</sup>, İbrahim Tuğrul Çınar<sup>17</sup>, Suat Tuysuz<sup>18</sup>

The increase in regional conflicts within today's increasingly multipolar international system has led nearly all states to significantly expand their military expenditures. At the same time, due to the transformative impact of digital technologies on modern warfare, traditional indicators such as troop numbers or ammunition stockpiles are losing their relevance. Instead, innovative and complex dynamics within the defence industry are gaining importance. In this context, this study adopts relatedness and economic complexity metrics, commonly used in innovation and trade literature, as analytical tools to evaluate technological competitiveness in the defence sector. This study aims to evaluate the comparative innovation potential of the Turkish Defence Industry relative to European countries by calculating product-level relatedness density and economic complexity indices for defence-related technologies classified under 4-digit IPC codes. The analysis covers 23 European countries, including Türkiye, using patent data from 2010 to 2020 obtained from the OECD Patent Statistics Database. Based on these data, a relatedness–complexity framework is constructed for specific sub-defence technology classes, namely F41 (Weapons), F42 (Ammunition), B64 (Aircraft and Aviation), and B63 (Ships and Waterborne Vessels), enabling a comparative mapping of Türkiye's position relative to its European counterparts. Next, based on the computations, Comparative Defence Advantage Index is constructed using Principal Component Analysis. This index highlights Türkiye's innovation-based competitiveness in the defence industry both as a whole and across specific IPC-based technology classes such as F41 (Weapons), F42 (Ammunition), B64 (Aircraft and Aviation), and B63 (Ships and Waterborne Vessels). The results will identify sub-sectors in which Türkiye holds potential comparative advantages and highlight areas where policy intervention is required to bridge the innovation gap with European countries. Based on these findings, technology-oriented policy recommendations will be developed. Additionally, Türkiye's relative defence industry position will be discussed as a strategic policy asset in the context of its EU accession process.

**Keywords:** Defence Economics, Relatedness, Economic Complexity

**JEL Codes:** H56, O33, O14

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## THE SPIN-IN PATTERNS OF DUAL-USE TECHNOLOGIES IN THE EU DEFENCE GEOGRAPHY

Necmettin Çelik<sup>19</sup>

Spin-in means using civilian knowledge in military patented technologies and is based on principle of disseminating dual-use technologies in the defence industries. Spin-in calls in the context of the EU Defence Innovation Scheme (EUDIS), which encourage to cross-fertilisation of the civil-defence innovation landscape, aim to increase innovation capacity of the EU Defence Industry by dual-use mechanism. However, the effectiveness of the European Defence Fund (EDF), which was created for this purpose and has a budget of €8 billion for 2021-2027, requires determining in which technology fields the dual-use potential and spin-in effect are stronger. Accordingly, in this study, the existence of spin-in effect based on dual-use technologies from civilian technologies to military technologies in the EU Defence Industry will be analyzed in terms of International Patent Classification (IPC) technology fields with Spatial Panel Models covering the period 1996-2020 and 22 EU countries. In empirical analysis, military technologies will be measured by patent statistics in sections F41-Weapons, F42-Ammunition, B64-Aircraft and Aviation, and B63-Ships or Other Waterborne Vessels of the IPC, while civilian technologies will be measured by patent statistics that do not cover these sections. According to the empirical findings, it will be possible to understand which technology fields should be supported in order to improve the innovation capacity of the EU Defence Industry by revealing dual-use and spin-in patterns. Thus, dual-use policies for the EU Defence Industry can be developed, and the effectiveness of the EDF can be increased.

**Keywords:** European Defence Funds, Dual-use Technologies, Technological Spin-in, EU Defence Geography, Spatial Panel Models.

**JEL Codes:** C31, D83, O31.

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## Urban Identity and Heritage in Transition: Strategies of Preservation in Historic Gulf Cities

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Historic cities across the Gulf region are increasingly shaped by the pressures of globalization and rapid urban development. These forces often threaten the integrity of local urban identities and cultural heritage. This study categorizes strategic approaches used to navigate these challenges through comparative case studies in Muharraq (Bahrain), Doha (Qatar), and Sharjah (UAE). By incorporating participant observation and phenomenological reflection, the research explores how urban identity is consolidated and renegotiated in these evolving contexts. It further applies the concept of heterotopia to interrogate the spatial and symbolic layering of heritage zones within rapidly transforming urban landscapes. Findings highlight the necessity of culturally responsive urban policies and advocate for adaptive heritage preservation as a central tool in sustainable urban regeneration. This research contributes to broader discussions on regional development, identity politics, and spatial justice in the Middle East.

**Keywords:** Gulf cities, urban identity, cultural heritage, spatial transformation, heterotopia, heritage-led regeneration

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**Using Geographical Indications as a Tool for Regional Economic Development:  
Analysis of Spatial Production Patterns, Regional Specialization and Rural Development in Türkiye**

Sena ERGÜL<sup>22</sup>, Tüzin BAYCAN<sup>23</sup>

Geographical indications (GIs) are widely known as effective tools not only for the legal protection of traditional products but also for promoting rural development, encouraging local branding, and supporting agri-food value chains. As agri-based economies seek to strengthen sustainable and inclusive development, agricultural trade and origin-based value creation are gaining new attention. This paper explores how Türkiye leverages agricultural exports and geographical indications to stimulate regional economic transformation and enhance competitiveness across diverse markets. The study integrates national export data, spatial production statistics, and GI registration records to assess Türkiye's evolving agri-food landscape. Agricultural production statistics were obtained from the Turkish Statistical Institute (TURKSTAT), while information on registered GIs was sourced from the Turkish Patent and Trademark Office's GI Platform and the European Union's GI Portal named eAmbrosia. Moreover, product based-export data was obtained from CEPII-BACI database. This study specifically focuses on EU-registered Turkish agricultural products and their impact on local production dynamics, using location quotient (LQ) analysis and panel data methods. In Türkiye case, a total of 1737 geographical indications registered nationally are recorded in the official GI platform maintained by the Turkish Patent and Trademark Office, reflecting the country's rich ecological and cultural diversity. Among these, 23 agricultural products with EU-GI registration are analyzed to understand their spatial and quantitative production patterns based on data covering the 2004–2024 period. Findings demonstrate that GI registration is associated with increased agricultural performance, regional specialization, and rural development. Türkiye's coordinated institutional framework, combining national registration systems and international visibility, contributes to both product differentiation and export growth. Türkiye's experience offers a valuable model for emerging GI economies in the region, particularly in aligning quality-based branding with broader trade and development strategies.

**Keywords:** Geographical indications, regional economic development, agricultural export, Türkiye

**JEL Classification:** P25, Q17, R11

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## **Economic Foundations of the 15-Minute City: Rethinking Urban Proximity and Sustainable Growth**

Meltem Parlak Mavitan<sup>24</sup>

This study examines the economic foundations of the 15-minute city concept, analyzing how proximity-based urban planning can reconcile traditional urban economic theories with sustainable development goals. The research aims to establish a theoretical framework for measuring the economic impact of proximity-based urban design and evaluate its potential for simultaneous achievement of economic growth and environmental sustainability.

The analysis utilizes comparative case study data from four cities implementing 15-minute city policies: Paris, Barcelona, Melbourne, and Portland. Data sources include municipal planning documents, real estate market reports, local business statistics, and OECD urban development indicators covering 2015-2024. Additional data comprises academic literature from urban economics, transport economics, and accessibility studies.

The study employs a mixed-methods approach combining systematic literature review with comparative policy analysis. Theoretical synthesis methodology integrates classical location theory with modern accessibility frameworks. Economic impact assessment utilizes cost-benefit analysis incorporating transport cost savings, time value calculations, health co-benefits quantification, and local economic multiplier effects.

The analysis reveals that 15-minute city implementation generates measurable economic benefits through three primary channels: transport cost savings for households, productivity gains from reduced commuting time, and local economic multiplier effects with higher retention rates in proximity-optimized neighborhoods. Real estate analysis shows significant walkability premiums in proximity-optimized areas. Health co-benefits generate substantial healthcare cost savings through increased physical activity and reduced air pollution exposure.

The 15-minute city concept demonstrates economic rationality beyond its environmental benefits. Proximity economics creates positive feedback loops between local economic development, sustainable transport, and quality of life improvements. The model offers a viable pathway for cities to achieve economic growth while meeting climate targets. However, implementation requires attention to spatial equity to prevent gentrification and ensure inclusive access to proximity benefits.

**JEL Classification:** R11, R41, Q01

**Keywords:** Proximity economics, sustainable urban development, accessibility

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## GREAT MODERATION AND OUTPUT VOLATILITY TRENDS IN MENA REGIONS

Hasan Engin Duran<sup>25</sup>

The output volatility is an undesirable phenomenon that describes the extent of “uncertainty” that is known to be detrimental to economic growth and development (Berument et al. 2011). Historically, “great moderation” of economic volatility has been claimed to be experienced in the western economies during the 1980s that resulted in significant decrease of output volatility. (Bernanke 2004; Clarida et al. 2000; McConnell and Perez-Quiros 2000; Stock and Watson 2002, 2003, 2005; Coric 2012). The occurrence of such a break is attributed to the advancement of inventory management systems (Zarnowitz and Moore 1986; McConnell and Perez-Quiros 2000; Owyang et al. 2008; Kahn et al. 2002), well-achieved monetary policy actions ((Taylor 1999; Boivin and Giannoni 2006) or simply to the smaller shocks received during this period (known also as “good luck hypothesis”) (Ahmed et al. 2004; Carlino et al. 2003; Owyang et al. 2008; Stock and Watson 2002, 2003, 2005). The purpose of this study is to test the great moderation and explore the output volatility trends in MENA regions or countries since this area did not receive an adequate attention in this context (Some examples of the exceptional studies are Nicet-Chenaf and Rougier, 2014; Coric, 2012; Balcilar and Danju, 2009; Duran, 2019). GDP or employment will be the main variable. A array of time series and/or spatial/non-spatial empirical tools will be employed to pursue such an analysis.

### REFERENCES

- Ahmed S, Levin A., Wilson BA (2004) Recent U.S. macroeconomic stability: good policies, good practices, or good luck? *Review of Economics and Statistics* 86(3): 824–832.
- Balcilar, M., Danju, D. (2009) Sources of Output Volatility in MENA Countries. İnönü Üniversitesi İktisadi ve İdari Bilimler Fakültesi, <https://abakus.inonu.edu.tr/server/api/core/bitstreams/79213eae-fcec-4000-b6f0-9d4da9deb78c/content>
- Baxter M., King R.G. 1999. Measuring Business Cycles: Approximate Bandpass Filters. *The Review of Economics and Statistics* (81): 575-593.
- Bernanke B (2004) The Great Moderation. Speech at the meetings of the Eastern Economic Association, Washington, D.C., February 20. <http://www.federalreserve.gov/boarddocs/speeches/2004/20040220/default.htm>.
- Berument, H.M., Dincer, N.N., Mustafaoglu, Z. (2011) Effects of growth volatility on economic performance – Empirical evidence from Turkey. *European Journal of Operational Research*, 217(2): 351-356.

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- Boivin J, Giannoni MP (2006) Has monetary policy become more effective? *Review of Economics and Statistics*. 88(3): 445–462.
- Buch CM, Doepke J, Pierdzioch C (2004). Business Cycle Volatility in Germany. *German Economic Review* 5(4): 451–479.
- Buch, C. M., Scholetter, M. (2013) Regional origins of employment volatility: evidence from German states. *Empirica* 40: 1-19
- Carlino G, Defina R, Sill K (2003) Post War Changes in Employment Volatility: New Evidence From State/Industry Panel Data, Growth Volatility. Working Papers 03-18, Federal Reserve Bank of Philadelphia.
- Carlino G, Defina, R, Sill K (2013) The Long and Large Decline in State Employment Growth Volatility. *Journal of Money, Credit and Banking* 45(2-3): 521-534.
- Chauvet M, Potter S (2001) Recent changes in the U.S. business cycle. Staff Reports 126 Federal Reserve Bank of New York.
- Clarida R., Gali J, Gertler M (2000). Monetary policy rules and macroeconomic stability: evidence and some theory. *The Quarterly Journal of Economics* 115: 147–180.
- Clark TE (2009) Is the great moderation over? Federal Reserve Bank of Kansas City Economic Review. Fourth Quarter: 5-39.
- Coric B (2012) The Global Extent of the Great Moderation. *Oxford Bulletin of Economics and Statistics* 74(4): 493-508.
- Darné O, Charles A, Ferrara L (2018). Does the Great Recession imply the end of the Great Moderation? International evidence. *Economic Inquiry*. 56(2): 745-760.
- Duran, H.E. (2019). Structural change and output volatility reduction in OECD countries: evidence of the Second Great Moderation. *Economic Structures* 8, 38 (2019). <https://doi.org/10.1186/s40008-019-0171-1>
- Engel RF (1982) Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kindom Inflation. *Econometrica* 50(4): 987-1008.
- Hakura D (2007) Output Volatility and Large Output Drops in Emerging Market and Developing Countries. IMF Working Papers 07/114, International Monetary Fund.
- Kahn JA, McConnell MM, Perez-Quiros G (2002) On the causes of the increased stability of the U.S. economy. Federal Reserve Bank of New York. *Economic Policy Review* 8(1): 183–202.
- Kim CJ, Nelson CR (1999). Has the U.S. Economy Become More Stable? A Bayesian Approach Based on a Markov-Switching Model of the Business Cycle. *The Review of Economics and Statistics* 81(4): 608-616.
- McConnell M, Perez-Quiros G (2000) Output fluctuations in the United States: what has changed since the early 1980's? *American Economic Review* 90: 1464–1476.
- Nicet-Chenaf, D., Rougier, E. (2014). Output Volatility and FDI To Middle East and North African Countries: A Close-Up On The Source Countries. *Région et Développement* n° 40
- Owyang MT, Piger J, Wall HJ (2008) A state-level analysis of the Great Moderation. *Regional Science and Urban Economics* (38): 578–589.
- Zarnowitz V, G. H. Moore (1986) Major Changes in Cyclical Behavior. in: R. J. Gordon (ed.), *The American Business Cycle: Continuity and Change*, National Bureau of Economic Research Conference on Research in Business Cycles, University of Chicago Press: 519–572

## **Assessment of Vulnerability and Resilience of the Agricultural Supply Chain in Türkiye in Response to the Kahramanmaraş Earthquakes**

Tüzin BAYCAN<sup>26</sup>, İbrahim Tuğrul ÇINAR<sup>27</sup>, Suat TUYSUZ<sup>28</sup>, Semanur SOYYIĞIT<sup>29</sup>

Two destructive earthquakes hit southeast Anatolia in the early part of 2023, and these earthquakes strongly affected 10 provinces. This region has a special importance for the agricultural sector in Turkish economy. Having a closer look, we see that the share of the 10 earthquake provinces in the sectoral GDP for agriculture, forestry, and fishing in Türkiye overall is almost 16% in 2022 (TÜİK, 2025a). As of 2022, the share of agricultural employment generated by the TR62, TR63, TRB1, TRC1, and TRC2 sub-regions, which include the 10 earthquake provinces, in the total employment of the region is 20.6%, showing one-fifth of the population earns their livelihoods from this sector in the region. The share of agricultural employment generated by this region within the agricultural employment in overall Türkiye is 20.8% in 2022 (TÜİK, 2025b). It means that the region has a special importance and potential to create jobs for people within this sector and to provide agricultural goods to both the region and the country.

Considering an earthquake as a random shock, the losses in the agriculture sector stemming from this kind of disaster may occur in several ways. First, production of agricultural goods and disruption of service delivery may affect economic flow within the sector because of physical damage. Second, disruptions of decision-making processes may affect the coordination of the flow of agricultural goods (GFDRR, n.d.). Besides the direct effects on agricultural production, disasters also affect livelihoods, nutrition, and food security (FAO, 2023). Hence, it is necessary to know the structure of the agricultural supply chain (in terms of both vulnerability and systemic importance) to manage the flow of goods with a minimum bottleneck.

For this purpose, we aim to analyze the interprovincial agriculture supply chain in Türkiye and determine the weaknesses and strengths of this chain in response to the Kahramanmaraş earthquakes. By utilizing the interprovincial trade data released by the Ministry of Industry and Technology, we applied complex network tools to agricultural supply chain network. The findings from the analysis reveal a heterogeneous connectedness and a core-periphery structure. Based on these findings, it gains importance to determine the centralities for each province. To achieve this, we employed various centrality measurements. Hub and authority centralities correspond to demand and supply

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This research is a part of the 1001 TUBITAK Project titled 'The Analysis of the Effects of 2023 Kahramanmaraş Earthquakes on the National and International Supply Chain' (Project ID: 223K626).

centralities. Additionally, we used right and left eigenvector centralities, which refer to vulnerability and systemic importance indices, respectively. Findings reveal that Gaziantep, Şanlıurfa, and Adana are among the top 10 provinces within the agricultural supply chain in terms of both demand centrality and supply centrality. Şanlıurfa and Gaziantep are also among the top 10 vulnerable provinces, while Adana and Diyarbakır are among the most systemically important provinces. The community detection algorithm revealed seven communities within the whole supply chain in agriculture. Adıyaman, Diyarbakır, Gaziantep, Kahramanmaraş, Malatya, and Şanlıurfa take place in the same community, referring to an increasing vulnerability. Looking at the bright side, two systemically important provinces affected by the earthquakes, namely Adana and Gaziantep, are involved in distinct communities, meaning a detractive factor for vulnerability. As a result of the analysis based on the aggregated earthquake region, we found that the 'earthquake region' ranks second in terms of both demand and supply centrality. Besides, it ranks first in terms of systemic importance within the agricultural supply chain. The study provides significant information and assessment for policy-makers to increase the resilience of the region against this kind of shocks.

**Keywords:** Disaster, Agricultural Supply Chain, Vulnerability, Resilience, Network Analysis

### References

- FAO. (2023). Impact of disasters in agriculture. [2.1 Multifaceted impacts of disasters in agriculture](#) (31 May 2025).
- GFDRR (n.d.). Agriculture, Livestock, Fisheries & Forestry. PDNA Guidelines Volume B. [https://www.gfdr.org/sites/default/files/publication/pdna-guidelines-vol-b-agriculture-livestock-fisheries-forestry\\_0.pdf](https://www.gfdr.org/sites/default/files/publication/pdna-guidelines-vol-b-agriculture-livestock-fisheries-forestry_0.pdf) (31 May 2025)
- TÜİK (2025a). <https://data.tuik.gov.tr/Kategori/GetKategori?p=Ulusal-Hesaplar-113> (31 May 2025)
- TÜİK (2025b). <https://data.tuik.gov.tr/Kategori/GetKategori?p=istihdam-issizlik-ve-ucret-108&dil=1> (31 May 2025)

## **Soft power and more: Analyzing regional connectivity between airports in Africa and Türkiye**

Umut ERDEM<sup>30</sup>, Tüzin BAYCAN<sup>31</sup>

Türkiye has a strategic position in the world aviation network, especially in air transportation. Due to its strategic position, it assumes important functions in ensuring intercontinental capital, cargo, and passenger circulation. The level of connection of regions to global and regional markets is an important determinant for the future of regional economies. Regions that can establish stronger connections with different markets will be able to repeat capital, cargo, human, and information circulation cycles more quickly, thus creating higher levels of capital accumulation and growing faster. In this context, this study analyzes Türkiye's economic relations with African countries through air connections. In some studies, Türkiye's aviation activities towards Africa are considered as Türkiye's soft power, as they strengthen the connection between the continent and other regions. Within the scope of the study, the transportation network between Türkiye and African airports was analyzed using the dynamic network analysis approach. As a result of the strategic expansion initiated by Turkish Airlines (THY) towards the African market in 2006, flights started to be organized to 41 different airports on the continent as of 2012. This number has increased significantly in 2017, reaching 54 airports. The African market, dominated by THY, provided flights to 23 countries on the continent in 2012, while this number increased to 31 countries in 2017. While Libya had the most airport connections in 2012, with 5 airports, this position was passed to Algeria with 6 airports in 2017. It is observed that geographical proximity is an important factor in the distribution of flight destinations in Africa. A more frequent flight network established with nearby countries both provides lower-cost access and enables more intensive passenger transportation. This situation also coincides with the economic and regional dynamics of the aviation sector.

**Keywords:** Aviation network, network analysis, regional development, Türkiye

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## **AN ANALYSIS OF SPATIAL PARAMETERS AFFECTING FEMALE EMPLOYMENT: THE CASE OF TURKIYE**

Fatih ALTUĞ<sup>32</sup>

The labor force, as one of the key instruments of competition in the global economic system, holds strategic importance for both developed and developing countries. In this context, women's participation in the labor force has become an increasingly significant issue on the global agenda. Although the social and economic dynamics differ between developed and developing countries, the barriers preventing women from participating in employment are largely similar.

This study examines the spatial parameters influencing female employment in Türkiye, a developing country with a relatively dominant patriarchal family structure. Unlike previous studies on female employment, this research employs global and spatial regression models. Global regression analyses tend to offer generalized results and fail to reflect the spatial perspective adequately. Therefore, spatial regression analyses were conducted.

The findings reveal that the factors affecting female employment do not have a uniform impact at the national level; instead, the effects of variables vary significantly across regions. These results highlight the need to move away from top-down policies based on generalized analyses and emphasize the importance of developing policies focusing on local and regional dynamics.

**Keywords:** Female Employment, Spatial analysis, Economic geography, Türkiye

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## LOCAL AND SECTORAL IMPACTS OF NATURAL DISASTERS: A CASE STUDY ON THE MANUFACTURING INDUSTRY IN ELBISTAN

Volkan İLMAZ, Fatih ALTUĞ<sup>33</sup>

Humans, living in close interaction with nature, continuously transform themselves and their environment. Unplanned resource usage, industrialization, and urbanization processes demonstrate human activity's transformative impact on nature. However, these irregular and uncontrolled interventions often result in natural disasters, with nature responding through floods, earthquakes, landslides, and droughts. Indeed, natural disasters that occur every year lead to the loss of thousands of lives and cause billions of dollars in economic damage. The scale of these losses varies depending on the type of disaster, the geographical and structural characteristics of the affected area, the location of settlements, and the nature of industrial activities in the region. The impacts of natural disasters are not limited to physical destruction; they also lead to significant disruptions in areas such as employment, economic growth, inflation, property structure, development pace, access to raw materials, agricultural production, education, health, housing, energy, transportation, and communication services. In this context, the aim of this study is to examine the impact of the earthquakes that struck Kahramanmaraş on February 6, 2023, specifically on manufacturing industry firms operating in Elbistan, which was located near the epicenter. The effects of the earthquake are evaluated through various parameters, including employment conditions in the sector, the functionality of infrastructure and superstructure facilities, and changes in domestic and foreign trade indicators. Primary data for the research were collected through face-to-face surveys with 44 of approximately 67 manufacturing firms operating in Elbistan. The collected data were analyzed using statistical methods such as factor analysis and Chi-Square tests via the SPSS software. According to the findings, firms face significant challenges, particularly infrastructure deficiencies, labor shortages, and market contraction. It has been observed that these losses are being addressed primarily through government support and incentive programs. In conclusion, this study aims to contribute a unique and localized perspective to the existing literature by focusing not on the macro-level impacts of natural disasters but on their local and sectoral effects.

**Keywords:** Natural disaster and economy, Manufacturing industry and earthquake, Economic geography, Türkiye

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## An Evaluation of Spatial Characters and the N-Minute City Model in Ankara

Selva Sözen<sup>34</sup>, Çiğdem Varol<sup>35</sup>

This study aims to understand the principles of spatial characters formed between the city center and sub-centers within the polycentric structure of Ankara, to classify these characters, and to discuss their reflections within spatial patterns.

The research targets a relational classification of the centers and sub-centers in Ankara based on spatial criteria such as accessibility, service diversity, density, and functional integrity. In this classification process, how spatial patterns are shaped in polycentric urban structures and how they are reproduced through social and spatial dynamics will be discussed. Spatial characters will be evaluated based on data such as center-periphery relationships and transportation connections, and a new model will be proposed within the framework of the “N-Minute City” approach. The development of this model will be based on the combined evaluation of both spatial analysis methods and survey data obtained from field research.

The concept of the N-Minute City emphasizes spatial equity within the city and inter-scale coherence in planning by prioritizing access to essential life services within a certain time frame. In the case of Ankara, a place-specific interpretation of this approach is proposed by re-analyzing center-subcenter relationships, access times, functional densities, and social networks. The model developed in this context is expected to serve as a "policy package" for future spatial policymaking, particularly enhancing sustainable, inclusive, and connective planning practices.

**Keywords:** Ankara, Polycentric Urban Structure, N-Minute City

**JEL Codes:** R10, R12, R58

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## DEFENCE-RELATED TECHNOLOGIES AND TECHNOLOGY INTENSIVE EXPORTS IN THE TURKISH DEFENCE INDUSTRY

Necmettin Çelik<sup>36</sup>, Alper Akpınar<sup>37</sup>

The defence industry has become a sector whose technological size and strategic importance have been increasing in recent years. In this context, intellectual property rights, especially patents, stand out as one of the fundamental elements that determine the international competitiveness and competence of countries in defence technologies. It is observed that patents play a critical role not only in terms of technology production but also in terms of the commercialization of these technologies and their opening up to international markets. The technological depth and innovation capacity behind defence industry export, which provide economic and geopolitical gains to countries, are largely associated with defence-related patents. The aim of this study is to examine the linkage between technology development capacity and foreign trade success in the Turkish Defence Industry, where high-tech intensive export capacity has increased especially since the early 2000's. For this purpose, the impacts of defence-related patents on defence exports in the period 1997-2020 were analyzed with the Zivot-Andres Unit Root Test and the Autoregressive Distributed Lag (ARDL) Model. The findings indicate that there are statistically significant long-run and positive impacts of defence-related technologies on high-tech intensive and medium-high-tech intensive defence exports. In other words, the increases observed in technology-intensive defence exports in recent years are based on the technology-oriented modernization efforts of the Turkish Defence Industry that began in the 1980's. These findings have important implications for defence policy makers. Firstly, the use of defence-related technologies not only for military purposes but also for civilian purposes (spin-off) will allow these technologies to spread to the private sector. Therefore, the increasing returns to scale will strengthen the Turkish Defence Industry worldwide. In addition, encouraging the use of technology-intensive dual-use by defence industry companies will lead to more efficient use of limited public resources. Finally, product-based relatedness patterns of the Turkish Defence Industry need to be determined in order to identify products suitable for dual-use technologies.

**Keywords:** Defence Economics, Defence-related Technologies, Defence-related Patents, Defence Export, ARDL Bounds Test

**JEL Classifications:** C32, F40, O32, L69

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## Geography of Logistics Clusters in Türkiye

Tüzin BAYCAN<sup>38</sup>, Aslı Duman<sup>39</sup>, Necmettin ÇELİK<sup>40</sup>

Türkiye has a strategic location as a corridor between Europe, Asia, and Africa, especially in land and sea transportation. Therefore, the logistics sector has a relative advantage for the Turkish economy in terms of both international trade and regional spillover potential. In this context, the location preferences of the logistics clusters should be strategically directed to benefit more from the spatial externalities of international trade. The aim of this study is to investigate the determinants of the clustering patterns of logistics sector in Türkiye. Therefore, firstly, the clustering patterns of the logistics sector in land transportation, water transportation, air transportation, and, postal and courier activities were estimated by Location Quotients (LQ) Method at the provincial level and for the years 2013-2023. Secondly, logistics cluster patterns were compared with international roads, border gates, geographical accessibility and spatial proximity. According to findings, logistics clusters in 18 provinces appear to have relative advantages. These logistics clusters are mostly located on the TRACECA international road. It is followed by E-Roads, ECO, TEM, EATL, and ESCAP roads. However, BSEC roads are not largely effective for logistics clusters. When the correlation coefficients between the LQ statistics and sub-dynamics of these roads are examined, it is seen that it is more important for a province to have a land border gate and an air border gate in order to have relatively advantage in the logistics sector. However, the importance of sea border gates in terms of location preference of the logistics sector is relatively low. Accordingly, maritime and railway trade networks also need to be strengthened in Türkiye. In addition, trade with Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, Russia, Ukraine needs to be improved to increase the potential of the Black Sea Economic Cooperation (BSEC) road, which aims to facilitate and support transportation between these countries and Türkiye.

**Keywords:** Logistics Clusters, LQ Method, International Roads, Geographical Accessibility, Spatial Proximity.

**JEL Codes:** L91, O18, R14.

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## EVALUATION OF INDUSTRY 4.0 TECHNOLOGY COMPONENTS IN TURKISH DEFENCE INDUSTRY

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The defence industry is one of the strategic sectors that plays a critical role in strengthening the security, defence capacity, and technological independence of states. In recent years, Industry 4.0 technologies such as artificial intelligence, big data analytics, cybersecurity, the Internet of Things, robotics, and autonomous systems have been triggering radical transformations in many areas of the defence industry. This technological transformation increases the operational efficiency of the defence industry, provides flexibility and speed in production processes, improves data-driven and autonomous decision-making capabilities in decision support systems, and enables real-time tracking and optimization in supply chain management. Thus, defence industry companies not only increase their cost efficiency but also deepen their sectoral competitive advantage. The aim of this study is to evaluate the adoption levels of Industry 4.0 technology components by selected American, British, Chinese, and Turkish defence industry companies through surveys and secondary data. In this context, the digital transformation strategies, technology investments, and innovation capacities of defence industry companies will be comparatively analyzed. Accordingly, policy recommendations will be developed to enhance the global competitiveness of Turkish Defence Industry companies based on Industry 4.0 components.

**Keywords:** Defence Economics, Turkish Defence Industry, Industry 4.0 Technologies, Global Competitiveness.

**JEL Codes:** C83, F52, O32.

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## **Defence Incentives and Technology-Intensive Defence Exports: Empirical Evidence from Turkish Defence Industry**

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The 12th Development Plan (2024-2028) aims to enhance the technological depth and export capacity of the Turkish Defence Industry as one of the four priority sectors. Investment incentives, as part of the Plan's policy measures, aim to increase the global competitiveness of the defense industry by supporting high value added production, innovation, and international market integration. In this study, the effectiveness of defence incentives on export performance of the Turkish Defence Industry was empirically investigated in terms of different technology intensity levels. For this purpose, defence export values and defence incentives were weighted using the Relative Comparative Advantage (RCA) Index in order to measure sectoral competitiveness. According to empirical findings of System GMM Panel Model covering 81 provinces and period 2002-2022, defence incentives have statistically significant and positive effects on defence exports, but they are limited. Accordingly, defence incentives have statistically significant and positive effects on shipbuilding and repair sub-sector which is classified as a medium-low technology intensive defence industry. However, for medium-high technology intensive defence industry such as arms and ammunition exports, and for high technology intensive defence industry like aerospace exports, the effects of defence incentives are statistically insignificant. These results suggest that the existing incentive system is inadequate in encouraging export growth in the high-technology intensive defence industry. Therefore, it is crucial to restructure incentive system not only to boost production but also to support R&D and innovation in line with the objectives of the 12th Development Plan. To ensure sustainable defence export growth, it is important to strengthen technology transfers, increase domestic production capacity, and integrate into global supply chains. The main reason for the limited impact of defence incentives in high technology intensive defence industry is the weaknesses in R&D infrastructure, skilled labor, and innovation capacity. To address these challenges, existing incentive system must evolve beyond financial support

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and be complemented by strategic technology programs, university-industry collaborations, and international technology transfer policies.

**Keywords:** Defence Incentives, Technology Intensive Defence Exports, System GMM

**JEL Codes:** F14, H25, L64, O38