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YTÜ YILDIZ TEKNİK ÜNİVERSİTESİ

# Informing Sustainable Regional Food Chains through Serious Games: The Case of Play Marmara “Food"

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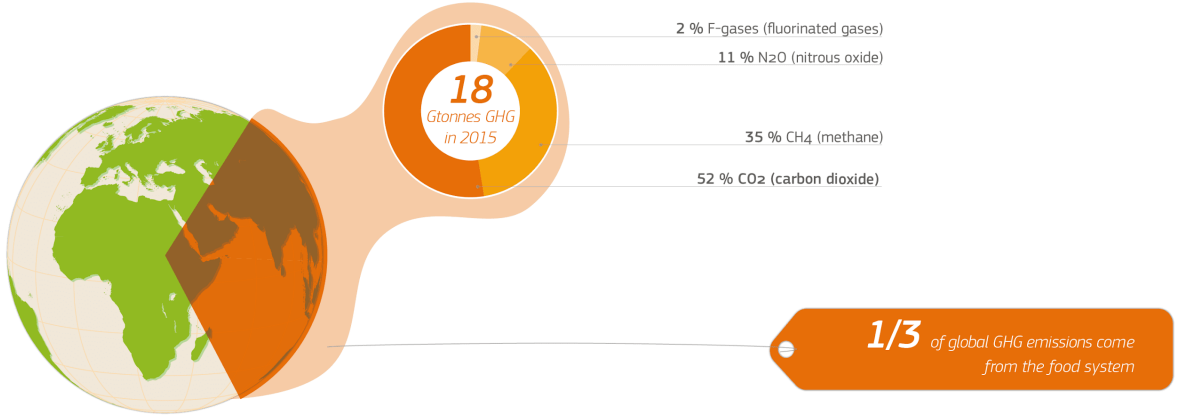
# Background & Problem Framing

- The global food system is responsible for nearly 1/3 of anthropogenic greenhouse gas (GHG) emissions (Crippa et al., 2021).
- Urbanization, climate change, and geopolitical instability (e.g., COVID-19 pandemic, war in Ukraine) have intensified vulnerabilities in global and regional food systems (FAO, 2022; WFP, 2022).
- In this context, the Marmara Region of Türkiye represents a critical testing ground for integrated, participatory planning due to its high population density, urbanization pressure, and dual role as both an economic and agricultural hub.




(Crippa et al., 2021)
https://edgar.jrc.ec.europa.eu/edgar_foodfeck

# Conceptual Framework

- This study is grounded in the City Region Food System (CRFS) framework proposed by FAO & RUAF (2023), which advocates for multi-level, multi-actor governance and integrated food planning.

- The research also draws on collaborative planning theory (Innes & Booher, 2004) and the concept of serious games as boundary objects enabling co-learning, negotiation, and experimentation (Mayer, 2009; Devisch et al., 2018).

- The use of serious games bridges technical knowledge and deliberative governance, allowing stakeholders to explore system complexity through structured interaction.

# Research Aim & Questions

- Can a serious game effectively simulate regional food system dynamics and inform multi-stakeholder planning?

- How does Play Marmara “Food” contribute to visualizing trade-offs, testing strategies, and revealing governance gaps in the Marmara food system?

- What are the limitations and planning implications of this participatory approach?

# Serious Games in Planning and Governance

- Serious games are interactive simulations developed for educational, planning, or governance purposes (Abt, 1970).
- In urban and regional planning, they are increasingly used to:
  - Translate abstract policy into tangible scenarios
  - Simulate multi-stakeholder decision-making
  - Engage citizens, officials, and experts in shared dialogue
- Notable examples:
  - World Climate Simulation: global emission negotiation game (Sterman, 2015)
  - Cities2030 CRFS Game: visualizing urban–rural food linkages (FAO/RUAF)
- In this context, Play Marmara “Food” continues this tradition by adapting serious games to Türkiye’s regional food planning needs.

# Marmara Region Food System: Profile

**Regional Overview**

- Türkiye's most populous and industrialized region (~25 million, 67,000 $km^2$)
- Major cities: Istanbul, Bursa, Kocaeli, Tekirdağ
- Urbanization threatens agricultural land and food security

**Environmental Challenges**

- Fertile lands under pressure from:
    - Urban sprawl & land conversion
    - Industrial pollution, drought, and over-extraction of groundwater
    - Soil degradation and biodiversity loss

**Agricultural & Livestock Risks**

- Pollution from fertilizers and olive-processing waste
- Livestock (esp. cattle) → 25,497 tons nutrient load (2013–2022), mostly nitrogen
- Groundwater contamination risks (e.g., İpsala district study)

# Marmara Region Food System: Profile

**Food System Challenges**
- Fragmented supply chain: too many intermediaries, weak coordination
- High logistics costs, low efficiency, post-harvest losses
- Small producers and low-income consumers most affected

**Governance Gaps**
- Need for integrated, participatory models
- City Region Food System (CRFS) approach:
    - Urban–rural integration
    - Multi-stakeholder planning
    - Local-scale engagement → regional strategy

**Strategic Priorities**
- Protect farmland, improve food safety and nutrition
- Reduce environmental burdens
- Ensure transparency, accountability, and equitable access

# Play Marmara ‘Food’ Game

- The Play Marmara Food game was developed by Play the City and the Marmara Municipalities Union and premiered at MARUF23.

- Built on prior MARUF game iterations (regional development, sea conservation)
- Game design draws on a multi-layered database combining agricultural, logistical, and environmental datasets (e.g., Copernicus land use, MMU strategic plans, Greenpeace inventories).

Play Marmara 2019 Game Session


Play Marmara ‘Sea’ 2021 Game Session


Play Marmara Food 2023 - Mayors Session

# Game Methodology

- **Purpose:**

Designed as a serious game to explore sustainable food futures in the Marmara Region through scenario-building and stakeholder collaboration.

- **Data Collection:**

Integrated geodatabase from 7 sources (regional strategies, ministry data, Copernicus, Greenpeace, MMU). Covers production, logistics, land degradation, and consumption patterns.

- **Stakeholders & Roles:**

6 roles: Local government, Producer, Cooperative, Logistics, Retailer/Consumer, NGO
Assigned to 5 regional teams (e.g., West Marmara, Istanbul)
Reflects real actor dynamics from interviews and participatory sessions
Role-specific resources and constraints included (e.g., perishability, fiscal limits)

# Game Components

**Gameboard:**

- Large GIS map (1:125,000 scale, 240×400 cm) on raised table
- Includes logistics centers, markets, erosion & desertification zones
- Provides spatial context for land-use decisions

**Food-Chain ID Cards:**

- Detail supply chains for key crops (sunflower, olive, wheat, grape)
- Highlight production steps, challenges, and techniques

**Action Cards:**

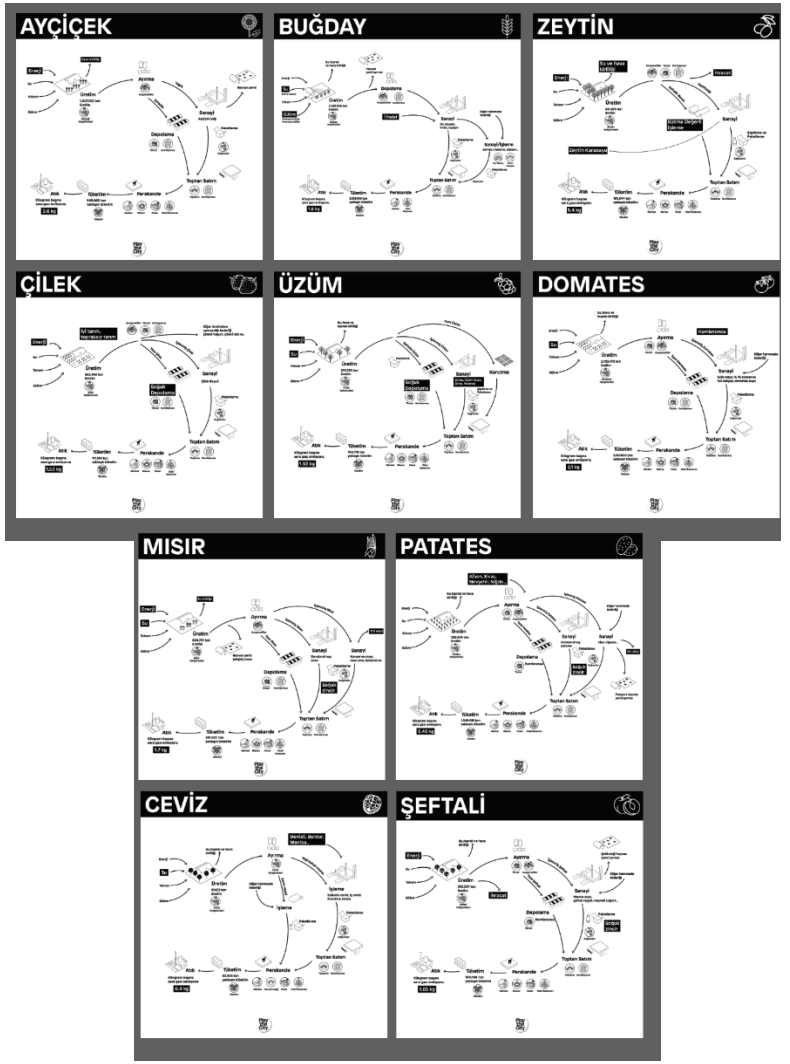
- 70 cards across production, consumption, logistics, waste, supply
- Represent international food policies and innovative practices
- Enable strategic interventions

**Collaboration Cards:**

- Promote inter-regional alliances

**Scoreboard Sheets:**

- Track progress on six sustainability indicators




Food Chain ID Cards

# Game Rounds

**1. Choose Your Team & Product**

-Participants form regional teams

-Select a key crop (e.g., wheat, olives, strawberries)

-Place Food-Chain ID Card on the map based on real production

**2. Build a Sustainable Food Chain**

-Use Action Cards (e.g., “Cold-Chain Logistics”, “Organic Fertiliser”)

-Explore trade-offs across environmental, social, and economic impacts

**3. Collaborate Across Regions**

-Form alliances with Collaboration Cards

-Co-invest in infrastructure (e.g.logistics hubs)

-Unlock bonus actions and shared benefits

**4. Evaluate & Reflect**

-Score outcomes on six sustainability indicators

-Expert panel reviews strategies for feasibility, equity, innovation

-Results inform future policy briefs and planning tools


Game Dynamics

# Key Findings from Game Sessions

**Game-based dialogue works:**

The game effectively brought together mayors, public officials, NGOs, academics, designers, and students in 5 game sessions.

Abstract policy goals were translated into tangible, crop-specific strategies.

Common priorities emerged: *Smarter logistics, Circular waste systems, New food governance models, Youth-focused incentives*

**Data-Driven dialogue:**

All game elements (cards, maps) were grounded in real datasets.

Enabled players to see the real-world impact of decisions.

Created a real-time policy-testing environment linked to GIS and statistics.

**Scoreboards expose blind spots:**

Scoreboards highlighted uneven attention to sustainability indicators.

Actions scored high in Technology, Economy, and Policy.

Healthy Food and Biodiversity scored lowest.

Indicates the need for future planning cycles to better address nutrition and ecosystems.


Play Marmara Food 2023 - Experts Session

# Conclusion & Policy Implications

- Games functioned as planning laboratories: enabling experimentation with constraints.
- Empirical data integrated into gameplay promoted evidence-based decision-making.
- Scoreboards exposed blind spots: Biodiversity and Healthy Food consistently scored lowest.
- Policy implications:
  - Use game insights to inform MMU's food strategy
  - Adopt the tool in other Turkish regions
  - Expand health and ecosystem metrics in future iterations
- Play Marmara Food exemplifies the potential of serious games in co-creative governance.
- It translates planning theory into practice through experiential simulation.
- Next steps:
  - Institutional uptake in regional planning frameworks
  - Longitudinal tracking of strategy implementation
  - Comparative testing across different urban regions

# Thank you!

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