

June, 2020

THEORY AND PRACTICE IN SOCIAL SCIENCES



EDITOR
PROF. YÜKSEL AKAY ÜNVAN, PH.D.

Theory and Practice in Social Sciences

Editor

Prof. Yüksel Akay Ünvan, Ph.D.

Publisher
Platanus Publishing®

Editor in Chief
Prof. Yüksel Akay Ünvan, Ph.D.

Cover & Interior Design
Platanus Publishing®

The First Edition
June, 2026

ISBN
978-625-7374-63-1

©copyright
All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, or any information storage or retrieval system, without permission from the publisher.

Platanus Publishing®
Address: Natoyolu Cad. Fahri Korutürk Mah. 157/B, 06480, Mamak,
Ankara, Turkey.

Phone: +90 312 390 1 118
web: www.platanuspublishing.com
e-mail: platanuskitap@gmail.com

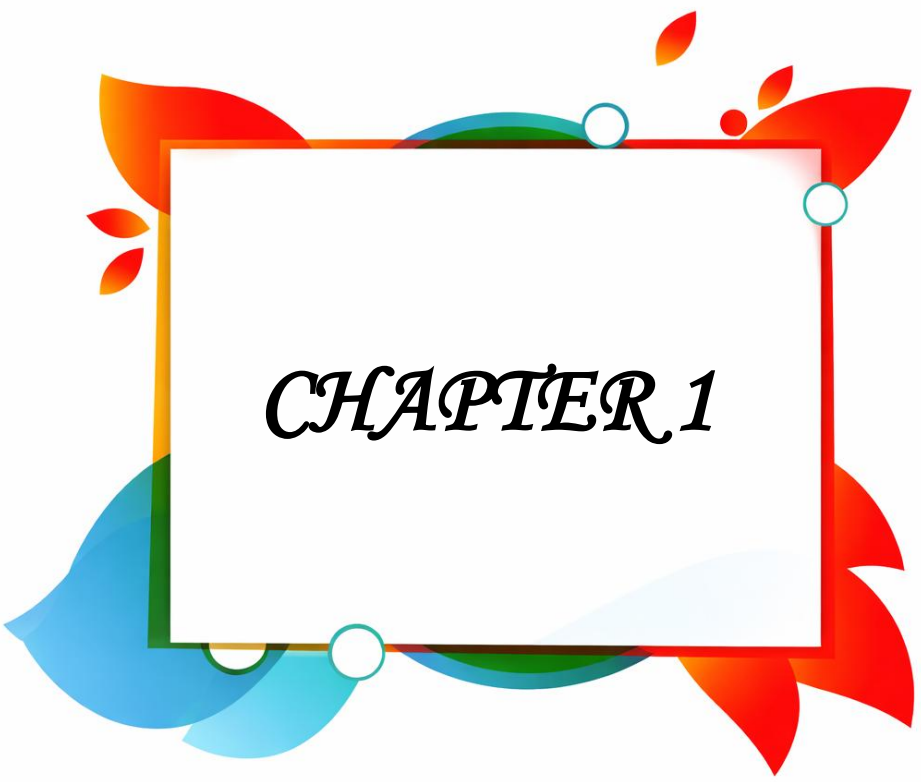


Platanus Publishing®

CONTENTS

CHAPTER 1	5
The Transformation of Business Management and Functions through Artificial Intelligence	
Mahmut Sayar	
CHAPTER 2	23
Integration of Ethnoarchaeological Elements of The Thrace Region into Tourism	
Elçin Doğan Gürbüz & Ozan Şengül	
CHAPTER 3	46
Fintech and Financial Inclusion: A systematic Literature Review	
Yüksel Akay Ünvan & Hodan Abdullahi Abdirahman	
CHAPTER 4	58
Smart Cities in Sustainable Urban Development: Conceptual Foundations, Technologies and Application Examples	
Betül Dİlfiroz & İsmail Sevinç	
CHAPTER 5	106
Beyond Fuel Prices: Factors Driving Electric Vehicle Sales in Leading Electric Vehicle Economies	
Şeyma Bozkaya	
CHAPTER 6	120
Military Ethos and Conservative Affinities: A Figurational Perspective on Discipline and Interdependence	
İrem Özgören Kinli	
CHAPTER 7	140
Ageing in the Context of Social Change: Demographic Transformation, Social Relations, and Rights-Based Policies	
Aziz Armutlu	
CHAPTER 8	160
Social Comparison and Identity in the Age of Social Media: Theoretical Foundations and Contemporary Findings	
Hanife Merve Çatan	

CHAPTER 9	190
History or Herstory? Women as Capital in Capitalist Society	
Ali Sayılğan	
CHAPTER 10.....	202
Competition Strategies in Public and Private Healthcare Institutions	
Mevlut Karadag	
CHAPTER 11.....	230
Statistical Analysis of Smart City Components	
Emre Ekin & Umay Evsa Han Şahin	
CHAPTER 12.....	254
The Social Formation of the Rural and Otherness: An Analysis from Feminist and Queer Geography Perspectives	
Miyase Yalçın	
BÖLÜM 13	280
The Twin Transition and Its Analytical Limits: A Typology of Articulation Forms in Green and Digital Transformation	
Umur Aşkın	
BÖLÜM 14	318
Structural Inequalities at The Intersection of Green and Digital Transition: The Limits of Growth, Justice, and Technology Optimism	
Umur Aşkın	
BÖLÜM 15	347
Analysis Of Alternative Islamic Taxes and Tax Systems	
Heiko Schuss	

A decorative rectangular frame with a white center. The frame is composed of a red border on the right and top, and a blue border on the left and bottom. The corners are decorated with stylized leaves in red, orange, and blue. Small white circles are placed at the intersections of the borders.

CHAPTER 1

The Transformation of Business Management and Functions through Artificial Intelligence

Mahmut Sayar¹

1. Introduction

The global competitive ecosystem is evolving into a new industrial process that goes beyond digitalization, in which data is transformed into an algorithmic asset. While traditional business management theories assume that managers make decisions using limited data, artificial intelligence (AI) technologies now eliminate these constraints by processing large volumes of data in real time. This fundamentally reshapes organizational decision-making processes (Duan et al., 2019). AI's impact on business functions goes beyond the mere integration of information technology to automate routine processes; it is a strategic transformation that redefines the value creation chain, corporate strategy, and competitive advantage (Borges et al., 2021). Consequently, AI has become a fundamental production factor that enhances businesses' agility and enables them to develop proactive strategies in uncertain environments.

Integrating artificial intelligence into business management facilitates a multi-layered process of technological maturation, progressing from analytical systems to intuitive and autonomous ones. Kaplan and Haenlein (2019) have categorised the evolution of AI systems as analytical, human-like, and artificial general intelligence. They emphasise that modern businesses are transforming the fields of forecasting and optimization, particularly through their analytical AI capabilities. Sub-fields such as machine learning (ML), deep learning (DL) and natural language processing (NLP) are employed in many different areas, including predicting customer behaviour and optimizing the supply chain. These technologies enhance management science capabilities by offering predictive and prescriptive analytical models that construct future scenarios rather than relying solely on descriptive analyses based on historical data.

The use of AI-powered algorithms in production planning, operations management and logistics functions, for example, has begun to replace traditional operations research methods. In logistics processes involving complex network

¹ Assistant Professor, İzmir Bakırçay University, Department of Business Administration, İzmir, Türkiye, ORCID: 0000-0002-1852-6276

structures, demand fluctuations and multi-objective optimization, dynamic models such as AI-based deep reinforcement learning (DRL) generate flexible solutions with significantly lower error margins than deterministic approaches. Comprehensive research by Wamba et al. (2021) shows that adopting AI in operational processes ensures cost minimization and directly improves businesses' environmental and social sustainability performance. Consequently, operational decision support systems situated at the intersection of industrial engineering and business functions are fostering a new form of human-machine collaboration by integrating AI into organizational memory.

From a functional perspective, the transformative impact of AI is felt across all departments, including marketing, human resources, accounting and corporate finance. While marketing departments devise algorithmic segmentation and hyper-personalization strategies, human resources departments use bias-free, data-driven models for talent management, predicting staff turnover and performance appraisals (Dwivedi et al., 2021). This comprehensive transformation brings with it multidimensional strategic challenges, such as data privacy, AI algorithmic bias, ethical governance, and organizational resistance. Aligning technological capabilities with organizational culture is critical for the successful commercialization of AI projects.

This study aims to examine the AI-driven transformation taking place in business management and its functions in a comprehensive manner. In order to address the analytical fragmentation in existing studies, this study takes a holistic approach to examining the impact of machine learning and artificial intelligence algorithms on strategic management, production planning, and operational efficiency. First, a comprehensive literature review will be presented examining the development of AI within business science. This will be followed by an analysis of the benefits to be gained through the integration of current technologies into industrial functions.

In recent years, the literature has examined in depth the sustainability-driven transformation of artificial intelligence in business management and functions. Significant studies have examined how AI can improve corporate environmental, social, and governance performance (Zhang et al., 2024; Berniak-Woźny, 2025), its contribution to environmental sustainability (Awwad et al., 2026), and its impact on strategic leadership and organizational models (Goel et al., 2024; Petkovic, 2026). Furthermore, the design of sustainable business models (Urbanovič et al., 2026) and studies demonstrating increased operational efficiency through AI optimization (Bruzzone et al., 2025; Wang & Qi, 2025) are also of great importance.

The transformation of core business functions, such as management, marketing, human resources, operations and strategy, through artificial intelligence, is a significant topic in the literature. Key areas of discussion include how AI restructures organizational decision-making mechanisms through human-machine interaction (Jarrahi, 2018; Raisch & Krakowski, 2021), how to transform AI into business value (Enholm et al., 2022) and how it can create a strategic competitive advantage (Mikalef & Gupta, 2021). These studies clearly demonstrate that, in today's data-driven world, businesses must view AI not merely as a technological tool, but as an integral strategic asset. They empirically demonstrate AI's potential to develop sustainable business models (Di Vaio et al., 2020), promote green human resource management (Alherimi et al., 2024), and optimize the supply chain sustainably (Cannas et al., 2024; Chen et al., 2024). At the same time, machine learning and deep reinforcement learning approaches facilitate the transition of organizations to a circular economy (Özsoy, 2023; Jobstreibizer, 2025) while minimising uncertainties in inventory management (Dehaybe et al., 2024). Advanced data analytics and autonomous systems are evident cornerstones of digital and green twin transformation strategies, directly reducing the operational carbon footprint while accelerating decision-making speeds within traditional business hierarchies.

2. Literature Review

The development of AI technologies has evolved from being a sub-field of information systems research to becoming a multidisciplinary area of study in business management literature, encompassing strategic management, operational excellence, and organizational behaviour. Current studies address the impact of AI on businesses, considering it not only as an improvement in technological infrastructure, but also as a fundamental restructuring of organizational capabilities and business models (Borges et al., 2021). Kaplan and Haenlein (2019) classify AI in a business context as analytical, human-like, or artificial general intelligence. They note that most research today focuses on analytical AI systems, which enable businesses to make rational, data-driven decisions.

A study by Alsharari (2024) found that integrating AI restructures business models and accelerates digital transformation, enabling superior business outcomes. In the field of human resources, however, the impact of technological advances on employee well-being must be assessed from two perspectives. Soomro et al. (2026) emphasised that, when combined with organizational support, the adoption of AI enhances employee well-being; however, in the absence of such support, it can become a barrier. In the realm of corporate finance and operational management, AI-supported systems have been shown to

statistically significantly improve firms' resource allocation efficiency by optimizing input combinations, unlike deterministic systems (Sun and Zhou, 2026). Table 1 summarises general comparative studies.

Table 1: General comparative studies.

Author	Year	Methodology	Findings
Salame, K.	2025	Qualitative Monograph Review	It is suggested that AI-integrated HR systems resolve organizational operational complexities, thereby strengthening ethical decision-making
Urbanovič, M., & Holubčík, M.	2026	Systematic Literature Review (PRISMA)	It is mapped that AI-based decision-making approaches improve sustainability monitoring and resource optimization with high accuracy across environmental, social, and governance (ESG) dimensions
Goel, A., Raut, G., Sharma, A., & Taneja, U.	2024	Bibliometric and Thematic Analysis using SPAR-4-SLR	It is determined that AI enhances sustainable performance in the service sector and provides new themes and intellectual frameworks for future research
Shahidi Hamedani, S., Aslam, S., & Shahidi Hamedani, S.	2025	Conceptual Framework and Industry Analysis	The adoption of AI in business operations accelerates the transition to sustainable practices by improving logistics operational capabilities and reducing environmental impacts
Ebule, A. E.	2025	Conceptual Review	Accurate forecasting of energy and raw material needs through deep learning and predictive analytics minimizes waste in business processes
Machucho, R., & Ortiz, D.	2025	Systematic Review using PRISMA 2020 and PICO Framework	It is proven that AI directly catalyzes organizational innovations in business functions through predictive capabilities and automation
Zhang, C., & Yang, J.	2024	Quantitative Data Analysis and Econometric Modeling	It has been found that the integration of AI technologies in businesses significantly improves corporate Environmental, Social, and Governance (ESG) performance metrics
Berniak-Woźny, J.	2025	Bibliometric Analysis	It is determined that AI makes sustainability reporting error-free by increasing standardization in the collection, evaluation, and reporting processes of ESG data
Chen, P., Chu, Z., & Zhao, M.	2024	Econometric Robustness Analysis (Chinese Data Set)	It is determined that AI has a high positive impact on environmental governance and social responsibility, forming a basis for sustainable development by increasing efficiency
Di Vaio, A., Palladino, R., Hassan, R., & Escobar, O.	2020	Systematic Literature Review and Qualitative Framework	It is shown that AI permanently transforms production and consumption models to achieve the UN Sustainable Development Goals (especially SDG 12)
Sang, Y., Loganathan, K., & Lin, L.	2026	Multi-Period DID Model (PSM-DID)	It is statistically proven that the adoption of AI-driven public and corporate policies significantly increases operational sustainability performance
Xie, Y., Luo, X., & Tan, X.	2025	Panel Data Analysis, DID Model	It is found that AI significantly improves the ESG performance of businesses by alleviating financing constraints and promoting green innovation
Awwad, B., & Zaid, M. A. A.	2026	Network Analysis and Bibliometrics	It is revealed that businesses directly reduce environmental impacts and maximize operational efficiency by integrating AI-driven solutions into sustainability frameworks

Mama, A., et al.	2026	Systematic Review	It is shown that supply chain, big data analytics, and AI integration simultaneously improve the environmental and economic performance of organizations
Giovannetti, A., Ghisi, F., Cirillo, L., et al.	2025	Simulation-Based AI-Supported Optimization	It is determined that the integration of advanced AI optimization in operational-level systems highly increases industrial energy efficiency
Dwivedi, Y. K., et al.	2021	Expert Opinion-Based Conceptual Synthesis	It is determined that socio-technical alignment and process governance are the actual critical success factors in the corporate adoption of AI, rather than technical barriers
Mikalef, P., & Gupta, M.	2021	Structural Equation Modeling (PLS-SEM)	It is confirmed that the data processing capability of AI algorithms directly and positively impacts organizational innovation, and indirectly improves overall firm performance
Jarrahi, M. H.	2018	Conceptual Analysis	It is proven that the analytical processing power of AI algorithms, when integrated with human intuition, creates a symbiotic structure in complex organizational decisions
Kaplan, A., & Haenlein, M.	2019	Literature Review and Case Analysis	It is emphasized that when designing corporate strategies, AI systems should be taken out of their purely analytical (weak) intelligence dimension and adapted to their human-supporting capacities

The impact of AI on core business functions can be examined under the following five headings:

2.1 AI in Strategic Management and Decision-Making Processes

Research in strategic management positions AI as a fundamental dynamic capability that optimizes decision-making processes in uncertain environments. A study by Borges et al. (2021) shows that AI can analyse market dynamics in real time at senior management level, overcoming cognitive limitations. The transition from decision support systems to autonomous decision-making mechanisms reduces managers' reliance on intuition while enhancing data-driven strategic positioning. However, studies emphasise the risks associated with fully autonomous strategic decisions and highlight that human-machine collaboration models are the most effective method for creating a strategic competitive advantage. Di Vaio et al. (2020) have demonstrated through bibliometrics that AI-supported sustainable business models are key to optimizing resource use and achieving the United Nations Sustainable Development Goals.

2.2 Operations Management, Production Planning and Logistics

In the fields of business administration, industrial engineering and operations research, AI offers revolutionary advantages, particularly in production planning and supply chain management. Toorajipour et al. (2021) demonstrated in their study of AI applications in supply chain management that machine learning, deep learning and multi-agent systems significantly outperform traditional statistical models, particularly in demand forecasting, inventory optimization and network design. Predictive maintenance AI algorithms that forecast machine failures and dynamic routing models based on deep reinforcement learning minimize operational costs while enhancing the resilience of logistics networks against

environmental shocks. Developments in the literature indicate a shift from deterministic optimization models towards stochastic and self-learning AI algorithms. The use of AI in operations management is facilitating this transition. In their study of the strategic use of AI in the digital age, Borges et al. (2021) found that, compared to traditional methods, machine learning significantly reduced error margins in demand forecasting and supply chain routing. Wamba et al. (2021) showed that AI-based production systems speed up the return on investment for Industry 4.0 initiatives.

2.3 Marketing and Customer Relationship Management

In marketing literature, the AI transformation is characterised by advanced personalization and the prediction of consumer behaviour. Davenport et al. (2020), in their study examining how AI will reshape marketing strategies, argue that natural language processing and computer vision technologies have transformed the customer experience from passive interaction to proactive value creation. Studies show that AI-powered recommendation systems and sentiment analysis algorithms can increase customer retention rates and customer lifetime value by a statistically significant amount. AI has facilitated the transition from mass marketing to hyper-personalization in the field of marketing. Mustak et al. (2021) found that AI applications, specifically those based on natural language processing, such as chatbots and recommendation engines, maximize customer perception and lifetime value.

2.4 Human Resource Management and Organizational Behaviour

In the field of human resources, AI is examined from a broad perspective, ranging from talent acquisition to performance appraisal. While analysing the opportunities and challenges presented by the use of AI in human resource management, Tambe et al. (2019) highlight that algorithm-based recruitment processes increase efficiency. However, they also note that model biases arising from training data may undermine perceptions of organizational justice. Key focal points in the literature include predicting employee turnover and enhancing workforce productivity through organizational network analysis. Furthermore, the impact of AI taking over routine tasks on employee well-being is debated from two perspectives: the fear of technological unemployment and talent development.

2.5 Finance and Accounting

AI is being explored in depth in the fields of corporate finance and accounting, with a focus on risk management, algorithm-based trading, and fraud detection. Cao (2022) provides an extensive overview of AI applications in finance, demonstrating how deep neural networks have replaced traditional econometric models in credit risk scoring and high-frequency trading. In accounting, the integration of robotic process automation and machine learning enables thorough

data analysis in audit processes, eliminating the need for sampling and enhancing corporate transparency.

Examining studies on AI applications in business functions reveals that research generally focuses on a single department or a specific algorithm. Studies examining how AI creates an integrated value chain across production, marketing, finance, and human resources on a horizontal axis remain scarce. This study aims to address this issue by highlighting the macro-level synergy created by AI within an organization's overall system architecture rather than its micro-level impact on individual functions.

3. The Transformation of Business Functions Through AI and The Strategic Benefits It Offers

Integrating artificial intelligence technologies into the business ecosystem is a breakthrough that goes beyond merely being an automation tool or an IT infrastructure update. It fundamentally transforms value creation processes, organizational capabilities, and competitive dynamics. Borges et al. (2021) emphasise that strategically using AI gives businesses the ability to extract meaningful insights from large amounts of unstructured data. This transforms the traditional intuitive management approach into a data-driven, analytical decision-making model.

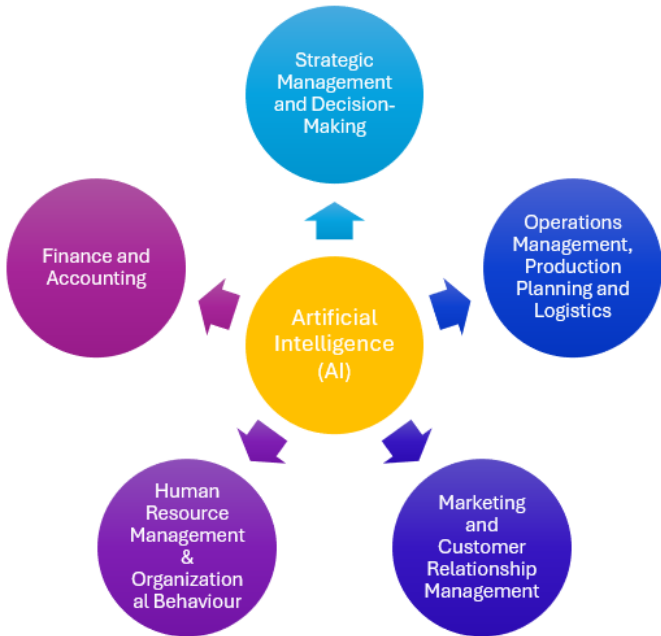


Fig.1. AI and Business Functions

The structural changes that AI brings about in core business functions, and the multidimensional benefits it provides, are as follows:

3.1 Transformation in Production, Operations and Supply Chain Management

Operations and supply chain management form the corporation of the physical value creation processes of businesses and are among the functions that benefit most from AI integration. Toorajipour et al. (2021) demonstrated the superiority of AI algorithms in solving stochastic and nonlinear problems within the supply chain. Traditional time series analysis-based demand forecasting methods have been replaced by deep learning models that can process thousands of variables simultaneously, including weather, market sentiment, and macroeconomic indicators. On the production floor, AI systems that process data from Internet of Things (IoT) sensors have standardised predictive maintenance applications that can identify when machines are likely to fail. This transformation minimizes supply chain vulnerabilities while maximizing operational flexibility. The greatest strategic benefits achieved in operational functions are radical reductions in inventory carrying costs, a reduction in the bullwhip effect and sustainable production planning supported by resource optimization.

3.2 Transformation in Marketing and Customer Relationship Management

The development of AI has caused a shift in marketing from a mass marketing approach to hyper-personalized one-to-one marketing. Davenport et al. (2020) note that machine learning and natural language processing technologies have completely redesigned the customer journey while examining the future of AI in marketing. Algorithms analyse consumers' digital footprints, including click-through rates, viewing times, and social media interactions. While chatbots and virtual assistants provide autonomous customer service all days, recommendation engines can predict consumers' next purchases with high accuracy. The greatest benefit of AI in marketing is its ability to increase customer lifetime value and optimise return on investment. Furthermore, algorithm-based pricing models enable businesses to maximize profit margins by responding instantly to demand fluctuations.

3.3 Transformation in Human Resources Management

The HR function is rapidly adopting AI technologies to digitize the employee experience and link talent management to objective metrics. Tambe et al. (2019) emphasize that using AI in HRM has the potential to improve organizational fairness by using data-driven algorithms to support traditional, often biased, human decisions. AI-based systems analyse the fit between candidates' skills and job requirements by scanning thousands of CVs in seconds during the recruitment process. Internal organizational network analyses and sentiment analysis

algorithms can predict employee turnover risk by measuring interactions in emails or communication platforms. In addition to reducing recruitment times and costs, placing the right talent in the right role increases workforce productivity. Personalized AI training modules identify skill gaps and offer tailored career development pathways, thereby strengthening employee engagement and organizational loyalty.

3.4 Transformation in Finance and Accounting Functions

Finance and accounting functions, which currently operate using historical data-based indicators, have gained forward-looking and predictive capabilities through AI integration. In his study of the technical aspects and opportunities of AI in financial services, Cao (2022) shows that algorithm-based systems far exceed human capabilities in risk management. AI-supported robotic process automation has made repetitive accounting tasks such as invoice processing, reconciliation, and data entry fully autonomous. In audit processes, the traditional sampling method has been replaced by models in which artificial intelligence continuously audits all transactions. The processing of high-frequency data enables corporate fraud detection to be carried out in real time. Furthermore, algorithm-based financial modelling optimizes cash flow cycles, reduces working capital costs, and minimizes the margin of error in strategic investment decisions.

The transformative impact of artificial intelligence on core business functions is creating a single, integrated system by eliminating silos between departments. For example, if sensor data on the production line detects a fluctuation in supply, this can trigger simultaneous updates to the pricing strategy in the marketing department and to the cash flow forecasts in the finance department via AI. The ultimate benefit that AI provides to businesses goes beyond optimizing internal processes: it fosters organizational resilience by imparting a high capacity for adapting to external shocks.

4. Discussion and Implications

Integrating artificial intelligence technologies into business management and core functions is not just an operational improvement, but a fundamental shift in methodology in today's business world. This study demonstrates how AI can provide a strategic competitive advantage within the corporate ecosystem.

The integration of AI into business functions is transforming the nature of decision-making structures. Duan et al. (2019), in their examination of the role of artificial intelligence in decision-making processes in the age of big data, emphasize that the traditional management approach based on human intuition has given way to algorithmic and data-driven rationality. AI is transforming all departments, from production and marketing to human resources and finance, by freeing them from vertical silos and creating a horizontal, integrated data flow network. However, this transformation is not without its challenges. As the

multidisciplinary research of Dwivedi et al. (2021) highlights, the black box nature of AI systems' computational processes poses a significant barrier to managers trusting the outcomes these systems produce. When businesses view AI merely as an IT investment, they fail to realise the expected value. Enholm et al. (2022) have demonstrated that for AI to generate business value, the technological infrastructure must simultaneously align with organizational capabilities and business model innovation. Therefore, the AI transformation within business functions can be considered a strategic change management process rather than merely a technological adaptation.

While physical and financial capital traditionally take centre stage in resource-based view theory, high-quality data and customised AI algorithms are now considered irreplaceable and inimitable strategic resources. A business's ability to survive in hyper-competitive environments depends on its capacity to perceive the external environment, seize opportunities, and restructure the organization. AI-enabled analytical systems process signals from the external market in real time, transforming an organization's dynamic capabilities from reactive to proactive and predictive (Enholm et al., 2022).

Rather than being seen as a threat that will replace the human workforce, AI systems should be viewed as partners that can enhance human cognition and capabilities. Managers must establish hybrid decision-support mechanisms that blend the analytical insights generated by algorithms with human intelligence and ethical judgement (Duan et al., 2019). In order for marketing, human resources management, operations and logistics to derive maximum benefit from AI transformation, internal data silos must be dismantled. Managers must build cloud-based, centralized data structures to facilitate cross-departmental data integration. Enhancing employees' AI literacy is a prerequisite for AI integration. Human resources departments should design proactive training programmes to prepare the workforce for a data-driven organizational culture.

The pace at which AI technologies are being developed is outstripping the rate at which current experimental studies are being conducted. Future research should focus on mixed-methods studies, particularly in natural language processing and large language models, in order to measure the direct financial impact on businesses' strategic communication, supply chain negotiations, and customer relations. Furthermore, the literature (Dwivedi et al., 2021) identifies a significant research gap in the effects of model biases on organizational justice and the dimensions of AI decisions relating to corporate governance and legal liability.

5. Results

This study examines the transformative impact of artificial intelligence technologies on business management and core functions. A review of the literature shows that AI is not just a tool for accelerating processes within organizations, but rather a transformative force that fundamentally reshapes the way businesses create value, develop competitive strategies and foster organizational culture (Borges et al., 2021). Traditional business management's

decision-making mechanisms, which relied on bounded rationality and human intuition, have been replaced by predictive and prescriptive algorithmic systems shaped by big data analytics alongside the AI revolution.

AI affects all business functions, including production, the supply chain, human resources, marketing and financial operations. As Toorajipour et al. (2021) emphasise, machine learning algorithms enhance supply chain resilience in operations management by minimizing stochastic uncertainties. However, successfully managing this transformational process cannot be achieved through modelling infrastructure investments alone.

The most critical challenge for business leaders is structuring human-machine collaboration effectively. Transparency issues arising from the black box nature of AI models, data security and data bias in machine learning models are fundamental ethical and managerial problems that must be resolved when integrating AI into corporate decision-making processes (Dwivedi et al., 2021). Consequently, organizations must develop technological innovation and ethical governance frameworks simultaneously to successfully transform their use of AI.

Current research typically focuses solely on AI within a single business function, such as marketing or human resources management. Future research could focus on models and multivariate econometric analyses that measure the simultaneous impact of human resources applications on operational performance indicators on the production line, such as reduced error rates. The impact of transitioning from AI applications capable of limited inferences to artificial general intelligence with multiple cognitive abilities on businesses' strategic architecture should be investigated. The conflict arising from the high energy consumption of AI systems and deep reinforcement learning models in relation to businesses' environmental, social, and governance (ESG) objectives (Wamba et al., 2021) should be investigated in detail within the context of sustainable, green AI.

The transformation of business management through artificial intelligence is an ongoing process of learning and updating. Organizations that can proactively adapt to this process by integrating their technological infrastructure with their human capital will be able to create sustainable value in today's and tomorrow's highly competitive markets. Integrating artificial intelligence technologies into business management and operations has become a fundamental process that redefines organizations' competitive strategies, extending beyond mere technological infrastructure improvements. As Borges et al. (2021) also emphasize, the strategic use of AI has transformed traditional decision-making mechanisms, providing businesses with the ability to derive meaningful and proactive business models from large amounts of unstructured data.

Thanks to AI, a logistics network's data stream is being transformed into an integrated neural network. This network shapes the marketing department's dynamic pricing strategy and the finance department's cash flow status in real time. This integrated structure enhances organizational agility, making businesses more resilient to external market shocks. The integration of AI into

business processes requires a human-machine collaborative model. While decision support systems take on routine and computationally intensive processes, human cognitive capacity will remain the fundamental driving force of organizations in areas such as ethics, innovation, strategic vision, and complex crisis management. Consequently, the most successful businesses of the future will be those that adopt an augmented intelligence approach, positioning AI as a strategic complement to human intelligence.

In this new era, where Industry 5.0 and sustainability goals are shaping the global business landscape, AI transformation is a necessity. Future research should focus on integrating AI with operational efficiency, modelling transparency, data ethics and corporate sustainability parameters. Business management studies should aim to develop frameworks that combine the analytical capabilities of AI with the principles of ethical governance and social responsibility.

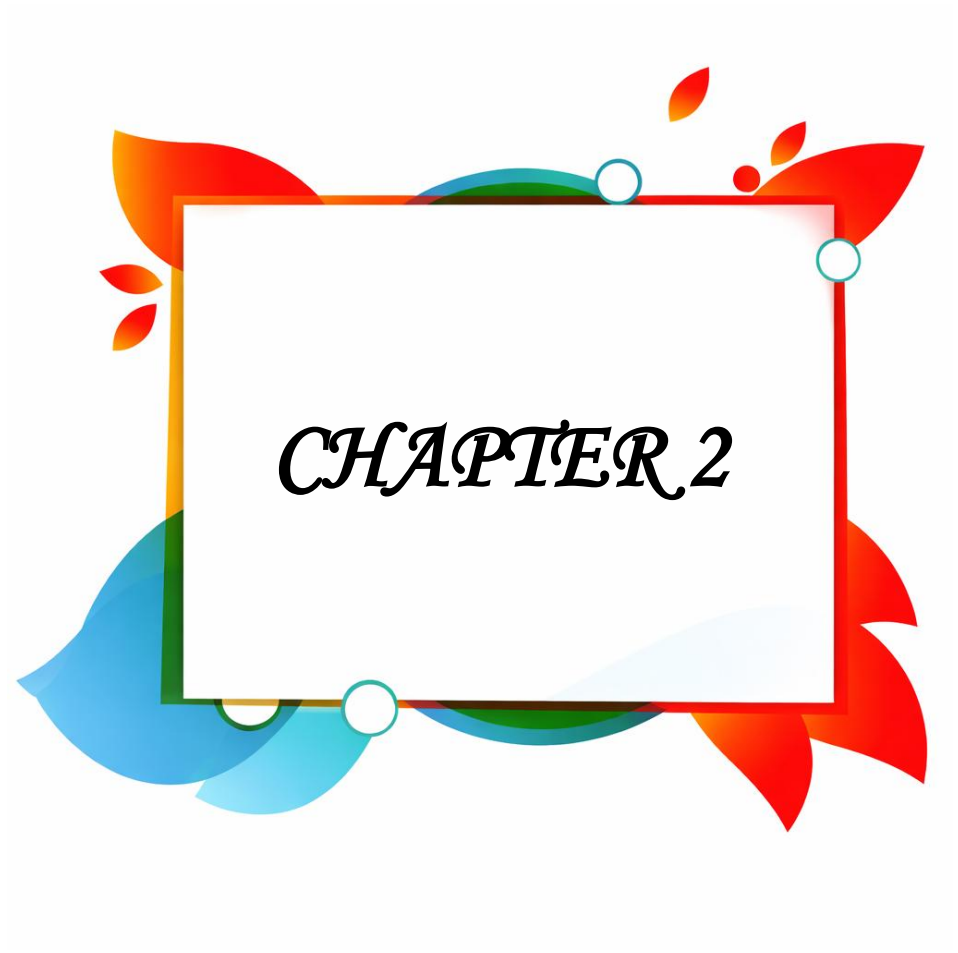
References

- Alherimi, N., vd. (2024). A Systematic Literature Review of Artificial Intelligence Advancements in Green Human Resource Management. *Sustainability*, 17(22). <https://doi.org/10.3390/su172210283>
- Alsharari, N. M. (2024). Artificial intelligence and business management: A systematic literature review. *Cogent Business & Management*, 11(1), 2432550. <https://doi.org/10.1080/23311975.2024.2432550>
- Awwad, B., & Zaid, M. A. A. (2026). Artificial intelligence and corporate environmental sustainability: Insights from a bibliometric analysis. *Competitiveness Review*. <https://doi.org/10.1108/CR-06-2025-0204>
- Berniak-Woźny, J. (2025). The role of AI in ESG and sustainability reporting: A bibliometric study. *Economics and Environment*, 94(3), 1167. <https://doi.org/10.34659/eis.2025.94.3.1167>
- Borges, A. F. S., Laurindo, F. J. B., Spínola, M. M., Gonçalves, R. F., & Mattos, C. A. (2021). The strategic use of artificial intelligence in the digital era: Systematic literature review and future research directions. *International Journal of Information Management*, 57, 102225. <https://doi.org/10.1016/j.ijinfomgt.2020.102225>
- Bruzzone, A. G., Gotelli, M., Massei, M., Sina, X., Giovannetti, A., Ghisi, F., & Cirillo, L. (2025). Memetic Optimization of Wastewater Pumping Systems for Energy Efficiency: AI Optimization in a Simulation-Based Framework for Sustainable Operations Management. *Sustainability*, 17(14), 6296. <https://doi.org/10.3390/su17146296>
- Cannas, V. G., Ciano, M. P., Saltalamacchia, M., & Secchi, R. (2024). Artificial intelligence in supply chain and operations management: a multiple case study research. *International Journal of Production Research*, 62(9), 3333-3360. <https://doi.org/10.1080/00207543.2023.2232050>
- Cao, L. (2022). AI in finance: Challenges, techniques, and opportunities. *ACM Computing Surveys (CSUR)*, 55(3), 1-38. <https://doi.org/10.1145/3502289>
- Chen, P., Chu, Z., & Zhao, M. (2024). The road to corporate sustainability: The importance of artificial intelligence. *Technology in Society*, 76, 102440. <https://doi.org/10.1016/j.techsoc.2023.102440>
- Davenport, T., Guha, A., Grewal, D., & Bressgott, T. (2020). How artificial intelligence will change the future of marketing. *Journal of the Academy of Marketing Science*, 48(1), 24-42. <https://doi.org/10.1007/s11747-019-00696-0>
- Dehaybe, H., Catanzaro, D., & Chevalier, P. (2024). Deep reinforcement learning for inventory optimization with non-stationary uncertain demand. *European*

- Journal of Operational Research, 314(2), 433-445.
<https://doi.org/10.1016/j.ejor.2023.10.007>
- Di Vaio, A., Palladino, R., Hassan, R., & Escobar, O. (2020). Artificial intelligence and business models in the sustainable development goals perspective: A systematic literature review. *Journal of Business Research*, 121, 283-314.
<https://doi.org/10.1016/j.jbusres.2020.08.019>
- Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2019). Artificial intelligence for decision making in the era of Big Data—evolution, challenges and research agenda. *International Journal of Information Management*, 48, 63-71.
<https://doi.org/10.1016/j.ijinfomgt.2019.01.021>
- Dwivedi, Y. K., Hughes, L., Ismagilova, E., Aarts, G., Coombs, C., Crick, T., ... & Williams, M. D. (2021). Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, 57, 101994. <https://doi.org/10.1016/j.ijinfomgt.2019.08.002>
- Ebule, A. E. (2025). Business intelligence and artificial intelligence for sustainable business operations. *International Journal of Scientific Research and Management (IJSRM)*, 13(1). <https://doi.org/10.18535/ijssrm/v13i01.ec05>
- Giovannetti, A., Ghisi, F., Cirillo, L., et al. (2025). Memetic optimization of wastewater pumping systems for energy efficiency: AI optimization in a simulation-based framework. *Sustainability*, 17(14), 6296. <https://doi.org/10.3390/su17146296>
- Goel, A., Raut, G., Sharma, A., & Taneja, U. (2024). Artificial intelligence and sustainable business: A review. *South Asian Journal of Business and Management Cases*, 13(3), 340-365.
<https://doi.org/10.1177/22779779241302146>
- Enholm, I. M., Papagiannidis, E., Mikalef, P., & Krogtstie, J. (2022). Artificial intelligence and business value: A literature review. *Information systems frontiers*, 24(5), 1709-1734.
- Jarrahi, M. H. (2018). Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making. *Business Horizons*, 61(4), 577-586. <https://doi.org/10.1016/j.bushor.2018.03.007>
- Jobstreibizer, J., Beliaeva, T., Ferasso, M., Kraus, S., & Kallmuenzer, A. (2025). The impact of artificial intelligence on business models: a bibliometric-systematic literature review. *Management Decision*, 63(13), 372-396.
- Kaplan, A., & Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons*, 62(1), 15-25.
<https://doi.org/10.1016/j.bushor.2018.08.004>

- Machucho, R., & Ortiz, D. (2025). The impact of artificial intelligence on business innovation: A review. Preprints.org. <https://doi.org/10.20944/preprints202502.1465.v1>
- Mama, A., et al. (2026). Sustainable operations management: Integrating environmental and economic performance. *World Journal of Advanced Research and Reviews*, 30(2), 1457-1465. <https://doi.org/10.30574/wjarr.2026.30.2.1367>
- Mikalef, P., & Gupta, M. (2021). Artificial intelligence capability: Conceptualization, measurement calibration, and empirical study on its impact on organizational creativity and firm performance. *Information & Management*, 58(3), 103434. <https://doi.org/10.1016/j.im.2021.103434>
- Mustak, M., Salminen, J., Plé, L., & Wirtz, J. (2021). Artificial intelligence in marketing: Topic modeling, scientometric analysis, and research agenda. *Journal of Business Research*, 124, 389-404.
- Özsoy, T. (2023). The role of artificial intelligence in facilitating the transition to a circular economy. *Nişantaşı Üniversitesi Sosyal Bilimler Dergisi*, 11(2), 369-389.
- Petkovic, M. (2026). Artificial Intelligence and Sustainability: Innovations in Business and Managerial Practices. *SBS Journal of Applied Business Research*. <https://doi.org/10.70301/SBS.MONO.2025.1.3>
- Raisch, S., & Krakowski, S. (2021). Artificial intelligence and management: The automation–augmentation paradox. *Academy of management review*, 46(1), 192-210
- Salame, K. (2025). Artificial intelligence and sustainability: Innovations in business and managerial practices. *SBS Journal of Applied Business Research*. <https://doi.org/10.70301/SBS.MONO.2025.1.3>
- Sang, Y., Loganathan, K., & Lin, L. (2026). Artificial intelligence and corporate sustainability: Evidence from China's national artificial intelligence innovation and development pilot zone policy. *Sustainability*, 18(6), 3113. <https://doi.org/10.3390/su18063113>
- Shahidi Hamedani, S., Aslam, S., & Shahidi Hamedani, S. (2025). AI in business operations: driving urban growth and societal sustainability. *Frontiers in Artificial Intelligence*, 8, 1568210. <https://doi.org/10.3389/frai.2025.1568210>
- Soomro, S., Fan, M., Sohu, J. M., Soomro, S., & Shaikh, S. N. (2026). AI adoption: a bridge or a barrier? The moderating role of organizational support in the path toward employee well-being. *Kybernetes*, 55(2), 1059–1085. <https://doi.org/10.1108/K-07-2024-1889>

- Sun, S., & Zhou, X. (2026). How does artificial intelligence improve firms' resource allocation efficiency? *Finance Research Letters*, 89, 109309. <https://doi.org/10.1016/j.frl.2025.109309>
- Tambe, P., Cappelli, P., & Yakubovich, V. (2019). Artificial intelligence in human resources management: Challenges and a path forward. *California Management Review*, 61(4), 15-42. <https://doi.org/10.1177/0008125619867910>
- Toorajipour, R., Sohrabpour, V., Nazarpour, A., Oghazi, P., & Fischl, M. (2021). Artificial intelligence in supply chain management: A systematic literature review. *Journal of Business Research*, 122, 502-517. <https://doi.org/10.1016/j.jbusres.2020.09.009>
- Urbanovič, M., & Holubčík, M. (2026). Artificial intelligence in managerial decision-making for sustainable business models: A systematic literature review. *Systems*, 14(3), 245. <https://doi.org/10.3390/systems14030245>
- Xie, Y., Luo, X., & Tan, X. (2025). Artificial intelligence technology application and corporate ESG performance—evidence from national pilot zones for artificial intelligence innovation and application. *Frontiers in Artificial Intelligence*, 8, 1643684. <https://doi.org/10.3389/frai.2025.1643684>
- Wang, Q., & Qi, Y. (2025). Artificial Intelligence and Corporate Sustainability: Shaping the Future of ESG in the Age of Industry 5.0. *Sustainable Development*, 34(1), 1-26. <https://doi.org/10.1002/sd.70200>
- Wamba, S. F., Bawack, R. E., Guthrie, C., Queiroz, M. M., & Carillo, K. D. A. (2021). Are we preparing for a good AI society? A bibliometric review and research agenda. *Technological Forecasting and Social Change*, 164, 120482. <https://doi.org/10.1016/j.techfore.2020.120482>
- Zhang, C., & Yang, J. (2024). Artificial intelligence and corporate ESG performance. *International Review of Economics & Finance*, 103713. <https://doi.org/10.1016/j.iref.2024.103713>



Integration of Ethnoarchaeological Elements of The Thrace Region into Tourism

Elçin Doğan Gürbüz¹ & Ozan Şengül²

1. ETHNOARCHAEOLOGY: CONCEPTUAL FRAMEWORK AND MONITORING OF CULTURAL HERITAGE

1.1 DEFINITION OF THE CONCEPT OF ETHNOARCHAEOLOGY

Cultural heritage encompasses tangible and intangible elements that reflect the identity, culture, and values of a community, spanning from the past to the present. These elements include historic cities and textures, cultural landscapes, monumental structures, and archaeological sites, as well as intangible aspects such as language, traditions, dance, music, and rituals (Vecco, 2010: 323; Kuşçuoğlu, 2017: 60). The importance of cultural heritage lies in its role in helping societies understand their history, origins, and cultural identity. Furthermore, cultural heritage facilitates continuity and unity through intergenerational transmission, enabling communities to interact with one another, comprehend diverse cultures, and show respect for them.

The distinction between tangible and intangible cultural heritage can be assessed based on their nature and characteristics. Tangible cultural heritage refers to physical artifacts and/or monuments with historical, cultural, artistic, or scientific value. These elements are tangible, visible, or interactable through any of the five senses (Gümüşçü, 2018: 109; McKercher & du Cros, 2002: 83). On the other hand, intangible cultural heritage encompasses traditions, expressions, knowledge, and practices that are deeply rooted in the cultural identity of communities and transmitted from generation to generation (Kutlu, 2009: 13; Altıntaş, 2016: 159). Examples of intangible cultural heritage include oral traditions, performing arts, rituals, festivals, knowledge and practices concerning nature and the universe, and traditional craftsmanship (Baylan, 2019: 13; Türker & Çelik, 2012: 89; Gültekin & Uysal, 2018: 2040).

The recognition of cultural heritage plays a crucial role in identifying societies, civilizations, and cultures throughout history. Understanding societies by uncovering their identities, cultures, and values is significant both culturally and in terms of tourism. Ethnoarchaeology, which assumes this role, is an interdisciplinary field that combines archaeological and ethnographic data to

¹ Assoc. Prof. Dr., Ege Üniversitesi Çeşme Turizm Fakültesi Turizm Rehberliği Bölümü
ORCID: 0000-0002-9047-8416

² M.A., ORCID: 0009-0003-0728-048X

explore the meaning of cultural heritage and understand the relationship between societies and their past (Tuna, 2019: 724). Ethnoarchaeology is an important discipline for the preservation of cultural heritage and its transfer to future generations, as it not only examines the material remnants of cultural heritage but also seeks to understand the lifestyles, belief systems, and traditions of societies (Dişli, 2022: 443).

Archaeological ethnography (Ethnoarchaeology) is a branch of archaeology that uses social science studies to solve archaeological problems. Ethnoarchaeology is an approach that combines archaeological and ethnographic methods to study technological systems, including the socio-cultural, economic, and political aspects of production. Ethnoarchaeology provides an indirect approach to understanding ancient life and helps reconstruct aspects of ancient cultures that cannot be understood through material heritage alone (Hamilakis & Anagnostopoulos, 2009: 66-67; Iles & Childs, 2014: 92).

Ethnoarchaeology can also be described as the interpretation of the unknown archaeological past through material similarities observed in the known present (Wylie, 1985: 70). This interpretation is based on the premise that the patterns of material culture in the past operated in a similar, if not the same manner as those in the present. This premise might become open to arguments when it comes to the interpretation of intangible cultural heritage (Chase, 2004: 281).

Ethnoarchaeology can be studied in two different branches. One of these approaches is the method derived from interpreting contemporary practices that exhibit clear historical continuities with the archaeological past. This is referred to as the direct historical approach (Lyman & O'Brien, 2001: 304). While material continuities between the past and the present may strengthen the likelihood that certain contemporary practices resemble those of the past, it is crucial to document and recognize societal transformations historically (Sinopoli & Stahl, 1961: 245–246). On the other hand, the second approach posits that contemporary practices are only similar to past practices when both are subject to comparable environmental and geographical constraints. This method is known as the general comparative approach (Ascher, 1961: 319).

Ethnoarchaeology and cultural heritage are interconnected through the study of ancient civilizations, their material culture, societal practices, and genetic links. As discussed earlier, the interdisciplinary nature of ethnoarchaeology significantly contributes to the preservation and interpretation of cultural heritage by shedding light on the cultural, historical, and environmental aspects of ancient societies. Ethnoarchaeology becomes particularly important in regions where tangible cultural heritage is limited. The absence of tangible artifacts in uncovering and promoting these cultures drives researchers, tourism professionals, and educators to explore diverse ways of utilizing intangible heritage. In this context, the concept of cultural experience emerges as a critical element.

1.2 ETHNOARCHAEOLOGY AND TÜRKİYE

As an interdisciplinary field, ethnoarchaeology contributes to the understanding and preservation of cultural heritage by studying the cultural behaviors and practices of societies of the past. The practices in Türkiye, limited but not nonexistent, gives us a guiding light towards the preservation and introduction of the Thracian cultural heritage to this geography's cultural richness and tourism potential.

Aşıklı Village, believed to be the first village of Central Anatolia and Cappadocia, was habited approximately 11,000 years ago and had seen continuous human activity for thousand years (Türkiye Kültür Portalı, 2012). While excavations of the Neolithic era village still continues, the new approaches and new research questions that have come into play include both conservation and exhibition, as well as a number of practical community-based projects that envision interaction with the local community (Özbaşaran et al., 2010: 216). These approaches encompass the experimental mudbrick houses built at the entrance of the mound as part of the conservation and exhibition works, constructed with completely experimental methods as exact replicas of the structures of the 9th millennium BC and 8th millennium BC, where the Aşıklı community lived and which were revealed by archaeological excavations.

Çomakdağ, a village in the Milas district of Muğla, is one of the rare places where approximately 500 years of traditions and customs have been preserved. It has maintained its unique character, reflecting centuries-old connections in everyday life through women's attire, wedding ceremonies, the distinctive chimneys of stone houses, ornate wooden doors, and the traditional dishes prepared in its kitchens.

Aşağı Pınar Open-Air Museum, located in the center of Kırklareli, is currently undergoing a project that brings the Neolithic lifestyle to the present through a village reconstruction initiative. Since the archaeological remains in the region were deemed insufficient for the exhibition, creative solutions such as the village reconstruction, a time tunnel, and an experimental archaeology area have transformed the museum into an experience-oriented ethno-village.

Çıplak Village, spanning a wide historical period from Troy to the Ottoman Empire, creates an authentic experience while also highlighting local cultural elements. Within the village, an Archaeology House has been built to tell the story of the Troy Treasures, a mosque and tomb built with stones brought from Troy have been renovated, a house within the village has been restored as the Local History House, and rural tourism products for the region have been developed.

These examples of ethnoarchaeological studies currently ongoing in Türkiye can shed light to other, maybe not well-known, or forgotten civilizations that ruled over these lands. For instance, research on the Thracian tribes provides valuable insights into their material culture, religious practices, and social structures, thereby aiding in the preservation and interpretation of their cultural

heritage. Studies highlight the cultural and historical aspects of the Thracian tribes, their interactions with other cultures, and their influence on the cultural landscape of the Balkans.

Research on traditional Bulgarian dairy products and their historical origins in the regions of Shumen, Targovishte, and Varna sheds light on the cultural practices and traditions of the Bizalti Thracian tribe, contributing to a deeper understanding of their heritage (Petrova et al., 2021: 2). Additionally, investigations into the genetic and historical connections of tribes such as the Illyrians and Thracians illuminate the cultural and ethnic diversity of the Balkan Peninsula and its relationship with cultural heritage (Garasanin, 1982: 142). The examination of Thracian pottery traditions and their attribution to specific Thracian tribes further enhances the understanding and preservation of their material culture and artistic heritage.

The influence of Thracian beliefs and culture extends beyond the region, particularly through their contributions to broader European culture. The two most notable figures are Dionysus and Orpheus, who were popularized in Greek mythology. Dionysus, whose Thracian name was Zagreus, is believed to have originated in Thrace before being integrated into the Greek pantheon around the 2nd millennium BC. His cult, however, remained prominent in Thrace, with a major shrine dedicated to him located in the mountains of the region, where oracles foretold the futures of figures like Alexander the Great and Emperor Augustus (Turner; Coulter, 2001: 152).

In Bulgaria's Strandzha Mountains in the southeast of the country, the preservation of Thracian intangible cultural heritage is uniquely unparalleled. The region serves as a unique site where both Christianity and paganism co-exist harmoniously. A ruined dolmen near the village of Zabernovo has been repurposed as a chapel dedicated to the Holy Spirit, while an offering tablet depicting the Thracian God Rider (Zagreus) can be found in the local St. George's Church, symbolizing the syncretism of pagan deities with Christian saints. The Strandzha Mountains are also the sole place in Bulgaria where the ancient practice of firewalking, or *nestinari*, is still performed. This ritual is traditionally associated with rites that unite the forces of the underworld and the light, in devotion to Dionysus. Practiced in several villages, including Balgari, Kosti, and Brodilovo, firewalking happens on the feast days of saints Constantine and Elena, as well as on the sacred days of St. Marina, St. Elijah, and St. John the Baptist. Interestingly, in the folklore of Strandzha, Constantine and Elena are portrayed not as mother and son, but as husband and wife, which many historians interpret as a Christianized version of the Thracian Great God and Great Goddess. Furthermore, firewalking is viewed as a revival of an ancient ritual, symbolizing the union of the sun and light, represented by the Great God, and the darkness, symbolizing the Great Goddess (Thracian Non-Material Heritage, 2024, <https://ancientbulgaria.bg/thracian/thracian-non-material-heritage>).

Kukeri Games, a Balkan tradition believed to have come from the ancient Thracian traditions include costumed men, performing ritualistic dances to scare

evil spirits away. During festivals, the kukeri, dressed in terrifying monster costumes and adorned with bells on their belts, believe that by dancing heavily to the sound and clamor of the bells in village and town squares, they will scare away winter and chase away evil spirits, while calling for the arrival of spring and goodness. Their costumes are sometimes made of tree bark, animal hides, and decorated with woolen threads and paper, making them quite heavy (Vatandaş Gazetesi, 2024, https://web.archive.org/web/20170422172228/http://www.vatandasgazetesi.com.tr/ozel-haber/kotu-ruhlari-kovdular-h1_3398.html).

The Thracian architecture also has been able to reach modern world, with examples throughout the Balkans; such as the houses in Kompsatos Valley in Greece, and the villages of north Kırklareli – which contrary to Kompsatos houses, are still inhabited and used whether for living or using for services such as cafeterias.

2. THRACIANS

2.1 THRACE

The earliest mention of Thrace as a name in ancient sources appears in Homer's epic *Iliad*, written in the Ionic dialect, where it is referred to as "Thrake" (Book II, line 545). As previously mentioned, Thrake was an ally of the Trojans during that time, and sources frequently highlight the geographical proximity of these two regions. In *Odyssey*, the region's name appears in one instance (Book VIII, line 361) as "Threkendes".

Thrace, whose boundaries can be delineated as the Rhodope Mountains to the west, the straits to the east, and the Marmara Sea and the Gulf of Saros to the south, encompasses the southeastern region of the Balkan Peninsula (Erzen, 1994). Although this geography is demarcated and even divided by mountain ranges, these natural barriers did not impede the Thracian tribes. The Thracians were able to establish settlements across the region, from the mountainous areas to the valleys. The most significant evidence supporting this conclusion is the presence of tumuli found in these areas. Notably, the Rhodopes, whose name is likely of Thracian origin (Erzen, 1994), are described by Thucydides as home to free mountain tribes who fought alongside the forces of Sitalces (II, 96-98).

Turkish Thrace (or Eastern Thrace) is a relatively low-lying region compared to the rest of Thrace. This area, predominantly composed of plains and plateaus, has an average elevation of 180 meters (Ergene District Governorate). These plains and plateaus are bordered by the Istranca Mountains to the north and the Ganos and Koru Mountains (also known as Gallipoli) to the south. To the north, Turkish Thrace is influenced by the rainy continental climate and mountainous terrain of the Balkans; to the east, it is shaped by the harsh continental climate of the Black Sea and the rugged topography of Anatolia; and to the south, it is bordered by the Mediterranean climate of the Aegean. This positioning creates a

region with diverse characteristics, blending elements from these surrounding areas.

The region is home to numerous myths. In Greek mythology, the name of the region is derived from Thrace, a sorceress who was the daughter of Oceanus and Parthenope and the sister of Europa. In 1000 BCE, Thracian tribes established the settlements of Lygos and Semystra in this area. Pliny mentions the founding of Semystra in his historical writings, while traces of Lygos remain near Seraglio Point (Sarayburnu). Additionally, the myth of Hero and Leander takes place in Sestos, a Thracian city.

2.2 WHO WERE THE THRACIANS?

The Thracians were a populace who lived in the lands of Eastern and Southeastern Europe (present-day Thrace, Bulgaria, Southern Russia, and Northern Greece) during antiquity. They primarily settled in the Balkans, but also reached as far as Anatolia (Asia Minor). They spoke a language from the Indo-European language family, which was believed to have had no written form in the past but has been proven to be in written form with their “writing centers” and the archaeological evidence of inscriptions found in Bulgaria and Greece (Webber, 2001: 3; Slavova, 2022: 1).

According to Herodotus, the Thracians were the second most populous group after the Indians, with an estimated population of around one million, comprising approximately 40 different tribes (Webber, 2001: 3). Herodotus stated: "This nation is so large that the only other nation that could rival them in population are the Indians. If the Thracians had been united under a single power and leadership, they would have been invincible, undefeatable, and much stronger than other nations" (Herodotus, II: 167; V.3). Herodotus also noted that if the Thracians had not fought among themselves, they could have been a very powerful community, as the Greeks and Romans always felt the shadow of this warrior folk descending from the Balkans.

The presence of humans in the Thracian Region, the name of which also derives from the Thracians, dates back to the Paleolithic era (approximately 40,000 years ago) (Casson, 1977: 3). The Thracian region, rich in minerals, saw the emergence of settled communities from this period onward, where people engaged in agriculture, mining in the region's highlands, and gold mining due to the presence of many rivers (Casson, 1977: 3; Pernicka et al., 2003: 148-149). The earliest references to these people, aside from archaeological data, appear in the writings of the famous poet Homer, who described the Thracians as wealthy, warrior-like, and fierce (around 1500 BCE). These Thracians spoke an Indo-European language, with a written language resembling Latin and Greek (Dimitrov, 2009: 13) (see: Thracian Language). One of the most significant sources regarding the social structure of the Thracians, who had a strong aristocratic class, comes from the historian Thucydides, who, although primarily focused on ethnography, mentioned the Thracians in his work *History of the Peloponnesian War*.

It is believed that the Thracians migrated to Southeastern Europe around the 7th millennium BCE. The Greek term "Thracians" was used to collectively refer to these migrating indigenous peoples (Popov, 2013: 203; Fol, 2008: 300). Thracian culture began to take shape during the Bronze Age, around the 4th millennium BCE (Danov, 1998: 50-58; Raicheva, 2014: 5-59). According to Xenophanes, the Thracians were red-haired and blue-eyed (Fragment B16). After the 12th century BCE, they settled in regions such as Bithynia and Troad in Asia Minor. This period also marked the rise of famous Thracian kings like Orpheus, Rhesus, Lycurgus, Tereus, and Zalmoxis, as well as alliances with Troy. During this time, the Thracians were also a powerful civilization in seafaring (Webber, 2001: 4).

The Thracians emerged at the same time as Ancient Greek civilization, progressing and developing alongside it. However, the Greeks considered the Thracians to be barbarians. This perspective persisted during the Roman period. It should be noted, however, that using the term "barbarian" to describe the Thracians can be misleading. The term "barbarian" originally referred to uncivilized, crude, and savage people, and the Greeks (and later the Romans) used it to describe any civilization or community outside their own, often to portray themselves as superior or more advanced. The application of the term "barbarian" to the Thracians should not imply that their civilization was inferior. What this viewpoint highlights is that the Greeks saw the Thracians as distinct, lesser, and "different." As Greek civilization expanded, starting from the 8th century BCE, certain Thracian tribes, particularly from the aristocratic class, were assimilated (Hellenization), leading to the integration of Thracian civilization into Greek culture. This process reflects the negative view the Greeks held of the Thracians.

2.2 THRACIAN CULTURAL HERITAGE

The social structure and culture of the Thracians were diverse and heavily influenced by factors such as vegetation and agriculture. Both their social and religious rituals were closely tied to agricultural practices (Dimova, 2022: 70). Archaeological findings in the Thrace region, including settlements, burial traditions, and cult practices, provide a glimpse, albeit limited, into the social organization of ancient Thracians.

The Thracians did not possess a unified political or cultural identity. Instead, they existed as a collection of loosely connected tribes, each with its own leadership structure and varying political organization.

Despite their geographic proximity, ancient Thracian tribes exhibited significant cultural and societal differences. For instance, the Getae were distinguished from other tribes primarily due to their interactions with Ancient Greeks, as they lived in regions with Greek colonies. Similarly, the Bessi, another Thracian tribe, inhabited the mountainous areas of southern Thrace. Unlike other Thracian tribes, the Bessi did not adopt maritime traditions, further setting them apart (Bekker-Nielsen, 2017: 493).

Archaeological findings and historical sources indicate that the Thrace region was home to a multi-ethnic and multi-cultural population, comprising mixed tribes such as the Greeks, Celts, Illyrians, and Thracians, who coexisted while speaking different languages (Theodossiev, 2000: 1-4). Additionally, the city of Pautalia in Thrace (modern-day Kyustendil, Bulgaria) was occupied by the Thracian tribe known as the Dentheletae, demonstrating the distinct presence of various Thracian groups in different regions (Grigorova, 2000: 238).

The ancient Thracian tribes, influenced by their geographic locations, were different in terms of cultural practices, interactions with other cultures, and social structures. This diversity contributed to the development of distinct identities, cultures, and legacies, as reflected in historical and archaeological records.

The Thracians were renowned for their war skills and were often hired as mercenaries by other ancient civilizations (Webber, 2001: 3). Known as fierce warriors, they were frequently depicted as such in historical and artistic representations. The Thracians also gained notoriety for their indulgence for raiding. A notable example is Alexander the Great's statement to the Thracians before the Battle of Issus: "All the purple and gold worn by the Persians is plunder, ready for you to seize." According to Thucydides (VII, 29), the Thracians became even more bloodthirsty when things went their way. Their bloodlust and plunder occasionally led them to switch sides during battles, whether through bribery or by their own choice (Webber, 2001: 3-4).

In addition to their prowess in battle, the Thracians were famous for their war songs. According to Strabo, these songs were so distinct that the Greeks gave them a name: *Titanismos*, meaning the roaring cries reminiscent of the Titans (Strabo, Geography 7).

The Thracians were also skilled craftsmen. Their expertise is evident in archaeological finds, including finely crafted gold and silver jewelry, ceramics, and other artifacts. Thracian art often featured depictions of animals, mythical creatures, and geometric patterns.

2.2.1 Thracian Language

Until relatively recently, it was believed that the Thracian language(s) were not in written form and were only in spoken form. However, recent findings suggest the existence of three distinct 'writing centers' in the 4th century BC, located in northeastern Bulgaria, the Upper Thracian Plain, and the Aegean coast. Inscriptions discovered in Kjolmen and Ezerovo villages in northeastern Bulgaria, the Duvanli tumuli and the found inscriptions in the Upper Thracian Plain, the settlements of Zone and Maroneia on the Aegean coast, and the island of Samothraki provide evidence of a written Thracian language. Particularly significant are the inscriptions found in Greece in 1988, which strongly support the existence of the Thracian language (Slavova, 2022: 79-80).

The limited surviving records of the Thracian language are primarily inscriptions, depictions, and materials containing personal names. Recent

research shows us the possible existence of a local alphabet used by the Thracian population before Greek assimilation (Dimitrov, 2009: 25).

There are two main theories regarding the history of the Thracian language. The first theory argues that the language continued to live and was spoken until the end of Antiquity, while the second argues that it became extinct during the Roman period, replaced by Latin or Greek. The second theory, which emphasizes socio-cultural and socio-linguistic factors, is supported by evidence of extensive assimilation during Thrace's incorporation as a Greek colony (Yanakieva, 2018: 138). Due to methodological challenges in studying the Thracian language, phonological analysis and the detailed interpretation of all recorded names are essential for deeper research.

Based on current knowledge, the Thracian language can be connected to other Indo-European languages. These include Celtic, Italic, Germanic, Baltic, Slavic, Phrygian, Hittite, and Armenian (Lykhachova, 2022: 76). Among modern Indo-European languages, Romanian and Albanian show the closest linguistic ties and similarities with Thracian language (Yanakieva, 2018: 131-132).

The Thracian language retains identifiable features to the present day. Based on specific ancient sources (e.g., Herodotus IV/VII; Strabo, Geography VII) and fragmented linguistic data, the existence of the Thracian language(s) can be argued. The fragmented data include 5 inscriptions (4 in Thracian and 1 in Dacian), 97 terms related to medicinal plants (40 in Thracian and 57 in Dacian, recorded by Dioscorides), and approximately 1,700 place names, hydronyms, mountain names, and deity names (Krimpas, 2022: 69-70).

Various aforementioned hypotheses have been proposed about the birth and ties of the Thracian language. These include connections with Iranian, Phrygian-Armenian, Greek, Illyrian, Albanian, Italic, Slavic, Hellenic, and Baltic language families. Among these, only the Thracian-Slavic hypothesis has gained traction as a theory. However, the most concrete information we have is that Thracian was an Indo-European language.

Found inscriptions from Ezerovo, Duvanlii, and Kjolmen open a window to the language and the culture of the Thracians. The inscriptions have been partially translated, but mostly interpreted. The Thracian inscriptions discovered so far were written in Greek letters without any spaces between words, which makes the inscriptions' interpretation particularly challenging. Written in ancient Greek alphabet, these inscriptions show us how Thracian people were buried and also what they believed in.

Ezerovo Ring

ΡΟΛΙΣΤΕΝΕΑΣΝ ΕΡΕΝΕΑΤΙΑ ΤΕΑΝΗΣΚΟΑ ΠΑΖΕΑΔΟΜ
ΕΑΝΤΙΑΕΖΥ ΠΙΤΑΜΙΗΕ ΠΑΖ ΗΑΤΑ (Rolisteneas Nerenea tiltean esko Arazea domean Tilezupta mie crazilta)

I am Rolesteneas, descendant of Nereneas. Tilezipta, a woman of the land, buried me in the soil.

The inscription tells us the deceased owner of the ring, Rolesteneas, and Tilezipta, whom buried Rolesteneas probably as a form of funerary practice.

Kjolmen Inscription

EBAP. ZEΣΑΣΝ IINETEΣA ITEK. A NBLABAIffN
NYAΣNΛETEΔNYEΔNEINΔAKATP.Σ

(Ebar Zes(a) asn HN etes igek. A / N blabahe gn! / N ua(s?) sn letedn ued(n), ne in dakatr s!)

Ebar, son of Sezas, lived here for 58 years. / Do not disturb this (grave)! / Do not disrespect this deceased, for the same shall be done to you!

In the Kjolmen Inscription, we also see a burial custom taking place, warning those who might disturb the burial site and the deceased buried within.

Duvanlii Ring

HYZIH ΔΕΛΕ ΜΕΖΗΝΑΙ eys, ie ... dele, mezenai.

Help thee (all powerful) ... Protect (you, who ride)!

Here we can see a reference to the Thracian Horseman, who is believed to be either a war hero that is seen depicted in ancient Thracian iconography as well, or Sabazios, a Thracian and Phrygian deity, 'sky father', originated in Asia Minor.

2.2.2 Thracian Religion

The religion and mythology of the Thracians are not well-documented, yet it is known that they had a polytheistic belief system, similar to the Ancient Greeks. They worshiped various gods and goddesses with a particular emphasis on gods associated with nature, fertility, and the afterlife. The Thracians also practiced rituals and ceremonies, and some evidence suggests the existence of divination practices.

Thracian belief still is a relatively understudied topic. Despite the limited number of studies, it is known that the plant world played a significant role in their cult practices. The Thracians' connection to agriculture is well illustrated by the prominence of the Dionysian cult. The Dionysian cult in Thrace retained specific forms and did not lose its distinctly Thracian character even during the Roman period (Vitas, 2018; Dimova, 2022).

Thracian religion lacked iconic representations, with depictions of deities found only on functional objects and not within sanctuaries. Despite this, Xenophanes of Colophon noted that Thracians imagined their gods with red hair and blue eyes, reflecting the belief that deities resembled their worshippers in human form (Archibald, 1999).

We can see an evolution throughout the Thracian belief system. While initially their practices were focused on rituals and the 'satisfaction of deities' through sacrifices; over time, these practices began to form the foundation for more complex belief systems. While Thracians would practice their beliefs through

everyday rituals that were ‘direct actions’ (such as offerings and sacrifices) to ensure favor from the gods in agriculture, fertility, or protection; these systems became to be more abstract and sophisticated, such as beliefs in afterlife, forming theological ideas, etc. So, Thracians evolved their beliefs from direct concrete actions towards abstract practices, thus forming pantheons for gods, often with specific roles (Archibald, 1999: 427-428; Rabadijev, 2015: 391).

3. INTEGRATING ETHNOARCHAEOLOGICAL ELEMENTS OF THRACIANS INTO TOURISM

The Thracian civilization, particularly in the context of Turkish Thrace, is an ancient culture with limited tangible cultural heritage but high potential for intangible cultural heritage. In tangible terms, this society is represented by a limited number of remains, such as the tumuli in Turkish Thrace and burial sites in the Balkans, as well as ethnoarchaeological elements, such as Thracian architecture observed in Turkish Thrace. Today, this civilization is primarily understood, promoted, and revitalized based on these limited tangible heritages, which are intertwined with intangible cultural heritage. In this context, the discipline of ethnoarchaeology can be employed to promote the cultural heritage of the Thrace region by combining archaeological data with ethnographic research. This approach allows for a deeper understanding of the region's historical and cultural significance. Ethnoarchaeology can provide insights into the traditions of local communities and offer a comprehensive view of Thrace's cultural heritage, merging the past and present. Additionally, ethnoarchaeological research can emphasize the historical and cultural wealth of the region, potentially enhancing its tourism appeal and playing a crucial role in the conservation of cultural heritage and the promotion of sustainable tourism. (Tuna, 2019, p. 734).

Deciding on how to create a tourist destination out of a (mostly) intangible heritage-driven ancient culture is a difficult question to answer. In this context, we can raise different options and opinions on how to achieve this.

Traditional Thracian architectural style is still prominent in villages within Edirne and especially Kırklareli. Some of these structures are entirely preserved, while others, as exemplified by their roofs, feature rye straw as the primary material and still keep some element of the Thracian architectural heritage. The architectural tradition of flat roofs is absent in the area; instead, all traditional homes are characterized by pitched roofs. These houses, tracing their origins back to the Thracian period, have been constructed and utilized in similar forms within the same geography for over 2,000 years. Historically, walls were plastered with mud and soil, remnants of which are still visible today. These architectural traits are not limited to the most prominent Kula village but can also be found in Kaynarca, Kuzulu, Ahlatlı, Demircihalil, Ahmetler, Ömeroba, and various other villages. A shared feature of these locations is their location within the forested regions of the Strandzha Mountains, where rye trees have been used in construction for millennia (Eres, 2023, 32-34).

Herodotus, in one of his passages, mentions that the Thracians styled their hair in buns and carried long spears. Xenophon, in *Anabasis*, noted during his stay either near the city of Heraion-Teikhos or possibly in the Strandzha Mountains region, “I understood why the Thracians wore trousers (*bracae*)—it was because of the extreme cold.” Thracians typically wore a tunic known as *zeira*, along with a headpiece made of fox fur and boots crafted from deer calfskin. Thracian women’s attire often included intricately woven dresses and shawls. The women were often adorned with tattoos (Herodotus, 5.6), which was a distinctive cultural feature.

While meat, butter, and dairy products were their main diet, the Thracians also incorporated grains into their diet. This is proven by references in the works of Xenophon, Demosthenes, and Strabo. Thracian wheat was referred to as *briza*, corresponding to a wheat species still cultivated and used in culinary in the region today. The Thracian diet was further enriched with various nuts and fruits, including hazelnuts, figs, apples, pears, cherries, plums, raspberries, and blackberries.

Thracian society was hierarchical, with an aristocratic warrior class at the top. Warriors were celebrated for their skill in horseback riding and archery. Thracian warriors are described as fierce, with long spears and distinctive shields (*peltes*) (Herodotus; Xenophon). Tribal chiefs wielded significant influence, often serving as both military leaders and political figures.

Thracians were masters at metalwork – especially considering their living areas being within the mountains – producing ornate jewelry, weaponry, and utilitarian objects. Gold and silver artifacts, such as those found in the Panagyurishte Treasure, highlight their artistic sophistication (Archibald, 1998, 199-200). Pottery and textile production were also significant, with geometric and animal motifs being common in their designs.

Considering the Dionysus cult being somewhat at the forefront of their beliefs, music, dancing, and storytelling were all very integral to the Thracian culture, indicating the importance of collective cultural practices in fostering community bonds. They were known for their wind and string instruments, which were often used in religious rituals (Vitas, 2018, 72).

While creating a touristic/cultural route for the Thracians, a couple of important challenges must be tackled first.

The Thracian culture and the Thracian heritage spans over multiple countries, including Türkiye. However, the reach of this ancient culture means that any one country cannot possibly be enough to encapsulate the essence of it, and transfer this in a meaningful and full way to the tourists. Thus, a multi-faceted, multi-country project that spans over at least two major countries, such as Türkiye and Bulgaria, must be discussed.

Another challenge of creating a route about Thracians is the lack of tangible elements. The Thracian heritage partly continues as a non-tangible heritage within some peoples still living in the area. Tangible heritage of the Thracians

include burial sites, remnants, and architectural continuity seen in the region. The only tangible elements of this culture in the Turkish Thrace are the burial sites (some of which still being discussed about being Thracian), and handful of architectural examples. Non-tangible heritage in the Turkish Thrace may have evolved and assimilated too much to be considered Thracian.

Composing a route just for the Turkish Thrace heritage can be limiting, and not very fruitful in terms of transferring the Thracian culture into present day. A route just for the Turkish Thrace could be of archaeological, with Edirne and Kırklareli museums in forefront, and the burial sites and Kırklareli village architecture added within. However, considering an *ethnoarchaeological* approach to the Thracians, borders of the Turkish Thrace should be crossed, and the ethnic characteristics of the culture must be incorporated into the route.

The multi-country route of Thracians, spanning from Turkish Thrace to Bulgaria through the Strandzha Mountains has a high potential of being a tourist attraction, considering the current Thracian attractions made in Bulgaria (e.g. Valley of Thracian Rulers), and the potential that lies within the Turkish borders.

3.1 A Thracian Hiking Route: Path of Thracians

A route of this magnitude should include both tangible and non-tangible heritage belonging to the Thracians, mainly the burial sites, architectural examples, and museums; and the still ongoing cultural elements such as festivals, celebrations, and games. While the non-tangible heritage can be found in the Turkish Thrace, the cultural heritage of the Thracians mainly exists in Bulgarian side of the Strandzha Mountains.

This proposed walking/hiking route begins in Kırklareli, and ends in Burgas. The planned duration of this route is estimated to be 10-12 days, spanning over 250 kilometers. This route plans to incorporate the festivals of Kukeri and Nestinari; however, these festivals being in different times of the year, the route is also subject to change within 12 months, including Kukeri in winter/spring time; Nestinari in summer time. Both festivals happening within the borders of the Strandzha Mountains gives us a range of motion in terms of adapting the route.

The key stopping points of the route are as follows:

Kırklareli, Türkiye: Aşağıpınar Village Open Air Museum
 Dupnisa Caves
 Istiranca Forests
 Border villages of Kırklareli

Malko Tarnovo: Propada Necropolis
 History Museum

Strandzha Mountains: Balgari Village (Nestinari)
 Strandzha National Park/Zvezdets (Kukeri)

Burgas: Pomorie Tombs

Burgas

The route starts in Kırklareli center, where a Neolithic and Chalcolithic Period ethnovillage can be seen, starting the era of the Thracians. Then, the Dupnisa Caves are believed to have a connection to the Thracian rituals. Around the Dupnisa Caves and the Istranca Forest, towards the foothills of Strandzha Mountains, lie the villages that still continue the Thracian architectural heritage. Crossing the border, with Propada Necropolis, we start to see marked paths that will guide us almost all the way to Burgas. Here we can divide the path into two. First goes towards the Balgari Village in summer, celebrating Nestinari (Image 1); the second is Zvezdets Village in winter, celebrating Kukeri (Image 2). From both Villages, we can reach Begliktash, a Thracian rock sanctuary, and along the Black Sea coastline, towards the Pomorie Tombs, where we see our last Thracian burial sites. The route then finishes in Burgas.

Throughout the route, we can experience the cultural elements of Thracians, while also strengthening our experience with tangible remnants, such as burial sites and ritual sites. Within the route, while experiencing either Nestinari or Kukeri Festivals, we can also join activities that, again, resonates with the Thracian culture, such as culinary activities (briza dishes, dairy products), and storytelling.

The aim of this route is to create an immersive experience for the tourists about a civilization that has given the region its name. The dynamic heritage of the Thracians provides us with enough headroom to create an attraction about this lasting legacy. However, the route being multi-country, a joint project must be created between Bulgaria and Türkiye, similar to TOGETGER, a cross-border project (INTERREG).

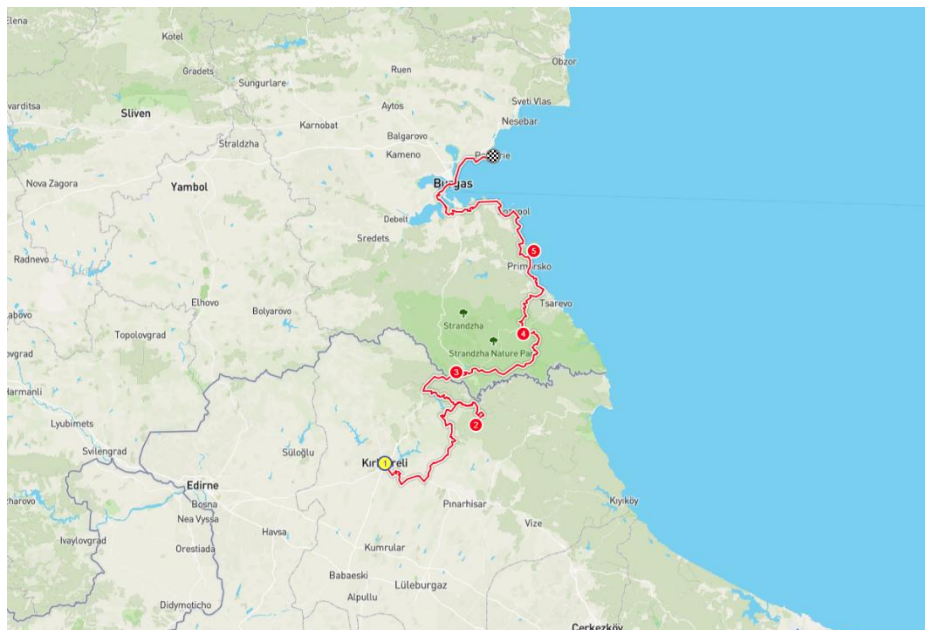


Image 1: Path of Thracians Route, first alternative, Nestinari Festival

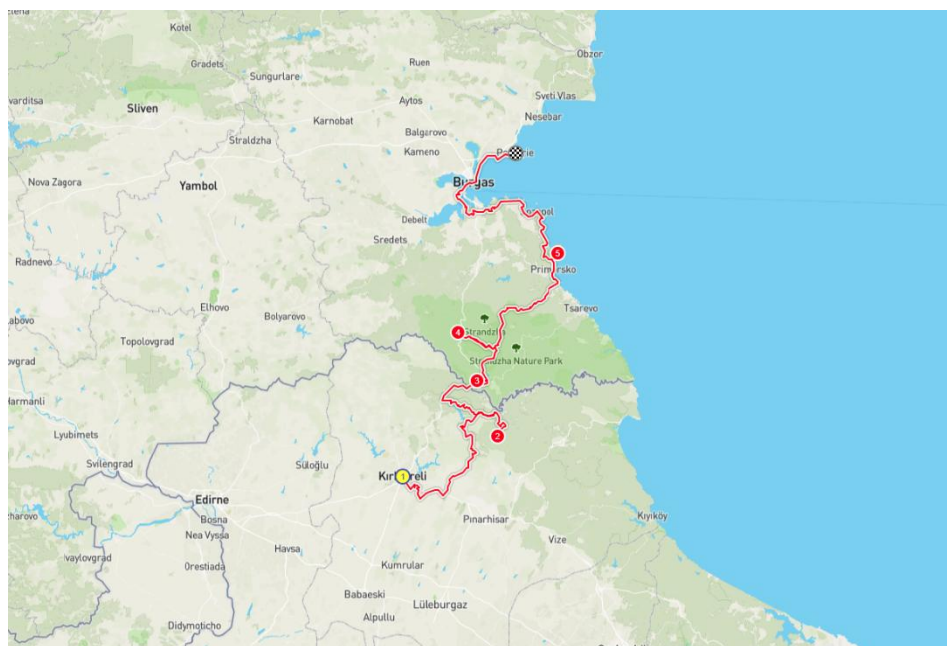


Image 2: Path of Thracians Route, second alternative, Kukeri Festival Route

3.2 A Thracian Ethnovillage

The second proposal that can integrate the Thracian heritage into tourism is an *ethnovillage*. Ethnographic village, or *ethnovillage*, is a real or artificial site that aims to preserve and portray the traditional lifestyle, culture, and architecture

of a specific peoples, where tourists can experience authentic rural practices (Smith & Robinson, 2006, 93). Ethnovillages are significant cultural assets for the development of ethno-tourism and the preservation of ethnoarchaeological and ethnocultural heritage. These villages can be explained as the integration of historical elements within towns or villages (Prevolšek et al., 2020, 1399). Ethnovillages serve as a platform displaying specific ethnic and cultural characteristics and offer visitors and tourists alike an immersive experience into the traditions, cultures, and lifestyles of various ethnic groups (Mukatova et al., 2020, 148).

A Thracian ethnovillage within the Turkish Thrace is a probable proposition if we consider the current archaeological remnants of the civilization. This includes the tumuli, such as the ones in Büyükdöğlük, Dokuzhöyük, Yenibedir Villages, and obelisks (or pillars), such as the ones in Lalapaşa and Çömlekakpınar. These remnants are especially important when we want to place this ethnovillage on a tangible, or concrete, heritage. Adding non-tangible elements to the tangible heritages can enhance the experience in such a way that real remnants can make the other elements feel as real.

Built on the foothills of a real tumulus, the Thracian Ethnovillage will carry ancient Thracian daily life to our day. The village will have buildings, made with Thracian architecture (as explained above), all of which will be used in different activities, such as gastronomy, workshops, storytelling, horseback riding and training, etc. The personnel working in the village will have time-appropriate clothing, creating more immersion. The food sold in the stands, or in the cafeteria, will be of traditional Thracian diet, replicating the same routines as the Thracians.

The workshops given within the village can be about preparing Thracian foods, making Thracian arts and crafts (such as pottery or engravings), learning and performing Thracian music, riding a horse, training like a ‘warrior’, etc. This, in turn, can also create a circulating capital up to a limit for the upkeep of the village.

While the aforementioned routes can experience the Thracian festivities authentically, in their current original regions, the timing within the practice of the route can be tricky. The village can act as an artificial festival area, holding these festivals in regular intervals to make the visitors experience these ancient practices whenever they want, further enhancing the authentic experience, feeling as if going back thousands of years by just entering a village gate.



Image 3: A visualization of a Thracian Ethnovillage, **Source:** Enver Şengül

4. CONCLUSIONS

Thrace region, being the crossroads of thousands of civilizations and countless peoples, is home to tremendous numbers of both tangible and non-tangible heritage. Utilizing these heritages and reaching its true potential is crucial for the local and national tourism.

This culture, still living just outside our borders, unquestionably existed within Turkish Thrace borders and can still be kept alive, so that we can both celebrate our undeniable heritage and contribute to our tourism, thus our economy, by reaching the same level of preservation as of our neighbor. In this context, a partnership with our western neighbors, such as Bulgaria, that have been working on the preservation of Thracian remnants and the Thracian culture can undeniably guide our research and our studies in the correct direction.

Especially Thracian heritage living within this crossroad, can be a tremendous attraction for the foreign tourists. At the same time, it could be a great way to educate our own local tourists about a lesser-known culture that existed here thousands of years ago, that we still see its effects of.

However, this implementation must start at the archaeological level, not just excavating the remnants of a long-gone civilization, but more importantly preserving and protecting them. The current state of the remains in Turkish Thrace is almost concerning, with little to no effort being made to protect them, while treasure hunters and vandals alike can irrevocably damage the delicate relics.

There are currently multiple ethnoarchaeological projects and even ethnovillage practices exist in Türkiye, with very successful examples such as Çıplak Köy, or Aşağı Pınar Open Air Museum. The potential of the Thracian culture and heritage that we can see in our neighbor Bulgaria, and the great efforts made within the discipline of ethnoarchaeology in Türkiye should be incorporated together so that a rich heritage such as Thracian culture does not fade away from the lands that is named after them, and contributes to the tourism and economy of both Thrace and Türkiye.

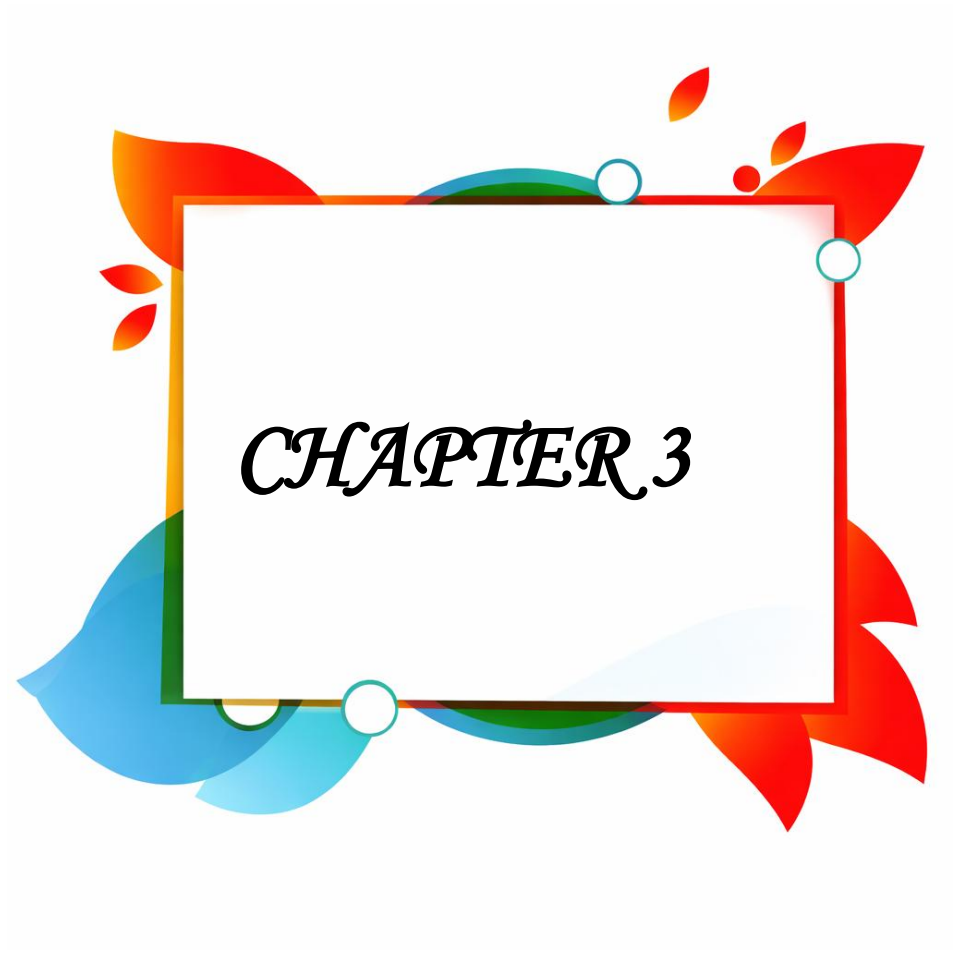
REFERENCES

- Altıntaş, K. M. (2016). Kaybolmaya yüz tutmuş geleneksel el sanatkârlarının karşı karşıya bulunduğu ticari sorunların analizi. *Bilig: Türk Dünyası Sosyal Bilimler Dergisi*, (77), 157-182.
- Ascher, R. (1961). Analogy in Archaeological Interpretation. *Southwestern Journal of Anthropology*, 17, 317-325.
- Archibald, Z. H. (1999). "Thracian Cult - from Practice to Belief". *Ancient Greeks West and East*. Leiden, Netherlands: *Brill*. 497-520.
- Baylan, E. (2019). Kültürel peyzaj ve yere bağlılık: van kenti örneği. *Yüzüncü Yıl Üniversitesi Tarım Bilimleri Dergisi*, 29(1), 10-23. <https://doi.org/10.29133/yyutbd.422054>
- Bekker-Nielsen, T. (2017). Thracians in the Roman Imperial Navy. *The International Journal of Maritime History*. 29(3) 479-494.
- Casson, L. (1977). The Thracians. *The Metropolitan Art Bulletin*. 35(1). 2-6.
- Chase, B. A. (2004). Ethno-archaeology in South Asia: An introduction and review. *Archaeology as History in Early South Asia*, 280-301.
- Dimitrov, P. A. (2009). Thracian Language and Greek and Thracian Epigraphy. *Cambridge Scholars Publishing*.
- Dimova, E. (2022). Plant Motifs and Sacred Rituals of the Thracians in Connection with the God Hypnos. *KIN Journal*. 8(1) 67-79.
- Dişli, G. (2022). Kültürel miras ve koruma olgusunun döngüsel ekonomi ve sürdürülebilirliğe katkısı: türkiye örnekleminde bir değerlendirme. *Süleyman Demirel Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, 26(3), 441-451. <https://doi.org/10.19113/sdufenbed.1084899>
- Eres, Z. (2023). Trakya’da Geleneksel Köy Mimarisinin Son İzleri. *Arkeoloji ve Sanat Yayınları*.
- Erzen, A. (1994). İlkçağ Tarihinde Trakya – Başlangıçtan Roma Çağı’na Kadar. *Arkeoloji ve Sanat Yayınları*.
- Garasanin M. 1982. The bronze age in the Central Balkan Area. In: Boardman J, Edwards IES, Hammond NGL, Sollberger E, editors. The prehistory of the Balkans, the Middle East and the Aegean world, tenth to eighth centuries B.C. *Cambridge: Cambridge University Press*. 75-186.
- Grigorova, V. (2000). Médicaments et thermalisme à Pautalia, Thrace. *Gesnerus* 57. 238-249.
- Gültekin, N. and Uysal, M. (2018). Kültürel miras bilinci, farkındalık ve katılım: taşkale köyü örneği. *Opus Uluslararası Toplum Araştırmaları Dergisi*. <https://doi.org/10.26466/opus.446272>

- Gümüşçi, Ö. (2018). Tarihi Coğrafya ve Kültürel Miras. *ERDEM*, 75, 101-102.
- Hamilakis, Yannis & Anagnostopoulos, Aris. (2009). What Is Archaeological Ethnography?. *Public Archaeology*. 8. 65-87
- Herodotus, IV/V/VI/VII
- Homer. Illiad.
- Homer. Oddyseus.
- Iles, L., Childs, S. (2014). Ethnoarchaeological and Historical Methods. In: Roberts, B., Thornton, C. (eds) *Archaeometallurgy in Global Perspective*. Springer, New York, NY. https://doi.org/10.1007/978-1-4614-9017-3_9
- Krimpas, P. G. (2022). Four Centuries of Theorizing on “Thracian” Language(s): A Critical New Look. *Balkanistica, Vol.35. The South East European Studies Association*. 69-94
- Kutlu, M. M. (2009). Somut Olmayan Kültürel Mirasın Korunmasında Eğitime Yönelik İlk Adım: Halk Kültürü Dersi. *Milli Folklor*. 21(82). 13-18.
- Lykhachova, V. A. (2022). The Paleo-Balkan Languages in the Context of Genealogical Classification: Linguohistoriographic Aspect. *Horlivka Institute of Foreign Languages of the Donbas State Pedagogical University. Studia Linguistica*. 20. 71-83.
- Lyman, R. L. & O'Brien, M. J. (2001). The Direct Historical Approach, Analogical Reasoning, and Theory in Americanist Archaeology. *Journal of Archaeological Method and Theory*, 8(4), 301-342.
- McKercher, B. & du Cros, H. (2002). Cultural Tourism: The Partnership between Tourism and Cultural Heritage Management. *The Haworth Press*. 3-4
- Mukatova, R., Mussina, K., & Zapatero, M. (2022). Innovative development of ethno-tourism in ulytau. *Bulletin of Turan University*, (3), 145-160. <https://doi.org/10.46914/1562-2959-2022-1-3-145-160>
- Öksüz Kuşçuoğlu, G., & Taş, M. (2017). Sürdürülebilir Kültürel Miras Yönetimi. *Yalvaç Akademi Dergisi*, 2(1), 58-67.
- Özbaşaran, M., Duru, G., Teksöz, D., Omacan, S. (2010). YAŞAYAN GEÇMİŞ: AŞIKLI HÖYÜK. *TÜBA-KED Türkiye Bilimler Akademisi Kültür Envanteri Dergisi* (8), 215-228.
- Pernicka, E. & Eibner, C. & Öztunalı, O. & Wagner, G. A. (2003). Early Bronze Age Metallurgy in the North-East Aegean. *Troia and Troad*. 143-172.
- Petrova P, Ivanov I, Tsigoriyna L, Valcheva N, Vasileva E, Parvanova-Mancheva T, Arsov A, Petrov K. (2021). Traditional Bulgarian Dairy Products: Ethnic Foods with Health Benefits. *Microorganisms*. 9(3):480. <https://doi.org/10.3390/microorganisms9030480>

- Prevolšek, B., Maksimović, A., Puška, A., Pažek, K., Žibert, M., & Rozman, Č. (2020). Sustainable development of ethno-villages in bosnia and herzegovina—a multi criteria assessment. *Sustainability*, 12(4), 1399.
- Rabadjiev, Kostadin (2015). "Religion". A Companion to Ancient Thrace. *Blackwell Companions to the Ancient World*. Malden, United States: Wiley-Blackwell. 443–456.
- Sinopoli & Stahl, A. B. (1993). Concepts of Time and Approaches to Analogical Reasoning in Historical Perspective. *American Antiquity*, 58(2), 235-260
- Slavova, M. (2006). Thracian names written through Greek and Latin letters: A philological approach. *ORPHEUS. Journal of Indo-European and Thracian Studies*. 16. 79-89.
- Smith, M. & Robinson, M. (2006). Cultural tourism in a changing world: Politics, participation and (re)presentation.
- Strabo, Geography VII
- Theodossiev, N. (2004). Celtic Settlement in North-Western Thrace during the Late Fourth and Third Centuries BC: Some Historical and Archaeological Notes. Institute of Archaeology and Ethnology of the Polish Academy of the Sciences. Thucydides, II.
- Tuna, A. (2019). Arkeolojik sit koruma pratikleri: türkiye ve abd karşılaştırması. *Gaziantep University Journal of Social Sciences*. <https://doi.org/10.21547/jss.440106724-735>
- Türker, A., & Çelik, İ. (2012). Somut Olmayan Kültürel Miras Unsurlarının Turistik Ürün Olarak Geliştirilmesine Yönelik Alternatif Öneriler. *Yeni Fikir Dergisi*, 4(9), 86-98. Türkiye Kültür Portalı. (2012). Aşıklı Höyük. T.C. Kültür ve Turizm Bakanlığı. <https://www.kulturportali.gov.tr/turkiye/aksaray/gezilecekyer/asikli-hoyuk>
- Türkiye Kültür Portalı. (2012). *Aşıklı Höyük*. T.C. Kültür ve Turizm Bakanlığı. <https://www.kulturportali.gov.tr/turkiye/aksaray/gezilecekyer/asikli-hoyuk>
- Turner, P., & Coulter, C. R. (2001). Dictionary of ancient deities. *Oxford University Press*.
- Vecco, M. (2010). A definition of cultural heritage: from the tangible to the intangible. *Journal of Cultural Heritage*, 11(3), 321-324. <https://doi.org/10.1016/j.culher.2010.01.006>
- Vitas, M. (2018). Dionysus in Thrace: Cult and Practice.
- Wylie, A. (1985). The Reaction against Analogy. *Advances in Archaeological Method and Theory*, 8, 63-111.
- Yanakieva, S. (2018). Language and Ethnic Identity of the Thracians during the Roman Age and Late Antiquity. *Proceedings of the First International*

Roman and Late Antique Thrace Conference. *National Archaeological
Institute with Museum Bulgarian Academy of Sciences*. 131-139



Fintech and Financial Inclusion: A systematic Literature Review

Yüksel Akay Ünvan¹ & Hodan Abdullahi Abdirahman²

INTRODUCTION

Financial inclusion has emerged as an important goal for economic development in the global economy because of its key importance in alleviating poverty, increasing financial stability, and facilitating sustainable development (Ha et al., 2025). Individuals and small-scale enterprises benefit from access to basic financial products such as payments, savings, loans, and insurance, allowing them to better engage in economic transactions (Jha & Dangwal, 2025).

The past decade has witnessed remarkable developments in financial technology (FinTech), which have revolutionized the delivery of financial products and services. Technologies such as mobile payments, online lending services, and AI-based financial services have overcome traditional obstacles and helped facilitate the provision of financial services in developing countries that lack sufficient traditional financial institutions (Vuković et al., 2024). This is why FinTech is perceived to be a potential means to promote financial inclusion across the globe (Jha & Dangwal, 2025).

Nonetheless, even in light of such optimism, the link between FinTech and financial inclusion continues to be multifaceted. The current body of literature has increasingly brought into question the prevailing belief that more extensive access to financial services translates directly to increased financial inclusion (Mandić et al., 2025). The concept of financial access versus financial inclusion has thus been critically highlighted, in which financial access is defined as the availability of financial services while financial inclusion pertains to their utilization and benefits to the user (Ha et al., 2025).

Furthermore, the integration of FinTech technologies creates new risks and challenges that could negatively affect their potential for inclusiveness. Thus, digital lending can provide increased access to credit opportunities but simultaneously result in over-indebtedness as a consequence of high interest rates and a lack of consumer protection mechanisms (Banna et al., 2021). Similarly, AI-based financial services

¹ Prof. Dr, Ankara Yıldırım Beyazıt University / Business Administration, Finance and Banking, Ankara, ORCID: 0000-0002-0983-1455

² Student, Ankara Yıldırım Beyazıt University / Business Administration, Finance and Banking, Ankara

are more efficient yet potentially exacerbate social inequalities via algorithms' biases and exclusion of individuals with little digital footprint (Del Sarto & Ozili, 2025). Moreover, the existence of significant disparities in digital and financial literacy further fuels the formation of the digital divide, preventing some population groups from using the potential offered by innovations (Odei-Appiah et al., 2021).

Finally, an essential deficiency that can be observed in the current research in the field of FinTech and financial inclusion is a lack of comparative analysis of various FinTech technologies. Specifically, most scholarly works consider particular innovative solutions individually, providing insights regarding their add. As such, this study attempts to fill these gaps through a critical and comparative analysis of various FinTech innovations, which include mobile money, digital lending, and artificial intelligence. The analysis entails exploring how these innovations work, assessing their advantages and disadvantages, and analyzing their implications for financial inclusion in varying contexts. Through the proposed approach, this study hopes to contribute to existing literature in the field by presenting a more realistic and context-oriented view of the influence of FinTech on financial inclusion. This study makes three major contributions to the literature. Firstly, it focuses on a comparison between various FinTech innovations instead of examining just one FinTech technology. Secondly, it incorporates considerations about risks, effectiveness, and the influence of contexts. Lastly, it contests the common optimistic view by showing how FinTech can sometimes result in financial exclusion depending on circumstances.

Methodology

The present study uses the systematic literature review (SLR) methodological approach to offer an organized investigation of the link between FinTech and financial inclusion. An SLR approach is ideal for synthesizing existing empirical and conceptual works, enabling comparison among various technologies.

Transparency was achieved in this study through a three-stage approach involving identification, screening, and inclusion of articles. In the first stage, studies that were relevant to the topic were identified. This was followed by screening, after which, finally, inclusion of the studies in the analysis was determined based on certain criteria.

Two major types of analysis were undertaken – thematic and comparative analysis. Thematic analysis was done to establish recurrent themes while

comparative analysis was used to assess differences among technologies and their performances.

For the collection of information for this research, major sources of databases such as Scopus, Web of Science, ScienceDirect, and Google Scholar have been considered. This is because such databases allow access to the best available literature related to finance, technology, developmental studies, and digital innovations. In this process, certain criteria have been followed through a systematic approach based on keywords such as “FinTech,” “financial inclusion,” “mobile payments,” “digital lending,” “AI and Finance,” and “digital financial services.” Additionally, certain boolean combinations like “FinTech AND financial inclusion” and “AI AND financial services” have also been taken into account.

To ensure the validity of this review, there was an application of a strict selection process. The criteria set for inclusion entailed that the sources should be peer-reviewed articles from journals, published within 2020 and 2025, which should have direct relevance to the topic of FinTech and financial inclusion, and have a methodology framework. Sources that would not be considered for this review included those that did not have relevance to financial inclusion, were lacking in methodological approaches, had non-academic nature, or had little relevance to the topic of interest. The search process started with about 60 articles found via databases. Of this, after elimination of duplicates and screening titles and abstracts, there were 55 articles. Further assessment made it possible to exclude 25 articles.

The analysis followed the themes of comparison and contrast. Initially, each selected FinTech study was divided into major FinTech technologies like mobile payments, digital lending, and AI-powered FinTech. Then the findings were analyzed thematically on a variety of topics including access, usage, affordability, risks, regulations, digital literacy, and infrastructure. In addition, the comparative analysis was used to find out under what circumstances a particular FinTech is effective. Thus, the study goes beyond simple descriptive analysis and identifies effective technologies, explains why these technologies are effective and when these technologies fail.

To add a degree of strategy into this methodology, FinTechs should be evaluated based on four analytical criteria: effectiveness, efficiency, risk factors, and failure conditions. Effectiveness can be defined as the ability of FinTech to improve financial inclusion. Efficiency is the ability of FinTech to reduce the costs of financial services and improve their delivery. The risk factors include over-indebtedness, biased algorithms, lack of transparency, and exclusion of vulnerable users. Failure conditions mean that FinTech does not result in positive outcomes especially when regulatory environment, infrastructure, or financial literacy are weak.

In summary, this design of methodology improves the research because it uses a systematic approach to study selection and a strategy for analysis of literature that ensures that this research is not only descriptive but also comparative on the true impact of FinTech innovations. The strategy aims to overcome the shortcomings of previous studies that have failed to adopt an analytical approach.

Study Selection Strategy:

First, 60 articles were obtained. Then the duplicate articles were removed, leaving 55 articles. Next, the titles and abstracts were screened, reducing the total number of articles to 25. After full text review, 30 articles made it to the final set of articles for the analysis.

LITERATURE REVIEW

The empirical literature shows inconsistencies about the role of FinTech technology in enhancing financial inclusion among different segments of society. For instance, while there is support for the view that mobile payments facilitate inclusion because of their accessibility and low need for infrastructure (Odei-Appiah et al., 2021), some other research studies reveal that FinTech technology such as digital lending poses threats in terms of over indebtedness (Banna et al., 2021). On the contrary, AI-based technology helps in increasing the efficiency of transactions, but may cause more exclusion because of algorithmic discrimination (Del Sarto & Ozili, 2025).

Considering these issues in the extant literature, this study will focus on building a framework to capture the link between FinTech technology and financial inclusion. This conceptual framework will be developed in a textual form rather than using a graphic representation of variables.

In the present research, FinTech technologies such as mobile money transfers, digital lending, and artificial intelligence will be considered as key determinants of financial inclusion. FinTech technologies indirectly affect financial inclusion via facilitating better access to financial services. However, access is not synonymous with financial inclusion since the latter implies successful and beneficial use of financial products and services by users.

In addition to the direct effect of FinTech on financial inclusion, there are other factors that may affect this connection, serving as moderating variables. Such factors comprise regulation quality, digital infrastructure development, and financial literacy. These factors are expected to have an impact on whether the innovation of FinTech technologies will lead to favorable results, namely financial inclusion, or unfavorable ones, like financial exclusion or overindebtedness.

To be more precise, mobile payment services can be considered effective instruments for promoting financial inclusion in situations where there is little

available infrastructure due to their relative simplicity and accessibility. Meanwhile, digital lending systems need more regulatory control because of the risks of overborrowing. Artificial intelligence-powered financial services also require highly advanced data infrastructure and technology capabilities, which might not be present in all environments.

In general, according to the proposed framework, financial inclusion is not necessarily an effect of FinTech technologies usage but rather a complex interplay of different factors. Thus, it is important to analyze the impact of FinTech on the particular environment and not make any assumptions about its universality.

"The above-mentioned problems serve as the foundation for creating a conceptual framework for understanding the FinTech technologies and financial inclusion relationship through the lens of context-specific analysis."

Discussion

With consideration of the gaps in the literature, this study focuses on the disconnection between the expectations of FinTech theories and the results achieved in practice. Although previous FinTech theories have mainly focused on the ability of such technology to bring about significant transformation and enhance financial inclusion, the findings from this research show that the efficiency of FinTech innovations cannot be assured and varies depending on both technological features and contextual settings (Mandić et al., 2025; Beck et al., 2021).

Through a comparison of various scholarly works on this topic, it emerges that among the different FinTech technologies, mobile payments are most efficient in achieving financial inclusion compared to other innovations. Mobile payment technologies require less infrastructure and low financial literacy among users, which makes them more effective since they target larger segments of populations, especially in developing countries (Odei-Appiah et al., 2021; Demirgüç-Kunt et al., 2022). Specifically, mobile payments appear to be more effective in settings where there is little availability of bank infrastructure, but mobile phones are available. Nevertheless, in areas characterized by poor accessibility to digital technologies and high transaction costs, mobile payments fail to work effectively.

On the other hand, while new digital lending models greatly increase access to credit, they also pose major risks, especially in less regulated environments. Various studies indicate that more access to credit results in debt problems, heavy interest payments, and greater riskiness, thus negating the entire premise of financial inclusion (Banna et al., 2021; Cornelli et al., 2023). In such scenarios, it can be said that the digital lending model will work best in environments with

solid regulation systems, adequate consumer protections, and clear pricing strategies.

In addition, the results show that financial services that use artificial intelligence (AI) have the toughest balancing act. The fact that AI increases efficiency through better risk assessments, fraud identification, and credit ratings means that it can create inequities due to the need for massive data sets and modern digital technologies (Bahoo et al., 2024; Mhlanga, 2021). The effectiveness of AI-based solutions depends significantly on high-quality data, good technological infrastructure, and regulation that guarantees equality and fairness. Nevertheless, in cases of partial and biased data, low digital footprints, and poor infrastructure, AI tends to marginalize already disadvantaged groups (Del Sarto & Ozili, 2025).

Moreover, recent research findings indicate that innovations like blockchain can promote transparency and trust in financial transactions, especially in scenarios where there is low institutional trust. Blockchain applications prove to be efficient mainly in situations of poor governance and high informational asymmetry since these innovations minimize fraud and facilitate traceability. At the same time, such innovations are less likely to perform efficiently when facing a lack of necessary infrastructure or other challenges.

From a critical standpoint, it has been noted that the success or failure of FinTech technologies does not lie merely in the technologies themselves but rather in their interplay with the context within which they are used. FinTech solutions have shown more positive outcomes when they have been used in contexts where there is good regulation, robust digital infrastructure, and greater financial literacy. On the other hand, under contexts with poor institutional frameworks, FinTech technologies have resulted in negative outcomes, such as increased financial exclusion, financial instability, and exploitation (Arner et al., 2021; Kodongo, 2024).

It is essential to note that the research rejects the idea that technological progress ensures financial inclusion by itself. On the contrary, the research shows that different technologies require different enabling factors for success. Specifically, mobile money functions well when there is access to digital infrastructure; digital lending can succeed only when the regulation of banks is solid; AI requires quality data; and blockchain is effective in environments of low trust.

In summary, this paper adds value to existing literature through its context-based comparison of FinTech innovations. This shows that financial inclusion is not only about accessibility to technological advancements, but it involves various determinants including regulatory issues, infrastructure, capability of users, and risk management. In view of the above, it becomes clear that a customized approach should be taken when developing FinTech strategies.

Research Gap

However, despite considerable achievements in studying the interplay between FinTech and financial inclusion, certain critical aspects that require attention remain. Specifically, it should be mentioned that significant steps forward in terms of creating a comparative framework for assessing different FinTech solutions have not been taken yet. It should be noted that, although there are numerous works dedicated to the interconnection between FinTech and financial inclusion, scholars limit their study only to one FinTech innovation at a time, namely mobile payments, digital lending, and artificial intelligence.

The second point to emphasize here is that the extant literature largely comprises positive descriptions of the role played by FinTech in financial inclusion. In particular, while a relatively large amount of literature is devoted to the topic of FinTech and financial inclusion, most research papers pay attention to its strengths rather than to the potential weaknesses of its use. In other words, the literature related to the problem fails to present a balanced evaluation of the use of FinTech in financial inclusion. Rather, most research papers focus on discussing its benefits and ignore its risks.

The following critical gap is linked to the absence of contextual analysis of the issues contributing to FinTech adoption. Although numerous works focus on such important issues as the role of institutional quality, regulatory environment, digital literacy, and IT infrastructure development, all of them do not take into account the contextual perspective. Hence, it is possible to state that there is no contextual perspective that would help to understand why identical FinTech innovations have different impacts on certain countries and social groups.

Moreover, the distinction between financial access and actual financial inclusion is another topic that needs to be addressed by researchers since the issue has been overlooked by many in the empirical literature. Although some of the recent studies have tried to differentiate between the two constructs, the relationship between the two constructs has been underexplored. For example, the effect of FinTech adoption on the overall financial health of the individual has not been extensively researched in the literature.

Finally, there seems to be a lack of research combining the three aforementioned approaches in one study. The present literature does not examine the three issues together but separately; therefore, it cannot provide a comprehensive analysis of the role played by FinTech in contributing to financial inclusion.

It shows that there is a requirement for a more critical and holistic evaluation that looks into the strengths and weaknesses, risks, and context-based performance of FinTech.

Research Questions

This research seeks to overcome the shortcomings inherent in previous studies through a set of research questions that have been formulated to facilitate a more profound analysis of how FinTech technologies affect financial inclusion in terms of their efficacy, limitations, and risks.

1: In what ways are the efficacy and effectiveness of different FinTech technologies (including mobile payments, digital lending, and artificial intelligence) compared for purposes of advancing financial inclusion?

2: What are the risks, limitations, and failures of these FinTech technologies, and how do they hinder financial inclusion?

3: What are the effects of context in influencing the efficacy and effectiveness of FinTech technology?

CONCLUSION

This study provides a comprehensive analysis of the relationship between FinTech and financial inclusion by comparatively evaluating key technologies such as mobile payments, digital lending, and artificial intelligence. According to the findings from the study, it can be concluded that FinTech is not always an efficient tool in terms of promoting financial inclusion since the efficacy depends significantly on the nature of the technology and the socio-economic environment where it operates.

It is noteworthy that among all other types of technologies mentioned above, mobile payments emerge as the most efficient means to promote financial inclusion due to underdeveloped banking infrastructure in different states. Meanwhile, the use of digital lending technology poses serious threats related to excessive indebtedness, lack of transparency, and financial stability, which may hinder the goals of financial inclusion in the future. Besides, even the implementation of such an advanced technology as artificial intelligence technology suffers from numerous limitations due to issues of bias and opacity.

In addition to this, it is essential to understand that just because financial services are accessible does not mean that there would be real financial inclusion or financial wellbeing. Thus, it is necessary to distinguish financial access from financial efficiency in the process of its implementation. Moreover, factors like digital literacy, costs, quality of regulations, and institutionalization would have an influence on the effects of FinTech implementation. If there are no appropriate steps taken in this regard, then the introduction of FinTech would increase inequality and financial exclusion instead of inclusion.

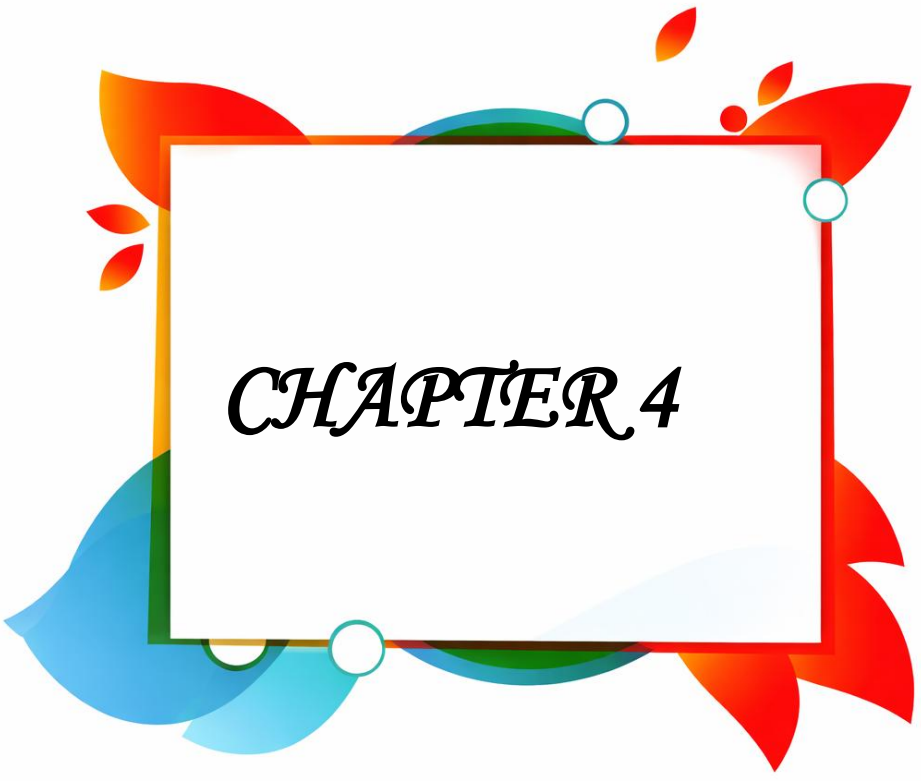
In contrast to previous studies, which focused only on the advantages of FinTech, this study considers various risks, failure situations, and constraints.

Therefore, policymakers should adopt a context-specific approach when implementing FinTech solutions, rather than assuming universal effectiveness.

REFERENCESS

- Allen, F., Gu, X., & Jagtiani, J. (2022). Fintech, financial innovation, and financial inclusion. *Review of Corporate Finance Studies*, 11(1), 1–40.
- Arner, D. W., Barberis, J., & Buckley, R. P. (2021). FinTech development and regulation: Past, present, and future. *Northwestern Journal of International Law & Business*, 41(2), 1–37.
- Bahoo, S., Corbet, S., & Larkin, C. (2024). Artificial intelligence in finance: A comprehensive review. *SN Business & Economics*, 4(1), 1–22.
- Banna, H., Hassan, M. K., & Alam, M. R. (2021). Islamic fintech and financial inclusion: Evidence from emerging economies. *Journal of Islamic Monetary Economics and Finance*, 7(2), 245–270.
- Basumatary, S., & Joshi, R. (2022). FinTech and digital transformation in banking. *International Journal of Financial Studies*, 10(3), 45–60.
- Beck, T., Chen, T., Lin, C., & Song, F. (2021). Financial innovation and fintech adoption: Implications for financial inclusion. *Journal of Financial Intermediation*, 45, 100890.
- Casino, F., Dasaklis, T. K., & Patsakis, C. (2021). Blockchain-based applications in financial services: A systematic review. *Future Generation Computer Systems*, 111, 678–692.
- Chang, S., Luo, Z., & Ren, S. (2021). Fintech and financial inclusion: Evidence from China. *Economic Modelling*, 102, 105528.
- Chen, M. A., Wu, Q., & Yang, B. (2021). How valuable is fintech innovation? *Review of Financial Studies*, 34(5), 2062–2106.
- Cornelli, G., Frost, J., Gambacorta, L., Rau, R., Wardrop, R., & Ziegler, T. (2023). Fintech and big tech credit: A new database. *Journal of Banking & Finance*, 145, 106626.
- Del Sarto, A., & Ozili, P. K. (2025). Artificial intelligence and financial inclusion: Opportunities and risks. *Journal of Financial Regulation and Compliance*, 33(1), 45–63.
- Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2022). The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19. *World Bank*.
- Frost, J., Gambacorta, L., Huang, Y., Shin, H. S., & Zbinden, P. (2021). BigTech and the changing structure of financial intermediation. *Economic Policy*, 36(106), 761–799.
- Ghosh, S. (2021). Financial inclusion, fintech, and economic growth. *Journal of Economics and Finance*, 45(2), 257–273.

- Gomber, P., Koch, J. A., & Siering, M. (2021). Digital finance and fintech: Current research and future directions. *Journal of Business Economics*, 91(5), 537–580.
- Ha, T. T., Nguyen, D. D., & Tran, Q. T. (2025). Financial inclusion in the digital age: The role of fintech. *Sustainability*, 17(2), 1123.
- Jha, S., & Dangwal, R. C. (2025). Financial inclusion and fintech adoption: A global perspective. *Journal of Financial Services Research*, 67(1), 55–78.
- Kodongo, O. (2024). Financial inclusion and economic development: Evidence and policy implications. *Journal of African Business*, 25(1), 1–20.
- Lee, I., & Shin, Y. J. (2021). Fintech: Ecosystem, business models, and investment decisions. *Business Horizons*, 64(1), 35–46.
- Mandić, V., Jakšić, M., & Pejić Bach, M. (2025). FinTech and financial inclusion: A critical review. *Technological Forecasting and Social Change*, 195, 122789.
- Mhlanga, D. (2021). Artificial intelligence in the financial sector: Opportunities and challenges. *Journal of Risk and Financial Management*, 14(7), 329.
- Odei-Appiah, S., Uddin, M. A., & Adjasi, C. (2021). FinTech and financial inclusion in Sub-Saharan Africa. *Journal of African Business*, 22(4), 543–567.
- Ozili, P. K. (2021). Financial inclusion research around the world: A review. *Forum for Social Economics*, 50(4), 457–479.
- Philippon, T. (2020). On fintech and financial inclusion. *Journal of Economic Perspectives*, 34(4), 65–86.
- Suri, T., & Jack, W. (2020). The long-run poverty and gender impacts of mobile money. *Science*, 354(6317), 1288–1292.
- Thakor, A. V. (2020). Fintech and banking: What do we know? *Journal of Financial Intermediation*, 41, 100833.
- Vuković, D., Papić, M., & Stojanović, A. (2024). Digital finance and financial inclusion: Empirical insights. *Economic Research-Ekonomska Istraživanja*, 37(1), 1–18.
- Zetzsche, D. A., Buckley, R. P., Arner, D. W., & Barberis, J. N. (2020). Regulating a revolution: From regulatory sandboxes to smart regulation. *Fordham Journal of Corporate & Financial Law*, 23(1), 31–103.

A decorative rectangular frame with a white center. The frame is composed of overlapping semi-circular shapes in red, orange, yellow, green, and blue. Four small white circles with blue outlines are positioned at the corners of the frame. The text "CHAPTER 4" is centered within the white area.

CHAPTER 4

Smart Cities in Sustainable Urban Development: Conceptual Foundations, Technologies and Application Examples¹

Betül Dilfiruz² & İsmail Sevinç³

1. INTRODUCTION

Today, cities face multifaceted challenges including population density, resource scarcity, climate change, strain on infrastructure, transportation bottlenecks, and social inequality. In this context, urban sustainability refers to a holistic approach that simultaneously addresses objectives such as preserving environmental balance, promoting economic development, and enhancing social well-being. However, traditional urban planning and management approaches have become increasingly inadequate in the face of the rapidly increasing complexity of cities and the processes of digital transformation. At this point, the smart city paradigm has emerged as an innovative tool that supports sustainability goals.

The smart city approach is based on the integration of digital platforms such as information and communication technologies (ICT), the Internet of Things (IoT), big data analytics, artificial intelligence, and sensor systems with city management processes. The aim is to ensure the efficient use of resources, improve the quality of services, reduce environmental impacts, and create more livable urban environments by increasing citizen participation (Caragliu, Del Bo and Nijkamp, 2011: 68). In this respect, smart cities are not based solely on technological infrastructure investments; they also encompass dimensions such as governance, participation, innovation, and social sustainability (Giffinger et al., 2007: 6; Albino, Berardi, and Dangelico, 2015: 4).

From the perspective of urban sustainability, smart cities provide a powerful tool for achieving goals such as improving energy efficiency, reducing carbon emissions in transportation, managing waste effectively, protecting water

¹ This article is based on the doctoral dissertation entitled “The Effects of Smart Cities on Local Sustainability: The Case of Konya Metropolitan Municipality,” prepared under the supervision of Prof. Dr. İsmail Sevinç in the Department of Political Science and Public Administration, Institute of Social Sciences, Necmettin Erbakan University.

² Lecturer Dr., Tokat Gaziosmanpaşa University, ORCID: 0000-0002- 3736- 7637

³ Prof. Dr., Necmettin Erbakan University, ORCID: 000-0002-4229-8760

resources, and enhancing quality of life. For example, Batty et al. (2012: 500) emphasize that smart cities can optimize energy, transportation, and infrastructure systems through real-time data analysis. The European Commission's Smart Cities and Communities initiative (EIP-SCC, 2013) and the United Nations' United for Smart Sustainable Cities initiative (U4SSC, 2016: <https://u4ssc.itu.int/>) promote the implementation of this approach in line with sustainable development goals.

However, the integration of smart cities with the vision of sustainability also brings with it a number of risks and debates. Authors such as Hollands (2008) and Kitchin (2014) argue that narrowing the smart city discourse to a solely technology-driven model of growth may give rise to new concerns regarding social justice, data security, and democratic participation. Therefore, the smart city approach should be conceived not only as a technological innovation but also as an inclusive and participatory governance model that is consistent with the principles of sustainability.

In this context, smart cities can be defined as a participatory and innovative model of urban life, supported by data-driven decision-making processes, that aims to simultaneously achieve environmental efficiency, social inclusion, and economic resilience in line with the urban sustainability approach. This perspective considers technology not simply as a tool, but as an essential component of sustainable development. In this way, smart cities have the potential to serve as key drivers of not only digital transformation but also environmental and social transformation in the cities of the future.

Within the context of urban sustainability, the smart city approach should be understood not merely as a technological transformation, but as a holistic expression of environmental, social, and governance reforms as well. To understand this approach effectively, it is essential to reveal the structural elements and functioning of the smart city concept. What makes a city "smart" is not only its digital infrastructure or technological capacity, but also the interaction of these elements with social, economic, and environmental systems. Therefore, identifying the key components that constitute the smart city concept is a critical step in understanding the extent to which this urban model aligns with sustainability goals.

2. THE CONCEPT OF SMART CITIES AND ITS FUNDAMENTAL COMPONENTS

Cities have developed as the most intensive centers of knowledge, capital, and innovation throughout human history. However, they have also faced various challenges that threaten sustainability, such as environmental pressures, inadequate infrastructure, social inequalities, and administrative complexities. The digital transformation that accelerated in the last quarter of the 20th century, along with the integration of information technologies into public administration

and the development of data-driven decision-making mechanisms, has led to the search for new solutions to these challenges. In this context, the concept of the smart city has emerged as a model that aims to improve efficiency, sustainability, and quality of life by integrating technology-based innovations into urban life (Caragliu, Del Bo and Nijkamp, 2009: 47).

The origins of the smart city concept began to take shape in the 1990s alongside concepts such as the digital city, the information society, and e-governance. Particularly in the 2000s, the strategic approaches of global technology companies in this field transformed the idea of the smart city from merely a technical application into an economic and administrative paradigm (Komninos, 2013). During this period, practices such as the digitalization of cities, the automation of energy and transportation systems, the collection of urban data through sensors, and the use of this data to guide management decisions came to the forefront (Batty et al., 2012: 486).

Conceptually, a smart city is an urban development model that aims to improve the efficiency of urban services, optimize the use of resources, and enhance citizens' quality of life through the use of information and communication technologies (ICT). At the same time, it supports participatory governance and sustainable development. However, there is no single and universally accepted definition of this concept in the literature; different researchers, disciplines, and institutions have defined the smart city from their own perspectives (Albino, Berardi and Dangelico, 2015).

The concept of a smart city is addressed from a multidimensional perspective and is regarded as an important strategic approach to achieving sustainable urban development. In this context, smart cities are defined as urban settlements where security is prioritized, natural resources are used efficiently and sustainably, ecological sensitivity is maintained, infrastructure systems are continuously monitored and improved, and innovative technologies are integrated into urban life (Hall, 2000: 1). Furthermore, the smart city approach is characterized as a dynamic, interactive, and sustainable living space capable of addressing current and future urban challenges, where new forms of services are developed through information and communication technologies (Clarke, 2013: 1).

One of the most commonly used definitions is given by Caragliu, Del Bo and Nijkamp (2009: 45): *A city is considered smart if it can create synergy among human capital, social capital, communication infrastructure, economic development, and a high quality of life through smart governance.* This definition emphasizes that a smart city is not merely a technology-based system; rather, it is also a governance approach that places human and social capital at the center. Therefore, according to this definition, what makes a city smart is not the technological tools themselves, but rather the way these tools facilitate interaction among people, institutions, and the environment.

Giffinger et al. (2007: 10–12), in their study on medium-sized cities in Europe, defined the smart city through six key components (economy, people, governance, mobility, environment, and living) and associated these components with measurable indicators. This approach provided the concept of the smart city with a systematic structure and laid the foundation for subsequent research. The Giffinger model is currently used as a fundamental framework referenced in many international assessment systems.

In contrast, Hollands (2008: 305) approached the concept of the smart city from a critical perspective, arguing that this discourse has sometimes become a technology-centered neoliberal marketing tool. According to Hollands, many smart city projects relegate sustainability elements such as social justice, participation, and environmental awareness to a secondary position; instead, they focus on attracting capital through technological solutions and reshaping urban space. This criticism indicates that the social dimension of the smart city approach needs to be strengthened in order to align it with sustainability principles.

The idea that smart cities are not only a technical phenomenon but also a process of social and governance transformation is more clearly reflected in Komninos' (2011:) approach, which defines smart cities as knowledge-based innovation systems. According to Komninos, what makes a city smart is not only its knowledge infrastructure, but also its social capacity and governance capabilities to transform this knowledge into innovation. From this perspective, a smart city is not a space equipped with technological systems; rather, it is an ecosystem in which the processes of knowledge creation, sharing, and utilization operate effectively.

Albino, Berardi, and Dangelico (2015), in their comprehensive literature review, identified that smart city definitions are mainly concentrated around four dimensions: technology-centered definitions, people- and community-oriented definitions, governance- and participation-centered definitions, and sustainability-oriented definitions. This classification clearly reveals the multidimensional nature of the concept. Accordingly, smart cities should be evaluated in terms of both the effective use of digital infrastructures and the strengthening of social participation.

In recent years, the United Nations' United for Smart Sustainable Cities (U4SSC) initiative (2016) and the ISO 37122 standard (2019) have redefined the concept of the smart city within the framework of sustainability. In these documents, a "*smart and sustainable city*" is defined as an urban settlement in which information and communication technologies are used in a way that supports urban quality of life, service efficiency, and sustainable development goals simultaneously.

Although the literature on the smart city phenomenon includes many different definitions, it can be seen that the concept is interpreted in various ways depending on regional, cultural, and historical contexts. Despite these differences, however, it is possible to identify some commonly accepted characteristics (Kaya Altay and Gökgür, 2019: 118–119). Accordingly, smart cities are defined as urban models that:

- are fundamentally based on data utilization and technological infrastructure,
- aim to centralize and manage knowledge production processes,
- seek to improve the quality of life of urban residents by providing solutions to urban problems,
- integrate the information society approach with the principles of sustainable development,
- promote participation and collaboration among stakeholders,
- develop both current and future-oriented urban strategies,
- possess tools and mechanisms capable of adapting to global and local urban dynamics,
- are considered interdisciplinary structures due to their holistic and multidimensional approach to urban challenges.

Within this framework, smart cities are evolving into dynamic and multi-layered governance models that combine the technological opportunities offered by the digital age with the goals of sustainable urban development. The components that reveal this multidimensional structure of smart cities in a concrete manner will be discussed in detail below.

The smart city approach goes beyond the technological infrastructures of cities and presents a comprehensive transformation vision across the dimensions of economy, society, environment, and governance. Six components stand out as the fundamental building blocks of this vision (Giffinger et al., 2007: 12). Bee Smart City defines these six strategic action areas individually and emphasizes that they form an interconnected system through their interaction with one another (Bee Smart City, 2025). Furthermore, the Smart City Wheel developed by Boyd Cohen highlights the complementary nature of these components in terms of urban strategies (https://www.researchgate.net/figure/The-Smart-city-wheel-by-Boyd-Cohen_fig3_317269039). In this context, the following section examines these six smart city components in an integrated manner (Giffinger et al., 2007: 12; Bee Smart City, 2025; Albino, Berardi and Dangelico, 2015: 5–7).

Smart Economy: Realizing the knowledge-based growth potential of cities, supporting the entrepreneurial ecosystem, and encouraging innovation and R&D

activities are central to the smart economy. Giffinger et al. relate economic dynamism to indicators such as the number of patents, the concentration of technology firms, and innovation capacity. Bee Smart City also associates this component with sub-indicators such as cities' ability to improve the business environment and attract start-ups and investment. The smart economy component is closely linked to other components, governance decisions determine resource allocation, and education and human capital support the sustainability of this economy.

Smart People: The presence of smart (digitally competent) people is a prerequisite for translating technology investments into societal impact. This component includes educational level, creativity, digital literacy, social capital, and the level of social participation. In the literature review conducted by Albino, Berardi, and Dangelico, human-centered definitions place great importance on this component. Bee Smart City presents digital inclusion training programs and social participation as key sub-areas. Smart people contribute to smart governance processes by actively participating and promoting the effective use of technological infrastructure.

Smart Governance: Smart governance is based on technology, transparency, and citizen participation in decision-making processes. This component is realized through e-services, open data platforms, online citizen feedback mechanisms, and performance indicators. The Giffinger model also evaluates governance in terms of management capacity and participation. Effective governance facilitates the integration of areas such as the economy, environment, and transportation, while data flows, budgeting, and strategy play a transformative role.

Smart Transportation: The mobility component aims to transform urban transportation systems into data-driven, multimodal structures that minimize environmental impacts. In this context, smart traffic management, real-time information systems, public transportation optimization, shared mobility systems, and travel demand management applications stand out as prominent approaches. Giffinger et al. propose criteria such as public transportation infrastructure, signaling systems, and accessibility as indicators of smart mobility. Smart mobility is directly associated with environmental sustainability and quality of life, as transportation-related emissions and traffic congestion have a direct impact on the urban ecosystem.

Smart Environment: The smart environment component encompasses the goals of preserving natural resources, improving energy efficiency, optimizing waste and water management, monitoring air quality, and enhancing ecological resilience in cities. Bee Smart City defines this component through subdomains such as waste reduction, pollution control, energy efficiency, and water management. Similarly, in the Giffinger Model, environmental indicators (e.g.,

energy consumption, water resources, and waste management efficiency) are addressed within this dimension. The smart environment intersects with mobility, living, and governance components. For example, clean air policies and data-driven environmental management directly affect public health and quality of life.

Smart Living: The smart living component focuses on improving the daily experiences of urban residents and is defined through the digital and physical integration of health, safety, housing, culture, education, and social services. Bee Smart City associates this component with sub-indicators such as e-health, digital security, smart housing, and cultural platforms. Giffinger et al. evaluate this concept through quality-of-life indicators (housing quality, healthcare infrastructure, security level, etc.). The smart living component represents the direct interaction between people and the city and reinforces the success of other components in terms of social acceptance.

It is evident that the concept of a smart city consists of multidimensional components that cannot be evaluated independently of one another. The success of cities is directly related to the interaction among these components and the level of synergy they create. For example, data integration between technological infrastructure and governance mechanisms, the interaction between human capital and innovation capacity, or the balance established between quality of life and environmental sustainability are key factors determining the holistic functioning of the smart city concept. Albino et al. (2015) state that, in addition to this structure, new dimensions such as data governance, digital ethics, and participatory social processes should also be considered among smart city components. Similarly, some studies consider elements such as urban security, cybersecurity, and climate resilience as independent sub-dimensions (<https://arxiv.org/abs/2207.04422>). Within this framework, for a city to be considered a smart city, having only a technological infrastructure is not sufficient; the infrastructure must also operate in an integrated manner with the human, governance, economic, environmental, and living dimensions.

3. SMART CITY TECHNOLOGIES

Urban sustainability requires a form of urban management that supports economic vitality while preserving environmental balance and enhancing social well-being. This approach is shaped not only by physical planning and environmental policies but also by digital technologies. At this point, smart city technologies have become a transformative tool for achieving sustainability goals. These systems, which are based on advanced information and communication technologies, provide comprehensive solutions to increase energy efficiency, reduce carbon emissions, optimize the use of natural resources, and improve the quality of urban services (UN-Habitat, 2023; Yan et al., 2023).

These technologies support urban sustainability not only in terms of the environmental dimension but also through economic resilience, social inclusiveness, and governance effectiveness. For example, while the Internet of Things (IoT) reduces resource waste by enabling real-time monitoring in energy and water management infrastructures, big data analytics and artificial intelligence (AI)-based systems strengthen data-driven decision-making capabilities in areas such as transportation, waste management, and disaster prevention. Blockchain technology supports smart city governance by establishing transparent, secure, and traceable transaction networks, while cloud computing infrastructures enable the scalability of smart systems by increasing data processing speed (Casario, 2023; Chentouf, Hasoun, and Bouchkaren, 2025).

In this context, research on the potential benefits of smart cities questions their effectiveness in achieving environmental sustainability goals while also revealing that the technological infrastructures and applications used bring various areas of risk. While the solutions offered by smart cities create significant opportunities in terms of resource efficiency and quality of life, they also have the potential to generate new problem areas in economic, social, and ethical dimensions. Within this framework, the major risks that come to the forefront can be listed as follows: the high costs of smart city projects and the association of these costs with the increasing profits of private technology companies; the prioritization of economic objectives over social priorities; the erosion of individual privacy; the unpredictable consequences that may arise from artificial intelligence systems; the deepening of the digital divide; the growing influence of global technology companies over urban governance; and the exclusion of citizens from decision-making processes (Bıçkıcı and Eyüslü, 2025: 409–413).

Ultimately, urban sustainability policies should be considered within a strategic framework capable of directing the aforementioned technological expansion and eliminating potential risks. In this study, rather than providing a detailed examination of all technologies, the focus is placed on smart city technologies that are widely recognized in the literature as the most prevalent and effective in terms of urban sustainability. In this context, smart city technologies are addressed as a functional whole that supports urban sustainability and are organized according to a sequential logic ranging from data generation to social impact. Accordingly, the technologies begin with the Internet of Things (IoT), which forms the digital infrastructure of cities and enables data flow. Subsequently, cloud and edge computing technologies are examined within the framework of big data and open data systems, which form the basis for interpreting and managing this data. This stage is followed by artificial intelligence applications, which play a decisive role in data-driven analysis and decision-making processes. The next stage consists of Industry 4.0 and Society 5.0 technologies, which reflect the transformation of the city's production and service infrastructure, along with autonomous vehicle systems that contribute to

environmental and economic sustainability. As an innovative tool for data security, transparency, and governance, blockchain technology provides a comprehensive trust infrastructure. Finally, social media and digital participation platforms, which support citizen participation and social sustainability, represent the democratic and inclusive dimension of smart cities. This sequence is structured not only based on the technical functions of technologies but also on their contributions to the environmental, economic, and social dimensions of urban sustainability.

3.1. Internet of Things- IoT

Although the concept of the Internet of Things (IoT) is defined in various ways by different disciplines in the literature, the common point is the digital interconnection of urban systems. J. Belissent (2010: 3) explains this concept as a system that enables the more efficient delivery of services such as security, healthcare, and transportation through the integration of information technologies into urban life. According to Örselli and Akbay (2019: 232), the Internet of Things refers to the process of transforming urban components involved in smart city applications into smart devices by equipping them with sensors, enabling these devices to continuously communicate and interact with each other, collect data, and share the information obtained.

The Internet of Things (IoT) is one of the fundamental tools that enable the effective use of information and communication technologies in transforming cities into smart environments. Digital connectivity and data sharing in various urban areas, such as transportation, environmental management, waste collection, water distribution, and cleaning services, are made possible through this technology. According to the report and map published by Beecham Research, in today's cities, it is no longer only individuals who use the internet; countless objects such as automobiles, water meters, streetlights, and sound and image sensing systems also generate data. These data are used through the Internet of Things in many sectors, from smart homes to smart cities, from information technology to energy, from security to manufacturing, construction, health and transportation (Demirdöğen, 2020: 72).

The complementary component of the Internet of Things, which plays such a central role in the digital infrastructure of smart cities, is sensor technology. Sensors enable the interaction between objects and their environment through their ability to detect various physical variables such as sound, light, motion, and weight. With these characteristics, they serve as a fundamental interface in the formation of big data. Therefore, sensor technologies and the Internet of Things constitute an integrated system that supports and complements each other. As Memiş (2017: 70) also points out, these systems, which work integrated with IoT and sensor technologies as well as mobile devices, big data and cloud computing

infrastructures, are among the fundamental components of digital transformation that enable objects and spaces to be described as smart.

The implementation of IoT systems in urban areas provides significant advantages in the management and delivery of city services. Efficient use of natural resources, improvement of public services quality, and reduction of operational costs, which are among the fundamental goals of the smart city approach, are made possible by establishing a comprehensive urban IoT infrastructure. This type of infrastructure supports the digital transformation of urban management by creating an integrated, accessible, and economical communication network for many public services. Indeed, according to Zanella et al. (2014: 22), urban IoT applications increase efficiency and optimization in the management of services such as lighting, transportation, park management, monitoring and maintenance of public spaces, waste collection, and the preservation of cultural heritage. Furthermore, these systems enable the analysis of different types of data collected across the city, thereby strengthening transparency in governance and increasing the speed and effectiveness of services provided by local governments to citizens. In addition, urban IoT networks raise individuals' awareness of urban life and environmental conditions, and serve as a tool to encourage more active participation of citizens in public administration processes.

In addition to all these, the benefits offered by urban IoT applications also include environmental monitoring, energy optimization, and infrastructure resilience. For example, in the context of smart grids and semi-smart energy systems, IoT-enabled sensors provide opportunities such as reducing losses, enabling demand-response mechanisms, and ensuring the safer integration of renewable energy sources by monitoring energy flows in near real time (Aggarwal et al., 2023). However, several limitations must be addressed to ensure that this technological convergence is fully aligned with the vision of sustainable urban development. In particular, issues such as high energy consumption, the security of network-connected devices, data management capacity, device lifespan and maintenance requirements, as well as the cost pressures that may arise from these factors, can limit the optimal performance of IoT solutions. Therefore, IoT-based approaches should be considered not only from a technical design perspective but also in conjunction with energy efficiency strategies, device standardization, and sustainable maintenance models. This balanced approach enables IoT systems to deliver long-term sustainable benefits in urban environments.

3.2. Big Data and Open Data

The concept of big data can be simply defined as datasets that exceed the capacity of existing software systems to store, manage, and process data. According to Alav (2023:105–108), thanks to big data, many forms of

information that could not previously be measured, stored, analyzed, or shared can now be digitized and processed. Today, big data encompasses all types of structured and unstructured data generated and captured through modern information and communication technologies. These data are collected from network sensors, smart objects and devices, web platforms, and social media applications. The processes of collecting, storing, and processing big data play a critical role in the effective functioning of smart cities. This data provides the necessary information to understand and optimize interactions within cities, directly contributing to the decision-making processes of both city administrators and citizens. According to Örselli and Akbay (2019: 233), the ability of smart systems to generate effective solutions depends on transforming big data collected from thousands of sensors every day into value-added information for citizens and city administrators through smart analysis and processing methods.

Big data forms the foundation of applications and solutions developed in smart cities. Through advanced analytical tools, relationships among complex datasets can be identified, and these relationships can be made visually understandable. Big data also provides actionable insights that enable public institutions to understand citizens' needs, develop policies and strategies, analyze trends and behavioral patterns, and anticipate possible future scenarios (Rabari and Storper, 2014: 28).

Since smart cities have an integrated structure with information and communication technologies, they generate large volumes of data and systematically store this data (Pınarcıoğlu and Kanbak, 2020: 65). The collected data helps city administrators identify problems that they were previously unable to detect, thereby improving the efficiency of urban services. In addition, the processes of data sharing and analysis strengthen public transparency while positively influencing communication and interaction between governments and citizens (Laleoğlu, 2021: 23).

Open Data, which stands out as a complementary element of the Big Data concept, refers not only to the collection of large volumes of data but also to making this data publicly accessible. Urban residents can access comprehensive information about ongoing or planned activities in the city through open data portals and gain insights into mobile applications and services that can be utilized within the urban environment (Akdamar, 2017: 49–50). These portals not only provide raw data but also develop interactive applications that enable users to monitor and analyze the city in accordance with their own objectives (Kitchin, 2014: 7). In this context, open data, which supports governance principles such as transparency, accountability, and participation, not only reinforces the concept of participatory governance but also contributes to its further development (Kocaoğlu & Yıldırımoglu, 2023: 26).

Open data thus makes significant contributions to both urban governance and urban residents within smart city processes. This data infrastructure enables cities to deliver services in a more innovative and data-driven manner, while also creating added value by ensuring the involvement of all stakeholders in research and development (R&D) activities. As a critical step toward achieving smart city goals, the use of open data enables cities to develop data-driven governance systems and establish sustainable and effective decision-making processes (Akdamar, 2017: 49).

According to research, the total volume of data approximately doubles every two years, and for these data to become valuable, they must be stored in appropriate storage environments, systematically organized, and processed using analytical methods. These processes constitute fundamental and indispensable components of data management systems (Raj & Kumar, 2017: 24). However, questions such as how data can be linked to citizens' needs and which datasets may be useful for explaining business or environmental conditions constitute significant challenges that need to be addressed. The growing accumulation of data is expected to reach petabyte, exabyte, and even zettabyte levels in the near future. Unless these data are organized and stored in a controlled and systematic manner, they will remain nothing more than a massive accumulation of information. For this reason, disciplines such as data mining and statistical analysis focus on the collection, organization, and meaningful analysis of data (Stimmel, 2016:29–30). On the other hand, there are several challenges associated with the effective utilization of open data. One of these is the need for governments to adopt an institutional approach that ensures the integrity, accuracy, and quality of the data they publish. Another challenge is that governments, as the producers of the data, must actively support users in leveraging these data to generate economic and social value (Wolff et al., 2017: 49).

Ultimately, big data and open data are considered important tools for enhancing the sustainability of smart cities. These data play a critical role in achieving objectives such as reducing the environmental impacts of cities, optimizing resource utilization, and promoting citizen participation. For example, open data portals contribute to the adoption of more sustainable lifestyles by raising city residents' awareness of issues such as transportation, energy consumption, and environmental quality. However, certain challenges need to be overcome to realize this potential. In particular, ensuring that data are up-to-date, accurate, and accessible, developing user-friendly platforms, and improving data literacy are of great importance. Otherwise, open data initiatives may fail to generate the expected impact and may deepen digital inequalities. In conclusion, big data and open data offer significant opportunities for enhancing the sustainability of smart cities. However, realizing these opportunities requires

appropriate infrastructure, policy support, and social participation (Glasco, 2023).

3.3. Cloud Computing

Cloud computing is an information technology system that enables data storage, sharing, and access among various devices such as computers, tablets, and smartphones through the internet. This technology provides a flexible infrastructure that enables users to share files and information through online platforms without being constrained by physical hardware limitations (Kelaidonis et al., 2017).

The integration of the cloud computing model into smart city applications promises to provide significant cost savings for urban administrations. Particularly for local governments with limited financial resources, the adoption of cloud computing infrastructure is considered an innovative and sustainable solution. This system enables institutions involved in urban management to access the information technology resources they require without any limitations and contributes to addressing infrastructural issues related to data processing centers. Cloud computing, which is a key technology in realizing the smart city vision, requires not only the restructuring of technical infrastructure but also the reorganization of institutional ways of working. When institutions successfully achieve this transformation, they move one step closer to the smart city ideal by benefiting from the advantages offered by cloud computing systems, such as flexibility, scalability, and cost-effectiveness (Alhomdy, 2021: 168–169).

Cloud computing is a concept frequently used in the field of contemporary information technologies and carries different meanings for various stakeholders. The smart city vision aims to improve quality of life through the effective utilization of data obtained from interconnected sensors, devices, and individuals. The resolution of continuously emerging urban challenges, such as security, traffic, and waste management depends on the comprehensive collection and analysis of data related to these areas. At this point, it is of great importance that such data are stored in a manner that allows them to be accessible and usable by both public and private stakeholders. Cloud computing services provide the necessary digital infrastructure for the storage and management of these data. Nevertheless, many city administrations are hesitant to utilize public cloud solutions for critical services because of concerns related to legal regulations, data privacy, and security. Consequently, most cities tend to adopt private cloud infrastructures or implement hybrid models that combine private and public cloud environments (Lea, 2017: 7).

From a structural perspective, cloud computing plays a critical role in achieving sustainability goals by enhancing the scalable data management capacity of cities. When data from different sources are effectively integrated and analyzed through centralized data repository systems, areas such as energy

conservation, infrastructure optimization, and service improvement are supported. However, the suitability of cloud solutions as an ideal option for cities depends not only on their technical advantages but also on the careful consideration of issues such as security, privacy, network latency, and data sovereignty. For example, Trigka and Dritsas (2025) emphasize the necessity of using cloud computing components together in smart cities, noting that the use of centralized cloud systems alone may create challenges related to latency, bandwidth limitations, and scalability. In this context, cities should develop strategies to maximize the benefits of cloud computing while reducing risks through hybrid models and local processing solutions. Thus, cloud computing will function not only as a technical infrastructure but also as a sustainable, secure, and socially accepted component of urban governance.

3.4. Artificial Intelligence

Artificial intelligence (AI) refers to a set of systems that can imitate human cognitive processes, such as learning, analyzing, decision-making, and problem-solving, through the use of information and communication technologies. These systems are also capable of improving their performance over time (Da Xu, Lu, & Li, 2021). This technology is also defined as a field of knowledge engineering that examines the processes of acquiring, processing, and representing knowledge by treating it as an object. In other words, artificial intelligence is a discipline that aims to automate mental and physical activities, such as thinking, interpreting, and taking action, which were traditionally performed only by humans, through the use of information and communication technologies (Huang et al., 2018).

Artificial intelligence has played a central role not only as one of the key components of Industry 4.0 but also in the development of smart cities. In particular, the analysis of big data through artificial intelligence algorithms has significantly enhanced the sustainability and livability of cities. In line with the objectives of the New Public Management approach, AI-supported systems increase efficiency in urban governance processes and enable the more effective management of complex problems. In this context, the applications of artificial intelligence in smart cities are extensive and encompass a wide range of sectors, including education, environmental management, energy optimization, healthcare services, public policy, financing, transportation systems, big data analytics, and the Internet of Things (IoT) (Allam & Dhunny, 2019: 82–85).

Artificial intelligence stands out in smart city governance as a technology that plays an active role in decision-making processes due to its ability to be programmed for specific objectives, make predictions, and generate recommendations. These systems, which are mainly fed by data collected through sensors or existing datasets, have the ability to develop models and predictions for different scenarios. In this respect, artificial intelligence provides cities with the capacity to adapt to rapidly changing urban dynamics and produce flexible,

fast, and effective solutions. Especially after 2010, the widespread use of artificial intelligence in the field of public administration has brought about a fundamental paradigm shift in policy development processes. The transition from evidence-based policymaking to a data-driven decision-making approach has made artificial intelligence a strategic tool in public administration. Although this transformation has also brought various ethical, governance-related, and social debates, many countries today are developing artificial intelligence strategies at both national and international levels and making significant investments in this field (Aslan, 2022: 35).

Artificial intelligence supports the data-driven management of urban operations in the context of smart cities and provides the capacity to develop solutions in areas such as energy optimization, traffic control, waste management, and environmental monitoring. For example, the study by Salhi et al. (2025) demonstrated that AI-based models can generate accurate predictions in critical urban systems, such as energy efficiency and infrastructure resilience, and contribute to a sustainable urban vision (Salhi et al., 2025). However, this potential cannot be limited only to technical achievements; there are several limitations that need to be considered in terms of implementation, such as privacy, data security, algorithmic biases, data inequality, and high computational costs. Furthermore, the integration of artificial intelligence systems into cities requires not only infrastructure investments but also the simultaneous development of governance models, legal regulations, and social acceptance. Therefore, while using artificial intelligence technologies in smart city management, both performance gains and ethical, technical, and social risks should be considered together, and a balanced approach should be adopted.

3.5. Industry 4.0 and Society 5.0

The concept of a smart city is based on an urban vision that includes an information and communication technologies (ICT)-based economic structure as well as the digital transformation elements of Industry 4.0. Industry 4.0 supports the development of smart economies and provides innovative solutions to environmental and demographic challenges in cities through energy efficiency, resource optimization, and sustainable production processes. This approach transforms production from merely a physical activity into a digital, integrated, and environmentally friendly process. In this way, production systems are reshaped in accordance with the principles of urban sustainability and contribute to reducing the environmental footprint of cities. Industry 4.0 technologies support the concept of smart factories by integrating design, supply, production, logistics, and service processes in a holistic manner. Through the horizontal and vertical integration of these processes, they enable the formation of automated value chains at local, regional, and global levels (Safiullin, Krasnyuk, & Kapelyuk, 2019: 4).

In the context of the digital transformation of urban life, the concept of Industry 5.0 is referred to as Society 5.0 due to its smart society characteristics and is considered an important turning point in the development of the smart city vision. The Super Smart Society approach, introduced by Japan for the first time at the CeBIT fair held in Tokyo in 2017, is considered a continuation of the Industry 4.0 process, which was initially developed in Germany in 2011. With the integration of Industry 4.0 technologies, such as the Internet of Things (IoT) and cloud computing, into production processes, traditional production methods based on physical labor have been replaced by a digitized, automation-oriented, and efficiency-based production model (Taş, 2018: 1823- 1825). However, this transformation has led to fundamental changes not only in the industrial field but also at the societal level. Differing from previous industrial revolutions in terms of speed, scope, and systemic impact, Industry 4.0 applications have formed the foundation of the Society 5.0 approach, in which technology is placed at the center of human life (Partigöç, 2023: 181- 182). Conceptually, Society 5.0 is a social transformation model that aims to maximize the interaction between humans and machines by addressing the economic, ethical, demographic, and sociological dimensions of digital transformation in a holistic manner (Arı, 2021: 457). In this respect, it is considered a paradigm that contributes to the human-centered and sustainable development dimension of smart cities, rather than focusing solely on technological aspects.

Industry 4.0 has initiated a transformation that optimizes resource use in production and management processes, introducing a new perspective to the concept of digital sustainability. Through this approach, material flows and waste management are controlled more effectively in digital environments, and unnecessary resource consumption in production cycles is minimized. In this way, current economic needs are addressed while ensuring that future generations have access to natural resources. Smart factory applications developed within the scope of Industry 4.0 contribute to reducing environmental impacts through energy efficiency and automation technologies, ensuring that production becomes aligned with sustainability principles. As a continuation of this transformation, Industry 5.0 / Society 5.0 adopts a human-centered production approach and aims to integrate technology with human creativity and flexibility. In this way, it envisions a sustainable development model in which efficiency, environmental awareness, and social well-being can be improved together within production processes. The focus of Society 5.0 is not limited to automation; it also emphasizes the preservation of social and cultural values that emerge through human-machine collaboration. In this context, smart cities and smart factories are becoming systems that integrate technological progress with sustainable living goals in areas such as digital education, digital economy, and the preservation of cultural heritage (Yiğit & Engin, 2025: 28). In this respect, Industry 4.0 and Society 5.0 demonstrate that the digital transformation process

is not only a technological innovation but also a strategic tool for sustainable urbanization and social development.

The use of Industry 4.0 technologies at the urban scale directly contributes to the sustainability goals of smart cities by reducing the use of raw materials and energy in production processes, improving waste management, and increasing the efficiency of infrastructure. On the other hand, the Society 5.0 vision repositions technology not only within a production-centered framework but also within a human-centered, environmentally conscious, and socially inclusive urban model. In this context, cities have the potential to achieve economic growth, social well-being, and environmental responsibility simultaneously through the integration of digital and physical systems. However, despite all these advancements, there are also limitations such as technological infrastructure deficiencies, data security and privacy concerns, the digital divide, and the weakness of governance mechanisms. For example, in this transformation process, the unequal distribution of technologies within cities may cause some social groups to be deprived of these benefits. Furthermore, relying solely on technological investments may cause governance and participatory processes to remain in the background. Therefore, in order for smart cities to develop sustainably through Industry 4.0 and Society 5.0 strategies, inclusive governance mechanisms, stakeholder participation, and ethical and privacy-oriented regulatory frameworks need to be developed simultaneously alongside technological innovations (Mishra, Thakur, & Singh, 2022).

3.6. Autonomous Vehicles

Cities located in different regions of the world are currently facing the increasingly growing problem of traffic congestion. Smart city applications develop sustainable solutions to critical urban challenges such as traffic congestion, air pollution, high energy consumption, waste management issues, public transportation inefficiencies, and increasing transportation demand, particularly through smart transportation and mobility systems. Urban mobility is at the heart of the smart city concept and constitutes one of the fundamental building blocks of this vision (Çakır, 2023:101).

Autonomous systems capable of operating without human intervention are expected to play a significant role in the transportation infrastructure of future cities. In this context, research on autonomous vehicle technologies is advancing rapidly (Javed et al., 2022). Autonomous vehicles are expected to contribute to sustainable transportation goals by reducing fossil fuel consumption and carbon emissions, particularly when integrated with electric and shared mobility models. In addition, structural changes such as reduced traffic congestion resulting from a decline in private vehicle ownership and the reorganization of public spaces are anticipated. This transformation is expected to profoundly influence not only

transportation systems but also urban planning and architecture (Bezai et al., 2021).

Autonomous vehicle technologies play a transformative role in helping smart cities achieve their sustainability goals. These vehicles not only reduce traffic congestion but also enhance energy efficiency, lower carbon emissions, and minimize the environmental impacts of urban transportation systems. Autonomous transportation infrastructure supported by shared mobility solutions enables the redesign of public spaces by reducing individual vehicle ownership. However, the widespread adoption of autonomous systems also brings new challenges, such as cybersecurity, data privacy, legal liability, and infrastructure compatibility. Therefore, the integration of autonomous vehicles into the smart city ecosystem requires a comprehensive strategy that addresses not only technological aspects but also managerial and ethical dimensions (Rahman and Thill, 2023).

The implementation of autonomous vehicle technologies in smart cities offers significant opportunities for the development of sustainable urban mobility policies. These systems are directly associated with objectives such as reducing traffic congestion, improving energy efficiency, lowering carbon emissions, and enhancing transportation safety. However, sustainability is not limited to environmental benefits alone; social inclusiveness, economic accessibility, and administrative integrity are also essential components of this process. The widespread adoption of autonomous systems also brings new limitations and challenges regarding issues such as data security, ethical responsibilities, the digital divide, and the cost of infrastructure investments. Therefore, the success of autonomous vehicle strategies that aim to contribute to urban sustainability depends not only on technological innovation but also on institutional collaboration, public participation, and comprehensive policy integration (Richter, 2022; İnce, 2025).

3.7. Blockchain

Blockchain is a distributed, shareable, and immutable data recording system that operates without the need for a central authority. This system permanently records all transactions carried out and enables all users on the network to access, verify, and share these records. This structure, formed by linking cryptography-based data blocks together, eliminates the need for intermediaries and reduces transaction costs. Although it is defined in different ways in the literature, blockchain technology is generally considered a distributed and decentralized digital ledger (Fanning and Centers, 2016: 53). The key characteristics of this technology include distributed structure (the storage of data across numerous nodes rather than on centralized servers), transparency (the ability of all participants in the network to view all transactions), security (the protection and immutability of data through cryptography), immutability (the inability to reverse

a block once it has been added), and smart contracts (contracts that automatically execute according to predefined rules) (Paliwal et al., 2020).

Although blockchain technology is currently used in many fields, it stands out as one of the most innovative application areas in the development of smart cities. With the implementation of this technology, the sustainability level of smart cities has increased significantly (Ridic et al., 2022: 135–136). Smart city structures, created through the integration of electronic devices, sensors, and information technologies in urban areas, ensure the efficient use of existing resources and support the management of social, physical, and economic infrastructures through digital systems. The primary objective of the smart city approach is to develop solutions to the challenges caused by increasing populations and rapid urbanization processes; and to facilitate urban life by improving the quality, accessibility, and efficiency of public services (Biswas and Muthukkumarasamy, 2016: 1392; Şen, 2020: 1; Neha et al., 2022: 363). Blockchain technology, which is based on the principles of security, transparency, and decentralization, plays a critical role in achieving these objectives; while strengthening data security, it also enhances accountability and reliability in urban management processes (Şen, 2020: 1).

In this context, blockchain technology is a system that enables both the secure transfer and verification of data, while allowing valuable information to be stored in decentralized multiple digital ledgers. Through this structure, blockchain ensures data integrity while also guaranteeing that transactions are immutable and traceable. Researchers emphasize that, considering the complex data flows and multi-stakeholder governance structures of smart cities, the implementation of reliable, transparent, and immutable systems such as blockchain is inevitable. Especially in municipal processes where record and document management are intensive, the requirements for transparency and security come to the forefront. In this context, one of the effective ways to establish an impartial, accessible, and reliable information infrastructure in order to combat corruption and enhance accountability in public services is the adoption of blockchain technology (Shari and Malip, 2022: 121–122).

Ultimately, blockchain technology offers significant opportunities for sustainability within the digital infrastructure of smart cities. In particular, the innovations it provides in data security, transparency, and resource management enable urban services to be carried out in a more efficient, accountable, and environmentally conscious manner (Biswas and Muthukkumarasamy, 2016: 1392–1393). However, the limitations of the technology regarding scalability, energy consumption, and legal regulations slow down its widespread adoption. For urban administrations to fully benefit from the potential of blockchain, they need to develop standardized systems that are aligned with open data policies and focused on energy efficiency (Demir and Kılıç, 2022: 85–86). In this regard,

blockchain solutions are considered one of the key elements of sustainable urban transformation; however, it is stated that their technological, institutional, and ethical dimensions should be addressed together (Chentouf, Hasoun, and Bouchkaren, 2025).

3.8. Social Media

In our era, where the digitalization process is accelerating, social media plays a critical role in restructuring the interaction between urban management and citizens. These tools facilitate citizens' access to information while also encouraging active participation in governance processes, paving the way for user-oriented approaches in the planning, monitoring, and evaluation of urban services. In line with smart city visions, the data obtained through social media and digital participation mechanisms contribute to the establishment of values such as transparency, accountability, and equitable access that support urban sustainability. However, this transformation process also faces challenges such as digital skill gaps, inadequate infrastructure, and issues related to social inclusion (Balakrishnan et al., 2023; Karic et al., 2024). In this context, cities' digital participation strategies should be viewed not merely as a technological innovation, but also as part of a sustainable, inclusive, and human-centered governance paradigm.

One of the primary objectives of smart cities is to respond to the needs and expectations of urban residents in the shortest possible time and in the most accurate manner. In achieving this goal, social media tools have emerged as an important channel for communication and feedback.. Since social media directly reflects the current problems and demands of urban residents, it has become a strategic source of data for local governments in service planning and decision-making processes. In this way, the quality of the services provided increases, enabling resources to be used more effectively and efficiently. At the same time, social media enables urban administrations to quickly analyze public opinion trends regarding existing or planned projects. For example, the effective use of platforms such as Twitter by a municipality facilitates direct communication with urban residents, the measurement of satisfaction levels regarding urban services, and the transparent announcement of activities related to the city (Yüksel, 2005: 254–257).

Social media contributes to the transformation of the governance approach by strengthening participation in urban management. These platforms support a governance model based on transparency, accountability, and trust by enabling citizens to directly participate in urban decision-making processes. In particular, tools such as Twitter, Facebook, Instagram, and online urban applications enable residents to share their problems instantly and allow local governments to develop rapid solutions to these issues (Bibri, 2021). Additionally, digital participation is directly associated with sustainability principles, as it contributes

to increasing environmental awareness and fostering social consciousness in areas such as energy and transportation. Due to the digital divide, the participation of groups with limited internet access and low levels of digital literacy in these processes may be restricted (Bertot, Estevez, and Janowski, 2016). This situation demonstrates that infrastructural and socio-technological inequalities need to be addressed in order for digital participation to be fully integrated into sustainable urban management.

4. SMART CITY EXAMPLES FROM THE PERSPECTIVE OF URBAN SUSTAINABILITY

Globally, smart cities have become innovative laboratories for urban transformation in an era of intensifying urbanization pressures, increasing resource management complexity, and prioritizing sustainability goals. In this context, the selected cities from around the world—Barcelona, Singapore, Amsterdam, Seoul, and Copenhagen—are highly representative examples in terms of demonstrating how the smart city approach is implemented under different geographical, cultural, and governance conditions. Each of these cities has developed unique approaches to the environmental, social, and economic dimensions of urban sustainability.

Barcelona, which has ranked among the top positions in the European Union’s “Smart City Benchmark” lists for years, serves as a leading example through its public digital infrastructure, data management, and citizen participation policies. The city serves as a model in environmental monitoring and energy efficiency through its open data platforms and sensor-based systems. For this reason, Barcelona has been selected to examine the impacts of a participatory and data-driven governance approach on sustainable urban management (<https://www.archdaily.com/>). **Singapore** is one of the rare examples that has elevated the smart city vision to the level of national policy through its “Smart Nation” strategy. Integrated digital management systems, transportation optimization, and data analytics-based solutions in water and energy management demonstrate how sustainable urbanization can be implemented through a comprehensive state strategy. In this respect, Singapore provides important insights into how technology-oriented planning can be balanced with environmental sustainability (<https://www.smartnation.gov.sg/>). **Amsterdam** is one of the first cities in Europe to materialize the goal of becoming a carbon-neutral city and, through the “Amsterdam Smart City Platform,” carries out collaboration among the private sector, local government, and citizens within a strong governance framework. This collaborative model is valuable in demonstrating how economic sustainability can be integrated with social participation (<https://amsterdamsmartcity.com/>). **Seoul** stands out for its high institutional capacity demonstrated in digital governance, disaster management, and smart transportation systems despite its high population density. The city’s

“Seoul Smart City Master Plan” aims to strengthen both social inclusiveness and environmental resilience through data sharing, sensor-based monitoring, and artificial intelligence-supported decision-making systems. For this reason, Seoul has been selected as one of the Asian examples where technology can be evaluated within the framework of social equity (<https://english.seoul.go.kr/>). Finally, **Copenhagen** represents a city model that integrates low-carbon economy, energy efficiency, and climate adaptation policies with digital technologies through the “Copenhagen Solutions Lab. With the goal of becoming a carbon-neutral capital by 2025, the city is one of the cities that most strongly integrates smart city applications into a sustainability perspective. This example demonstrates how climate-friendly technologies can be systematically implemented at the urban scale (<https://urbandevelopmentcph.kk.dk/climate>).

The common feature of these five cities is that they position technological innovations not merely as tools for efficiency, but as a component of sustainable quality of life. Despite their geographical and socioeconomic differences, all of them integrate the smart city approach with the principles of inclusive governance, resource management, environmental resilience, and data-driven decision-making. Therefore, the selected examples represent the process of redefining urban sustainability through digitalization on a global scale.

4.1. Barcelona

Barcelona, located on the Mediterranean coast and being one of Europe’s leading metropolitan cities, provides a unique area of experience in terms of sustainability due to both its historic urban fabric and high population density. Dynamics such as tourism pressure, heavy traffic congestion, the urban heat island effect, and rapidly changing land use significantly affect the city’s administrative and spatial systems. As of 2024, despite having a population exceeding 1.6 million, the city hosts approximately 12 million tourists annually; this situation increases sustainability pressures, particularly on energy, waste management, and the use of public spaces (Barcelona Consorci de Turisme, 2024). Within the framework of the European Union’s “Mission 100 Climate-Neutral and Smart Cities” initiative, Barcelona is among the cities that have committed to becoming carbon neutral by 2030 (European Commission, 2024). This goal requires the city administration to develop policies that combine not only technological innovation but also environmental resilience and social inclusiveness. In this context, the adoption of smart city approaches in Barcelona is considered not merely a technical modernization project, but rather a comprehensive tool for sustainable urban transformation. Therefore, Barcelona stands out as an appropriate example for analyzing how smart city applications are institutionalized within the framework of sustainability (<https://ajuntament.barcelona.cat/ca/>).

In urban management, Barcelona operates with a “green + digital” vision that integrates digitalization and environmental transformation goals. The city’s strategic framework is based on a policy set called the “Barcelona Green Deal,” which combines the principles of sustainable urban growth, digital innovation, and social equity up to 2030. This strategy, in alignment with the European Union’s Green Deal and Digital Transformation policies, aims to reduce carbon emissions, facilitate the transition to clean energy, expand digital infrastructure, and increase citizen participation. Within this framework, the municipality has implemented the “Barcelona Digital City 2024–2027” action plan and has developed an integrated system across the city in areas such as digital infrastructure, open data sharing, cybersecurity, e-governance, and technology-based social innovation (Barcelona Digital City, 2024).

This governance model has a multi-stakeholder structure that encourages the participation not only of technical institutions but also of the private sector, universities, and civil society organizations in the process. For example, the 22@Innovation District project has transformed the city’s former industrial area into an innovation hub for information technologies, energy efficiency, and creative industries. This area serves as a focal point for applications such as smart energy management, digital public services, and the open sharing of urban data, alongside the strengthening of digital infrastructure. In addition, the municipality has developed a digital operating system called City OS, establishing an urban decision-support infrastructure capable of collecting and analyzing data from different departments on a single platform (Kocakaya and Engin, 2020: 77–79). This system enables the efficient management of urban resources through artificial intelligence and Internet of Things (IoT)-based solutions.

Another notable aspect of Barcelona’s governance approach is the active involvement of citizens in digital participation processes. The participatory platform called Decidim.Barcelona is an open-source digital democracy tool that enables city residents to contribute directly to local planning and budget decisions (Decidim Barcelona, 2025). This initiative strengthens the interaction between city administration and citizens, transforming technology into a tool that enhances social inclusion. In this way, Barcelona does not reduce its smart city model to mere investments in digital infrastructure, but rather implements it as a framework that transforms the quality of governance and social participation.

Barcelona’s smart city strategy is based on areas of application that directly link technology-based solutions to urban sustainability goals. The city’s primary focus is to bring about a comprehensive transformation in the areas of transportation and mobility, energy and environmental management, and digital engagement and service infrastructure. This transformation is based on the principles of data-driven planning, IoT-based systems, and citizen-centered digitalization.

In the field of transportation and mobility, Barcelona was selected by the European Commission as a pilot city as part of the “EU Mission for Climate-Neutral and Smart Cities” as of 2023 (European Commission, 2023). As part of this process, the city has strengthened its multimodal transportation infrastructure to reduce carbon emissions. The Superilla project is one of the most concrete examples of this transformation. This model creates pedestrian-friendly, green public spaces by restricting motor vehicle traffic in specific neighborhoods. By 2024, a total of 23 superblock areas had become operational; the goal is to increase this number to over 500 by 2030 (<https://ajuntament.barcelona.cat/en/>). In addition, sustainable transportation options have been expanded with a network of bicycle paths exceeding 240 km throughout the city. The share of electric bus fleets in public transportation reached 36% in 2025, with a target of 100% electric transportation system by 2030 (<https://www.barcelona.cat/mobilitat/en>). These practices both reduce greenhouse gas emissions and improve air quality.

In the field of energy and environmental management, Barcelona promotes renewable energy production and local energy communities through its state-owned energy company, ‘Barcelona Energia’ (<https://www.barcelonaenergia.cat/en/home>). With over 200 solar panel systems installed in the city, approximately 4,500 MWh of clean energy is generated annually; this meets a significant portion of the electricity needs of municipal buildings. Furthermore, within the scope of Climate Plan 2030, the goals include increasing green infrastructure and reducing the urban heat island effect (https://www.barcelona.cat/barcelona-pel-clima/sites/default/files/climate_plan_maig.pdf). Innovative approaches are also being implemented in terms of waste management: thanks to the “smart waste bins” system, waste bins whose fill level is monitored by sensors have optimized waste collection routes and reduced fuel consumption by 25% (Smart Cities World, 2024).

In terms of digital participation and service infrastructure, Barcelona integrates smart city policies with social innovation. Through the Decidim.Barcelona platform, city residents contribute online to neighborhood planning and budget priorities (Decidim Barcelona, 2025). In addition, the city supports research and innovation by publicly sharing more than 600 datasets through its Open Data BCN platform (https://dataportals.org/portal/bcn_cat/). This data infrastructure enables the transparent implementation of urban planning, environmental management, and energy efficiency projects. Thus, Barcelona views technology not merely as a technical tool, but as a citizen-centric, sustainable, and inclusive practice of urban governance.

Barcelona's smart city applications aim to strengthen the three key components of sustainability: environmental, social, and economic impacts. The

city's environmental performance has produced tangible gains, particularly in the areas of energy efficiency, mobility transformation, and carbon reduction. According to the European Commission's 2024 monitoring report, Barcelona managed to reduce per capita carbon emissions by 22% between 2015 and 2023 (European Commission, 2024). Within the scope of the Superilla program, an annual reduction of approximately 80,000 tons of CO₂ equivalent has been achieved in motor vehicle traffic, and the green space ratio has increased to 8.7%. (<https://ajuntament.barcelona.cat/ca/>). Additionally, the city aims to reduce energy consumption by 10% and water consumption by 5% by 2025 under the "Climate Plan 2030" framework (https://www.barcelona.cat/barcelona-pel-clima/sites/default/files/climate_plan_maig.pdf). These indicators demonstrate that smart city technologies are directly linked to environmental sustainability outcomes.

From a social perspective, Barcelona's smart city policies have developed an approach that prioritizes digital participation and social inclusion. As of 2024, more than 75,000 users have participated online in urban policy-making processes through the Decidim.Barcelona platform (Decidim Barcelona, 2025). The platform has particularly contributed to increasing the visibility of groups such as women, young people, and migrant communities in urban planning processes. To reduce digital inequalities, the municipality expanded its public Wi-Fi network and, as of 2024, has made available more than 2,000 free access points across the city (Barcelona Digital City, 2024). In addition, under the Digital Inclusion Program targeting low-income households, device and internet connectivity support was provided to 3,000 students. These applications demonstrate that smart city policies contribute not only to infrastructure development but also to social inclusion.

From an economic perspective, Barcelona has transformed its smart city ecosystem into a strategic instrument for fostering local innovation, entrepreneurship, and green economy-led growth. As of 2024, more than 12,000 companies operate within the 22@ Innovation District, and the area accounts for approximately 30% of the city's total R&D investments (Kocakaya ve Engin, 2020: 78). The number of people employed in the city's digital economy sector increased by 47% between 2018 and 2023. In addition, approximately 1,500 new jobs were created as of 2023 through renewable energy production and energy efficiency investments implemented via Barcelona Energia (<https://www.barcelonaenergia.cat/en/home>). These data demonstrate that smart city policies are an effective tool for promoting economic diversification and green growth.

The Barcelona experience provides a strong model for how the smart city approach can be integrated with sustainable urban transformation objectives. The city has approached digitalization not merely as a technological process, but as

an integrated concept encompassing social participation, environmental balance, and economic resilience. Within this framework, the Barcelona Green Deal and Digital City 2024–2027 strategies have established a governance framework that integrates the environmental, economic, and social dimensions of sustainable development (<https://ajuntament.barcelona.cat/ca/>; Barcelona Digital City, 2024). The city’s institutional capacity, open data practices, renewable energy investments, and participatory digital platforms demonstrate that urban sustainability is not only a physical phenomenon but also a governance-related one.

In this context, three fundamental dynamics underlie Barcelona’s success: first, an integrated policy approach, meaning that the areas of environment, energy, transportation, digitalization, and social participation are managed in a coordinated manner. Second, a participatory governance model, whereby citizens are involved in decision-making processes through tools such as Decidim.Barcelona. Third, a data-driven planning approach, in which digital infrastructures such as City OS and Open Data BCN enhance the efficiency of public services and ground policy-making in empirical evidence (Barcelona Digital City, 2024). When combined, these elements indicate that Barcelona’s smart city vision extends beyond a purely technological transformation and is oriented toward the construction of a sustainable way of life.

In conclusion, Barcelona is a pioneering model that implements urban sustainability in a multidimensional manner through smart city applications. The city’s strategic approach offers a form of governance that serves as a model not only for European cities but also for developing metropolitan areas. This model demonstrates that technology-driven urbanization can be sustainable only when integrated with the principles of ecological balance, social equity, and economic diversification. Accordingly, Barcelona is regarded as an example that has succeeded in transforming the concept of “smart” from a technical label into the foundation of a sustainable and inclusive urban life.

4.2. Singapore

Singapore, with a population of approximately 5.6 million and limited natural resources, has been continuously driven by the constraints of its island geography to pursue resource efficiency and infrastructural resilience. In this context, the city-state governance model has aimed to ensure the continuity of urban services and sustainable resource use by adopting technology-based solutions at the national policy level. (<https://www.tech.gov.sg/technews/how-singapore-has-become-a-leading-tech-hub-in-asia/>). Water security, smart transportation, and digital public services lie at the core of Singapore’s sustainability agenda; at the same time, its vulnerable island position in the context of climate change necessitates coordinated and rapid policy responses at the national level (<https://www.smartnation.gov.sg/>; <https://www.greenplan.gov.sg/>).

Within this national framework, Singapore's smart city approach has evolved through the Smart Nation initiative launched in 2014, which continues to be pursued with an updated vision in the 2024–2025 period. The Smart Nation 2.0 document goes beyond building technological infrastructure and officially emphasizes the goal of using technology more effectively, equitably, and in a way that generates social benefit, structured around the pillars of “growth, trust, and community.” This strategic transformation aims to accelerate the integration of digital identity, sensor networks, national data platforms, and AI-enabled services into public service delivery; therefore, the case of Singapore demonstrates how smart city applications can be scaled through national-level coordination (Smart Nation 2.0, 2024).

Governance and inter-agency collaboration are defining features of the Singapore model. The Smart Nation programme, implemented under the leadership of the Ministry of Digital Development and Information, coordinates municipal, transport, water, and energy agencies as well as sectoral stakeholders under a unified framework. This centralized coordination structure ensures risk management, data standardization, and the alignment of technology investments with national priorities. It also enables solutions to be tested at scale through public–private partnerships and pilot projects, facilitating their rapid deployment and wider adoption (<https://www.smartnation.gov.sg/>).

In terms of application areas, Singapore's priority projects are grouped under three main axes: transportation and smart mobility, water–energy cycles, and digital public services together with AI-based operational optimization. In transportation, electric and autonomous vehicle pilots implemented by the Land Transport Authority (LTA), the expansion of electric bus fleets, and real-time traffic management systems aim to make urban mobility less carbon-intensive and more inclusive. These initiatives are supported by data-driven decision-making processes aimed at reducing the energy consumption of transportation, improving road safety, and enhancing service quality (<https://www.lta.gov.sg/content/ltagov/en/newsroom/2024/10/news-releases/new-electric-bus-features-for-safer-and-inclusive-journeys.html>).

In this context, water management is one of Singapore's most distinctive areas of implementation. The country's water security strategy is based on the integration of water reuse, rainwater harvesting, and energy-efficient treatment technologies. NEWater facilities (advanced treated reclaimed water) and smart monitoring applications of national water agency PUB focus on diversifying the water supply while also minimizing the energy and carbon costs of operations. PUB's sustainability reports provide regular data on water recovery rates, facility efficiency, and infrastructure resilience, making the tangible sustainability contributions of water management more measurable and traceable (PUB

Singapore's National Water Agency, 2025; <https://www.pub.gov.sg/-/media/PUB/PDF/To-Publish-PUB-SR-23-Final.pdf>).

Digital public services and data platforms support Singapore's goals of social inclusion and service efficiency. National digital identities, e-services, and the local one-service portal facilitate citizens' access to services, while also strengthening resource allocation and emergency response capacity through data analytics. National AI strategies focus on increasing both economic efficiency and social benefits by using predictive analytics in healthcare, education, and urban operations (<https://www.smartnation.gov.sg/initiatives/national-ai-strategy/>).

The impacts of the Singapore case on urban sustainability can be evaluated under three main headings. From an environmental perspective, through the Green Plan 2030 targets and Smart Nation initiatives, the country is progressing toward greater energy efficiency, reduced transport-related emissions, and increased autonomy in the water cycle; for example, the expansion of electric buses and smart traffic management contributes to improving the emissions profile of the transport sector (<https://www.greenplan.gov.sg/>; <https://file.go.gov.sg/smartnation2-report.pdf>). From a social perspective, while the widespread adoption of digital services facilitates access to public services, programs aimed at closing the digital divide and inclusive policy designs strive to prevent the exclusion of vulnerable groups. From an economic perspective, investments focused on Smart Nation increase digital sector employment and the production of high-value-added services; however, managing the impacts of technological transformation on employment and income distribution requires a distinct policy agenda (Smart Nation 2.0, 2024).

However, Singapore also faces certain limitations and risks that require careful consideration. While its centralized governance structure is highly effective, issues such as data privacy, algorithmic transparency, and the potential negative impacts of technology on disadvantaged groups must be continuously monitored through regulatory frameworks. In addition, it is necessary to verify through independent assessments whether infrastructure investments deliver clear benefits in terms of energy use and the living environment; for instance, balancing the energy costs of water reclamation with its net environmental benefits is a concrete example of such evaluations (<https://www.greenplan.gov.sg/>).

In conclusion, Singapore presents one of the most enabling models for scaling technology-based sustainability policies by integrating smart city applications with national strategy. The goals emphasized in Smart Nation 2.0—growth, trust, and community—shape the city's technology investments not only toward efficiency gains but also toward serving the public good. Compared to other metropolises, Singapore case demonstrates how the combination of national

coordination and local implementation can provide significant speed and scale advantages in achieving urban sustainability goals; however, these advantages entail long-term risks if they are not supported by transparent regulation, independent performance monitoring, and social inclusion policies (Smart Nation 2.0, 2024).

4.3. Amsterdam

Amsterdam, Northern Europe's economic and cultural hub, presents a multi-layered urban system that requires the simultaneous management of limited space, intensive tourism, and high infrastructure demands. In this context, city governance has developed strategies that integrate sustainability goals with principles of technology, governance, and the circular economy. Amsterdam's strategic choice is based on reducing resource consumption, lowering urban emissions, and expanding circular practices within the local economy; for this reason, the city serves both as one of Europe's best-practice laboratories and as a practical example of the "circular city" approach (City of Amsterdam, 2020; Ellen MacArthur Foundation, 2024).

This strategic framework has been operationalized through the Amsterdam Circular Strategy 2020–2025, adopted by the City Council of Amsterdam, and subsequent implementation agendas. The city's policy objectives include reducing the use of virgin raw materials by half by 2030 and transitioning to a fully circular urban economy by 2050 (City of Amsterdam, 2020). These targets have been linked to various policy instruments such as urban planning, infrastructure investments, and public procurement, and their implementation has been further supported by action packages covering the 2023–2026 period (Implementation Agenda for a Circular Amsterdam 2023–2026, 2023). From a governance perspective, Amsterdam promotes multi-stakeholder, project-based implementation by establishing open innovation platforms between local government, universities, civil society, and the private sector, such as Amsterdam Smart City (<https://amsterdamsmartcity.com/>). This structure strengthens both piloting and scaling capacities, while accelerating the implementation of circularity policies.

In the context of application areas, the primary fields Amsterdam focuses on are transportation, circular construction and material management, energy transition, and open data/digital services. In transportation, the city stands out with its cycling infrastructure and electric public transit targets, and the expansion of the urban cycling network is supported by high-capacity cycling lanes such as 'Plusnet Fiets'. Furthermore, large-scale electric bus deployments were completed by the end of 2024, and it is planned that, as a 2025 target, the entire bus fleet will be transitioned to zero-emission vehicles (I amsterdam, 2025; CINEA, 2025). These investments directly contribute to the transformation of carbon-intensive modes of transportation. On the other hand, Amsterdam supports the

expansion of electric vehicle charging infrastructure across the city and the integration of renewable energy through smart grid pilots; an analysis indicates that tens of thousands of charging points are planned to be installed in the city by 2030 (<https://www.oliverwymanforum.com/mobility/urban-mobility-readiness-index-2023/amsterdam.html>).

Circular economy practices have particularly focused on construction materials and organic waste streams. The municipality aims to develop reuse and recovery strategies in the construction sector, converting construction and demolition waste into valuable materials. Implementation agendas set out the goal of halving the amount of new raw materials used in the construction sector by 2030 and outline the pathway toward full circularity by 2050; these promise both environmental and economic benefits, including reduced material costs and new job opportunities (City of Amsterdam, 2020; <https://amsterdamsmartcity.com/>). Biogas and composting projects developed for organic waste combine energy recovery and soil regeneration in urban waste management; as a result, dependence on landfills is reduced and the urban circular cycle is accelerated (Implementation Agenda for a Circular Amsterdam 2023-2026, 2023).

Digital infrastructure and open data initiatives form another pillar of Amsterdam's smart city approach. Open Data platforms and Amsterdam Smart City partnerships enable municipal data to be accessed by academia and the private sector, thereby laying the groundwork for the emergence of innovative initiatives (<https://data.amsterdam.nl/>). This data-driven approach facilitates the development of operational applications such as traffic optimization, energy consumption monitoring, and waste collection route optimization. However, data-sharing practices also raise questions regarding privacy, data governance, and transparency; in Amsterdam, some advanced traffic technology applications were paused due to privacy concerns, highlighting the need to balance open data with population privacy (NOS, 2025).

The impacts of Amsterdam's smart city policies on urban sustainability are characterized by both positive tangible outcomes and ongoing challenges. From an environmental perspective, the city's climate reports indicate progress toward the 2030 targets, with significant reductions in CO₂ emissions observed during the 2015–2023 period; the municipality has updated its target to reduce carbon emissions by 55–60% by 2030. Circular strategies contribute to the conservation of vital resources by reducing raw material consumption and generate potential energy and carbon savings in construction and organic waste streams (Friant et al., 2023). Policies promoting cycling and public transportation in mobility continue to play a decisive role in reducing intra-urban emissions.

In terms of social impacts, Amsterdam's open data and participatory innovation platforms have the potential to strengthen civic engagement.

Specifically, innovation ecosystems like 22@ create jobs by supporting local entrepreneurship (<https://amsterdamsmartcity.com/>). However, careful planning is required to ensure that the spread of new technologies does not deepen spatial inequalities; in particular, the effects of urban transformation on rents and the housing market make it necessary to design social inclusion policies in parallel. Moreover, in data- and algorithm-based applications, privacy and security concerns remain an area of adjustment in the case of Amsterdam, and therefore the regulatory–implementation cycle needs to be strengthened (Friant et al., 2023).

Among the economic benefits observed in practice for Amsterdam are the creation of new employment sectors through circular approaches and the reduction of material costs. Municipal calculations predict that material recycling in the construction sector has the potential to create hundreds of millions of euros in annual value (<https://amsterdamsmartcity.com/>). However, support programs are essential to ensure the fair distribution of these economic benefits and to support small businesses in adapting to the transformation.

Overall, the Amsterdam experience offers important lessons on how smart city applications can be integrated with sustainability goals. Firstly, supporting circular economy goals with concrete action plans and implementation agendas; secondly, strengthening local innovation capacity through open data and multi-stakeholder innovation networks; and thirdly, developing proactive policy mechanisms on data privacy and technological regulation. Amsterdam demonstrates that while technology is used as a tool for ecological and economic restructuring, issues such as privacy, social equity, and regulatory transparency must simultaneously remain on the policy agenda. Therefore, when compared with Barcelona and Singapore, Amsterdam serves as a strong reference point as a “circular and open data–driven European model.

4.4. Seoul

Seoul, the capital of South Korea, stands out as one of the leading global examples of smart city transformation through its digital governance, citizen participation, and data-driven public services. With a population exceeding 10 million and an area of 600 km², Seoul is one of Asia’s most densely populated cities. Since the early 2000s, it has developed a long-term vision that integrates information and communication technologies (ICT) into urban governance. This vision is not only a digitalization objective but also a strategy for building a sustainable, participatory, and inclusive urban life. Seoul’s “Smart Seoul” policies integrate environmental sustainability into digital governance, jointly targeting energy efficiency, mobility, urban resilience, and social inclusion (Seoul Metropolitan Government [SMG], 2024; <https://www.oecd.org/en/topics/regional-rural-and-urban-development.html>).

Through the Smart Seoul Master Plan (2025), launched in 2015, the city administration has made digital innovation a core component of public services. Within the scope of this plan, sub-programs such as the “Smart Seoul Platform,” “Data Hub,” “Digital Twin Seoul,” and “Smart M-Office” have been developed. Through these systems, data on municipal services, traffic, energy consumption, environmental quality, and disaster management are monitored in real time and made publicly available in open data formats. In particular, Digital Twin Seoul creates a three-dimensional digital model of the city’s infrastructure, enabling urban planning processes to be tested through simulations. This model is used in disaster management, energy optimization, and urban mobility analysis; as of 2025, it is intended to cover all districts of the city (<https://data.seoul.go.kr/>).

At the core of Seoul’s smart city policies lies a participatory digital governance approach. The “mVoting” mobile participation platform enables citizens to directly engage in local decision-making processes. As of 2023, more than 1.5 million users have actively used this platform to submit urban policy proposals or participate in voting processes (<https://www.seoulsmartcityprize.com/prize/index.php>). In addition, tools such as the “Seoul Smart Complaint System” and the “Seoul Open Data Plaza” strengthen the principles of transparency and accountability in governance. As of 2024, the “Open Data Plaza” platform has made more than 7,500 datasets publicly available and has formed the basis for over 500 digital initiatives developed in the city (Seoul Metropolitan Government [SMG], 2024). This system distinguishes itself from other Asian cities by linking technological infrastructure with mechanisms of democratization (<https://www.oecd.org/en/topics/regional-rural-and-urban-development.html>).

From a sustainability perspective, Seoul has adopted a comprehensive strategy that integrates its carbon neutrality targets with smart city applications. Under the Carbon Neutral Seoul 2050 Plan, the city is implementing transformation steps across the energy, transport, buildings, and waste management sectors, supported by digital technologies. The “Smart Energy Management System (SEMS)” platform monitors the energy consumption of public buildings using AI-supported sensors and provides efficiency recommendations. As of 2023, it has been reported that this system has been implemented in more than 1,000 public buildings and has achieved an average reduction of 14% in energy consumption (Korea Institute of Science and Technology, 2023). In the transport sector, electric bus fleets, intelligent traffic management systems, and shared micro-mobility applications have been expanded under the “Seoul Smart Mobility” initiative. As of 2024, 30% of the city’s public transport vehicles have become electric, and traffic congestion has decreased by 7% compared to the previous five years (<https://www.energy.or.kr/english>).

Another dimension of Seoul's digital transformation is its disaster management and urban resilience policies. The Smart Disaster Management System project monitors critical data such as air quality, flood risk, and energy supply through real-time sensor networks and sends automated alerts during crises. Following the heavy rainfall in 2022, the system's early warning mechanism enabled the safe evacuation of more than 20,000 residents from high-risk areas (<https://www.undrr.org/>). Such applications demonstrate that digital technologies are used not only for economic efficiency but also for social safety and environmental resilience.

However, the Seoul experience also brings certain critical dimensions. First, despite the pace of digitalization, the risk of digital exclusion among the elderly population persists; therefore, under the "Digital Inclusion Seoul" program, the municipality has established digital education centers for elderly and low-income groups. In addition, issues of data security and privacy have sparked debate, particularly in the context of AI-supported surveillance systems. As of 2025, the city administration is developing new regulations that strengthen personal data protection protocols. Seoul's policy approach demonstrates that the balance between technological advancement and ethical governance is an integral part of the sustainability paradigm (<https://english.seoul.go.kr/policy/smart-city/digital-inclusion/>).

Seoul's overall experience shows that smart cities can be managed in alignment with sustainable development goals. It is evident that technological infrastructure can generate transformative effects not only in energy and mobility efficiency but also in governance, social participation, and disaster resilience. The Seoul case demonstrates that the success of digital transformation processes depends not only on technology itself but also on how it is governed with inclusivity, ethics, and environmental sensitivity. In this respect, Seoul represents a hybrid example that combines the emphasis on local environmental transformation seen in Barcelona and Amsterdam with Singapore's systematic digital governance model.

4.5. Copenhagen

Copenhagen is one of the leading European cities that integrates the smart city approach with environmental sustainability, energy efficiency, and citizen-centered digital governance. With a population of approximately 800,000 and high quality-of-life indicators, the capital of Denmark has long adopted the "carbon-neutral city" vision as a strategic goal in urban governance. This goal has been shaped by the Copenhagen Climate Plan 2025, adopted in 2012, and its subsequent updates strengthened through digital transformation. Copenhagen is the first major European capital to aim for carbon neutrality by 2025, and this target is supported by integrated digital applications in energy, transport, urban planning, and waste management (City of Copenhagen, 2023; C40 Cities, 2024).

The city's strategic orientation aims not only at emission reduction but also at establishing sustainable lifestyles through smart data management, circular economy, and public participation (<https://www.oecd.org/en/topics/regional-rural-and-urban-development.html>).

One of the most distinctive features of Copenhagen's smart city vision is the digitalized management of the green transition. The city administration monitors performance across all sectors, from energy production to waste management, using digital sensor networks, data centers, and analytics platforms. For example, the City Data Exchange platform enables the sharing of energy, mobility, and environmental data among the municipality, the private sector, and citizens; as of 2024, this platform has made more than 1,200 datasets openly accessible (<https://cphsolutionslab.kk.dk/en/focus-areas/city-data-exchange>). In this way, private initiatives are able to develop solutions that reduce carbon footprints, while research institutions can directly provide data to policy-making processes (<https://smart-cities-marketplace.ec.europa.eu/>). In addition, through the Smart City Accelerator Programme implemented across the city, start-ups are supported in developing innovative products in the fields of energy efficiency and digital planning (<https://www.copcap.com/>).

The transport sector plays a critical role in Copenhagen's sustainability strategy. In the city, approximately 49% of daily trips are made by bicycle, making it one of the highest rates in Europe. Through the "Cycle Superhighways" project, the municipality has created more than 700 kilometers of bicycle highways; as of 2025, this network is being expanded to also cover the wider metropolitan region. In addition, the electric bus fleet accounted for 40% of the total public transport vehicles at the end of 2024 (<https://international.kk.dk/>). Intelligent traffic signal systems have been implemented to reduce traffic congestion and improve energy efficiency; thanks to these systems, greenhouse gas emissions during peak hours have decreased by up to 10% (<https://cphsolutionslab.kk.dk/en/focus-areas/city-data-exchange>). In addition, it is targeted to increase the number of electric vehicle charging stations across the city to 10,000 by 2025 (C40 Cities, 2024)

Energy management is at the center of Copenhagen's smart city applications. The city has integrated its district heating systems with digital control systems and developed AI-supported predictive algorithms to optimize renewable energy sources. As of 2024, 80% of Copenhagen's energy mix is supplied from renewable sources, and 60% of the city's heating demand is met by energy generated from waste incineration plants (<https://www.euroheat.org/member-area/outlook-2025/denmark>). In addition, the Nordhavn Smart District Project produces low-carbon living spaces through smart energy grids and sensor-based buildings; this model has been described by the European Commission as "one

of the best examples of urban energy integration.” (https://energy.ec.europa.eu/index_en).

From an urban planning perspective, Copenhagen has systematized data-driven decision-making processes across the entire city. Through the Copenhagen City Dashboard, indicators such as air quality, water management, traffic flow, and energy consumption are monitored in real time and reported in a publicly accessible manner (<https://international.kk.dk/>). This system facilitates citizen participation in decision-making processes and increases the transparency of urban governance. In addition, with “Green Mobility as a Service (MaaS)” applications, public transport, bicycle rental, and shared vehicle systems have been integrated into a single digital platform (<https://www.oecd.org/en/topics/region-al-rural-and-urban-development.html>).

Copenhagen’s sustainability indicators demonstrate the tangible impacts of its smart city applications. Between 2010 and 2023, per capita CO₂ emissions across the city decreased by 70% (<https://international.kk.dk/>). Thanks to investments in renewable energy, the 2025 carbon neutrality target is achievable. Additionally, according to the 2024 report of the European Environment Agency, Copenhagen is well above the European average in terms of air quality, water management, and waste recycling rates. However, the city administration has stated that the carbon neutrality target may be at risk of being delayed and has prepared revised plans for the post-2025 period aimed at 2030 targets (<https://www.eea.europa.eu/publications/greenest-capitals-2024>).

From a social sustainability perspective, Copenhagen adopts the principle that technological innovations should directly contribute to citizens’ well-being. Through digital participation platforms such as CitizenLab Copenhagen, the city administration collects citizens’ opinions in decision-making processes (<https://www.copcap.com/>). In addition, digital skills programs support inclusive transformation in low-income neighborhoods. However, some studies emphasize that the excessive centralization of digital services may create risks such as data security concerns and dependence on the private sector. To maintain this balance, Copenhagen has begun implementing the EU’s “Ethical AI for Cities” principles at the local level (<https://www.eea.europa.eu/publications/greenest-capitals-2024>; <https://www.oecd.org/en/topics/region-al-rural-and-urban-development.html>).

Overall, the example of Copenhagen shows that smart cities can evolve into an integrated governance model aligned with sustainability goals. The city carries out its transformation in energy, transportation, and digital infrastructure within the framework of social inclusion and environmental responsibility, thereby instrumentalizing smart technologies to enhance societal well-being. Compared to Barcelona’s focus on spatial renewal, Amsterdam’s emphasis on circularity, and Singapore’s digital governance-oriented approach, Copenhagen is

considered one of the most mature examples of a “green smart city” paradigm that places environmental sustainability at its core.

Ultimately, an assessment reveals that the development of smart city policies globally varies depending on how local governments integrate digital technologies with their sustainability goals. In this context, the examples of Barcelona, Singapore, Amsterdam, Seoul, and Copenhagen represent five distinct governance paradigms that reflect different implementation models of the smart city approach across various geographies. Each of them has approached technology not merely as a tool for efficiency, but as a transformative mechanism that supports social, environmental, and economic sustainability (<https://www.oecd.org/en/topics/regional-rural-and-urban-development.html>; <https://unhabitat.org/>).

In line with the European Union’s smart city policies, Barcelona emphasizes a public space-oriented digitalization and participatory governance approach. The “Barcelona Digital City Strategy” and the “Sentilo” open data platform integrate citizen participation into decision-making processes while also supporting goals of energy efficiency and social inclusion through digital infrastructure. In contrast, Singapore, with its ‘Smart Nation’ vision, has adopted a centralized digital governance model built on data-driven public services, urban security, and administrative efficiency. While this approach maximizes technological integration, it has also raised debates regarding data privacy and individual freedoms. The case of Amsterdam stands out with a network-based collaborative model that places circular economy and energy efficiency principles at the center of urban planning. The “Amsterdam Smart City” platform is based on the co-creation capacity of local government, the private sector, and civil society. This model is considered one of the most participatory examples of digital transformation in Europe (<https://smart-cities-marketplace.ec.europa.eu/>). In contrast, Seoul is one of the pioneers of citizen-centered digital governance. Under the “Smart Seoul Master Plan,” applications such as “mVoting” and the “Open Data Plaza” have made urban governance more transparent and participatory. Seoul has also developed an innovative approach that integrates AI-powered disaster management and digital twin technologies with urban safety (<https://english.seoul.go.kr/smart-seoul-map-shows-well-intentioned-stores-and-trails-suitable-for-people-with-disabilities/>). Copenhagen, among the five cities, represents the most comprehensive strategic model that places environmental sustainability at its core. Through its “Carbon Neutral Copenhagen 2025” vision, the city has enhanced its environmental performance by integrating energy efficiency, green mobility, and data-driven planning (<https://international.kk.dk/>). It can be observed that Barcelona and Amsterdam emphasize spatial and social dimensions, Singapore and Seoul advance along a technological governance axis, and Copenhagen builds a framework focused on environmental efficiency.

A comparative analysis of these five cases shows that successful smart city implementations converge on three common dimensions. First, digital transformation should be understood not only as an infrastructural process but also as one that strengthens institutional and social capacity. Second, open data management and citizen participation enhance democratization in governance. Third, technological investments must be directly linked to sustainability objectives. Although cities differ in terms of geographical, economic, and socio-political conditions, Barcelona's socially innovation-oriented approach, Singapore's efficiency-based governance model, Amsterdam's collaborative framework, Seoul's participatory model, and Copenhagen's environmental sustainability-centered strategy demonstrate that smart cities can achieve success at different scales and through different pathways. Therefore, these cities provide a comprehensive comparative framework illustrating how smart city policies aligned with sustainability principles can evolve under different governance models.

5. CONCLUSION

In this study, the concept of smart cities has been examined within the framework of sustainable urbanization, and the ways in which technological innovations contribute to urban sustainability have been discussed in detail. The core components of smart cities—such as the Internet of Things, big data, artificial intelligence, cloud computing, blockchain, and autonomous systems—have been evaluated as tools that enhance efficiency, participation, and environmental awareness in urban governance. It has been demonstrated that when these technologies are integrated with sustainability objectives, they enable more efficient use of resources, reduce carbon emissions, and improve the quality of life. However, it has been emphasized that technology alone is not sufficient in this process; governance, data security, social participation, and ethical principles are also decisive in the development of sustainable smart cities.

Evaluations based on global smart city examples have revealed the opportunities and limitations that technological transformation creates in terms of sustainability. The experiences of cities such as Barcelona, Singapore, Amsterdam, Seoul, and Copenhagen have demonstrated the successes of smart city applications in areas such as energy management, transportation, waste management, and participatory governance.

Overall, the conceptual framework developed in this study identifies the position of the smart city approach within the paradigm of sustainable urbanization and highlights the complementary dimensions of these two concepts.

Smart cities gain meaning not only through investments in technological infrastructure, but also when they are evaluated in terms of planning, participatory governance, and social inclusion in line with the principles of

sustainable development. In this regard, it has been concluded that the contribution of smart cities to urban sustainability is shaped by the vision of local governments, the level of social participation, and the cooperation mechanisms among different stakeholders.

REFERENCES

- AGGARWAL**, Geetika ve diğerleri (2023). ‘Smart Grid and IoT For Sustainable Smart Cities: Potential, Applications and Future Research Directions’, **IEEE SMARTGRID**.
- AKDAMAR**, Emrah (2017). ‘Akıllı Kent İdealine Ulaşmada Büyük Verinin Rolü’, Kent Akademisi, Cilt: 10, Sayı: 30, ss. 200- 215.
- ALAV**, Orhan (2023). **Yeni Nesil Bilgi Merkezleri: Veri Yönetimi**, 1.Basım, Ankara: Akademisyen Yayınevi.
- ALBINO**, Vito, Umberto Berardi and Rosa Maria Dangelico (2015). ‘Smart Cities: Definitions, Dimensions, Performance and Initiatives’, **Journal of Urban Technology**, Vol: 22, No: 1, pp. 3- 21.
- ALHOMDY**, Sharaf ve diğerleri (2021). ‘The Role of Cloud Computing Technology: A Savior to Fight The Lockdown in Covid-19 Crisis, The Benefits, Characteristics and Applications’, **International Journal of Intelligent Networks**, Vol: 5, No: 2. Pp. 166- 174.
- ALLAM**, Zaheer and Zaynah A. Dhunny (2019). ‘ On Big Data, Artificial Intelligence and Smart Cities’, **Cities**, Vol: 89, pp. 80- 91.
- ARI**, Emin Sertaç (2021). ‘Süper Akıllı Toplum: Toplum 5.0’, **Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü Dergisi**, Cilt: 23, Sayı: 1, ss. 455- 479.
- ASLAN**, Meryem (2022). ‘Mateverse’in Akıllı Kent Hizmetlerine Etkisi’, **Akademik Araştırmalar ve Çalışmalar Dergisi**, Cilt: 14, Sayı: 27, ss. 292- 303.
- BALAKRISHNAN**, Soumya ve diğerleri (2023). ‘Sustainable Smart Cities- Social Media Platforms and Their Role in Community Neighborhood Resilience- A Systematic Review’, **International Journal of Environmental Research and Public Health**, Vol: 20, No: 18.
- Barcelona Consorci de Turisme**, 2024: <https://professional.barcelonaturisme.com/en> (Erişim Tarihi: 20.04.2025).
- Barcelona Digital City**, 2024: <https://ajuntament.barcelona.cat/digital/en> (Erişim Tarihi: 20.04.2025).
- BATTY**, Michael ve diğerleri (2012). ‘Smart Cities of The Future’, The European Physical Journal, Vol: 214, Special Topics, pp. 481- 518.
- Bee Smart City**, 2025 (<https://www.beesmart.city/en/smart-city-indicators>) (Erişim Tarihi: 02.02.2025).
- BELISSENT**, Jennifer (2010). ‘Getting Clever About Smart Cities: New Opportunities Require New Business Models’, (<https://pdfcoffee.com/getting-clever-about-smart-cities-pdf-free.html>) (Erişim Tarihi: 14.03.2025).

- BERTOT**, John, Elsa Estevez and Tomasz Janowski (2016). ‘Universal and Contextualized Public Services: Dijital Public Service Innovation Framework’, **Government Information Quarterly**, Vol: 33, No: 2, pp. 211-222.
- BEZAI**, Nacer Eddine ve diğerleri (2021). ‘Autonomous Vehicles and Smart Cities Future Directions of Ownership vs. Shared Mobility’, **56th ISOCARP World Planning Congress in Doha, Qatar**.
- BIBRI**, Simon Elias (2021). ‘Data- Driven Smart Sustainable Cities of The Future: An Evidence Synthesis Approach to A Comprehensive State of The Art Literature Review’, **Sustainable Futures**, Vol: 3.
- BIÇKI**, Doğan ve Selin Eyişlu (2025). ‘Eleştirel Açından Akıllı Kentler: Büyükşehir Belediyeleri Üzerine Bir Farkındalık Araştırması’, **KMÜ Sosyal ve Ekonomik Araştırmalar Dergisi**, Cilt: 27, Sayı: 48, ss. 405-430.
- BISWAS**, Kamanashis and Vallipuram Muthukkumarasamy (2016). ‘Securing Smart Cities Using Blockchain Technology’, **14th IEEE International Conference on Smart City**.
- C40 Cities**, 2024: <https://www.c40.org/case-studies/copenhagen-carbon-neutrality/> (Erişim Tarihi: 07.06.2025).
- CARAGLIU**, Andrea, Chiara Del Bo and Peter Nijkamp (2009). ‘Smart Cities in Europe’, **Journal of Urban Technology**, Vol: 18, No: 2, pp. 45- 59.
- CESARIO**, Eugenio (2023). ‘Big Data Analytics and Smart Cities: Applications, Challenges and Opportunities’, **Frontiers in Big Data**, Vol: 6.
- CHENTOUF**, Fatima Zahrae, Mohamed El Alami Hasoun and Said Bouchkaren (2025). ‘Blockchain For Sustainable Smart Cities: Motivation and Challenges’, **Computer Sciences and Mathematics Forum**, Vol: 10, No: 1.
- CINEA**, 2025: https://cinea.ec.europa.eu/news-events/news/e-mobility-revolution-amsterdam-2025-04-23_en (Erişim Tarihi: 01.06.2025).
- City of Amsterdam**, 2020: <https://www.amsterdam.nl/en/policy/sustainability/circular-economy/> (Erişim Tarihi: 01.06.2025).
- City of Copenhagen**, 2023: <https://international.kk.dk/> (Erişim Tarihi: 07.06.2025).
- CLARKE**, Ruthbea Yesner (2012). ‘Smart Cities and The Internet of Everything: The Foundation For Delivering Next- Generation Citizen Services’, **IDC Government Insights**, pp. 1- 18.
- ÇAKIR**, Erhan (2023). ‘Kentsel Dönüşüme Yeni Bir Yaklaşım Olarak Akıllı Kentler: Tepebaşı Belediyesi Melih Savaş Yaşam Köyü Örneği’, (**Doktora Tezi**),

Kütahya Dumlupınar Üniversitesi Lisansüstü Eğitim Enstitüsü, Kamu Yönetimi Anabilim Dalı, Kütahya.

ÇAKIR, Erkan (2023). '21. Yüzyılda Kentsel Dönüşüm ve Yeni Eğilimler', **Meriç Uluslararası Sosyal ve Stratejik Araştırmalar Dergisi**, Cilt: 7, Sayı: 18, ss. 118- 144.

DA XU, Li, Yang Lu and Ling Li (2012). 'Embedding Blockchain Technology Into IoT For Security: A Survey', **IEEE Internet of Things Journal**, Vol: 8, No: 3.

Decidim Barcelona, 2025: <https://www.decidim.barcelona/> (Erişim Tarihi: 20.04.2025).

DEMİR, Yasemin ve Sabiha Kılıç (2022). 'Blok Zincir ve Akıllı Şehir Kavramları Ekseninde Bibliyometrik Bir Çalışma', **Girişimcilik İnovasyon ve Pazarlama Araştırmaları Dergisi**, Cilt: 6, Sayı: 12, ss. 82- 101.

DEMİRDÖĞEN, Yavuz (2020). 'İslami Fintek Ekosistemi Üzerine Bir Değerlendirme', **Gaziantep Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi**, Cilt: 2, Sayı: 1, ss. 63- 99.

Ellen Macarthur Foundation, 2024: <https://www.ellenmacarthurfoundation.org/circular-examples/shaping-a-sharing-economy-amsterdam> (Erişim Tarihi: 01.06.2025).

European Commission, 2023: <https://territorial.ec.europa.eu/?lng=en&ctx=udp> (Erişim Tarihi: 20.04.2025).

European Commission, 2024: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en (Erişim Tarihi: 20.04.2025).

FANNING, Kurt and David P. Centers (2016). 'Blockchain and Its Coming Impact on Financial Services', **Journal of Corporate Accounting & Finance**, Vol: 27, No: 5, pp. 53- 57.

FRIANT, Martin Calisto ve diğerleri (2023). 'Sustainable Circular Cities? Analysing Urban Circular Economy Policies in Amsterdam, Glasgow and Copenhagen', **Local Environment The International Journal of Justice and Sustainability**, Routledge Taylor& Francis Group.

GIFFINGER, Rudolf ve diğerleri (2007). **Smart Cities- Ranking of European Medium-Sized Cities**, Final Report.

GLASCO, Jon (2023). <https://www.beesmart.city/en/smart-city-blog/navigating-the-challenges-of-open-data-and-participatory-governance> (Erişim Tarihi: 24.03.2025).

- HALL**, Robert E. (2000). ‘The Vision of A Smart City’, **In Proceeding of The 2nd International Life Extension Technology Workshop**, Paris, pp. 1- 16.
- HOLLANDS**, Robert G. (2008). ‘Will The Real Smart City Please Stand Up?’, **City: Analysis of Urban Trends, Culture, Theory, Policy, Actio**, Vol: 12, No: 3, pp. 303-320.
- HUANG**, Boming ve diğerleri (2018). ‘Automated Trading Systems Statistical and Machine Learning Methods and Hardware Implementation: A Survey’, **Enterprise Information Systems**, Vol: 13, No: 2, pp. 1- 13.
- I amsterdam**, 2025: <https://www.iamsterdam.com/en/business/key-sectors-for-business/mobility/key-facts-on-amsterdams-mobility-industry> (Erişim Tarihi: 01.06.2025).
- Implementation Agenda for a Circular Amsterdam 2023- 2026**, 2023: <https://www.shareyourgreendesign.com/wp-content/uploads/2023/12/text-2.pdf> (Erişim Tarihi: 01.06.2025).
- İNCE**, Enver Cenan (2025). ‘Mapping the Path to Sustainable Urban Mobility: A Bibliometric Analysis of Global Trends and Innovations in Transportation Research’, **Sustainability**, Vol: 17, No: 4.
- JAVED**, Abdul Rehman ve diğerleri (2022). ‘Future Smart Cities Requirements, Emerging Technologies, Applications, Challenges and Future Aspects’, **Cities**, Vol: 129.
- KARIC**, Sarah ve diğerleri (2024). ‘Digital and Multi-Channel Citizen Participation in Germany: A Comprehensive Overview of Patterns, Methods and Determinants’, **Raumforschung und Raumordnung, Spatial Research and Planning**, Vol: 82, No: 3, pp. 215- 230.
- KAYA ALTAY**, İclal ve Pelin Gökğür (2019). ‘Akıllı Şehir Kavramının Orta Ölçekli Şehirlerin Gelişmesindeki Araçsallığı’, **Artium**, Cilt: 7, Sayı: 2, ss. 115- 123.
- KELAIDONIS**, Dimitris ve diğerleri (2017). ‘Cloud Internet of Things Framework for Enabling Services in Smart Cities’, **Designing, Developing and Facilitating Smart Cities**, pp. 163- 191.
- KITCHIN**, Rob (2014). ‘The Real-Time City? Big Data and Smart Urbanism’, **GeoJournal**, Vol: 79, No: 1, pp. 1- 14.
- KOCAKAYA**, Kübra ve Taylan Engin (2020). ‘22@Barcelona Projesi Analizi: Bandırma Ölçeğinde Uygulanabilirliği’, **Akıllı Ulaşım Sistemleri ve Uygulamaları Dergisi**, Cilt: 3, Sayı: 1, ss.71- 93.
- KOCAOĞLU**, Mustafa ve Merve Yıldırımoglu (2023). ‘Farklı Ülke Deneyimleri Çerçevesinde Açık Verinin Yönetişim Kavramı Açısından Değerlendirilmesi’, **Uluslararası Akademik Birikim Dergisi**, Cilt: 6, Özel Sayı, ss. 23- 39.

- KOMNINOS**, Nicos (2011). ‘Intelligent Cities: Variable Geometries of Spatial Intelligence’, **Intelligent Buildings International**, Vol: 3, No: 3, pp. 172-188.
- Korea Institute of Science and Technology**, 2023: <https://www.kist.re.kr/eng/index.do> (Eriřim Tarihi: 04.06.2025).
- LALEOĞLU**, Baki (2021). **Akıllı Şehirler, Değışen Şehir Yönetimi ve Türkiye**, 1.Baskı, SETA.
- LEA**, Rodger (2017). ‘Smart Cities: An Overview of The Technology Trends Driving Smart Cities’, **IEEE Advancing Technology for Humanity**.
- MEMİŞ**, Levent (2017). ‘Akıllı Teknolojiler, Akıllı Kentler ve Belediyelerde Dönüşüm’, **Yasama Dergisi**, Sayı: 36, ss. 66- 92.
- MISHRA**, Priyanka, Prabhat Thakur and Ghanshyam Singh (2022). ‘Sustainable Smart City to Society 5.0: State-of-the-Art and Research Challenges’, **SAIEE Africa Research Journal**, Vol: 113, No: 4.
- NEHA**, Neha ve diğlerleri (2022). ‘Challenges in the Adaptation of IoT Technology’, **Intelligent Systems Reference Library**, pp. 347- 369.
- NOS**, 2025: <https://nos.nl/artikel/2550574-amsterdam-zet-niet-meer-in-op-slimme-verkeerslichten-wegens-privacywetgeving> (Eriřim Tarihi: 01.06.2025).
- ÖRSELLİ**, Erhan ve Can Akbay (2019). ‘Teknoloji ve Kent Yaşamında Dönüşüm: Akıllı Kentler’, **Uluslararası Yönetim Akademisi Dergisi**, Cilt: 2, Sayı: 1, ss. 228- 241.
- PALIWAL**, Vineet ve diğlerleri (2020). ‘Blockchain Technology for Sustainable Supply Chain Management: A Systematic Litarature Review and A Classification Framework’, **Sustainability**, Vol: 12, No: 18.
- PARTİGÖÇ**, Nur Sinem (2023). ‘Sürdürülebilir Kentsel Planlama Süreçlerinde Akıllı Şehir Yaklaşımının Rolü’, **Çevre, Şehir ve İklim Dergisi**, Cilt: 2, Sayı: 3, ss. 174- 189.
- PINARCIOĞLU**, Nihal Şirin ve Ayşegül Kanbak (2020). **Sürdürülebilir Kent Modelleri**, 1.Basım, Londra: IJOPEC Publication Limited.
- PUB Singapore’s National Water Agency**, 2025: <https://www.pub.gov.sg/Public/WaterLoop/OurWaterStory/NEWater> (Eriřim Tarihi: 27.05.2025).
- RABARI**, Chirag and Michael Storper (2014). ‘The Digital Skin of Cities: Urban Theory and Research in The Age of The Sensored and Metered City, Ubiquitous Computing and Big Data’, **Cambridge Journal of Regions Economy and Society**, Vol: 8, No: 1, pp. 27- 47.

- RAHMAN**, Mokhiesur and Jean Claude F. Thill (2023). ‘Impacts of Connected and Autonomous Vehicles on Urban Transportation and Environment: A Comprehensive Review’, **Sustainable Cities and Society**.
- RAJ**, Pethuru and Sathish A. P. Kumar (2017). ‘Big Data Analytics Processes and Platforms Facilitating Smart Cities: Foundations, Principles and Applications’, **Smart Cities**, pp. 23- 52.
- RICHTER**, Maximillian A. ve diğerleri (2022). ‘Smart Cities, Urban Mobility and Autonomous Vehicles: How Different Cities Needs Different Sustainable Investment Strategies’, **Technological Forecasting& Social Change**, 184.
- RIDIC**, Ognjen ve diğerleri (2022). ‘The Smart City, Smart Contract, Smart Health Care, Internet of Things, Opportunities and Challenges’, **Blockchain Technoogies for Sustainability**, pp. 135- 149.
- SAFIULLIN**, Anton, Lyudmila Krasnyuk and Zoya Kapelyuk (2019). ‘Integration of Industry 4.0 Technologies For ‘ Smart Cities’ Development’, **IOP Conference Series Materials Science and Engineering**, 497. Pp. 1- 8.
- SALHI**, Amina ve diğerleri (2025). ‘Leveraging Artificial Intelligence to Enable Sustainable Urban Development Through The Creation of Smart and Environmentally Friendly Carbon- Free Cities’, **Scientific Reports**, No: 15.
- Seoul Metropolitan Government [SMG]**, 2024: <https://english.seoul.go.kr/policy/smart-city/digital-inclusion/> (Erişim Tarihi: 04.06.2025).
- SHARI**, Nur Fadhilah Mohd and Amizah Malip (2022). ‘State of the Solutions of Blockchain Technology for Data Dissemination in Smart Cities: A Comprehensive Review’, **Computer Communications**, Vol: 189, pp. 120-147.
- Smart Cities World**, 2024: <https://www.smartcitiesworld.net/> (Erişim Tarihi: 20.04.2025).
- Smart Nation 0.2**, 2024: <https://file.go.gov.sg/smartnation2-report.pdf> (Erişim Tarihi: 27.05.2025).
- STIMMEL**, Carol L. (2016). **Building Smart Cities: Analytics, ICT and Design Thinking**, London- New York: CRC Press.
- ŞEN**, Emine Betül (2020). ‘Blok Zincir Teknolojisi ve Akıllı Şehir Sistemleri’, **Uluborlu Mesleki Bilimler Dergisi (UMBD)**, Cilt: 3, Sayı: 1, ss. 1- 9.
- TAŞ**, Hacı Yunus (2018). ‘Dördüncü Sanayi Devriminin (Endüstri 4.0) Çalışma Hayatına ve İstihdama Muhtemel Etkileri’, **OPUS Uluslararası Toplum Araştırmaları Dergisi**, Cilt: 9, Sayı: 16, ss. 1817- 1836.
- TRIGKA**, Maria and Elias Dritsas (2025). ‘Edge ve Cloud Computing in Smart Cities’, **Future İnternet**, Vol: 17, No: 3.

ULUBAŞ HAMURCU, Aslı (2023). ‘Akıllı Şehirler ve Sürdürülebilir Kentsel Dönüşüm’, **Çevre Şehir ve İklim Dergisi**, Cilt: 2, Sayı: 4, ss. 70- 95.

UN- HABITAT, (2023). <https://unhabitat.org/programme/people-centred-smart-cities> (Erişim Tarihi: 03.01.2025).

WOLFF, Annika ve diğerleri (2017). ‘Engaging With The Smart City Through Urban Data Games’, **Playable Cities**, pp. 47- 66.

YAN, Zhenjun ve diğerleri (2023). ‘Intelligent Urbanism With Artificial Intelligence in Shaping Tomorrow’s Smart Cities: Current Developments, Trends and Future Directions’, **Journal of Cloud Computing**, No: 12.

YİĞİT, Gizem ve Orhan Engin (2025). ‘Endüstri 5.0 ile Sürdürülebilirliğin Sağlanması: Bir Bibliyometrik Analiz’, **İstanbul Aydın Üniversitesi Sosyal Bilimler Dergisi**, Cilt: 17, Sayı: 1, ss. 23- 46.

ZANELLA, Andrea ve diğerleri (2014). ‘Internet of Things for Smart Cities’, **IEEE Internet of Things Journal**, Vol:1, No: 1, pp. 22- 32.

INTERNET SOURCES

<https://ajuntament.barcelona.cat/ca/> (Erişim Tarihi: 20.04.2025).

<https://amsterdamsmartcity.com/> (Erişim Tarihi: 01.06.2025).

<https://arxiv.org/abs/2207.04422> (Erişim Tarihi: 20.04.2025).

<https://cphsolutionslab.kk.dk/en/focus-areas/city-data-exchange> (Erişim Tarihi: 07.06.2025).

<https://data.amsterdam.nl/> (Erişim Tarihi: 01.06.2025).

<https://data.seoul.go.kr/> (Erişim Tarihi: 04.06.2025).

https://dataportals.org/portal/bcn_cat/ (Erişim Tarihi: 27.05.2025).

<https://english.seoul.go.kr/> (Erişim Tarihi: 07.06.2025).

<https://english.seoul.go.kr/policy/smart-city/digital-inclusion/> (Erişim Tarihi: 04.06.2025).

<https://english.seoul.go.kr/smart-seoul-map-shows-well-intentioned-stores-and-trails-suitable-for-people-with-disabilities/> (Erişim Tarihi: 07.06.2025).

<https://international.kk.dk/> (Erişim Tarihi: 07.06.2025).

<https://smart-cities-marketplace.ec.europa.eu/> (Erişim Tarihi: 07.06.2025).

<https://u4ssc.itu.int/> (Erişim Tarihi: 07.06.2025).

<https://unhabitat.org/> (Erişim Tarihi: 07.06.2025).

<https://urbandevelopmentcph.kk.dk/climate> (Erişim Tarihi: 07.06.2025).

<https://www.archdaily.com/> (Erişim Tarihi: 07.06.2025).

<https://www.barcelona.cat/mobilitat/en> (Eriřim Tarihi: 20.04.2025).

<https://www.barcelonaenergia.cat/en/home> (Eriřim Tarihi: 20.04.2025).

<https://www.copcap.com/> (Eriřim Tarihi: 07.06.2025).

<https://www.eea.europa.eu/publications/greenest-capitals-2024> (Eriřim Tarihi: 07.06.2025).

<https://www.energy.or.kr/english> (Eriřim Tarihi: 04.06.2025).

<https://www.greenplan.gov.sg/> (Eriřim Tarihi: 27.05.2025).

<https://www.lta.gov.sg/content/ltagov/en/newsroom/2024/10/news-releases/new-electric-bus-features-for-safer-and-inclusive-journeys.html> (Eriřim Tarihi: 27.05.2025).

<https://www.oecd.org/en/topics/regional-rural-and-urban-development.html> (Eriřim Tarihi: 04.06.2025).

<https://www.oliverwymanforum.com/mobility/urban-mobility-readiness-index-2023/amsterdam.html> (Eriřim Tarihi: 01.06.2025).

https://www.researchgate.net/figure/The-Smart-city-wheel-by-Boyd-Cohen_fig3_317269039

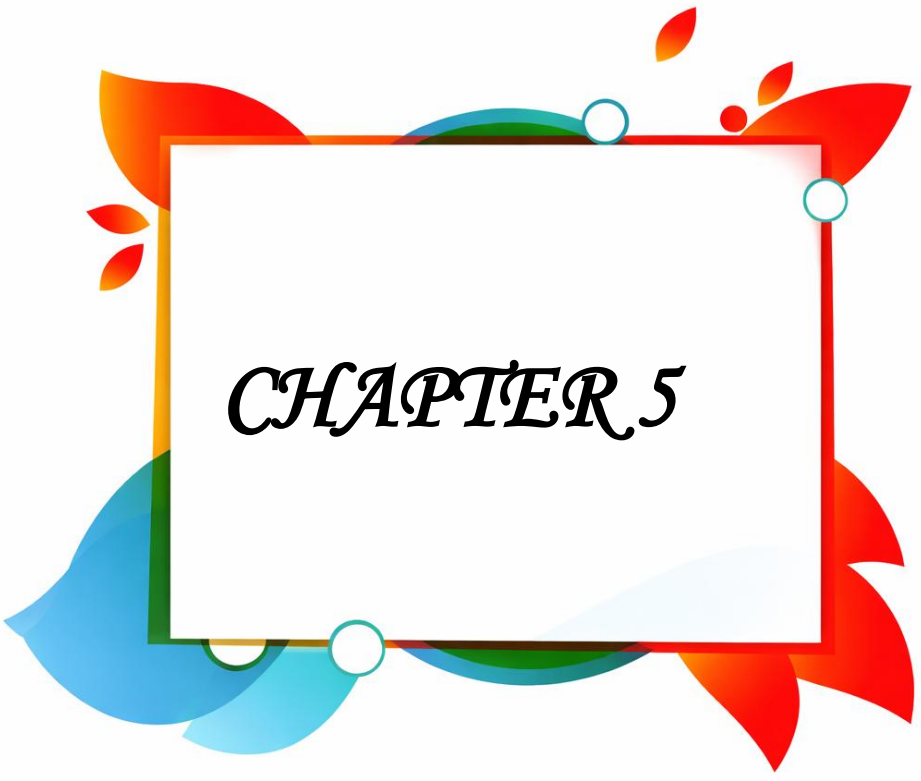
<https://www.seoulsmartcityprize.com/prize/index.php> (Eriřim Tarihi: 04.06.2025).

<https://www.smartnation.gov.sg/> (Eriřim Tarihi: 27.05.2025).

<https://www.smartnation.gov.sg/initiatives/national-ai-strategy/> (Eriřim Tarihi: 27.05.2025).

<https://www.tech.gov.sg/technews/how-singapore-has-become-a-leading-tech-hub-in-asia/> (Eriřim Tarihi: 27.05.2025).

<https://www.undrr.org/> (Eriřim Tarihi: 04.06.2025).

A decorative rectangular frame with a white center. The frame is composed of a thick border with a color gradient from yellow to red. Four small white circles are positioned at the corners of the frame. Surrounding the frame are stylized, colorful leaves in shades of red, orange, and blue.

CHAPTER 5

Beyond Fuel Prices: Factors Driving Electric Vehicle Sales in Leading Electric Vehicle Economies

Şeyma Bozkaya¹

Introduction

The automotive industry is one of the most powerful sectors of national economies. The market strength of countries operating in the automotive sector positively contributes to their economic growth. In recent years, the electric vehicle industry has attracted considerable attention due to its continuous expansion and strengthening market position. The electric vehicle market gained significant momentum following the establishment of the Electric Vehicles Initiative (EVI) in 2010 as a multigovernmental policy forum under the framework of the Clean Energy Ministerial (CEM) (IEA-GlobalEV, 2025). Electric vehicles are preferred not only as an alternative within the automotive industry but also as an environmentally friendly mode of transportation in an era characterized by climate crises. Furthermore, electric vehicles hold critical importance due to their quiet operation, ease of use, and, most importantly, their potential to reduce dependence on petroleum (Yong et al., 2015; Un-Noor et al., 2017).

Electric vehicles (EVs) were first invented by Robert Anderson between 1832 and 1839 using non-rechargeable primary batteries (Guarnieri, 2011; Thiel et al., 2020). Subsequently, other prototypes were developed; however, these attempts failed to achieve commercial success due to the absence of practical rechargeable batteries and electrically efficient motors. By 1900, EVs accounted for approximately 28% of road vehicles in New York City following the development of rechargeable lead-acid batteries and DC electric motors. EVs remained popular until around 1918, after which their popularity declined due to the widespread availability of petroleum (gasoline). By 1933, the number of EVs had fallen to nearly zero because of their low speeds and the comparatively lower costs and greater efficiency of internal combustion engine (ICE) vehicles (Chan, 1993).

Vehicles powered by internal combustion engines emit carbon dioxide, hydrocarbons, and sulfur oxides, which contribute to global warming through

¹ Dr., Istanbul Medipol University, Faculty of Business and Management Sciences, Department of Economics and Finance, 0000-0001-8589-6608

greenhouse gas effects and environmental pollution, thereby posing significant risks to both the environment and human health. Consequently, zero-emission vehicles (ZEVs) have become essential as a strategy for pollution prevention. ZEVs include both fuel-cell vehicles and electric vehicles. Nevertheless, EVs can also be categorized into hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), battery electric vehicles (BEVs), and vehicle-integrated EVs; however, only BEVs fully satisfy the criteria of zero-emission vehicles (Kempton & Letendre, 1997; Browne et al., 2012).

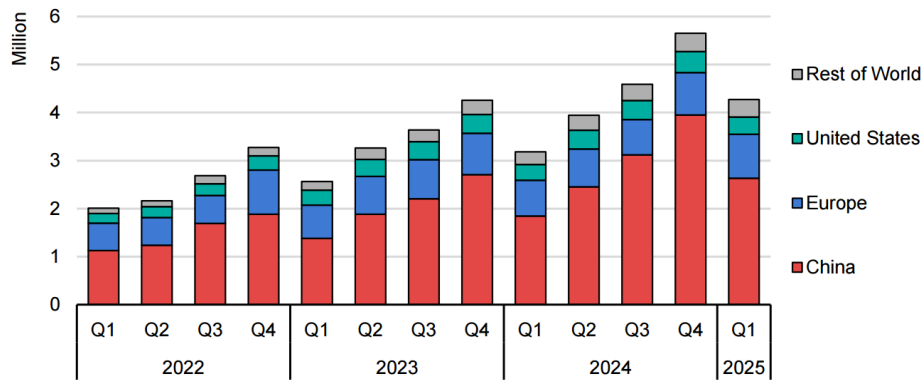
The EV sector has experienced significant growth thanks to technological advancements, increased government incentives, and rising environmental awareness. As countries embrace the concept of a green economy with lower carbon emissions, EVs are playing a critical role in shaping sustainable investment portfolios with their low carbon emissions. Electric vehicles, which produce no greenhouse gas emissions during operation, are considered a promising solution in the fight against climate change.

Electric vehicles reduce dependence on fossil fuels, thus supporting energy security. Countries that charge electric vehicles using renewable energy sources such as solar and wind power can reduce their reliance on imported oil. This can increase their economic stability and ensure energy security (Kapoor, 2024). The integration of renewable energy sources into charging infrastructure further strengthens the environmentally sustainable profile of electric mobility (Rezai & Peng, 2024). At the same time, the EV sector represents an important driver of employment creation. From manufacturing and maintenance to the development of charging infrastructure, electric vehicles generate employment opportunities across various industries. The transition toward electric mobility has also stimulated innovation and entrepreneurship, enabling the emergence and growth of new businesses and services. The rapid expansion of the EV market contributes significantly to economic growth. Growth in the EV industry translates into increased revenues for companies, higher tax revenues for governments, and positive spillover effects on related sectors. Although the initial purchase price of electric vehicles is generally higher than that of conventional vehicles, their total cost of ownership is often lower. EVs contain fewer moving parts, which results in reduced maintenance costs. In addition, the cost of electricity as a fuel source is typically lower than gasoline or diesel, providing substantial savings throughout the vehicle's operational lifespan (Kapoor, 2024).

In 2024, global electric vehicle sales exceeded 17 million units. This figure represents more than 20% of total car sales worldwide. The 3.5 million additional electric vehicles sold in 2024 surpassed the global electric vehicle count of 2020. China maintained its leadership in electric vehicle sales; in 2024, almost half of all car sales in China were electric. Therefore, one in ten cars on Chinese roads is now electric.

In Europe, EV sales stagnated in 2024 as subsidy programs and other supportive policies were gradually reduced. Nevertheless, the market share of electric vehicles remained around 20%, as stronger sales performances in some countries offset weaker sales in others. In the United States, electric vehicle sales increased by approximately 10% on an annual basis, accounting for more than one out of every ten vehicles sold. Consequently, electric vehicles represented more than 10% of total automobile sales in the country (IEA-GlobalEV, 2025). Figure 1 illustrates EV sales based on quarterly data covering the 2022–2025 period.

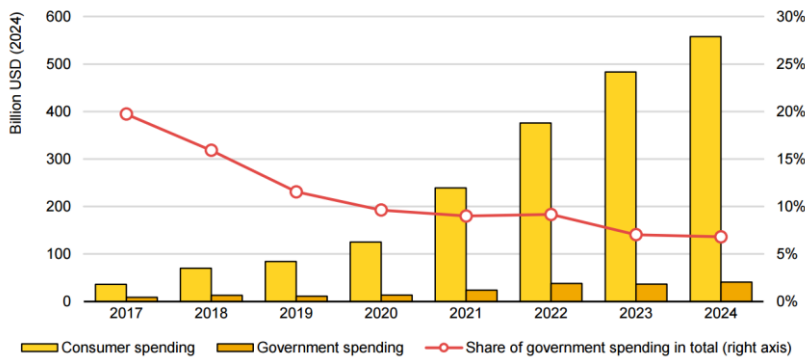
Graph 1: Electric Vehicle Sales Between the First Quarter of 2022 and 2025



Source: International Energy Agency-IEA

In the figure, the red areas represent sales in China. Despite fluctuations over time, China accounts for the largest share of EV sales. Europe ranks second in terms of market share, followed by the United States in third place. In this context, China holds dominant market power in the global EV industry. Figure 2 illustrates global consumer and government expenditures on electric vehicles between 2017 and 2024.

Figure 2: Global Consumer And Government Spending On Electric Vehicles, 2017-2024



Source: International Energy Agency-IEA

As the graph shows, electric vehicle sales have increased steadily over the past decade. However, this has been accompanied by a steady decline in government spending per vehicle through purchase subsidies and tax incentives. This downward trend accelerated in 2022 with the regular reduction and elimination of subsidies. In 2024, government spending accounted for less than 7% of total global spending on electric vehicles. In contrast, total global consumer spending on electric vehicles steadily increased, reaching US\$560 billion in 2024 (IEA).

In this context, electric vehicles (EVs) and the factors influencing this market have been widely examined in empirical studies. Önder and Kaya (2019) investigated the determinants of EV sales across 12 countries and found that oil prices, renewable energy consumption, and education levels have a positive impact on sales. Chen et al. (2021) demonstrated that producer incentives and GDP are significant factors in the adoption of electric vehicles. Similarly, Sun et al. (2022), in their analysis of five major economies in the EV market, found that electric vehicles play an important role in renewable energy systems. In this context, the present study investigates the determinants of EV sales, a sector that has recently become a powerful component of the global economic structure. According to the International Energy Agency (IEA) report, the countries with the largest share in the EV market—namely China, United States, Germany, Norway, Netherlands, France, United Kingdom, South Korea, and Japan—are examined in terms of the factors affecting EV sales. Per capita GDP, inflation, and oil prices are selected as independent variables. Due to data constraints, the analysis covers the period from 2010 to 2024. The study employs the GMM (Generalized Method of Moments) estimator.

The study consists of three parts. The first part covers fundamental concepts and current information related to the topic. The second part defines the variables used in the model design, explains the empirical methodology, and finally presents the empirical findings. Lastly, policy recommendations based on the empirical findings are presented.

2. Model and Variable Definition, Methodology and Empirical Findings

2.1. Model and Variable Definition

This study investigates the determinants of electric vehicle sales in countries leading the electric vehicle market (China, USA, Germany, Norway, Netherlands, France, UK, South Korea, Japan) according to the IEA report. In this context, inflation rate, GDP per capita, and oil prices were included in the model as independent variables. Due to data limitations, these relationships were investigated using annual data from 2010-2024. Table 1 shows the information regarding these variables.

Table 3: Definition of Variables and Data Source Used in the Model

Variables		Identification and Measurement	Database	
Electric Vehicle (logEv)		Electric vehicle sales (unit)	IEA	
Inflation (logInf)		Consumer price index (annual % growth)	WDI	
GDP per capita (logGDPpc)		GDP as a percentage of the total population (at constant prices, \$2015)	WDI	
Oil Prices (logCO)		Crude Oil Prices: Brent - Europe, Dollars Per Barrel, Annually	Federal Economic (FRED)	Reserve Data

The model to be predicted in this study is as follows:

$$\log EV_{i,t} = \beta_0 + \beta_1 \log Inf_{i,t} + \beta_2 \log GDPpc_{i,t} + \beta_3 \log CO_{i,t} + u_{i,t} \quad (1)$$

In the model, the sub-indices i and t represent the cross-sectional unit and time, respectively. β_0 represents the constant term, while $\beta_{1,2,3}$ represent the slope coefficients. Finally, the symbol u represents the error term. To minimize heterogeneity among the variables used in the model and to make the coefficient interpretations more understandable, all variables were estimated using logarithmic transformations.

This study examines the primary factors expected to influence electric vehicle sales. In this context, key economic indicators reflecting individuals' purchasing power, macroeconomic conditions, and energy costs are included in the model. Per capita GDP, inflation, and oil prices are considered key factors that could affect electric vehicle demand. Per capita GDP represents the welfare level of society and the disposable income capacity of consumers. Since electric vehicles often have higher initial costs compared to traditional internal combustion vehicles, an increase in income levels is expected to facilitate consumer access to these vehicles. At the same time, higher income levels are associated with increased awareness of environmentally friendly technologies and strengthened sustainable consumption trends. Therefore, increases in per capita income are expected to positively impact electric vehicle sales. Inflation is a significant indicator of economic stability and purchasing power. In high-inflation environments, the erosion of consumers' real incomes can lead to a postponement of demand for durable consumer goods. Since electric vehicles represent a high-cost investment, price instability and rising living costs are considered to put pressure on consumers' vehicle purchasing decisions. In this context, increases in the inflation rate are expected to negatively impact electric vehicle sales. Oil prices, on the other hand, are one of the key energy indicators that directly affect the economic attractiveness of electric vehicles. Increases in fossil fuel prices can raise the operating costs of traditional vehicles, leading consumers to alternative transportation technologies. Especially in the long term, high oil prices can

contribute to electric vehicles becoming more advantageous in terms of operating costs. Therefore, increases in oil prices are expected to have a positive effect on increasing demand and sales of electric vehicles.

2.2. Methodology and Empirical Findings

In the econometric analysis, the descriptive statistics of the variables were first examined. Table 2 presents the summary statistics of the variables used in the study.

Table 2: Summary of Statistics

Var.	Observation	Average	Stan. Deviation	Min	Max
logEV	135	4.4351	1.0019	1.7853	6.8061
logGDPpc	135	4.5757	0.2497	3.7607	4.9012
logInf	135	0.4014	0.2733	-1	1.0477
logCO	135	1.8719	0.1391	1.6228	2.0477

It is noteworthy that the number of observations is 135. This is a sufficient number of observations for a short panel. The variable with the minimum value is inflation, while the variable with the maximum value is electric vehicles. Table 3 shows the correlation relationship of the variables.

Table 3: Correlation Matrix

	logEV	logGDPpc	logInf	logCO
logEV	1			
logkGDPpc	-0.1018	1		
logInf	0.1882	0.0955	1	
logCO	-0.2287	-0.0296	0.3430	1

According to the correlation matrix, no pairwise correlation exceeding the threshold of 0.80 was observed among the variables, indicating that multicollinearity is not severe enough to hinder the econometric analysis. A negative correlation was identified between GDP per capita and both electric vehicle sales and oil prices. Table 4 presents the Variance Inflation Factor (VIF) statistics.

Table 4: VIF

Var.	VIF	1/VIF
logInf	1.15	0.871185
logCO	1.14	0.878425
logGDPpc	1.01	0.986480
Mean VIF	1.10	

VIF is a test used to examine the presence of multicollinearity among independent variables in a regression model. Multicollinearity refers to a situation in which two or more explanatory variables in the model are highly correlated with each other. This condition makes it difficult for the model to distinguish the individual effect of each variable on the dependent variable and may lead to unreliable estimation results. A VIF value equal to 1 indicates that there is no correlation among the independent variables, which is considered the ideal case. When $1 < \text{VIF} < 5$, a weak to moderate level of correlation is assumed among the variables, which is generally not considered problematic. However, when VIF exceeds 5 or 10, it indicates a high degree of multicollinearity, in which case the coefficient estimates become statistically unreliable. In this context, there is no obstacle to conducting an econometric analysis. Table 5 presents the test results required to determine the appropriate econometric methodology used in the study.

Table 5: Model Selection

Model	F-Test		Hausman Test		Selected Model
	Stats.	p-val.	Stats.	p-val.	
<i>(Dependent Variable logEV)</i>	33.33	0,000***	72.04	0,000***	Fixed Effects Model (FEM)

The table reports the F-test and Hausman test statistics, which are widely used in panel data analysis. The F-test is employed to examine whether the model contains unit-specific effects. The results indicate the presence of unit effects in the model. The Hausman test is used to determine whether the FEM or the Random Effects Model is more appropriate. The Hausman (1978) test evaluates the existence of a correlation between the error term and the explanatory variables due to unit-specific effects (Wooldridge, 2000: 288). The null hypothesis of the Hausman test is defined as: H_0 = the Random Effects Model is appropriate (Baltagi, 2005). According to the Hausman test statistics, the FEM is found to be the appropriate specification. Since the time dimension of the dataset is relatively short ($T = 15 < 20$), the FEM is preferred in this study.

Table 6: Fixed Effects Model

Variables	Coefficient	Std. Error	P-val.
LogGDPpc	14.868	1.105	0,000***
LogInf	1.021	0.210	0,000***
LogCO	-1.544	0.371	0,000***
Constant	-61.116	5.227	0,000***

F(Stats) 81.82

*F(p-val.): 0.000****

In this study, the GMM is employed as a control estimator, and the evaluation is based on the findings obtained from the GMM results. This estimator is a dynamic model. The defining feature of dynamic models is that lagged values of the dependent variable are included on the right-hand side of the equation as explanatory variables. In this context, if there is a correlation between the lagged dependent variable and the error term in dynamic models, Ordinary Least Squares (OLS) estimators produce biased and inconsistent results (Baltagi, 2005). Therefore, to address such issues, the use of the GMM has been recommended in dynamic panel estimations. The widespread application of the GMM approach in panel data analysis is mainly due to its ease of implementation and its reliance on relatively simple assumptions regarding the instrumental variables used in estimation (Asongu & Odhiambo, 2019). The GMM estimator is commonly associated with the Arellano and Bond (1991) approach. This estimator has the advantage of being applicable with a two-step standard error correction procedure, which is known as the Difference GMM. The second stage of this method corresponds to an extension proposed by Arellano and Bover (1995) and further developed by Blundell and Bond (1998), commonly referred to as System GMM. Roodman (2009) provided a further refinement of linear GMM estimators, offering a framework for panels characterized by fixed effects, as well as heteroskedasticity and idiosyncratic errors, particularly in settings where T is small and N is large. These estimators are especially suitable for dynamic panels. The general form of the dynamic panel model is expressed as follows:

$$y_{it} = x_{it} * b_1 + w_{it} * b_2 + u_{it} \quad (2)$$

In the equation, $i=1, \dots, N$ and $t=1, \dots, T$ denote the cross-sectional units and the time dimension, respectively.

$$u_{it} = v_i + e_{it} \quad (3)$$

In the equation, x_{it} represents the vector of exogenous variables. The term v_i denotes unobserved individual-specific effects. The error term is represented by e_{it} . The variable w_{it} includes predetermined covariates that are correlated with v_i (which may also include lagged values of the dependent variable), as well as endogenous explanatory variables included in the model. The parameters b_1 and b_2 represent vectors of estimable coefficients.

Table 8. Arellano–Bond Dynamic GMM Results

Dependent Variable (logEV)	Coeff.	p-val.
<i>logEV</i> _{<i>t</i>−1}	0.7302	0.000***
LogGDPpc	2.2682	0.000***
LogInf	0.2519	0.005***
LogCO	-0.0369	0.785
<i>Wald Chi</i> ₂	2361.41	0.000***
<i>Sargan test</i>	126.38	0.110***
<i>A-Bond Test for AR (1)</i>	-2.54	0.0011**
<i>A-Bond Test for AR (2)</i>	-1.69	0.900

Since the GMM estimator is used as a control estimator in this study, the interpretation is primarily based on the results obtained from this method. The table reports several diagnostic tests used to assess the validity and consistency of the System GMM (Arellano–Bond dynamic GMM) estimations. The first test is the Wald test, which examines whether the variables included in the model are jointly significant. The results indicate that the model is statistically significant as a whole. The second test is the Sargan test, which evaluates the validity of the instrumental variables used in the model. Under the null hypothesis, the instruments are assumed to be valid, implying no correlation between the instruments and the error term. Based on the probability values, the validity of the instruments is accepted. Finally, the Arellano–Bond test is used to detect the presence of autocorrelation in the model. The results of the Arellano–Bond test indicate that there is no second-order autocorrelation [AR(2)] problem in the model.

When the coefficient estimates are evaluated, it is observed that only oil prices are statistically insignificant. A 1% increase in GDP per capita leads to a 2.2682% increase in electric vehicle sales. In addition, a one-period lag of electric vehicle sales increases the dependent variable by 0.7302%. A 1% increase in inflation raises the dependent variable by 0.2519%.

Conclusion and Evaluation

This study examines the determinants of EV sales in countries that hold significant market power in the global EV industry. In this context, GDP per capita, inflation, and oil prices are included in the model as independent variables.

Since the EV market is relatively new, the availability of data is quite limited. Accordingly, the analysis investigates these relationships using annual data for the period 2010–2024. Given the short time dimension of the panel, the model is estimated using the Fixed Effects approach, which is efficient in short panel settings. The GMM estimator is also employed as a control estimator. The findings reveal that oil prices are statistically insignificant. In contrast, GDP per capita and inflation are found to have a positive impact on electric vehicle sales. The findings of this study support the existing empirical literature (Koengan et al., 2022; Alali et al., 2022; Novonty et al., 2022).

The findings indicate that the electric vehicle market is closely associated not only with energy costs but also with countries' economic structures and consumer behavior. According to the results, the positive impact of increases in GDP per capita on electric vehicle sales is an expected outcome, particularly when considering the overall economic characteristics of the countries included in the sample. In countries that are leading the transition to electric mobility—such as China, United States, Germany, Norway, and Netherlands—higher income levels facilitate consumer access to environmentally friendly technologies. Although electric vehicles offer long-term advantages in terms of energy efficiency and maintenance costs, their relatively high upfront purchase prices compared to conventional vehicles make income a critical determinant of demand. In particular, consumers in higher-income groups tend to exhibit stronger environmental awareness and a greater propensity to adopt new technologies, which can be considered one of the main drivers of this relationship. Moreover, government support policies, tax incentives, and well-developed charging infrastructure in these countries further enhance the responsiveness of EV demand to income growth.

A notable finding in the study is that the increase in the inflation rate positively impacts electric vehicle sales. This finding, contrary to traditional economic expectations, can be explained by the structural characteristics of the countries in the sample group. In particular, the fact that inflation in developed economies often coincides with increases in energy costs and fuel prices may have led consumers to opt for electric vehicles, which offer lower long-term operating costs. Furthermore, the fact that the electric vehicle market largely caters to middle and upper-income groups may limit the negative impact of inflation on purchasing decisions. The strong environmental consumption habits in countries like Norway, the Netherlands, and Germany, and the continuation of government incentive mechanisms for electric vehicles, may also have contributed to consumers maintaining demand for electric vehicles even during periods of economic uncertainty. In addition, the fact that some consumers bring forward their vehicle purchase decisions during inflationary periods due to the expectation of facing higher costs in the future can also be considered a supporting factor for this result.

The fact that oil prices were not statistically significant can be considered an important finding, indicating that the electric vehicle market is beginning to reach a certain level of maturity. In particular, it is observed that in the countries included in the sample, the use of electric vehicles has moved beyond being solely a fuel-saving choice and has become an integral part of environmental awareness, technological transformation, and sustainable transportation policies. In other words, consumers now view electric vehicles not only as an economic alternative to rising oil prices but also as an element of long-term environmental and technological transformation. In countries such as Norway, China, and the Netherlands, strong charging infrastructure, government incentives, and low-carbon targets may have made the demand for electric vehicles relatively independent of oil prices. Furthermore, recent advances in battery technologies and reduced production costs may have increased the affordability of electric vehicles, weakening the determining influence of oil prices.

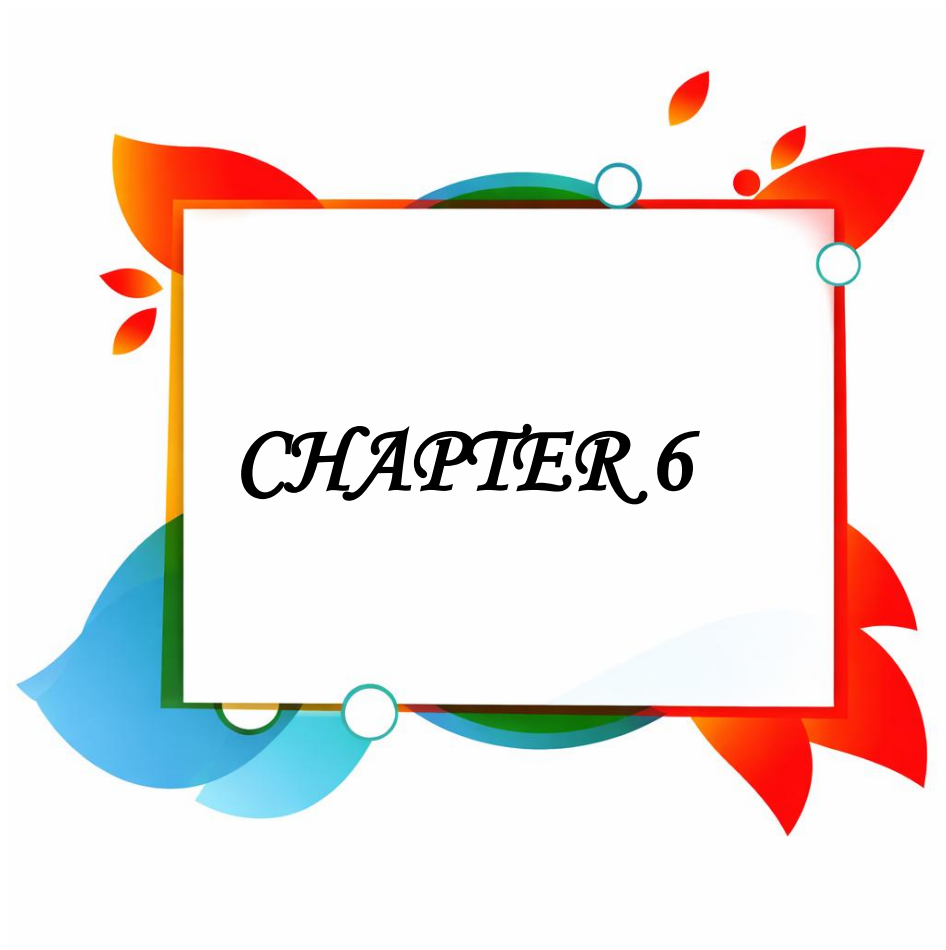
Based on these findings, it is crucial for policymakers to shift from short-term policies focused solely on energy prices to long-term strategies that support income levels, accelerate technological transformation, and strengthen electric vehicle infrastructure. Especially in developing countries, where electric vehicles remain a high-cost technology, measures such as tax breaks, low-interest loans, and purchase subsidies could be widely implemented. Furthermore, expanding charging infrastructure, incentivizing domestic battery production, and increasing renewable energy investments will play a critical role in the sustainability of the electric vehicle ecosystem. For countries lagging behind in the electric vehicle transition, incentive policies implemented by leading countries like Norway, China, and Germany can serve as a valuable example.

References

- Alali, L., Niesten, E., & Gagliardi, D. (2022). The impact of UK financial incentives on the adoption of electric fleets: The moderation effect of GDP change. *Transportation Research part A: policy and practice*, 161, 200-220.
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies*, 58(2), 277-297.
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of econometrics*, 68(1), 29-51.
- Asongu S. A., & Odhiambo N. M. (2019). How enhancing information and communication technology has affected inequality in Africa for sustainable development: An empirical investigation. *Sustainable Development*, 27(4):647–656.
- Baltagi, B. H. (2005). *Econometric analysis of panel data*, third edition, John Wiley & Sons Gmbh, West Sussex, England.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics*, 87(1), 115-143.
- Breusch, T. S., & A. R. Pagan. 1980. The Lagrange multiplier test and its applications to model specification in econometrics. *Review of Economic Studies*, 47: 239-253.
- Browne, D.; O'Mahony, M.; Caulfield, B. (2012). How should barriers to alternative fuels and vehicles be classified and potential policies to promote innovative technologies be evaluated? *J. Clean. Prod.* 2012, 35, 140–151.
- Chan, C.C. (1993). An Overview of Electric Vehicle Technology. *Proc. IEEE* 1993, 81, 1202–1213.
- Chen, Z., Carrel, A. L., Gore, C., & Shi, W. (2021). Environmental and economic impact of electric vehicle adoption in the US. *Environmental Research Letters*, 16(4), 045011.
- Guarnieri, M. (2011). When cars went electric, Part 2. *IEEE Ind. Electron. Mag.* 2011, 5, 61–62.
- Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica: Journal of the Econometric Society*, 1251-1271.
- <https://www.ica.org/data-and-statistics/data-product/global-cv-outlook-2025#global-ev-data>
- Kapoor, V. (2024). *The Global Rise of Electric Vehicles and their Social, Economic and Environmental Impact*, Robert Kennedy Colloge,

<https://blog.college.ch/master-degree-online/the-global-rise-of-electric-vehicles-and-their-social-economic-and-environmental-impact/>

- Kempton, W.; Letendre, S.E. (1997). Electric vehicles as a new power source for electric utilities. *Transp. Res. Part D Transp. Environ.* 1997, 2, 157–175.
- Koengkan, M., Fuinhas, J. A., Belucio, M., Alavijeh, N. K., Salehnia, N., Machado, D., ... & Dehdar, F. (2022). The impact of battery-electric vehicles on energy consumption: A macroeconomic evidence from 29 European countries. *World Electric Vehicle Journal*, 13(2), 36.
- Novotny, A., Szeberin, I., Kovács, S., & Máté, D. (2022). National culture and the market development of battery electric vehicles in 21 countries. *Energies*, 15(4), 1539.
- Önder, H., & Kaya, O. C. (2019). Elektrikli araçların satışı üzerinde sosyo-ekonomik faktörlerin etkisi: bir panel veri analizi. *Anemon Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi*, 7(1), 17-21.
- Rezaei, R., & Peng, H. (2024). The growing business of electric vehicles: A shift towards sustainable transportation.
- Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The stata journal*, 9(1), 86-136.
- Sun, D., Kyere, F., Sampene, A. K., Asante, D., & Kumah, N. Y. G. (2023). An investigation on the role of electric vehicles in alleviating environmental pollution: evidence from five leading economies. *Environmental Science and Pollution Research*, 30(7), 18244-18259.
- Thiel, C.; Tsakalidis, A.; Jager-Waldau, A. (2020). Will Electric Vehicles Be Killed (again) or Are They the Next Mobility Killer App? *Energies* 2020, 13, 1828. [CrossRef]
- Un-Noor, F., Padmanaban, S., Mihet-Popa, L., Mollah, M. N., & Hossain, E. (2017). A comprehensive study of key electric vehicle (EV) components, technologies, challenges, impacts, and future direction of development. *Energies*, 10(8), 1217.
- WDI- <https://databank.worldbank.org/source/world-development-indicators>
- Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.
- Yong, J.Y.; Ramachandramurthy, V.K.; Tan, K.M.; Mithulananthan, N. A (2015). review on the state-of-the-art technologies of electric vehicle, its impacts and prospects. *Renew. Sustain. Energy Rev.* 2015, 49, 365–385.



Military Ethos and Conservative Affinities: A Figural Perspective on Discipline and Interdependence

İrem Özgören Kinli¹

Military institutions have long been understood as distinct social formations characterised by strong internal cohesion, hierarchical organisation, and a highly codified system of values. The concept of military ethos has therefore occupied a central place in the sociology of the armed forces, often invoked to explain the persistence of discipline, solidarity, courage, and self-sacrifice among military personnel (Lang, 1965; Moskos, 1977). These values are typically presented as the defining features of military culture and as the foundation of organisational effectiveness in contexts marked by uncertainty, risk, and the potential for violence.

At the same time, military ethos has frequently been associated with conservatism, whether explicitly or implicitly. The emphasis on order, hierarchy, tradition, and continuity has led many observers to view military institutions as inherently conservative, both culturally and, at times, politically (Bénéton, 1988). Such interpretations, however, tend to remain at a descriptive level. They identify similarities between military values and conservative thought, but rarely explain how and why these similarities emerge, how they are reproduced, or under what conditions they may change.

This chapter moves beyond a descriptive account of military ethos by examining how military values are formed, stabilised and internalised within the institutional life of the armed forces. Drawing on a figural perspective inspired by Norbert Elias (1978, 1991), it argues that discipline, hierarchy, courage, solidarity and abnegation should be understood as relationally produced dispositions rather than fixed moral attributes. The chapter develops a conceptual argument grounded in classical military sociology and illustrative examples from the French military tradition. Its aim is not to claim that all military institutions express a uniform ethos, but to clarify the mechanisms through which military values may acquire conservative affinities.

In Elias's terms, military institutions can be understood as dense figurations: networks of interdependent actors whose conduct is shaped by hierarchy, discipline, shared risk and shifting power balances (Elias, 1978). From this

¹ Assoc. Prof., İzmir Kâtip Çelebi University, <https://orcid.org/0000-0002-9774-6567>

perspective, military ethos is not simply a prescribed code of values. It is produced through institutional relations that transform external command into self-regulation, and practical dependence into solidarity, cohesion and mutual obligation.

This relational understanding also clarifies the apparent affinity between military ethos and conservatism. The emphasis on order, hierarchy and continuity should not be read automatically as ideological conservatism. It also reflects the organisational conditions of military life, where coordination, predictability and collective reliability are essential.

At the same time, this affinity has limits. Military institutions are embedded in changing societies, and transformations in technology, warfare, political regimes and civil–military relations reshape the conditions under which military ethos is reproduced (Janowitz, 1960). Its relationship with conservatism is therefore contingent rather than fixed.

Methodologically, the chapter offers a conceptual reinterpretation of classical military sociology through an Eliasian figurational lens. It does not present an empirical case study. Instead, it develops a theoretical argument about how discipline, hierarchy, courage, solidarity and abnegation are produced through relational structures and internalised over time. This perspective also engages with recent debates on professionalisation, organisational change, technological transformation, diversity, civilianisation and cohesion in contemporary armed forces (Soeters, 2018; Resteigne, 2022).

The chapter proceeds in five steps. It first revisits military ethos within classical and contemporary military sociology. It then introduces a figurational framework for analysing ethos as a product of interdependence and socialisation. The following sections examine discipline, hierarchy, courage, solidarity and abnegation as relationally formed dispositions. The final section analyses the affinities and limits of the relationship between military ethos and conservatism.

1. Military Ethos in Military Sociology

The concept of military ethos has long been recognised as a central analytical category in the sociology of the armed forces. It refers to the system of values through which military institutions organise behaviour, structure internal relations, and ensure the effectiveness of collective action in contexts defined by uncertainty, risk, and the potential use of violence. Understanding military ethos is therefore essential not only for analysing the internal functioning of military organisations, but also for examining their relationship with the broader society in which they are embedded.

Early sociological analyses emphasised the distinctive nature of military institutions. Lang (1965) identified three features that distinguish military organisations from most civilian organisations: the communal character of

military life, the formalisation of hierarchy, and the predominantly descending chain of command. Together, these features integrate military personnel into a highly regulated institutional environment in which authority, rank and discipline structure both organisational action and everyday relations.

Building on these insights, subsequent research further developed the analysis of military organisation. The institutional/occupational model proposed by Charles C. Moskos (1977; 1986) represents one of the most influential frameworks in this regard. This model conceptualises military organisations along a continuum between two ideal-typical orientations. At one end, the institutional model is characterised by a strong normative commitment to collective values, where factors such as leisure time, family concerns, salary, and external career opportunities are subordinated to the fulfilment of military duties. At the other end, the occupational model reflects a shift towards a more market-oriented logic, in which individual preferences, professional incentives, and civilian career prospects play a more prominent role.

In practice, military organisations are neither fully institutional nor fully occupational; rather, they are situated between these two poles. Their position along this continuum varies according to broader social, political, and economic conditions. Recent military sociology has further developed this insight by showing that contemporary armed forces are increasingly shaped by professionalisation, technological complexity, multinational operations, recruitment challenges, diversity, and changing relations with civilian society. These developments do not dissolve military ethos, but they complicate the conditions under which it is reproduced. Cohesion, discipline, and professionalism are therefore no longer sustained only through traditional institutional forms; they are also shaped by new organisational environments, changing missions, and more differentiated forms of military labour (Soeters, 2018; Resteigne, 2022; Hachey et al., 2020). As a result, military ethos cannot be understood as a fixed or homogeneous system of values. It is shaped by ongoing adjustments in the relationship between armed forces and the societies in which they operate.

Huntington's analysis of military professionalism is also central to this argument. For Huntington, the professional military mind is marked by realism, hierarchy, discipline, expertise and an orientation toward order and security. His account links military professionalism to a conservative disposition without reducing the armed forces to partisan conservatism. Military conservatism refers less to direct political ideology than to a professional orientation shaped by command, responsibility and organised violence (Huntington, 1957).

The concept of ethos requires a precise definition, as it provides the analytical foundation for understanding the value system of military institutions. According to Gresle et al. (1990, p. 109), ethos refers to the ways in which individuals or

groups interpret and internalise moral rules, producing shared convictions about legitimate conduct and the organisation of collective life. Ethos may be understood as a structured set of values through which a group defines what ought to be done and how members should orient their behaviour. Building on this definition, military ethos may be understood as the value system through which members of the armed forces internalise norms, interpret their roles and organise their conduct in accordance with institutional expectations.

Classical military sociology, institutional writings and military traditions identify discipline, courage, solidarity and abnegation as central components of military ethos. These values are not merely symbolic; they perform organisational functions in contexts where coordination, cohesion and collective action are critical. Discipline occupies a central position, but it is not homogeneous. A useful distinction can be made between formal and functional discipline. Formal discipline refers to codified practices such as saluting, uniforms and prescribed gestures. Functional discipline, by contrast, is oriented toward action and effectiveness. It presupposes military personnel who can understand the intention of command and act with controlled autonomy within established rules. Abnegation, courage and solidarity are closely linked to the military profession's relation to bodily risk, vulnerability and death. In combat, the fulfilment of a mission may require individuals to subordinate personal preservation to collective objectives. Courage enables action under danger, while solidarity sustains mutual dependence among those exposed to shared risk (Corvisier, 1988, pp. 227-243).

The nature of courage has been further explored in classical military theory. Carl von Clausewitz conceptualises courage as a complex disposition encompassing multiple dimensions, including indifference to danger, emotional resilience, physical endurance, and decisiveness under conditions of uncertainty (Clausewitz, 1989, pp. 71-95). These elements highlight the extent to which courage cannot be reduced to a simple individual trait but must be understood as a structured disposition shaped by both psychological and organisational conditions.

Solidarity constitutes another fundamental component of military ethos. In combat, the risks faced by individuals create a situation of intense mutual dependence, in which the survival of each individual is closely linked to the actions of others. Solidarity thus implies not only moral support but also physical protection, as individuals rely on one another in situations of extreme vulnerability. This dynamic is particularly evident at the level of the primary group, where close interpersonal bonds play a decisive role in sustaining morale and enabling collective action (Ardant du Picq, 1978, pp. 65-92; Keegan, 1993, pp. 265-314).

Taken together, these elements suggest that military ethos cannot be reduced to a simple list of values. While discipline, courage, solidarity, and abnegation remain central components, their meaning and function are inseparable from the organisational and relational contexts in which they are embedded. Military ethos is therefore best understood as a structured configuration of dispositions that are continuously sustained through institutional practices, training processes, and shared experiences.

This observation raises an important analytical question. If military ethos is shaped by organisational structures, social relations, and situational constraints, how can its apparent stability over time be explained? And why do its core elements so often appear aligned with broader themes commonly associated with conservatism, such as order, hierarchy, and continuity? Addressing these questions requires moving beyond descriptive accounts of military values and examining the relational processes through which they are formed and sustained, a shift that is developed in the following section through a figurational perspective.

2. A Figurational Approach to Military Ethos

The preceding section identified discipline, courage, solidarity and abnegation as central components of military ethos. A figurational approach now allows these values to be analysed as historically formed dispositions embedded in institutional relations, socialisation practices and patterns of mutual dependence.

Elias's sociology rejects the separation of "the individual" and "society" as independent entities. Individuals are formed within webs of interdependence, and society consists of the changing relations through which individuals become who they are (Elias, 1978, 1991). A figuration is therefore a network of interdependent actors whose actions are mutually oriented and shaped by shifting power balances. This is crucial for analysing military institutions, which do not simply impose values from above, but form individuals through relations with superiors, subordinates, peers, units, traditions and operational demands.

The armed forces may therefore be understood as an intensive figuration. Military action requires coordination under uncertainty, hierarchy, danger and possible death. The conduct of one individual can directly affect the survival, effectiveness or failure of others. Obedience, trust, discipline and solidarity are therefore practical necessities generated by the structure of military interdependence.

This perspective is also important because Elias insists that social processes unfold over time. Figurations are not fixed arrangements; they are historically changing configurations shaped by long-term processes of socialisation, monopolisation, differentiation, and the regulation of conduct (Elias, 1978, 2000). Military ethos should therefore be understood as the outcome of a long

historical process through which certain forms of behaviour become institutionalised, transmitted, and internalised. Discipline, hierarchy, and solidarity do not simply appear as formal rules; they become durable dispositions through training, repetition, ritual, command relations, and shared exposure to danger.

Elias's analysis of the civilising process is particularly relevant here. In *The Civilizing Process*, he argues that long-term social development involves a transformation in the regulation of behaviour: external constraints increasingly become internal forms of self-restraint (Elias, 2000). Although Elias's historical focus is not the military institution as such, this conceptual movement from external compulsion to self-control is highly useful for analysing military discipline. Military discipline begins as an external system of command, rules, gestures, sanctions, and hierarchical control. Over time, however, these external constraints are internalised by military personnel as habits of conduct, emotional control, bodily comportment, and readiness to act in accordance with institutional expectations.

This point allows us to reinterpret the distinction between formal and functional discipline discussed earlier. Formal discipline, with its codified practices such as saluting, uniformed presentation, and prescribed gestures, corresponds to the visible and external control of conduct. Functional discipline, however, requires more than mechanical obedience. It presupposes an individual capable of acting autonomously within the intentions of command and within the limits of military rules. In Eliasian terms, functional discipline depends on internalised self-control. Military personnel must not only obey; they must regulate their conduct, interpret the situation, anticipate expectations, and act in ways consistent with the broader figuration of command and interdependence.

Courage can also be read from a figurational sociology. It is not only an individual virtue, but a socially formed capacity to regulate fear within relations of command, peer expectation, group loyalty and shared danger. Military personnel confront danger not simply as private individuals, but as members of a unit whose actions affect the safety and effectiveness of others.

Solidarity can likewise be understood through interdependence. In combat, soldiers depend on one another for survival, protection, orientation and psychological endurance. The primary group is therefore the immediate relational unit through which loyalty, sacrifice and cohesion become lived experiences rather than abstract ideals.

Abnegation can be reinterpreted in the same terms. The willingness to subordinate personal interest to collective purpose is generated within a figuration in which individuals are trained to understand themselves as part of a larger unit whose survival and effectiveness depend on coordinated conduct. Abnegation

thus becomes intelligible as a disposition produced through institutional socialisation and dense interdependence.

This figurational reading also helps explain the apparent continuity of military ethos. Values such as discipline, courage, solidarity, and abnegation persist not simply because they are repeatedly stated in doctrine or tradition, but because they are embedded in the relational structure of military life. They are reproduced through practices, rituals, command relations, training routines, and shared experiences that shape both behaviour and emotional orientation. In Eliasian terms, military ethos becomes part of a socially formed habitus: a durable yet historically variable pattern of conduct and self-control.

At the same time, a figurational perspective prevents us from treating military ethos as timeless or unchanging. Since figurations are dynamic, military ethos must also be understood as historically situated. Changes in technology, forms of warfare, civil–military relations, professionalisation, and democratic control alter the balance between external discipline and internal autonomy, between obedience and initiative, and between tradition and adaptation. This is why military ethos may display strong continuities while also undergoing significant transformation.

This theoretical move is important for the chapter's broader argument concerning conservatism. A descriptive approach may simply observe that military ethos resembles conservatism because both emphasise order, hierarchy, tradition, and continuity. A figurational approach goes further by asking why such affinities emerge. It suggests that these elements are not necessarily expressions of ideological conservatism; rather, they are rooted in the relational and functional conditions of military life. The armed forces require coordination, predictability, disciplined conduct, and durable bonds of interdependence. These requirements help explain why military ethos often appears close to conservative forms of social thought, while also allowing us to recognise the limits and historical variability of that affinity.

3. Discipline and the Internalisation of Hierarchy

This section examines discipline as the mechanism through which hierarchy becomes internalised conduct. Military discipline is not simply obedience to command or external control. It is a process through which institutional authority is translated into bodily comportment, emotional regulation, practical judgement and self-control.

Lang's account is relevant here because it shows how rank and descending command make hierarchy continuously visible within military life. The chain of command reduces ambiguity about who commands, who obeys and how action should proceed, especially where hesitation or competing centres of authority may threaten collective effectiveness (Lang, 1965, pp. 838-878).

This hierarchical order can be interpreted through Weber's concept of legal-rational authority, but it cannot be fully explained by it. In its formal dimension, military authority is based on rank, regulation, and institutionally defined competence. The officer commands not as a private individual, but as the holder of a legally recognised position within an institutional chain of authority (Weber, 1971). Yet military authority also contains traditional and, in certain contexts, charismatic elements. The legitimacy of command may depend not only on formal rank, but also on personal example, courage, competence, and the capacity of the leader to establish a direct bond with subordinates.

This dual character of authority is captured by Boulègue's distinction between the disciplinary model and the aristocratic model of military society. The disciplinary model is marked by structural rigidity, hierarchical formalism, and the centrality of regulations. It emphasises the impersonal and institutional character of command. The aristocratic model, by contrast, rests on a more personalised form of authority, in which the officer's power is experienced as an embodied relation between leader and soldiers. The bond between officers and soldiers may involve recognition, trust, admiration, fear and affective attachment. Authority is strengthened not only by rule, but also by identification (Boulègue, 1999, pp. 261-288).

The following examples are not evidence of a universal military pattern. They illustrate how formal authority and personalised command have been articulated within one influential national case: the French military tradition. Lyautey emphasises the importance of the officer's relationship with soldiers under command, arguing that soldiers do not respond only to the formal command of an institution, but also to the officer who has gained their confidence through attention, proximity and trust (Lyautey, 1984, p. 26). De Gaulle similarly emphasises the moral and affective dimension of command, suggesting that military leadership operates not only through formal authority but also through influence over those who execute orders (De Gaulle, 1932, p. 28). These formulations show that military authority is not exhausted by formal obedience. It also operates through moral influence, emotional attachment, and the internalisation of the command relationship.

From a figurational perspective, the coexistence of formal discipline and personalised authority is not contradictory. Elias's concept of figuration directs attention to networks of interdependence in which power is asymmetrical but relationally sustained (Elias, 1978). The subordinate is bound to the superior not only through regulation, but also through expectations, trust, recognition, and shared exposure to danger. The superior, in turn, depends on subordinates for the execution of orders, the maintenance of cohesion, and the success of the mission. Military authority is therefore unequal, but it is not simply one-sided. It operates

within a network of interdependence in which command is maintained through competence, example and the capacity to preserve cohesion.

This is where Elias's analysis of self-control becomes particularly useful. In *The Civilizing Process*, Elias argues that long-term social development involves the internalisation of behavioural controls: constraints that were once imposed from outside increasingly become embedded in individuals as habits of self-restraint (Elias, 2000). Military discipline can be interpreted through this movement from external constraint to internalised control. Regulations, drills, sanctions, uniforms, gestures, and command structures begin as external forms of discipline. Through repetition, training, and institutional socialisation, however, they are incorporated into bodily comportment, emotional control, and practical judgement. Disciplined military personnel are not simply controlled from outside; they come to regulate themselves in accordance with the expectations of the military figuration.

The historical evolution of military discipline reinforces this interpretation. Older forms of discipline, often associated with the mechanical organisation of troops, relied heavily on external surveillance, close-order formations, and the direct visibility of command. In France, the development of military regulation from the seventeenth and eighteenth centuries onward contributed to the increasing formalisation of military life. Rules, inspections, standardised practices, and the multiplication of regulations became central to the organisation of the armed forces (Corvisier, 1992, pp. 383-413; Chagniot, 1992, pp. 29-54). Yet changes in warfare gradually made purely external discipline insufficient. The dispersion of soldiers on the battlefield, the increased complexity of weapons, and the decentralisation of combat required combatants to act with initiative when direct supervision was no longer possible.

The development of modern discipline therefore did not simply weaken hierarchy; it altered the way hierarchy operated. Military personnel were no longer expected merely to act as part of a mass under the immediate eye of superiors. They increasingly had to interpret the situation, understand the commander's intent, and maintain discipline in the absence of direct control. Contemporary debates on mission command develop this point further by emphasising trust, initiative, professional judgement, and decentralised action as necessary conditions of effective command in complex and technologically mediated environments (Nilsson, 2021). In this respect, modernisation did not abolish discipline; it changed its form. It shifted the emphasis from external surveillance alone toward internalised responsibility, controlled initiative, and practical judgement.

An Eliasian reading avoids treating this transformation as a simple opposition between coercion and freedom. Military discipline restricts conduct, imposes obligations and reinforces subordination. Yet it also produces capacities: the

ability to control fear, manage bodily reactions, coordinate with others and act under uncertainty. Self-control is therefore not outside power; it is formed within relations of power. Military ethos emerges through this process, as institutional constraint becomes embodied disposition.

This interpretation also begins to clarify the relationship between discipline and conservatism. Military discipline appears conservative because it gives priority to order, hierarchy, continuity, and respect for established forms. Yet these elements should not be understood only as ideological preferences. They are also organisational requirements produced by the structure of military interdependence. Where collective action may fail if authority is unclear, conduct unpredictable, or emotional control weak, disciplined relations become a condition of institutional effectiveness. At the same time, military discipline should not be understood as absolute submission. The increasing importance of initiative, professional judgement, and legal limits on obedience shows that modern military authority involves a historically evolving balance between external command and internalised responsibility. This balance is central to the chapter's argument, since it demonstrates that military ethos may preserve hierarchical order while also requiring responsible agency within that order.

4. Courage, Solidarity and the Relational Formation of Military Virtues

If discipline links military ethos to hierarchy and self-control, courage and solidarity link it to danger, vulnerability, and collective survival. In military life, these values acquire their meaning through exposure to fear, dependence on comrades, and the need to sustain action under extreme pressure. Courage and solidarity therefore belong to the moral vocabulary of the armed forces, but they are also practical dispositions formed in situations where the individual's conduct is inseparable from the fate of others.

Courage occupies a central place in the ethos of the combatant because it corresponds directly to the defining specificity of the profession of arms: its relationship to death. Military action may require individuals not only to accept danger, but to continue acting when danger becomes immediate and personal. Combat implies the risk of injury, lasting physical damage, psychological trauma, and death. In this context, courage is not an ornamental virtue. It becomes a necessary condition for military action itself, since the possibility of fear, hesitation, or flight is built into the experience of combat (Corvisier, 1988, pp. 227-243).

Clausewitz provides one of the most important classical accounts of courage. In his discussion of military genius, courage appears as both a moral and practical capacity required for military effectiveness (Clausewitz, 1989, pp. 71-95). It includes firmness before danger, emotional force, bodily endurance and what Clausewitz calls resolution, or the "courage of the mind." This last dimension is

especially important for command, since military leaders must assume responsibility and act under uncertainty, instability and danger.

Courageous military personnel are therefore not simply individuals who possess bravery as a private attribute. Their emotional responses are shaped through training, discipline, command relations, peer expectations and shared exposure to danger. Fear does not disappear, but it is regulated. Pain is not denied, but it is endured. Hesitation is not impossible, but it is contained by the demands of the group and the mission. Courage can therefore be understood as a socially formed capacity for emotional control under conditions of risk.

Courage also becomes meaningful only in relation to solidarity. In combat, individuals do not confront danger as isolated actors. The risk faced by any individual combatant is rarely theirs alone: action, hesitation or failure is distributed through the unit and may affect the safety and effectiveness of others. Solidarity therefore implies more than mutual sympathy. It involves physical protection, practical reliance, and a shared sense of obligation created by exposure to common danger.

The importance of this point was already visible in Ardant du Picq's reflections on combat. In his analysis of ancient and modern battle, Ardant du Picq emphasised the psychological fragility of soldiers under fire and the centrality of group cohesion in overcoming fear. For him, the problem of combat was not merely technical or tactical; it was also moral and social. The institution had to create the conditions under which fear and the instinct of self-preservation could be contained. *Esprit de corps* and solidarity within the fighting unit were therefore not secondary features of military life, but conditions for combat effectiveness (Ardant du Picq, 1978, pp. 65-92).

Keegan's analysis of battle adds a specifically modern dimension to this argument. The expanded battlefield, technological mediation of violence, long-distance weapons, and intensification of destruction make combat increasingly difficult to endure psychologically. The enemy may become less visible, the space of battle more fragmented, and violence more impersonal. These conditions amplify fear and disorientation, making the individual less able to sustain the experience alone. Solidarity among combatants therefore becomes a way of anchoring military personnel within an immediate human environment when the battlefield itself becomes disorganising and dehumanising (Keegan, 1993, pp. 265-314).

This is why the primary group occupies such an important place in military sociology. It is the immediate relational unit through which soldiers experience mutual dependence, trust, obligation, and emotional support. As Barrois notes, the primary group is marked by strong interdependence and by the formation of a lived "we" (Barrois, 1993, p. 236). In military life, this "we" may become a practical condition for enduring combat.

Military cohesion gives this primary group experience a broader institutional meaning. As Sourbier-Pinter notes, beyond technical competence, soldiers must also learn to respect a principle of order and solidarity in combat, referred to in military life as cohesion (Sourbier-Pinter, 2001, pp. 51-52). Cohesion links discipline to belonging. It enables the collective to function not only because orders are given, but because individuals have come to recognise themselves as members of a shared unit. Training, uniform, ritual, shared hardship, and the repeated experience of dependence all contribute to this process.

In this immediate relational setting, military ethos becomes lived experience. Abstract values such as courage, loyalty, sacrifice, and solidarity become concrete through repeated relations of dependence. Soldiers do not internalise solidarity simply as doctrine; they experience it through the expectation that others will protect them and that they must protect others in return. Likewise, courage is sustained not only by individual will, but by the presence of others before whom fear must be controlled and responsibility maintained. The group thus becomes a social mechanism through which emotional control and moral obligation are formed.

Abnegation is therefore best understood not as a separate military value, but as the point at which courage and solidarity converge. In Eliasian terms, it expresses a particular configuration of the We-I balance, in which individuals do not disappear, but come to understand themselves through membership in a larger collective (Elias, 1991). The willingness to subordinate personal interest to collective purpose is produced within a relational environment shaped by the group, the mission and the chain of dependence that binds military personnel to one another. Courage enables individuals to face danger; solidarity binds them to others within that danger; abnegation expresses the readiness to privilege the collective over the self.

The durability of these values lies in their repeated enactment. Courage, solidarity, and abnegation persist not simply because military institutions praise them in official discourse, but because they are embedded in training, shared risk, group rituals, operational experience, and the memory of past sacrifice. They become durable because they are lived, tested, and reinforced through concrete dependence on others. At the same time, their expression changes with the transformation of military organisation and warfare. The courage required in close combat is not identical to the courage required in technologically mediated operations; the solidarity of a small combat unit may differ from the cohesion required in complex multinational missions or highly specialised professional units. Yet the underlying problem remains: military action requires individuals to regulate fear, sustain trust, and act in relation to others under conditions of uncertainty.

This analysis prepares the ground for understanding the relationship between military ethos and conservatism. Courage, solidarity, cohesion, and abnegation all support a moral order in which duty, loyalty, continuity, and collective obligation are valued above individual preference. For this reason, they may appear to align with conservative themes. Yet their significance cannot be reduced to ideological conservatism. These values arise from the relational and practical demands of military life: the need to sustain collective action, preserve trust, regulate fear, and bind individuals into a durable “we.” The apparent affinity with conservatism must therefore be examined as a relationship between military values and the social conditions that make them necessary.

5. Military Ethos and Conservatism: Affinities and Limits

The values associated with military ethos appear to have a strong affinity with conservative social thought, particularly in their emphasis on order, continuity, duty, authority, inherited forms, and the primacy of collective obligation over individual preference. Yet this affinity should not be understood as a simple ideological identity. The question is not whether military institutions are politically conservative by nature, but why their value systems so often display structural similarities with conservative understandings of social order.

Bénéton defines conservatism as a modern intellectual and political movement that emerges with modernity while reacting against it. In its classical form, conservatism gives priority to continuity, inherited institutions, historical experience, social hierarchy and the preservation of order against the perceived dangers of abstraction, innovation and radical rupture (Bénéton, 1988, pp. 8-9). Huntington’s account of the military mind is relevant here because it shows how military professionalism may cultivate a disposition toward order, hierarchy and realism without necessarily implying partisan political conservatism (Huntington, 1957).

Military ethos shares several of these concerns. The armed forces are organised around the preservation of order, the recognition of hierarchy, the transmission of traditions, and the subordination of individual conduct to collective purposes. Discipline, in this respect, is not only an organisational technique; it also expresses a moral preference for predictability, coordination, and controlled behaviour. Similarly, military traditions, rituals, uniforms, ranks, commemorations, and inherited symbols provide continuity between generations of soldiers. They create a sense that the individual is not acting alone, but as part of an institution that precedes him and will outlast him. This gives military culture a distinctly traditionalist dimension.

The affinity becomes clearer when one considers the values through which conservative thought imagines social order: fidelity, deference, honour, duty and devotion to the common good. These values overlap with the moral vocabulary of military ethos, where loyalty to the group, respect for authority and devotion

to the mission are central. Military ethos therefore resonates with a conservative understanding of social life in which obligations and duties take precedence over individual preference (Corvisier, 1988, pp. 227-243).

This does not mean, however, that military ethos simply reproduces conservative ideology. A figurational reading allows the affinity to be understood in a more precise way. The armed forces are dense figurations of interdependence. Their members depend upon one another under conditions of danger, uncertainty, and asymmetrical authority. In such a setting, order and hierarchy are not only symbolic preferences; they are practical conditions for coordinated action. Similarly, tradition is not merely nostalgic attachment to the past; it helps stabilise identity, transmit standards of conduct, and bind individuals into a durable collective. From this perspective, the conservative appearance of military ethos is partly produced by the relational requirements of military life itself.

Elias's concept of the We-I balance is particularly useful here. Military socialisation shifts the balance between individual self-understanding and collective belonging. Soldiers are not expected to disappear as individuals, but they are expected to understand themselves through the "we" of the unit, the institution and the mission. This explains why military values often privilege duty, cohesion, and sacrifice. They express a configuration in which the "I" is strongly shaped by institutionalised forms of collective dependence (Elias, 1991). Military ethos thus appears close to conservatism because both resist the image of the isolated, fully autonomous individual and instead emphasise embeddedness, inheritance, obligation and belonging.

The role of the past is also central. Military culture relies heavily on traditions, ceremonies, narratives of sacrifice, and symbolic references to earlier generations. These references are not simply decorative. They contribute to cohesion by linking present members of the armed forces to predecessors and successors. Soldiers are encouraged to see themselves as part of a chain of transmission. This resembles the conservative idea that individuals are heirs before they are innovators, and that social life depends on the preservation and transmission of accumulated experience. In military institutions, however, this relation to the past is not only doctrinal. It performs a practical function: it strengthens identification, stabilises conduct, and supports collective morale.

At the same time, this affinity has important limits. Military institutions are not mechanically conservative, nor are they necessarily conservative in a partisan or ideological sense. The French case illustrates this point. In the French context, the army has historically preserved hierarchical, disciplinary, and traditional elements, while also being integrated into republican and democratic political orders. Boulègue's analysis of the integration of the French army into republican society is important in this respect, because it shows that military culture can

combine traditional forms of authority with political adaptation (Boulègue, 1999). The persistence of military traditions therefore does not automatically imply opposition to modern political regimes.

The principle of subordination to civilian authority further limits any simple identification between military ethos and conservatism. In the French tradition, this principle gradually became central during the nineteenth century. Girardet's account suggests that, in the nineteenth-century French military tradition, honour became increasingly associated with obedience, execution, and political restraint: the army, as an institution, was expected to become the instrument of the powers on which it depended (Girardet, 1998). Political neutrality was not simply a liberal imposition from outside the military; it also served the internal preservation of the armed forces by preventing political divisions from tearing the institution apart.

Contemporary civil–military relations literature reinforces this point by showing that armed forces in modern states operate across a wide range of roles, including warfighting, peace operations, counter-terrorism, support to police forces, disaster response, and internal security tasks. These expanding roles complicate any simple understanding of military ethos as merely traditional or conservative, since the armed forces must preserve hierarchy and discipline while adapting to plural missions and democratic oversight (Matei, Halladay, & Bruneau, 2022).

This distinction is crucial. The military may appear conservative because it values hierarchy and obedience, yet obedience is directed toward legally constituted authority rather than necessarily toward a conservative political programme. The duty of military personnel is not to preserve a particular party, ideology, or regime preference, but to serve the state within the boundaries of law and institutional command. In democratic contexts, this creates a paradox: values that look conservative at the level of organisational culture may support political neutrality and subordination to civilian rule. Military conservatism, if the term is used, should therefore be understood first as a cultural and organisational disposition, not as a direct political ideology.

Modernisation also complicates the picture. Military institutions may defend tradition, but they cannot reject change in any absolute sense. Technological development, changing forms of warfare, professionalisation, international missions, media visibility and legal regulation all require adaptation. Recent debates on military professionalism show that technological and data-driven warfare raise new questions about judgement, responsibility, command and the ethical limits of obedience (Hachey et al., 2020; Roach & Eckert, 2020). Modernisation does not abolish military ethos; it changes the balance among its components.

The legal limits placed on obedience provide another important boundary. Modern military discipline is no longer conceived as unconditional submission. The recognition that manifestly unlawful orders should not be executed indicates that obedience is framed by legal and ethical norms, particularly in the context of international humanitarian law, command responsibility and professional military ethics (Walzer, 1977; ICRC, n.d.). This alters the relationship between discipline and hierarchy. The subordinate remains bound by command, but not in a way that suspends responsibility altogether. Military authority is therefore constrained by law, civilian control, and professional ethics. Such limits prevent military ethos from being understood as a closed traditional order immune to wider social and political transformations.

The relationship between military ethos and conservatism must therefore be formulated carefully. Military ethos exhibits conservative affinities in its emphasis on order, hierarchy, continuity, tradition, discipline, loyalty and collective obligation. Yet these affinities emerge from the organisational and relational conditions of military life rather than from a simple ideological identity. Its apparent conservatism is historically situated, institutionally mediated and limited by adaptation, legal responsibility, political neutrality and subordination to civilian authority. The significance of military ethos lies precisely in this tension: it preserves inherited forms of order while continually adjusting them to changing social, political and military conditions.

Conclusion

This chapter has argued that military ethos is neither a fixed inventory of values nor a simple ideological expression of conservatism. Discipline, courage, solidarity, abnegation, hierarchy and cohesion are central to military life, but their significance lies in the relational conditions through which they are formed and sustained.

A figurational perspective makes it possible to understand these values as part of a dynamic configuration. Military institutions are dense networks of interdependence in which individuals are bound to superiors, subordinates, peers, units, missions and inherited traditions. Within these networks, discipline becomes self-regulation, courage becomes the regulation of fear, solidarity becomes grounded in practical dependence, and abnegation becomes intelligible through a We–I balance shaped by collective belonging. This approach also clarifies why military ethos may display conservative affinities without being reducible to ideological conservatism.

At the same time, military ethos is neither absolute nor immutable. Military institutions adapt to technological change, new forms of warfare, democratic oversight, legal norms, and shifting relations between the armed forces and civilian society. Modern military personnel are not merely obedient executors of command; they are increasingly required to exercise judgement, initiative, and

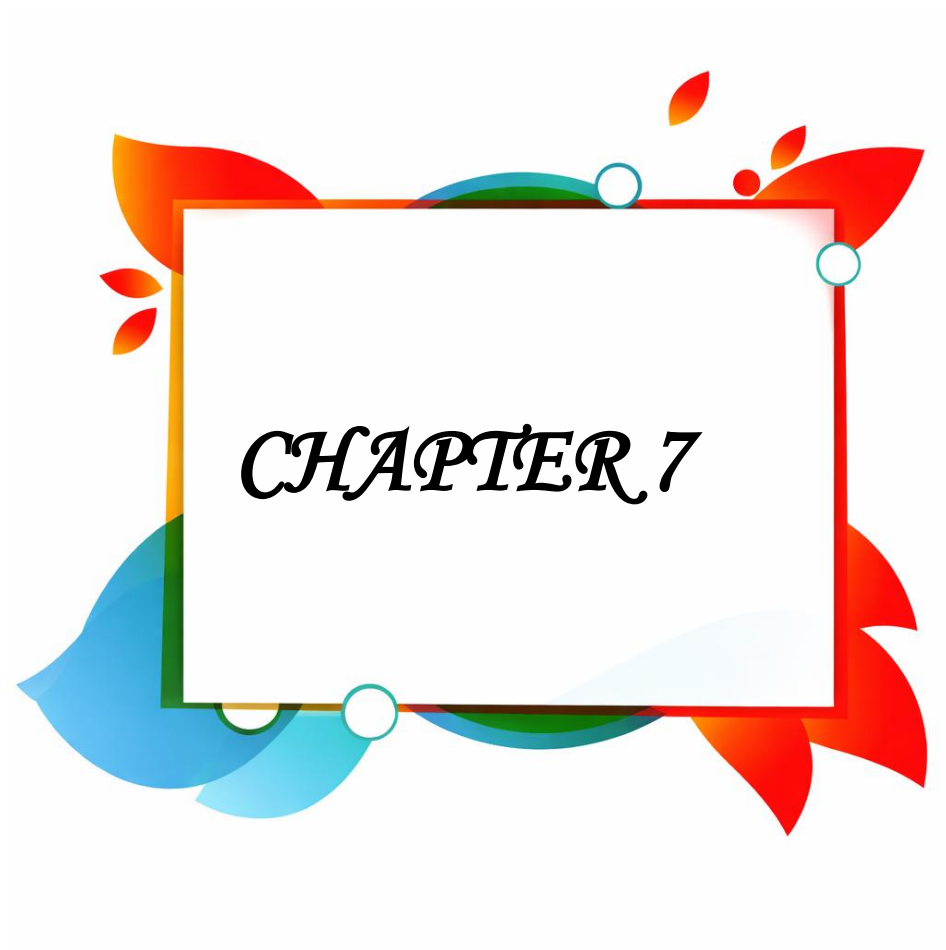
responsibility within structured hierarchies. This means that the apparent conservatism of military ethos must be understood as historically situated, institutionally mediated, and relationally produced.

The significance of military ethos lies in this tension between continuity and transformation. It preserves inherited forms of order, but only by continually adapting them to changing conditions of military action. A figurational reading therefore shows that the military does not merely possess an ethos; it continually produces one through disciplined interdependence.

References

- Ardant du Picq, C. (1978). *Etudes sur le combat antique et moderne*. Champ libre.
- Barrois, C. (1993). *Psychanalyse du guerrier*. Hachette.
- Boulègue, J. (1999). De l'ordre militaire aux forces républicaines : deux siècles d'intégration de l'Armée dans la société française. In A. Thiéblemont (Ed.), *Cultures et logiques militaires* (pp. 261-288). Presses Universitaires de France.
- Bénéton, P. (1988). *Le conservatisme*. Presses Universitaires de France.
- Chagniot, J. (1992). Les progrès de l'administration militaire. In J. Delmas (Ed.), *Histoire militaire de la France II: De 1715 à 1871* (pp. 29-54). Presses Universitaires de France.
- Clausewitz, C. von. (1989). *De la guerre*. Editions Gérard Lebovici.
- Corvisier, A. (Ed.). (1988). *Dictionnaire d'art et d'histoire militaire*. Presses Universitaires de France.
- Corvisier, A. (1992). Louis XIV, la guerre et la naissance de l'armée moderne. In P. Contamine (Ed.), *Histoire militaire de la France: Vol. 1. Des origines à 1715* (pp. 383-413). Presses Universitaires de France.
- De Gaulle, C. (1932). *Le fil de l'épée*. Berger-Levrault.
- Elias, N. (1978). *What is sociology?* Columbia University Press.
- Elias, N. (1991). *The society of individuals*. Basil Blackwell.
- Elias, N. (2000). *The civilizing process: Sociogenetic and psychogenetic investigations*. Blackwell.
- Girardet, R. (1998). *La société militaire de 1815 à nos jours*. Perrin.
- Gresle, F., Panoff, M., Perrin, M., & Tripier, P. (1990). *Dictionnaire des sciences humaines*. Nathan.
- Hachey, K. K., Libel, T., & Dean, W. H. (Eds.). (2020). *Rethinking military professionalism for the changing armed forces*. Springer.
- Huntington, S. P. (1957). *The soldier and the state: The theory and politics of civil-military relations*. Harvard University Press.
- International Committee of the Red Cross. (n.d.). *Customary international humanitarian law: Rule 154. Obedience to superior orders*. ICRC.
- Janowitz, M. (1960). *The professional soldier: A social and political portrait*. Free Press.
- Keegan, J. (1993). *Anatomie de la bataille*. Robert Laffont.

- Lang, K. (1965). Military organizations. In J. G. March (Ed.), *Handbook of organizations* (pp. 838-878). Rand McNally.
- Lyautéy, H. (1984). *Le rôle social de l'officier*. Albatros.
- Matei, F. C., Halladay, C., & Bruneau, T. C. (Eds.). (2022). *The Routledge handbook of civil-military relations*. Routledge.
- Moskos, C. C. (1977). From institution to occupation: Trends in military organization. *Armed Forces & Society*, 4(1), 41-50.
- Moskos, C. C. (1986). Institutional/occupational trends in armed forces: An update. *Armed Forces & Society*, 12(3), 377-382.
- Nilsson, N. (2021). Mission command in a modern military context. *Journal on Baltic Security*, 7(1), 5-15.
- Resteigne, D. (2022). Sociology of the military. In A. M. Sookermany (Ed.), *Handbook of military sciences* (pp. 1-15). Springer.
- Roach, S. C., & Eckert, A. E. (Eds.). (2020). *Moral responsibility in twenty-first-century warfare: Just war theory and the ethical challenges of autonomous weapons systems*. State University of New York Press.
- Soeters, J. (2018). *Sociology and military studies: Classical and current foundations*. Routledge.
- Sourbier-Pinter, L. (2001). *Au-delà des armes: Le sens des traditions militaires*. Imprimerie nationale.
- Walzer, M. (1977). *Just and unjust wars: A moral argument with historical illustrations*. Basic Books.
- Weber, M. (1971). *Economie et société*. Plon.



Ageing in the Context of Social Change: Demographic Transformation, Social Relations, and Rights-Based Policies

Aziz Armutlu¹

Introduction

Ageing represents the final stage of the human life course following childhood and adulthood and constitutes a subjective process shaped not only by biological changes but also by social and cultural conditions (Altındağ, 2017; Çetin, 2019). In traditional societies, old age has often been defined in relation to physical decline and loss of functional capacity, whereas in contemporary societies the chronological age of 65 is generally accepted as the threshold of old age (Müftüler, 2018). The World Health Organization classifies older adults into three categories: young-old (65–74 years), old-old (75–84 years), and oldest-old (85 years and over) (Kurt et al., 2008).

Although ageing is an inevitable and natural stage of the human life course, it cannot be understood solely through the lens of biological ageing. The meaning and significance attributed to old age for both individuals and societies are shaped by historical trajectories, cultural values, economic structures, and institutional arrangements. In this respect, ageing constitutes a socially constructed status that extends beyond chronological age and is continuously redefined within systems of production, family relations, caregiving practices, healthcare services, and social policy frameworks. Advances in medicine and public health, increasing life expectancy, and declining fertility rates have contributed to a substantial growth in the size and proportion of older populations worldwide. This demographic transformation has elevated ageing from an individual life experience to a central concern within the fields of sociology, public administration, social policy, and social welfare studies (Phillipson, 2013).

Population ageing refers to the increasing proportion of older adults within the total population as a result of longer life expectancy and declining fertility rates (Soysal, 2023). This demographic transition, coupled with processes of industrialization and urbanization, has altered the traditional status of older

¹ Dr., Ministry of Family and Social Services of the Republic of Türkiye.
ORCID:0000-0003-2838-7588.

persons within the family and has given rise to new social challenges (Bulduk, 2014; Duvan & Kantar Davran, 2022). Furthermore, ageing is often associated with physical and cognitive decline, which may increase the risk of social exclusion and limit participation in various spheres of social life (Çunkuş et al., 2019).

Contemporary societies frequently exhibit an ambivalent approach toward ageing. On the one hand, older adults are regarded as custodians of knowledge, experience, life wisdom, and collective memory. On the other hand, within social systems characterized by speed, productivity, and competitiveness, they are often associated with dependency, vulnerability, and the risk of marginalization. This dual perception demonstrates that ageing is neither a universal nor a fixed category; rather, it is a socially constructed and continuously negotiated stage of the life course shaped by changing social conditions (Marshall, 1999; Vincent, 2003). Macro-level processes such as industrialization, urbanization, international migration, digitalization, and neoliberal economic restructuring have profoundly transformed the familial roles, social visibility, and everyday experiences of older adults.

The relationship between social change and ageing is reciprocal rather than unidirectional. While economic, cultural, and technological transformations reshape the living conditions of older individuals, the growing proportion of older adults simultaneously compels social institutions to adapt to emerging needs and demands. Healthcare systems, social security arrangements, long-term care services, transportation networks, urban planning strategies, and digital public services are among the sectors most directly affected by this demographic shift. Consequently, ageing should not be viewed merely as an individual life stage but rather as a significant social issue closely linked to social justice, intergenerational solidarity, active citizenship, social participation, and the development of inclusive societies.

This chapter examines ageing from a sociological perspective within the broader context of social change. First, it explores how ageing is socially constructed and how meanings attributed to old age vary across societies and historical contexts. It then discusses the implications of demographic transition, changing family structures, urbanization, digitalization, and economic restructuring for the lives of older adults. Finally, the chapter evaluates ageing policies, rights-based approaches, and intergenerational solidarity as key dimensions for fostering more inclusive, age-friendly, and socially sustainable societies.

1. Ageing as a Social Construction

Although ageing is commonly associated with the biological process of growing older, from a social science perspective it encompasses a far more complex and multidimensional phenomenon. The age at which an individual is

considered “old,” the roles and responsibilities attributed to older adults, and societal attitudes toward ageing vary across societies and historical periods. This variation demonstrates that ageing is not merely a biological reality but also a socially constructed category. In other words, ageing constitutes a stage of the life course whose meaning is shaped by the social, cultural, economic, and political contexts in which individuals live.

For these reasons, ageing should be understood not simply as a process of biological decline but as a social phenomenon shaped by societal values, cultural norms, and social policy frameworks (Altındağ, 2017; Müftüler, 2018). From this perspective, ageing is defined less by chronological age than by the roles, statuses, and expectations assigned to older adults within a given society, making it a socially constructed category (Çetin, 2019; Müftüler, 2018).

Several key dynamics contribute to the social construction of ageing: **Social Constructionism.** This perspective argues that ageing is a process shaped by complex socio-cultural factors rather than being solely determined by biological changes (Soysal, 2023). According to symbolic interactionism, individual identity emerges through social interaction; consequently, the experience of ageing is influenced by societal expectations and role definitions associated with later life (Soysal, 2023; Tufan, 2002).

Institutional Construction and Retirement: In contemporary societies, ageing is closely linked to institutional arrangements rather than biological age alone (Akçay, 2015). The widely accepted threshold of 65 years has largely emerged through the development of social security systems and retirement policies during the twentieth century (Müftüler, 2018; Soysal, 2023). Retirement, in particular, redefines social identity by categorizing individuals as no longer economically productive, thereby reshaping their position within society (Akçay, 2015; Soysal, 2023).

Cultural and Historical Transformation: The meaning of ageing varies across historical periods and cultural contexts (Duvan & Kantar Davran, 2022). In traditional agrarian societies, old age was commonly associated with wisdom, authority, and social prestige. However, in industrial and post-industrial societies, technological change and shifting patterns of economic production have reduced the social value traditionally attached to accumulated experience, leading to the redefinition of ageing as a domain of dependency, vulnerability, and social concern (Duvan & Kantar Davran, 2022; Soysal, 2023).

Social Perceptions and Exclusion: Negative stereotypes and perceptions portraying older adults as a social burden contribute to the construction of ageing as an undesirable life stage (Çunkuş et al., 2019). Older individuals may internalize these societal messages, shaping their self-perceptions and experiences of ageing in accordance with prevailing social narratives (Soysal, 2023).

The meanings attributed to ageing have undergone significant transformations throughout history. In traditional societies, older adults occupied prominent positions as family authorities, transmitters of cultural values, and custodians of collective memory. Life experience and accumulated knowledge enhanced their social status and reinforced their influence within the community. However, processes of industrialization and modernization have diversified access to knowledge, expanded professional specialization, and transformed economic production systems, resulting in the redefinition of the traditional roles of older adults. In contemporary societies, where productivity and economic performance are highly valued, an individual's social worth is often assessed in relation to their capacity to participate in the labor market, influencing societal perceptions of retirement and later life.

Furthermore, ageing is not a homogeneous experience. The living conditions, opportunities, and challenges encountered by older adults are shaped by multiple factors, including socioeconomic status, educational attainment, gender, health conditions, family relationships, and place of residence. For example, the experiences of older adults living in rural communities differ substantially from those of older individuals living alone in metropolitan areas. Similarly, women generally experience longer life expectancy, assume greater caregiving responsibilities throughout their lives, and face higher levels of economic vulnerability, making gender a particularly important dimension of ageing. Consequently, understanding ageing requires a multidimensional perspective that takes into account both individual diversity and structural social inequalities.

2. Demographic Transformation and Population Ageing

Demographic transition refers to the process through which societies move from high fertility and high mortality rates to low fertility and low mortality rates (Çetin, 2019; Uyanık, 2017). One of the most significant outcomes of this process is population ageing, characterized by both the numerical and proportional increase of older adults (aged 65 years and over) within the total population (Özkul & Kalaycı, 2015; Soysal, 2023). Recognized as one of the most important demographic phenomena of the twenty-first century, this transformation has been driven by factors such as industrialization, urbanization, advances in medical technology, and increasing life expectancy (Müftüler, 2018; Uyanık, 2017; Çetin, 2019).

At the global level, demographic transition is widely regarded as one of the most profound processes of social transformation in recent history. Improvements in healthcare systems, rising living standards, and advances in medical and public health technologies have extended life expectancy, while declining fertility rates have fundamentally altered population structures. As a result, the proportion of older adults within national populations has steadily increased, compelling

societies to confront a range of unprecedented social, economic, and political challenges.

Population ageing should not be viewed merely as a demographic phenomenon. Rather, it has far-reaching implications for healthcare systems, social security arrangements, long-term care services, labor markets, and broader welfare institutions. In particular, changes in the balance between the working-age population and retirees have intensified debates concerning the sustainability of pension systems and social protection mechanisms. Nevertheless, interpreting population ageing solely in terms of economic costs or public expenditures represents an overly reductionist perspective. Older adults continue to play significant roles in society through volunteering, informal caregiving, cultural transmission, community engagement, and civic participation, thereby contributing substantially to social cohesion and social capital.

Globally, the proportion of older adults increased from 5.1% in 1950 to 9.3% in 2020 (Duvan & Kantar Davran, 2022). Türkiye has followed this global trend and is currently experiencing the later stages of demographic transition, placing it among rapidly ageing societies (Müftüler, 2018; Soysal, 2023). While older adults constituted only 3.9% of the population in 1935, this figure had risen to 9.7% by 2021 (Duvan & Kantar Davran, 2022; Soysal, 2023). Population projections indicate that individuals aged 65 and over will account for approximately one-fifth (20.8%) of Türkiye's population by 2050 (Bilir, 2018; Müftüler, 2018; Soysal, 2023).

The principal drivers and consequences of population ageing can be summarized as follows:

Declining Fertility Rates: Social transformations such as increasing educational attainment, greater labor force participation among women, and the shift from extended family structures to nuclear family arrangements have contributed to declining fertility rates (Soysal, 2023; Uyanık, 2017).

Increasing Life Expectancy: Improvements in healthcare services, the control of infectious diseases, and enhanced nutritional conditions have enabled individuals to live longer and healthier lives (Bilir, 2018; Kurt, 2008; Çetin, 2019).

Rising Dependency Ratios: The simultaneous decline in the working-age population and increase in the older population has generated pressures on social security systems, pension schemes, and national economies (Özkul & Kalaycı, 2015; Soysal, 2023; Uyanık, 2017).

Socio-Cultural Transformation: Modernization processes have weakened the traditional authority and social status previously held by older adults. Their role as sources of wisdom and guidance within the family has diminished, exposing many older individuals to challenges associated with role loss, social

exclusion, and reduced social participation (Müftüler, 2018; Soysal, 2023; Uyanık, 2017).

These demographic transformations necessitate the development of inclusive and rights-based social policies in areas such as healthcare, social security, urban planning, housing, and employment. They also underscore the importance of promoting active and healthy ageing frameworks that support the well-being, autonomy, and social participation of older adults (Çetin, 2019; Republic of Türkiye Ministry of Family and Social Services, 2023; Uyanık, 2017).

From this perspective, population ageing should not be framed as a social crisis but rather as a structural transformation that requires effective governance and policy adaptation. The central challenge lies in the capacity of social institutions and public policies to respond to changing demographic realities. The creation of age-friendly environments, the expansion of long-term care services, the implementation of active ageing policies, and the promotion of social participation among older adults represent key priorities for ageing societies. Such an approach contributes to replacing deficit-oriented perspectives that portray older adults as a social burden with more inclusive frameworks that recognize them as rights-bearing citizens, productive contributors, and holders of valuable knowledge and experience.

3. Changes in Family Structure and Ageing

One of the most significant effects of social change on the experience of ageing can be observed in transformations in family structures. In traditional societies, older adults typically lived within extended family systems, maintaining their care arrangements, social support networks, and interpersonal relationships through family members. However, processes such as industrialization, urbanization, rising educational attainment, increased female labor force participation, and growing individualization have brought about profound changes in family life. As the extended family model has gradually been replaced by nuclear family structures, the position of older adults within the family and the nature of intergenerational relationships have been fundamentally reshaped.

In particular, increasing internal and international migration has encouraged adult children to relocate to different cities or countries for educational and employment opportunities, thereby increasing the likelihood that older parents will live alone. The growing geographical distance between family members has weakened traditional caregiving mechanisms and altered the sources of social support available to older adults. Consequently, issues such as loneliness, social isolation, limited emotional support, and the need for assistance with activities of daily living have become increasingly visible.

The modernization process has transformed the traditional extended family structure into a predominantly nuclear family model (Bulduk, 2014; Duvan & Kantar Davran, 2022). This transformation has weakened the authority traditionally held by older adults within the family and, alongside the increasing participation of women in paid employment, has created gaps in conventional family-based caregiving arrangements (Bulduk, 2014; Soysal, 2023). Today, many older adults prefer to maintain what has been described as “intimacy at a distance” with their children while remaining connected to familiar social environments through the practice of ageing in place (Müftüler, 2018; Soysal, 2023).

Nevertheless, living alone should not be interpreted solely as a negative condition. For many older adults who enjoy good health, adequate financial resources, and strong social networks, living independently represents autonomy, self-determination, and the preservation of personal privacy. Therefore, quality of life in later life is determined less by household composition than by the extent to which individuals can access the social, community-based, and institutional support services they require.

Contemporary debates on elder care increasingly focus on the balance between family responsibility and public responsibility. Assigning the entire burden of care to family members may impose significant physical, psychological, and economic costs, particularly on women, who traditionally assume caregiving roles. Consequently, contemporary social policy approaches advocate the development of formal care services that complement family support systems. Home care services, adult day-care centers, community support programs, and neighborhood-based social work interventions contribute to the independent living of older adults while simultaneously reducing caregiving burdens on families. Such arrangements not only improve the quality of life of older individuals but also promote the sustainability of intergenerational solidarity within changing family structures.

4. Urbanization, Space, and Age-Friendly Environments

Urbanization refers to the profound transformation of social structures resulting from large-scale migration from rural areas to urban centers, particularly in the context of industrialization (Müftüler, 2018). This process has contributed to the decline of extended family systems and the expansion of nuclear family arrangements, leading older adults to lose many of their traditional positions of authority, centrality, and support within the family (Soysal, 2023; Müftüler, 2018). In modern urban settings, older people have increasingly moved away from their traditional status as sources of wisdom and authority and are often perceived as economically inactive or dependent populations, creating conditions that may foster loneliness and social isolation (Soysal, 2023; Baran, 2016).

As one of the most visible outcomes of social transformation, urbanization has directly affected the lived experiences of older adults. During the last century, large-scale migration from rural communities to urban areas has reshaped physical environments, social relationships, and everyday lifestyles. However, rapid urban development has often occurred without adequately considering the needs of ageing populations. Consequently, many urban environments remain insufficiently equipped to support the safety, independence, and active participation of older adults.

Environmental barriers such as inadequate or poorly maintained sidewalks, limited accessibility in public transportation systems, insufficient pedestrian crossings, and a lack of public resting spaces can restrict the mobility of older adults. Reduced mobility not only creates physical limitations but may also diminish social participation, thereby increasing the risks of loneliness, social exclusion, and marginalization. For this reason, urban planning strategies should be guided by principles of accessibility and universal design to facilitate the active participation of older adults in community life.

Within this context, the concept of age-friendly cities has gained increasing prominence. Age-friendly cities represent a holistic approach that seeks not only to remove physical barriers but also to foster the social inclusion and active engagement of older adults. Public spaces such as parks, walking paths, cultural centers, libraries, community centers, and neighborhood gathering places can strengthen social interaction and community participation among older populations. Likewise, the incorporation of accessible design principles into housing policies supports independent living and enables older adults to remain in their homes for longer periods.

Physical space constitutes a critical determinant of independence and quality of life in old age (Kalinkara, 2005). Research indicates that older adults spend a substantial proportion of their time within their homes and immediate neighborhoods; therefore, the physical characteristics of housing and surrounding environments significantly influence their safety and opportunities for community engagement (Güler & Çobanoğlu, 1994; Kalinkara, 2011). Physical barriers within urban environments, including inadequate infrastructure, elevated curbs, and complex transportation systems, may restrict participation in social activities and contribute to social exclusion (Durgun & Tümerdem, 1999; Kalinkara, 2005).

The Age-Friendly Environments and Cities approach seeks to make urban areas more accessible, safe, and inclusive for ageing populations (Sun et al., 2018). Policies developed within this framework generally encompass the following dimensions:

Accessibility and Transportation: Age-friendly public transportation systems and barrier-free urban infrastructure facilitate access to services,

resources, and opportunities for older adults (Sun et al., 2018; Republic of Türkiye Ministry of Family and Social Services, 2023).

Ageing in Place: Older adults are encouraged to remain within their familiar home environments while maintaining connections with their communities and accessing necessary support services such as home care and social assistance programs (Çetin, 2019; Soysal, 2023).

Social Participation and Safe Environments: Urban policies should promote the involvement of older adults in decision-making processes and support the development of safe communities designed to minimize risks and enhance social participation (Özcebe, 2007; Republic of Türkiye Ministry of Family and Social Services, 2023).

The significance of place in later life extends beyond the physical environment. Cities also serve as social spaces that contain individual life histories, social networks, and collective memories. Older adults are not merely consumers of urban services; they are also important carriers of cultural heritage and historical memory. The weakening of neighborhood culture, the decline of social ties, and the reduction of opportunities for public interaction may undermine older adults' sense of belonging and community attachment. Therefore, the development of age-friendly environments should be pursued not only through architectural and infrastructural improvements but also through policies that strengthen social solidarity, community engagement, and social inclusion.

5. Technology, Digitalization, and Emerging Inequalities

Rapid advancements in digital technologies have transformed nearly every aspect of social life and fundamentally reshaped individuals' everyday practices. Activities ranging from banking transactions and healthcare services to education and public administration are increasingly conducted through digital platforms. This transformation has significantly influenced the lived experiences of older adults, making access to and proficiency in digital technologies important determinants of social participation and inclusion. Consequently, digitalization creates both new opportunities and new forms of inequality for ageing populations.

Older adults who are able to use digital technologies effectively can access information more efficiently, benefit from public services more easily, and maintain social relationships regardless of geographical distance. In particular, video communication applications, social media platforms, and online healthcare services contribute to sustaining social connectedness and enhancing the quality of life of older individuals. However, the opportunities generated by digitalization are not equally accessible to all segments of society. Limited access to technological devices, insufficient digital literacy skills, concerns regarding

online security, and economic constraints may exclude certain older adults from participating fully in the digital world.

Technological Transformation and the Redistribution of Knowledge Power: In traditional societies, older adults occupied positions of authority and prestige due to their accumulated knowledge and life experience (Duvan & Kantar Davran, 2022; Müftüler, 2018). However, this situation has undergone significant transformation within contemporary digital societies. As technology has become embedded in nearly all areas of life, the value attributed to experiential knowledge has diminished, and informational power has increasingly shifted toward younger generations who possess greater technological competence (Çetin, 2019). This transition has contributed to the erosion of the social status traditionally associated with old age and has created new forms of inequality, causing some older individuals to perceive themselves as outdated, marginalized, or technologically inadequate (Uyanık, 2017; Soysal, 2023).

The Digital Divide and Exclusion in Working Life: Within post-industrial and information societies, rapid technological change has rendered many occupational skills possessed by older workers obsolete (Soysal, 2023). Organizational management often favors younger workers who are perceived as “digital natives,” while negative stereotypes regarding older employees’ ability to adapt to technological innovation may discourage investments in their training and professional development (Sennett, 2011; Soysal, 2023). The emergence of Industry 4.0 and the acceleration of digital transformation processes have increased employment insecurity among workers aged 40 and over, often pushing them toward low-paid, precarious, informal, or insecure forms of employment and thereby reinforcing existing socioeconomic inequalities (Aubert et al., 2006; Soysal, 2023).

Digital Surveillance, Performance Pressure, and Workplace Inequality: The integration of digital technologies into work processes has intensified performance monitoring and surveillance mechanisms in contemporary workplaces. For older workers, this environment often creates heightened pressure to maintain productivity under conditions of continuous evaluation and time-sensitive performance expectations (Soysal, 2023). The increasing pace of work and pervasive digital monitoring may contribute to occupational stress, workplace exclusion, and reduced job satisfaction among individuals who experience age-related physical or cognitive changes.

Accessibility, Service Delivery, and Consumer Culture in Everyday Life: Digitalization has transformed access to essential services, including banking, healthcare, social security administration, and public services. For technologically proficient older adults, digital service delivery offers convenience and flexibility. However, for those with limited digital literacy or

restricted access to technological resources, digitalization may create significant barriers to accessing essential services and exercising social rights (Altındağ, 2017). Furthermore, within neoliberal consumer culture, older adults are frequently overlooked as primary consumers of new technologies and are often underrepresented in media and advertising. At the same time, they are increasingly targeted as consumers of anti-ageing products and technologies that promise the preservation of youthfulness, thereby reconstructing ageing as a market-oriented category within contemporary consumer culture (İlik & İçağasioğlu Çoban, 2021).

In summary, digitalization simultaneously generates opportunities and challenges for older adults. On the one hand, digital technologies facilitate ageing in place, support independent living, and enhance access to information and services. On the other hand, they may disrupt traditional intergenerational power relations and generate new forms of social and economic exclusion for individuals who lack digital competencies or access to technological resources (Republic of Türkiye Ministry of Family and Social Services, 2023; Uyanık, 2017). The COVID-19 pandemic clearly demonstrated the importance of digital inclusion for older populations. During the pandemic, access to healthcare, public services, and social interaction increasingly depended on digital platforms. While digitally competent older adults were better able to adapt to these circumstances, individuals with limited digital skills faced heightened risks of social exclusion and marginalization. Consequently, the digital divide emerged not merely as a technological issue but as a new dimension of broader social inequality.

For this reason, digitalization policies should extend beyond investments in technological infrastructure. Expanding digital literacy programs for older adults, adopting principles of accessible and inclusive design, and developing user-friendly technologies are essential for promoting digital inclusion. Furthermore, intergenerational learning initiatives that encourage younger individuals to share digital knowledge and skills with older adults can strengthen digital participation and reduce technological inequalities. The primary objective should not be to compel older adults to adapt to technology; rather, it should be to ensure that technological systems are designed in ways that respond to the diverse needs, capacities, and experiences of individuals across all age groups.

6. Economy, Retirement, and Active Ageing

One of the most significant dimensions linking ageing to broader processes of social change concerns economic life. In contemporary societies, retirement has emerged as an institutional arrangement that signifies withdrawal from the labor market and transition into a new stage of the life course. However, retirement experiences vary considerably depending on individuals' economic resources, social support systems, and living conditions. For some, retirement provides opportunities for rest, personal development, volunteering, and increased social

participation. For others, it may be accompanied by income loss, economic insecurity, and heightened risks of social exclusion (Phillipson, 2013).

Global economic transformations and changes in labor markets have direct implications for the economic security of older adults. In particular, the expansion of flexible employment arrangements, the persistence of informal labor markets, and transformations in social security systems may weaken income security in later life. Individuals who have spent much of their working lives in low-paid, precarious, or insecure employment are more likely to experience poverty during old age. Similarly, women who have had limited participation in the labor market due to unpaid caregiving responsibilities often encounter greater economic vulnerability in later life (Estes, 2001; Walker, 2002). Consequently, old-age poverty should not be understood merely as a problem emerging during later life but rather as the cumulative outcome of social and economic inequalities that have accumulated across the life course (Phillipson, 2013).

One of the most influential concepts in contemporary ageing policy is active ageing. The active ageing approach seeks to enable individuals to maintain their health, continue participating in social life, and enjoy secure living conditions as they grow older. The World Health Organization defines active ageing as the process of optimizing opportunities for health, participation, and security in order to enhance quality of life throughout the ageing process (World Health Organization [WHO], 2002). This perspective promotes the recognition of older adults not as passive recipients of care who withdraw from social life, but as active citizens who continue to contribute to society through their knowledge, skills, experiences, and social engagement (Walker, 2002).

At the same time, the concept of active ageing requires critical examination. It is important to recognize that older adults do not share identical health conditions, economic resources, or physical capacities. Consequently, active ageing should not evolve into a normative framework that expects all older individuals to remain continuously productive, independent, and economically active. A more inclusive perspective acknowledges the diversity of ageing experiences and recognizes the rights of individuals who require care, live with chronic illnesses, or experience functional limitations. Such an approach emphasizes their entitlement to live with dignity, security, participation, and social inclusion regardless of their level of productivity or independence (Walker, 2002; WHO, 2002).

Accordingly, ageing policies should not be shaped solely by concerns related to economic productivity or labor market participation. Rather, they should be grounded in broader principles of human rights, social justice, social protection, and quality of life. Policies that promote income security, equitable access to healthcare, long-term care services, social participation, and community inclusion are essential for ensuring the well-being of ageing populations. Within

this framework, older adults are recognized as rights-bearing citizens whose social value extends far beyond their economic contributions, thereby reinforcing more inclusive and equitable approaches to ageing and social welfare.

7. Intergenerational Relationships and Solidarity

Processes of social change often give rise to differences in life experiences, value systems, and social expectations among generations. In particular, rapid technological advancements, transformations in the world of work, and shifts in cultural norms have contributed to divergent ways in which younger and older generations perceive and engage with the world. Although these differences may occasionally generate disagreements within family relationships, workplaces, political preferences, and everyday social practices, it would be overly simplistic to interpret intergenerational relations solely through the lens of conflict. The sustainability and resilience of societies depend significantly on the strength of interaction, reciprocity, and solidarity among different generations (Bengtson, 2001).

Intergenerational relationships constitute important social processes through which knowledge, experience, cultural values, and emotional support are transmitted across generations. Older adults, through their accumulated life experiences, historical memory, and cultural capital, can provide guidance and support to younger generations. At the same time, younger individuals can assist older adults by facilitating access to digital technologies, promoting adaptation to social and technological change, and supporting mobility and participation in contemporary social life. This reciprocal exchange not only generates benefits at the individual level but also contributes to social integration, social cohesion, and the development of mutual understanding between generations (Silverstein & Bengtson, 1997).

Although transformations in family structures, urbanization, and processes of individualization have altered the nature of intergenerational relationships, they have not diminished the need for intergenerational solidarity. On the contrary, in ageing societies, intergenerational solidarity has become increasingly important for maintaining social cohesion, social welfare, and collective well-being. Within this context, grandparents often play active roles in childcare and provide substantial emotional support within family networks. Similarly, younger generations can enhance the quality of life of older adults by facilitating access to digital technologies, supporting digital inclusion, and encouraging participation in social and community activities (Walker, 2002).

Educational institutions, local governments, and civil society organizations play a critical role in strengthening intergenerational interaction and cooperation. Initiatives such as collaborative workshops, volunteer programs, oral history projects, cultural heritage activities, and community-based social engagement programs create opportunities for meaningful interaction between generations.

These initiatives promote empathy, mutual respect, and social connectedness while reinforcing the perception of older adults as active and valuable members of society rather than passive recipients of care who have withdrawn from social life.

The World Health Organization has also emphasized that intergenerational solidarity constitutes a key component of social integration and active ageing in ageing societies (WHO, 2002). From this perspective, old age should not be viewed as a period characterized by the withdrawal from social relationships. Rather, it represents a dynamic stage of the life course in which the exchange of knowledge, experience, values, and social support continues across generations. Strengthening intergenerational solidarity therefore contributes not only to the well-being of older adults but also to the development of more inclusive, cohesive, and socially sustainable societies.

8. Ageing Policies and a Rights-Based Approach

As populations age, the position of older adults within society has become increasingly visible within the field of social policy. Understanding the social transformations associated with ageing is important; however, it is equally essential to develop institutional and policy responses that address these changes. For many years, ageing policies were primarily shaped by frameworks centered on care, assistance, and protection, with older adults frequently viewed as passive recipients of services and support. More recently, however, the emergence of rights-based approaches has challenged this perspective by emphasizing that older persons are not merely a group requiring protection but are citizens entitled to equal rights, dignity, autonomy, and full participation in social life (United Nations, 1991; WHO, 2002).

At the core of the rights-based approach are the principles of human dignity, equality, participation, non-discrimination, and social justice. Within this framework, ensuring older adults' access to healthcare services, income security, adequate housing, accessible transportation, social participation opportunities, lifelong learning, and involvement in decision-making processes is of fundamental importance (United Nations, 2002). The objective of ageing policy is therefore not limited to meeting basic needs; rather, it seeks to create the conditions necessary for older individuals to maintain independent lives and actively participate in society as full members of their communities.

Within this context, ageism has emerged as one of the most significant social challenges confronting older adults. The perception of older people as unproductive, resistant to change, dependent, or burdensome may generate various forms of exclusion at both interpersonal and institutional levels. Age-based discrimination can negatively affect older adults' rights, opportunities, and quality of life across multiple domains, including healthcare, employment, media

representation, social relationships, and access to public services (Butler, 1969; WHO, 2021).

Consequently, contemporary ageing policies should extend beyond a narrow focus on service provision. They must also seek to transform societal perceptions of ageing, enhance the participation of older adults in governance and decision-making processes, and promote the development of age-friendly social environments. Mechanisms such as senior councils, participatory local governance practices, age-friendly urban policies, and inclusive social service programs constitute important instruments for achieving these objectives (WHO, 2007).

In addition, reducing age-related stereotypes through education and media initiatives, fostering intergenerational understanding, and increasing the social visibility and representation of older adults can contribute significantly to the development of more democratic, inclusive, and socially cohesive societies. Such efforts help challenge age-based prejudice and reinforce the recognition of older adults as active social actors rather than passive beneficiaries of welfare services.

Ultimately, ageing policies should evolve into a comprehensive framework that extends beyond the organization of care services. Grounded in the principles of human rights, social justice, social inclusion, and active citizenship, this framework should promote the equal participation of older adults in all spheres of social life. By adopting a rights-based perspective, societies can move toward more equitable and inclusive ageing policies that recognize older persons as rights-bearing citizens whose dignity, autonomy, and social contributions deserve full recognition and protection.

Conclusion

The relationship between ageing and social change represents one of the most significant dimensions of contemporary social transformation. Increasing life expectancy, declining fertility rates, and the progressive ageing of populations have elevated ageing from an individual life-course phenomenon affecting a specific age group to a central issue within contemporary societies. Consequently, ageing should not be understood solely as a biological process but rather as a multidimensional social phenomenon shaped by economic, cultural, political, and social dynamics.

The discussions presented throughout this chapter demonstrate that ageing is a socially constructed category and that the experiences of older adults are profoundly influenced by the social contexts in which they live. Processes such as demographic transition, transformations in family structures, urbanization, digitalization, and economic restructuring shape the lives of older individuals in diverse ways, creating both new opportunities and new forms of vulnerability. In particular, challenges such as loneliness, social isolation, digital exclusion,

income insecurity, and age-based discrimination have emerged as critical issues that ageing societies must address through comprehensive and inclusive policy responses.

At the same time, ageing should not be defined solely through the lens of problems, dependency, or social need. Older adults continue to play vital roles within society through their accumulated knowledge, life experiences, cultural memory, social capital, and contributions to family and community life. Strengthening intergenerational solidarity, promoting age-friendly environments, enhancing digital inclusion, and expanding initiatives that support active ageing represent important policy directions capable of fostering greater social participation and improving the quality of life of older adults.

Contemporary approaches to ageing must move beyond traditional models centered exclusively on care, assistance, and protection and instead embrace a rights-based perspective. Ensuring older adults' access to healthcare, adequate housing, income security, social participation, lifelong learning opportunities, and involvement in decision-making processes is essential not only for improving the well-being of ageing populations but also for promoting more equitable, inclusive, and democratic societies. Within this framework, the primary objective of ageing policy should be to create conditions that enable older adults to remain active, autonomous, and valued members of society rather than treating them merely as passive recipients of services and support.

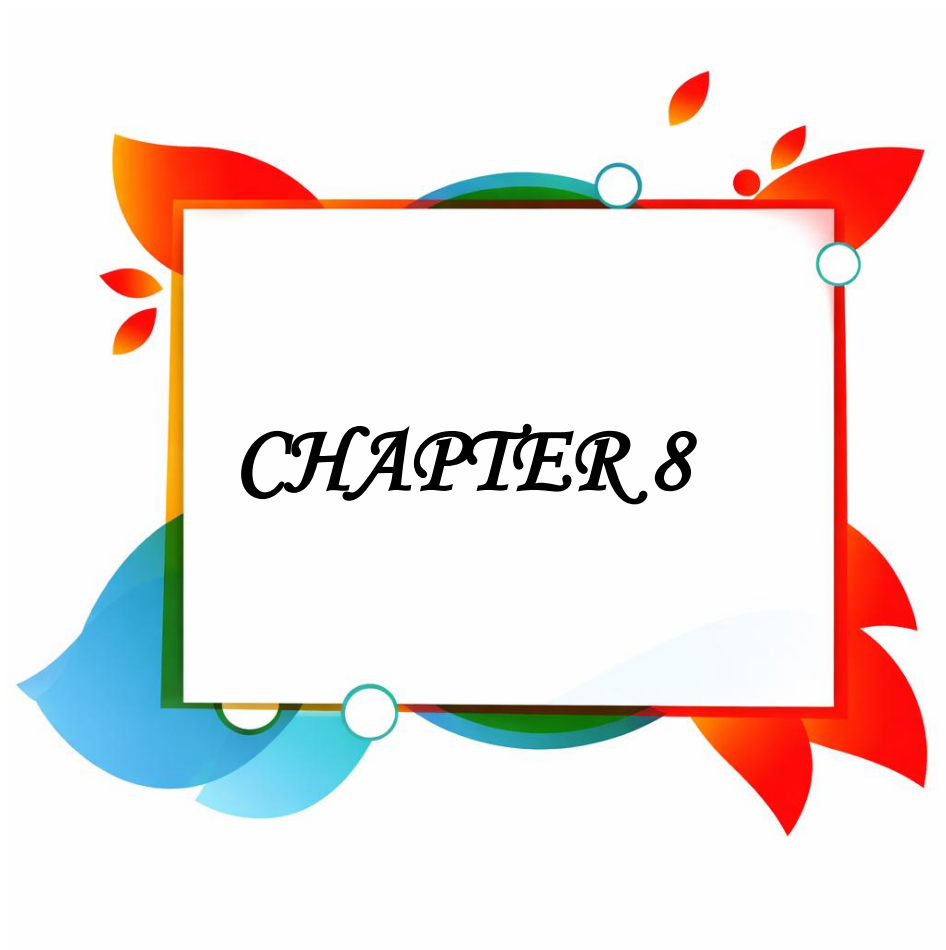
Ultimately, the reality of population ageing requires new ways of thinking that extend beyond the boundaries of social policy and encompass all dimensions of social life. Rather than adopting approaches that position older adults at the margins of society, there is a need to strengthen perspectives that recognize their knowledge, experience, and lived realities as valuable resources for social development. The creation of accessible, inclusive, and solidarity-based living environments for all members of society will not only enhance the well-being of today's older populations but will also provide the foundation for sustainable, humane, and socially just societies in the future. In this sense, responding effectively to population ageing should be regarded not merely as a demographic necessity but as a fundamental component of social development, social justice, and inclusive citizenship in the twenty-first century.

References

- Akçay, C. (2015). Yaşlılık ve emeklilik: Kavramlar, kuramlar, sorunlar. Pegem Akademi.
- Altındağ, Ö. (2017). Diyarbakır'da yaşlı olmak: İhtiyaçlar, sorunlar ve hizmet beklentileri [Being old in Diyarbakır: Needs, problems, and service expectations] (Doctoral dissertation, Hacettepe University).
- Aubert, P., Caroli, E., & Roger, M. (2006). New technologies, organisation and age: Firm-level evidence. *The Economic Journal*, 116(509), F73–F93. <https://doi.org/10.1111/j.1468-0297.2006.01060.x>
- Baran, A. G. (2016). Yaşlılıkta sosyal izolasyon ve yalnızlık. İçinde H. Ceylan (Ed.), *Yaşlılık sosyolojisi* (ss. 77–96). Nobel Yayıncılık.
- Bengtson, V. L. (2001). Beyond the nuclear family: The increasing importance of multigenerational bonds. *Journal of Marriage and Family*, 63(1), 1–16. <https://doi.org/10.1111/j.1741-3737.2001.00001.x>
- Bilir, N. (2012). Yaşlılık tanımı, yaşlılık kavramı, epidemiyolojik özellikler. İçinde N. Bilir ve N. P. Erbaydar (Ed.), *Halk sağlığı temel bilgileri*.
- Bilir, N. (2018). Yaşlılık tanımı, yaşlılık kavramı, epidemiyolojik özellikler. İçinde N. Bilir (Ed.), *Yaşlı sağlığı* (ss. 13–31).
- Bulduk, E. Ö. (2014). Yaşlılık ve toplumsal değişim. *TSA*, 18(2), 53–61.
- Butler, R. N. (1969). Age-ism: Another form of bigotry. *The Gerontologist*, 9(4), 243–246. https://doi.org/10.1093/geront/9.4_Part_1.243
- Çetin, S. (2019). Yaşlılarda yaşam kalitesi ve yaşlılık algısında sosyal hizmetin rolü: Ankara örneği [The role of social work in the quality of life and perceptions of ageing among older adults: The case of Ankara] (Master's thesis, Sakarya University).
- Çunkuş, N., Taşdemir Yiğitoğlu, G., & Akbaş, E. (2019). Yaşlılık ve toplumsal dışlanma. *Geriatrik Bilimler Dergisi*, 2(2), 58–67.
- Durgun, B., & Tümerdem, Y. (1999). Kentleşme ve yaşlılara sunulan hizmetler. *Geriatrist Dergisi*, 2(3), 115–120.
- Duvan, E. K., & Kantar Davran, M. (2022). Tarihsel süreçte yaşlının toplumsal statüsü. *Journal of Social and Humanities Sciences Research*, 9(86), 1625–1632. <https://doi.org/10.26450/jshsr.3191>
- Estes, C. L. (2001). *Social policy and aging: A critical perspective*. Sage Publications.
- Güler, Ç., & Çobanoğlu, Z. (1994). Yaşlı ve çevre (Çevre Sağlığı Temel Kaynak Dizisi No. 24).

- İlik, B., & İçağasıoğlu Çoban, A. (2021). Yaşlılık ve sosyal hizmetler (Teknik Rapor No. 16- 2021/2). Sağlık ve Sosyal Yardım Vakfı.
- Kalınkara, V. (2005). Yaşlılık döneminde birey-çevre etkileşimi için tasarım: Gerontolojik yaklaşım. İçinde Ş. Ergin (Ed.), III. Ulusal Yaşlılık Kongresi Kitabı (ss. 138–148). Okullar Yayınevi.
- Kalınkara, V. (2011). Temel gerontoloji: Yaşlılık bilimi. Nobel Akademik Yayıncılık.
- Kurt, G. (2008). Türkiye’de yaşlılık olgusuna sosyolojik bir bakış (Sivas il örneği) [A sociological perspective on the phenomenon of ageing in Türkiye: The case of Sivas] (Master’s thesis, Cumhuriyet University).
- Kurt, G., Beyaztaş, F. Y., & Erkol, Z. (2008). Yaşlıların sorunları ve yaşam memnuniyeti. *Adli Tıp Dergisi*, 24(2), 32–39.
- Müftüler, H. G. (2018). İstanbul’da yaşlılık ve yaşlılığın yapısal değişimi. *Yıldız Sosyal Bilimler Enstitüsü Dergisi*, 2(1), 58–80.
- Özcebe, H. (2007). Yaşlılar ve güvenli toplumlar. İçinde Yaşlılıkta kaliteli yaşam (Bölüm 20, ss. 127–132). Hacettepe Üniversitesi GEBAM.
- Özkul, M., & Kalaycı, I. (2015). Türkiye’de yaşlılık çalışmaları. *Sosyoloji Konferansları*, 52, 259–290.
- Phillipson, C. (2013). Ageing. Polity Press.
- Sennett, R. (2011). Karakter aşınması: Yeni kapitalizmde işin kişilik üzerindeki etkileri (B. Yıldırım, Çev.). Ayrıntı Yayınları.
- Silverstein, M., & Bengtson, V. L. (1997). Intergenerational solidarity and the structure of adult child-parent relationships in American families. *American Journal of Sociology*, 103(2), 429–460. <https://doi.org/10.1086/231213>
- Soysal, G. (2023). Türkiye’de toplumsal yaşlanma ve çalışma hayatı: Özellikler, sorunlar ve bir uygulama [Social ageing and working life in Türkiye: Characteristics, challenges, and an application] (Doctoral dissertation, Bursa Uludağ University).
- Sun, Y., Phillips, D. R., & Wong, M. (2018). A study of housing typology and perceived age-friendliness in an established Hong Kong new town: A person-environment perspective. *Geoforum*, 88, 17–27.
- T.C. Aile ve Sosyal Hizmetler Bakanlığı. (2023). Yaşlanma vizyon belgesi.
- Tufan, İ. (2002). Antik çağdan günümüze yaşlılık: Sosyolojik yaşlanma. İTGE Yayınları.
- United Nations. (1991). United Nations principles for older persons. United Nations General Assembly Resolution 46/91. <https://www.un.org/development/desa/ageing/resources/international-year-of-older-persons-1999/un-principles-for-older-persons.html>

- United Nations. (2002). Political declaration and Madrid international plan of action on ageing. United Nations. <https://social.un.org/ageing-working-group/documents/mipaa-en.pdf>
- Uyanık, Y. (2017). Yaşlılık, yaşlanan nüfus ve sosyal politika. *İş ve Hayat*, 67–104.
- Walker, A. (2002). A strategy for active ageing. *International Social Security Review*, 55(1), 121–139. <https://doi.org/10.1111/1468-246X.00118>
- World Health Organization. (2002). Active ageing: A policy framework. World Health Organization. <https://apps.who.int/iris/handle/10665/67215>
- World Health Organization. (2007). Global age-friendly cities: A guide. World Health Organization. <https://apps.who.int/iris/handle/10665/43755>
- World Health Organization. (2021). Global report on ageism. World Health Organization. <https://www.who.int/publications/i/item/9789240016866>



Social Comparison and Identity in the Age of Social Media: Theoretical Foundations and Contemporary Findings

Hanife Merve Çatan¹

1. The Theoretical Foundations of Social Comparison

The systematic study of how people place themselves in relation to others traces back to Leon Festinger's (1954) *A Theory of Social Comparison Processes*. Festinger proposed that human beings carry a basic motivation to assess their own opinions and abilities, and that when objective standards for such assessment are unavailable, they turn to other people as their reference point (1954). Many of the questions that arise in everyday life (for instance, whether one's political views are defensible) cannot be settled by appeal to physical reality. In these cases, the only available yardstick is the attitudes and behaviors of others in comparable situations. Given how directly the theory speaks to our ordinary intuitions, it is reasonable to say that Festinger's account reframed self-evaluation as a fundamentally social act.

According to the theory, the comparisons we make intuitively in daily life are not random processes. Festinger (1954) introduced the similarity hypothesis, arguing that people prefer to compare themselves with others who resemble them, on the grounds that a comparison with someone vastly superior or far below offers little diagnostic information. He also drew a distinction between the mechanisms governing comparison of opinions and comparison of abilities. People do not merely want to know how competent they are; they also want to become more competent. This pulls ability comparisons in the direction of targets who are somewhat superior to oneself, and so abilities carry a unidirectional upward drive that opinions do not. From these premises Festinger derived a set of group-level consequences, among them pressures toward uniformity and the tendency to break off comparison with—and to derogate—those who diverge too sharply. In its original form, the theory addressed deliberate evaluation among similar individuals within relatively bounded, co-present social groups.

¹ RA, University of Health Sciences, Psychology Department,
ORCID: 0000-0003-0848-4452

The theory expanded considerably over the decades that followed. Researchers widened its scope from the evaluation of opinions and abilities to the assessment of personal attributes, emotions, and life circumstances more generally, and they began to distinguish the various motives that comparison could serve. As part of this expansion, it was shown that people compare themselves not only for accurate self-evaluation but also for self-enhancement and self-improvement (Wood, 1989). The most consequential development, however, was Wills's (1981) articulation of downward comparison principles. Wills argued that individuals experiencing threat or diminished well-being could recover a subjective sense of adequacy by comparing themselves with others who were worse off. Where Festinger (1954) had emphasized the informational value of similar and slightly upward targets, Wills (1981) clarified the self-protective value of downward ones. Taylor and Lobel (1989) added a further wrinkle in an early study, observing that people may turn to downward comparisons to enhance their feelings while simultaneously seeking contact with -and information from- those who are doing better.

A further important development concerned the affective consequences of comparison direction. For a long time, theory assumed that upward comparison weakened the self while downward comparison elevated it. More recent work has shown this view to be too coarse. Upward comparison can produce a contrast effect, in which the gap between self and target is experienced as a deficit and self-evaluation suffers, but it can equally produce an assimilation effect, in which the target is perceived as attainable and the comparison becomes motivating rather than discouraging (Collins, 1996). Which reaction emerges depends on whether the person making the comparison sees the target as relevantly similar, the standard as accessible, and the dimension as malleable. Downward comparison is similarly bidirectional: it can reassure, but it can also raise anxiety about one's own potential decline. In short, the emotional payoff of comparison is not fixed but conditional, and this becomes centrally important once comparison moves online.

A further line of theoretical refinement clarified that comparison is not only a source of information but also a determinant of behavior and social relationships. Tesser's (1988) self-evaluation maintenance model proposes that when a psychologically close other outperforms us on a dimension central to our self-definition, the comparison threatens our self-evaluation; we respond by distancing ourselves from that person, reducing the importance of the dimension, or undermining the other's performance. If the dimension is not relevant to the self, however, the same achievement by a close other becomes a source of pride and strengthens rather than weakens self-evaluation. The model thus brought into sharp focus two variables that the digital context renders especially variable: the psychological closeness of the comparison target and the self-relevance of the comparison dimension. In doing so it demonstrated that comparison shapes

whom we approach, whom we avoid, and which activities we choose to pursue. This accumulated theoretical inheritance offers a rich vocabulary—direction of comparison, contrast and assimilation, similarity and closeness of the comparison target, self-relevance of the dimension—that makes it possible to analyze, rather than merely describe, the psychological consequences of social media.

As evidence accumulated, social comparison evolved from a single theory into a broad research field (Buunk & Gibbons, 2007). Contemporary syntheses have emphasized that comparison is often a rapid, spontaneous, and not consciously chosen process that arises whenever one encounters information about another person (Suls et al., 2002). This last point bears directly on the present chapter. Festinger's original theory described deliberate comparison among similar peers within small, co-present groups. The internet-based, asynchronous environments populated by strangers in which comparison now mostly takes place fall well outside these scope conditions and are directly relevant to where the theory now stands. In these settings, the similarity of targets is not guaranteed, comparison is more often the result of incidental exposure to what the feed delivers than the product of a deliberate choice, and the option of ceasing comparison with those too different is obstructed by an environment that continually supplies new targets. The next section turns to the structural features through which these environments intensify the comparison process and to the related concepts with which it has become entangled.

2. Social Media and Online Social Comparison

Social networking platforms constitute an ongoing and unusually rich infrastructure for social comparison. When Festinger (1954) first formulated the theory, he assumed that comparison information was relatively costly to obtain; social media has reversed this assumption. A user scrolling on a platform encounters, in a matter of minutes, dozens of data points concerning the appearance, achievements, relationships, possessions, and leisure activities of others, most of whom are only loosely known. Several features of these platforms expand the comparison process far beyond what is available offline. Comparison information is continuously accessible and asynchronous, which means it can be reached at any hour of the day and dwelled on for as long as one wishes. The comparison information obtained from social media is also quantified: likes, followers, comments, and views correspond to numerical scores and translate comparisons that would otherwise be ambiguous into a precise arithmetic. This information is, in addition, permanent and searchable, so that a single favorable or unfavorable comparison can be revisited indefinitely. For these reasons Verduyn et al. (2020) characterize social network sites as environments that both multiply opportunities for comparison and shape the direction those comparisons take.

The direction of comparison that emerges on social media is overwhelmingly upward, and the explanation lies in self-presentation. Goffman's (1959) dramaturgical analysis of everyday life distinguished a front stage, where people present carefully arranged and idealized versions of themselves, from a back stage, where less flattering realities are managed out of view. Social media platforms are almost entirely front-stage environments. Users selectively share their most attractive photographs, their accomplishments, and their most enviable experiences, frequently reinforcing them with editing tools and filters (Fox & Vendemia, 2016). The result is a systematically positivity-biased feed in which the ordinary viewer measures the unedited whole of their own life, disappointments included, against a curated highlight reel of other people. Upward comparison on social media is therefore not an occasional event but the statistical default, and because idealized targets are typically perceived as dissimilar and their achievements as unattainable, the dominant response is contrast rather than inspiration (McComb et al., 2023).

The identity of the comparison target matters at least as much as the direction of comparison, and here social media diverges sharply from the offline environments Festinger had in mind. In offline life, those available for comparison form a relatively stable circle made up mostly of close peers; on social media, the feed gathers a heterogeneous and continuously shifting set of targets spread across three broad clusters. The first cluster comprises strangers and celebrities, whose lives are distant and whose accomplishments, however impressive, can often be set aside as bearing little relation to one's own circumstances. The second cluster, a category specific to the platform era, consists of influencers: seemingly ordinary individuals who have professionalized their self-presentation and occupy an ambiguous position between celebrity and peer. Influencers are close enough to invite comparison but idealized enough to lose it. The developmentally most consequential cluster is the third—familiar peers. Classmates, acquaintances, former friends, and others drawn from one's own social environment all fall into this group. Because these targets satisfy Festinger's similarity criterion and the closeness criterion central to Tesser's model, comparison with them is both more likely to occur and more likely to affect self-evaluation. Midgley et al. (2021) captured the point with the observation that social media can turn every day into a high school reunion. The phrase signals continuous exposure to the life trajectories of precisely the people against whom one is most inclined to measure oneself. The platform, then, does not merely supply more comparison targets; it changes their composition, so that idealized content is often offered by a familiar peer rather than a distant figure.

The relationship between platform use and comparison varies with the type of use. A consistent distinction in the literature separates active use—posting, messaging, and direct interaction—from passive use, which consists largely of silently watching and scrolling through the content of others (Verduyn et al.,

2017). Passive use is the more harmful of the two. Without the compensating benefits of connection or self-expression, passive use consists in being exposed to the self-presentations of others, and it is the form most strongly associated with upward comparison and envy. Kross et al. (2013) showed in early findings that Facebook use predicted declines in momentary affect and life satisfaction over time, and subsequent studies identified social comparison as a central explanatory pathway. Vogel et al. (2014) demonstrated that habitual and frequent Facebook use was linked to lower trait self-esteem and that this association was explained by exposure to upward comparisons. In a complementary study, Vogel et al. (2015) showed that the pattern was moderated by social comparison orientation: individuals with a stronger tendency to compare themselves both used social media more and were more damaged by it. de Vries and Kühne (2015) similarly found that susceptibility to negative comparison on Facebook depended on the user's dispositional and self-evaluative characteristics. The effect of social media on the self is therefore determined both by what users do on the platform and by who they are.

3. The Structural Features of Social Media Platforms

The kind of comparison a platform draws users into is closely related to what that platform is designed to display. Visually oriented platforms such as Instagram and TikTok place the body and face front and center and therefore steer comparison toward appearance in particular. Physical appearance comparison—the assessment of one's own physical attractiveness against that of others—is a particularly consequential form of upward comparison (Schaefer & Thompson, 2014; Thompson et al., 1991). This is so because physical appearance is highly visible and immediately judged in a photograph-based feed, and because cultural ideals of attractiveness are narrow, demanding, and unreachable for most users. Comparison targets include not only celebrities and influencers but also peers, whose edited and filtered self-portraits offer an idealized standard that is perceived as relevant and proximate. Burnell et al. (2019) found that among the platforms they examined, Instagram showed the strongest association between passive scrolling and social comparison, and they attributed the pattern to the platform's visually oriented design. These differences in platform-driven effects suggest that the risks of social media are not evenly distributed across platforms. Those that privilege visual self-presentation tend to produce the appearance-focused comparisons most closely linked to body dissatisfaction and weakened self-evaluation.

Two additional features of contemporary platforms intensify the comparison process in ways that bear directly on the self. The first is quantification: platforms attach publicly visible numerical measures to every post and every user (likes, comments, follower counts, view counts), transforming a previously diffuse social standing into an explicit and comparable score (van Dijck, 2013). Self-

presentation thereby becomes a measurable performance whose success or failure is made visible both to the user and to others (Hogan, 2010). Pursuing these numerical measures can make self-worth contingent on quantitative external feedback. Experimental studies have shown that receiving more likes raises state self-esteem while receiving fewer lowers it (Burrow & Rainone, 2017; Sherman et al., 2016). The second relevant feature of social media platforms is algorithmic curation. Feeds are not neutral, chronological records but are ordered by recommendation systems that select and surface content predicted to maximize engagement (Beer, 2017; Bucher, 2012). Because content showcasing extraordinary appearance, achievement, or experience attracts high engagement, algorithmic curation can systematically overrepresent the upward comparison targets most apt to deflate self-evaluation (Tiggemann & Anderberg, 2020). Quantification and curation together contribute to the closure of a self-reinforcing loop. Social media users post in search of approval, compare the response their posts receive against what others receive, and return to the feed—where curated, idealized content awaits them—in order to seek the very validation the comparison has just rendered uncertain. This posting–validation–comparison cycle helps explain why problematic and excessive use is so often not merely observed alongside social comparison but is interwoven with it.

In offline life, by contrast, people present themselves somewhat differently to family, employers, close friends, and strangers. The separation of these audiences allows a person to sustain context-appropriate variants of the self without falling into obvious contradiction (Goffman, 1959). Social media tends to dissolve these boundaries. Marwick and boyd (2011) characterized the resulting situation as context collapse: the fusing of multiple previously distinct audiences into a single, indeterminate audience addressed through a single profile or post. The user can no longer reliably tailor self-presentation to a known audience and must instead speak to an imagined and potentially unbounded observer, presenting a single self acceptable to all such observers (Litt, 2012). This generates two consequences for comparison and identity. First, because a post reaches every audience simultaneously, the stakes of self-presentation rise, and a comparison that goes poorly is observed broadly rather than privately. Second, users are pushed either toward a simplified, broadly acceptable persona or toward the effortful maintenance of separate accounts for different audiences. Both strategies have been empirically documented among users (Vitak, 2012). Either can strain the consistency and perceived authenticity of self-presentation. Context collapse thus makes the front-stage performance both more consequential and harder to sustain, and it does so during the developmental years when young people are still working out which self to present.

4. Concepts Associated with Social Comparison on Social Media

Social comparison on social media is not an isolated psychological process. It sits at the center of a cluster of concepts that it both feeds and is fed by. This cluster cannot be reduced to comparison alone, yet it cannot be fully understood without it. For this reason, the present section treats fear of missing out, envy, self-objectification, validation-seeking, and problematic social media use as the components of a pattern through which comparison keeps the user continuously within the stream.

The most visible member of this cluster is the fear of missing out (FoMO). Przybylski et al. (2013) defined FoMO as a pervasive apprehension that others may be having rewarding experiences from which one is absent, along with a persistent desire to stay informed of what others are doing. Drawing on Deci and Ryan's (1985) self-determination theory, the authors demonstrated that FoMO is elevated in individuals whose basic psychological needs for competence, autonomy, and relatedness are inadequately met, and that it predicts more intense social media use. At the conceptual level, FoMO is deeply intertwined with social comparison: the sense of "missing out" arises through comparing one's own experience with the curated evidence of others. Burnell et al. (2019) demonstrated this connection empirically, showing that passive social network use predicted higher social comparison, which in turn predicted higher FoMO and ultimately lower well-being in a sequential pattern. FoMO is therefore not only an output of comparison but also a motivational pull that returns the user to the feed and so generates fresh opportunities for comparison.

The second concept, envy, is the classic affective consequence of social comparison. In their comprehensive review, Smith and Kim (2007) defined envy as a painful feeling comprising displeasure and ill feeling, arising from an upward comparison with someone perceived as superior. van de Ven, Zeelenberg, and Pieters (2009) drew a theoretically important distinction between two forms: benign envy, which mobilizes the motivation to reach the other's success, and malicious envy, which generates the desire to pull the other's success down. In the social media context, the literature on envy has largely focused on the second form and its links with affect. Krasnova, Widjaja, Buxmann, Wenninger, and Benbasat (2015) argued that the passive consumption of friends' positivity-biased posts can elicit envy and may set off a self-reinforcing envy spiral, in which envious users intensify their own self-promotional posting, thereby raising the comparison standard for everyone else. Tandoc, Ferrucci, and Duffy (2015), in a study of 736 college students, corroborated this pattern empirically: they showed that Facebook envy mediated the relationship between surveillance use of Facebook and depressive symptoms and that Facebook use was not on its own positively related to depression once this mechanism was controlled for. Appel, Gerlach, and Crusius (2016), in their review of the so-called "Facebook

depression" hypothesis, concluded that envy arising from upward comparison is one of the most plausible pathways linking social media use to depressive symptoms, while cautioning that the effects are modest and conditional.

The third concept, self-objectification, is a specific consequence of appearance-based comparison. Fredrickson and Roberts's (1997) objectification theory argued that women in particular, when their bodies are continually exposed to the evaluative perspective of an external observer, may over time internalize that perspective and come to evaluate their own bodies as objects. Vandenbosch and Eggermont (2012) showed in a sample of adolescent girls that media exposure operates sequentially through the internalization of beauty ideals, self-objectification, and body surveillance. Social media directly feeds this process by continuously offering opportunities for comparison between visibly and quantitatively evaluable images of oneself and images of others. Hanna, Ward, Seabrook, Jerald, Reed, Giaccardi, and Lippman (2017) showed that the association between Facebook use and psychological well-being in emerging adults was mediated by both social comparison and self-objectification, demonstrating that on visually oriented platforms, comparison and objectification operate not as a single mechanism but as two interlocking ones.

The fourth concept is the validation-seeking and feedback-seeking that platforms structurally encourage. Crocker and Wolfe (2001) argued that when self-worth is based on the approval of others, it acquires an unstable character that rises and falls with external feedback, becoming what they called approval-contingent self-worth. Social media provides an infrastructure that institutionalizes this contingency through the liking and commenting of every user's posts by others. Nesi and Prinstein (2015), in a longitudinal study of 619 adolescents, found that technology-based social comparison and feedback-seeking behaviors predicted depressive symptoms and that this association was particularly strong among girls and lower-status peers. This result situates the construct in the social psychology literature as an independent and gender-moderated structure. In a smaller experimental setting, Burrow and Rainone (2017) directly demonstrated that when participants were led to believe their own posts had received fewer likes than average, their state self-esteem dropped, providing causal evidence of the effect of quantitative feedback on self-worth.

The fifth structure, which connects these four concepts and frequently emerges as their joint outcome, is problematic social media use. Andreassen (2015), in her review of social network addiction, defined problematic use as a pattern characterized by loss of control, continued use despite negative consequences, and mental preoccupation. Marino, Gini, Vieno, and Spada (2018), in a meta-analysis of adolescents and young adults, reported that problematic Facebook use was moderately positively associated with psychological distress and moderately negatively associated with well-being.

Foremost among the mechanisms feeding this pattern is social comparison. Samra, Warburton, and Collins (2022) demonstrated that social comparison functions as a mediating mechanism in the relationship between problematic social media use and depressive symptoms. When the concepts discussed above (FoMO, envy, self-objectification, validation-seeking) come together, they hold the user inside a closed loop in which the discomfort caused by the feed is sought to be alleviated by returning to that same feed; problematic use is the behavioral outcome of this loop.

Two issues require careful handling in the picture that emerges from these mechanisms. The first concerns causal direction. Although it is natural to describe social media use as generating comparison and comparison as generating distress, a significant portion of the available evidence is correlational and these relationships are most likely reciprocal. Individuals who already feel inadequate or whose mood is low are more inclined toward comparison and passive scrolling, and the experience further deepens the condition that initiated it. Verduyn, Ybarra, Résibois, Jonides, and Kross (2017), in their critical review, emphasized this circularity and observed that social media use and well-being do not act on one another along a unidirectional causal path but rather influence one another within a feedback loop. The second issue is that the mechanisms discussed above do not operate uniformly across users. Their strength depends on the platform, on the type of use, and on the user's stable characteristics, including social comparison orientation and baseline self-esteem. These two important caveats do not weaken the claim that comparison is the principal mechanism linking social media to the self. The real question is not whether social media affects the self but in whom, under what patterns of use, and through which of these interwoven processes that influence is strongest.

5. The Identity-Related Psychosocial Consequences of Online Social Comparison

Since what social comparison exists to evaluate is the self itself, the downstream consequences of habitual online comparison are most consistently organized around the self and identity. This section addresses these consequences under six thematic headings: self-esteem, contingent self-worth, self-concept clarity, body image, identity formation, and self-discrepancies. These are followed by two paragraphs discussing the affective and clinical outcomes most often reported in the empirical literature and, finally, the conditions and moderators that shape them.

The most directly affected outcome is self-esteem. A useful distinction separates trait self-esteem, the relatively stable general evaluation of one's worth, from state self-esteem, the momentary and fluctuating sense of adequacy. Online comparison affects both. Vogel, Rose, Roberts, and Eckles (2014) showed that Facebook users frequently exposed to upward comparison reported lower trait

self-esteem; in a follow-up study, Vogel, Rose, Okdie, Eckles, and Franz (2015) demonstrated that this pattern was moderated by social comparison orientation, with high-orientation individuals both comparing more and being more harmed by it. Burrow and Rainone (2017), in an experimental setup, showed that like-feedback has a direct causal effect on state self-esteem. Beyond these findings, recent work on feedback loops in adolescents suggests that algorithmically mediated validation may render young people's self-evaluations particularly volatile (Chen, 2025). Taken together, these results show that short-term comparison experiences may accumulate over time to erode trait self-esteem.

A second question closely linked to the level and stability of self-esteem concerns what self-esteem rests on—that is, its contingencies. Crocker and Wolfe (2001) argued that general self-esteem is not a single, undifferentiated quantity but is based on specific domains such as academic competence, virtue, physical appearance, or the approval of others, with self-worth rising and falling alongside successes and failures in the domains an individual treats as central. The relevance to social media is direct. Platforms organized around quantitative feedback push users toward basing their self-worth on highly external and highly visible domains—most prominently, the approval of others and physical appearance. When self-worth becomes dependent on the approval of others, the locus of self-evaluation shifts outward; one's sense of value is no longer anchored in internally adopted standards but has effectively been delegated to an audience whose reactions are variable, quantitative, and beyond the user's control. Because this externalization changes the structure of how one knows one's own value, the shift is not only one of self-esteem but also one of identity, and it helps to explain why social comparison in this environment can be so harmful.

A third and closely related outcome is self-concept clarity—the extent to which one's self-beliefs are clearly defined, internally consistent, and stable over time (Campbell, 1990). Several features of social media plausibly threaten this clarity. The maintenance of carefully curated, idealized personas can widen the gap between the self that is displayed and the self that is privately experienced, and sustaining multiple audience-tailored presentations across different platforms may fragment rather than consolidate one's self-understanding. Importantly, the research here points to a moderating role for authenticity. Bargh, McKenna, and Fitzsimons (2002) showed that online environments can allow a person to express their "true self" more comfortably than they can offline, and Reinecke and Trepte (2014), drawing on longitudinal data, demonstrated that online authentic expression predicts well-being. Consistent with these findings, Avci, Baams, and Kretschmer (2025) reported in a systematic review that what is associated with diminished self-concept clarity is not social media use itself but idealized self-presentation.

The fourth domain, where evidence is strongest and most consistent, is body image. On visually oriented platforms, appearance-related comparison is robustly tied to body dissatisfaction, internalization of culturally idealized body types, and, in more severe cases, disturbed eating attitudes and symptoms. Experimental and longitudinal studies with young women and adolescent girls have repeatedly linked Facebook and Instagram exposure to elevated body image concerns (Fardouly, Diedrichs, Vartanian, & Halliwell, 2015; Tiggemann & Slater, 2013), and the meta-analysis by Bonfanti et al. (2025) confirmed a reliable association between social comparison on social media and both body image concerns and eating-disorder symptoms. Fardouly and Vartanian (2016), reviewing the literature on social media and body image, emphasized that the operative variable is not exposure to a platform itself but appearance comparison, demonstrating that what mediates the harm is the act of comparing one's own body with the bodies displayed on the platform.

The fifth domain, which provides the developmental background of these processes, is identity formation. The most intensive users of social media are adolescents and emerging adults, for whom identity formation is the central developmental task. Erikson (1968) characterized adolescence as the stage at which the individual must resolve the identity-versus-role-confusion crisis by integrating values, attachments, and self-images into a coherent sense of who one is. Marcia (1966) operationalized this process through the dimensions of exploration and commitment, and later models such as the three-factor framework of Crocetti, Rubini, and Meeus (2008) added the continuous reconsideration of commitments. Social media can serve this developmental work; it may function as a relatively low-stakes laboratory in which young people try out self-presentations, receive feedback, and explore different identities. The same affordances, however, can disrupt the process. Avci et al. (2025) found that adolescents engaged in online social comparison exhibited not only higher identity exploration but also higher identity distress—the uncomfortable, anxious uncertainty that accompanies an unresolved sense of self—suggesting that online comparison may keep the identity question continually open by offering an endless stream of alternative selves against which any provisional commitment can be found wanting.

The sixth domain, which provides the conceptual logic for comparison's effect on identity, is self-discrepancies and possible selves. Higgins's (1987) self-discrepancy theory distinguishes the actual self from two self-guides: the ideal self, representing hopes and aspirations, and the ought self, representing duties and obligations. Discrepancies between actual and ideal selves produce dejection-related emotions such as disappointment and dissatisfaction, while discrepancies between actual and ought selves produce agitation-related emotions such as anxiety. Within this framework, social media tends to amplify such discrepancies: the idealized content of the feed continually raises the standard set by the ideal

self, pulling it ever further from the actual self known from the inside. Markus and Nurius's (1986) concept of possible selves—imagined selves one hopes to become or fears becoming—operates in much the same way, since influencer and peer content offers concrete, detailed templates of selves one is not.

These cognitive and self-evaluative disruptions do not remain confined to the self-concept; they extend to affective and, in more severe cases, clinical outcomes. The empirical literature has repeatedly linked comparison-saturated social media use to elevated depressive symptoms, identifying online social comparison rather than screen time itself as the operative mediating pathway (Jiang et al., 2025; Nesi & Prinstein, 2015; Tandoc et al., 2015). More specifically, appearance-focused comparison is related to appearance anxiety—a persistent worry about being negatively evaluated on the basis of one's looks—and, at the more serious end, to disturbed eating attitudes and symptoms (Bonfanti et al., 2025). One moderating variable runs consistently through all of these outcomes: gender. Women and adolescent girls tend to experience the appearance-related consequences of online comparison more acutely than men, an inequality generally attributed not to biology but to the socialization of feminine self-worth around physical appearance and to the heavier appearance-evaluation pressure that visually oriented platforms direct at female users (Fardouly & Vartanian, 2016; Nesi & Prinstein, 2015). This does not mean men are unaffected—appearance and status pressures operate on them as well—but the evidence points to a particularly strong body-image pathway for girls and women.

Finally, to present these outcomes as uniformly negative or as deterministic would be to misrepresent the evidence. The literature also documents real benefits and substantial individual variation. Positive online feedback and authentic self-expression can affirm identity and support self-esteem (Reinecke & Trepte, 2014); for marginalized or isolated young people, social media may provide spaces of belonging and identity affirmation that would otherwise be inaccessible (Granic, Morita, & Scholten, 2020). Comparison itself is not invariably harmful: where upward targets are perceived as similar and attainable, comparison can inspire and motivate rather than diminish. Psychological resilience moderates the outcomes, buffering individuals against the depressive consequences of comparison (Jiang et al., 2025); the active-passive distinction means that connective, expressive use carries less risk than silent observation. Umbrella reviews of the broader question conclude that the average association between social media use and adolescent mental health is small and highly heterogeneous, with effects depending substantially on the person, the platform, and the type of use (Valkenburg, Meier, & Beyens, 2022). The accurate summary is therefore conditional: online social comparison—most reliably for fragile users engaged in passive, appearance-focused, upward comparison—tends to damage self-

perception and complicate identity formation; but the magnitude, and indeed the direction, of the effect depends on a recognizable set of moderating conditions.

6. Current Empirical Research

The theoretical framework set out in the preceding sections is increasingly supported by the literature. This section presents recent international and national studies that bear on that framework.

6.1. Findings from International Research

One of the most rigorous demonstrations of the comparison mechanism comes from Midgley et al. (2021), who reported four studies including experimental and longitudinal designs and involving a combined total of 798 undergraduates. Participants reported in real time the social comparisons they made while scrolling on Facebook and Instagram across domains including appearance, lifestyle, achievement, and relationships. The studies showed that scrolling on social media reliably elicited upward comparisons and that the frequency and intensity of these upward comparisons predicted momentary drops in state self-esteem, mood, and life satisfaction, along with cumulative declines following scrolling sessions. Crucially, participants lower in trait self-esteem made more frequent and more intense upward comparisons, leaving them at greater risk of being harmed by the same exposure. By capturing comparison as it happened rather than retrospectively, the work supplied unusually direct evidence that upward comparison is the proximal mechanism through which ordinary social media use translates into weaker self-evaluation.

Another strong and causal evidence comes from a meta-analysis by McComb et al. (2023), which aggregated 48 experimental studies covering 7,679 participants, mostly adolescents and young adults. Since the included studies randomly assigned participants to view upward comparison targets versus neutral or downward content, the synthesis isolates not merely an association but the causal effect of exposure. Pooled effects showed that exposure to upward comparison targets significantly impaired body image ($g = -0.31$), subjective well-being ($g = -0.19$), mental health ($g = -0.21$), and self-esteem ($g = -0.21$). The authors interpreted this pattern as evidence of a dominant contrast effect. Rather than drawing inspiration from superior others, users perceived them as dissimilar and judged themselves more harshly by comparison. Effect sizes were larger when the comparison standard was a neutral control rather than a downward target, underscoring the moderating role of comparison context. As a result, exposure to upward comparison targets impairs self-perception, at least over the short intervals these studies typically assess.

Burnell et al. (2019) examined the indirect pathways linking passive social network site use to well-being in a sample of 717 college students. Using a serial mediation framework, they found that passive use (the viewing of others' profiles

and content without interacting) predicted greater social comparison, which in turn predicted greater fear of missing out, which finally predicted worse outcomes (lower general self-worth, lower perceived social acceptance, lower perceived physical appearance, and more depressive symptoms). The study is notable for positioning social comparison and FoMO as sequential rather than competing mechanisms. In addition, the pathway from comparison and FoMO to physical-appearance perception was significant for women but not for men. The authors also found that the link between scrolling and comparison was weaker among the youngest participants. These findings clarify that the harm of passive use is not direct but operates through an identifiable chain of comparison-driven cognition.

Further, Irmer and Schmiedek (2023) used an electronic diary method to track adolescents' social media use and well-being across sequential days. The study found that days of higher social media use were associated with lower well-being and that this within-person association was mediated by upward social comparisons. On days when young people used social media more, they made more upward comparisons, and it was these comparisons rather than screen time itself that accounted for the drop in well-being. Because the design examined fluctuations within the same individual over time, it reduced the confounds that limit between-person studies and supplied ecologically valid evidence that the comparison mechanism operates within the fabric of everyday adolescent life. The findings reinforce a recurring theme of the amount of use matters largely insofar as it produces comparison.

Focusing on the body, Bonfanti et al. (2025) conducted a systematic review and meta-analysis of the association between social comparison on social media and both body image concerns and eating-disorder symptoms. The review reported that greater engagement in social comparison on social media is related to more pronounced body image concerns and elevated eating-disorder symptoms. The authors emphasized that the operative variable is appearance-based comparison rather than general social media use and that this relationship holds across samples. By aggregating the evidence, the meta-analysis established body image as the domain in which the comparison-driven risks of social media are most robustly demonstrated, and it identified disordered eating as a clinically serious downstream outcome that warrants preventive attention.

Scully et al. (2023) examined the same body image pathway on a finer scale, in a study of online appearance-related activity and body dissatisfaction among adolescent girls. Rather than treating social media use as an undifferentiated whole, the study distinguished appearance-focused online activities (viewing, editing, and posting photographs, and attending to others' appearance-related content) and related these to social comparison and body dissatisfaction. The findings showed that what was associated with greater body dissatisfaction was not general time on social media but appearance-specific online activity,

operating through appearance comparison. By isolating the appearance-comparison mechanism in an adolescent-girl sample, the study demonstrated that body dissatisfaction tracks appearance-focused comparison activity rather than total time online and identifies adolescent girls as a group for whom such activity is particularly prominent.

Avci et al. (2025) addressed identity directly in a systematic review of social media use and adolescent identity development, drawing together studies that operationalized identity through exploration, commitment, self-concept clarity, and identity distress. Results indicated that adolescents engaged in social comparison on social media showed both greater identity exploration and greater identity distress, suggesting that online comparison keeps the identity process active and unsettled rather than bringing it to resolution. Also, the quality of self-presentation proved more decisive than the quantity of use. Authentic self-presentation was linked to greater self-concept clarity, while idealized self-presentation showed no such association. The review concluded that social media is neither uniformly beneficial nor uniformly harmful for identity, and that outcomes depend on how adolescents use these platforms, reframing the central question from how much young people use social media to how they use it.

Bringing together comparison and identity processes within a single model, Martinac Dorčić et al. (2023) conducted a study with 354 late adolescents in Croatia (mean age 18.49, predominantly young women) to examine how social media use, social comparison on social media, and identity dimensions jointly relate to body image satisfaction. The study is notable for treating identity not as a distant background variable but as an active component of the model, examining identity exploration and commitment alongside social comparison as predictors of different domains of body image. The findings showed that body image domains were predicted differently. Social media use and social comparison were more important predictors of thoughts and feelings about appearance and weight, while identity dimensions mattered more for adolescents' evaluations of how others view their appearance, with stronger identity commitment and exploration linked to more positive perceptions in this domain. By integrating the comparison literature and the identity development literature study offers a more complete account of why late adolescence, the period in which identity questions are most salient, is also a period of pronounced sensitivity to the body-image consequences of online comparison.

Situating the question in a non-Western context, Shang and Bao (2025) examined self-esteem and appearance anxiety among Chinese college students, modeling the roles of social media use and upward social comparison. The study found that social media use was associated with elevated appearance anxiety and that upward social comparison occupied a central position in this association, with lower self-esteem linked to greater vulnerability. By treating appearance

anxiety as a separate outcome and situating the study among Chinese students, the work extends the comparison literature beyond its predominantly Western, English-speaking base and indicates that the upward-comparison mechanism documented in Western samples generalizes to other cultural settings, where intense academic and appearance-related pressures may further sharpen its effects.

Jiang et al. (2025) examined the pathway from social comparison to depression, testing self-perception as a mediating variable and psychological resilience as a moderating one. The study found that frequent social comparison was associated with increased depressive symptoms and that this relationship operated through weakened self-perception, including declines in self-concept clarity and self-esteem. Importantly, psychological resilience moderated this pathway: more resilient individuals showed smaller declines in self-perception and smaller increases in depression, apparently because they were able to reframe comparisons as opportunities for growth rather than threats. The study is valuable for identifying both a mechanism and a protective factor, and it supports the broader conclusion that the consequences of online comparison are not fixed but depend on individual resources.

6.2. Findings from Research Conducted in Türkiye

Empirical interest in the relationships among social media, social comparison, and psychosocial outcomes in Türkiye has grown markedly over the past decade. This literature is characterized by two patterns. First, the great majority of studies rest on cross-sectional and correlational designs, while the longitudinal and experimental designs increasingly common in the international literature remain scarce. Second, the studies cluster around three main axes of the relationship between self-esteem and social media use (and especially problematic use), the link between appearance-focused comparison and body image and eating attitudes, and the fear of missing out. National studies that model comparison as an explicit mediator have only recently begun to appear.

One of the earliest and most-cited studies in the Turkish literature is Buran Köse and Doğan (2019), who examined the relationship between social media addiction and self-esteem in university students. The study found a moderate negative association between self-esteem and social media addiction, reporting that students with lower self-esteem tended to show more addictive use patterns. This relationship was more pronounced among users with larger follower counts, particularly on the relapse and conflict dimensions of addiction, and gendered motives were also documented, with women being more inclined to use social media for mood regulation. Although the design was correlational and did not measure comparison directly, the findings revealed in a Turkish sample the kind of self-esteem vulnerability that comparison-based theories would predict.

Further, Kavaklı and Ünal (2021) used structural equation modeling to test social comparison as a mediator in the relationships among social media addiction, self-esteem, and general belongingness in a sample of 311 students. Social media addiction was negatively associated with both self-esteem and belongingness, and social comparison significantly mediated both relationships (standardized indirect effects of -0.21 and -0.19 , respectively). The study added an important distinction regarding the direction of comparison: upward comparison was related to lower self-esteem, while downward comparison was related to higher self-esteem and a stronger sense of belongingness. By explicitly grounding the analysis in social comparison theory and documenting the mediating role of comparison in a Turkish sample, Kavaklı and Ünal's study stands as one of the most theoretically clear contributions in the national literature.

Bahtiyar (2021) examined the appearance-comparison-body-image link directly in a Turkish sample of 295 university students. The findings revealed a theoretically important distinction: the association between time spent on social media and body image was very weak ($r = -0.09$) and nonsignificant, whereas the association between level of social comparison and body image dissatisfaction was moderate, positive, and significant ($r = 0.403$). In other words, the variable predicting body image was not the duration of use but how intensely the user engaged in comparison. The finding that body image did not differ by gender or duration of use, but did differ by socioeconomic level and platform used, supports the view that the visual architecture of social media platforms (Instagram and similar visually oriented platforms) creates a differentiated risk operating through comparison behavior. This study is important for replicating in a Turkish sample the structure identified in the international literature by Bonfanti et al. (2025) and Scully et al. (2023) at the meta-analytic and cross-sectional levels that what matters is not exposure to the platform but the act of appearance comparison.

Aydoğan (2024) offered a complementary study focused on the relationships among social media addiction, body satisfaction, and self-esteem. The analysis showed that social media addiction was negatively related to both body satisfaction and self-esteem, and that body satisfaction was positively related to self-esteem. Contrary to the proposed model, however, body satisfaction did not significantly mediate the relationship between social media addiction and self-esteem. This mixed result is informative: it indicates that the pathways by which social media use may diminish self-esteem are not confined to body-related concerns and warns against assuming a single mediating pathway. Read alongside Bahtiyar's (2021) findings, Aydoğan's result presents a coherent picture: body dissatisfaction emerges visibly in users engaged in online comparison but does not, on its own, mediate other identity-related outcomes (notably self-esteem itself). This suggests that the harm pathway reaching self-

esteem involves additional mechanisms independent of body image (such as validation-seeking, FoMO, and social comparison).

Kefeli Col et al. (2025) provides the most recent study documenting in a Turkish sample the relationship between appearance-focused comparison and a clinically meaningful outcome of disturbed eating attitudes. The authors examined how social media appearance comparison and need for social approval related to eating attitudes in 371 university students. This descriptive cross-sectional study found that disturbed eating attitudes were identified in 11.6% of the sample, and that eating attitudes were positively related to both social media appearance comparison and need for social approval: as appearance comparison rose, indicators of disturbed eating rose with it. The authors recommended media literacy education and intervention programs supporting positive body image as preventive measures. The study is important for linking the appearance-comparison mechanism to a clinically serious outcome at the national level and for echoing in the Turkish context the meta-analytic findings of Bonfanti et al. (2025).

Examining the fear of missing out directly, Yıldız & Yürekli (2024) administered a social media use scale alongside a FoMO scale in a study of 414 Turkish university students. The study found a significant positive association between social media use and FoMO, indicating that more intense users experienced greater apprehension about missing rewarding experiences. While demographic characteristics did not differentiate FoMO levels, time spent online and on social media did, with more time linked to higher FoMO. Although the study did not directly measure social comparison, as discussed earlier FoMO is tightly bound to comparison processes; Yıldız & Yürekli's findings therefore indirectly show that the passive use-comparison-FoMO chain documented by Burnell et al. (2019) in an international sample is also visible among Turkish youth.

The most recent study extending the social comparison framework in the Turkish literature beyond adolescents and young adults, and offering a rigorous example of mediation modeling, belongs to Bayraktar and Çelik (2025). The study tested the mediating role of social comparison in the relationship between parental self-efficacy and sharenting behavior. The findings showed that parental social comparison significantly predicted sharenting and mediated the relationship between perceived parental emotional availability and sharenting. These results empirically confirms that social comparison performs in a Turkish sample exactly the kind of mediating role theory predicts, and it replicates Kavaklı and Ünal's (2021) findings in a group beyond young adults. Taken together, social comparison appears to function consistently as a significant mediating variable in Turkish samples as well.

Considered as a whole, these studies bring three patterns into view. First, the mechanisms identified in the global literature (upward comparison, appearance comparison, FoMO, validation-seeking) are reliably observed among Turkish youth, and studies such as those by Bahtiyar (2021), Kefeli Col et al. (2025), and Yıldız and Yürekli (2024) show that international findings are replicated at the national level. Second, the analytic tradition pioneered by Kavaklı and Ünal (2021) and continued by Bayraktar and Çelik (2025) has begun to move the national literature from a descriptive to an explanatory level by modeling social comparison as an explicit mediator. Third, the limitations of the existing literature stand out: the great majority of studies rest on university-student samples, cross-sectional designs, and convenience sampling; longitudinal studies in adolescent samples are quite limited; and identity-related outcomes (identity exploration, identity distress, self-concept clarity, authenticity) have not yet been examined as systematically as in the international literature. These gaps mark an open agenda for research into the dynamics specific to the social media–identity relationship.

7. Conclusion

Over the course of more than seventy years, the study of social comparison has moved from Festinger's (1954) account of deliberate and intentional self-evaluation among similar peers to a framework deepened by Wills's (1981) downward comparison, Tesser's (1988) closeness–self-relevance, and Collins's (1996) contrast–assimilation, and finally to the analysis of continuous, quantified, and largely upward comparison in algorithmically curated digital environments. The evidence reviewed in this chapter supports a conclusion that is conditional but consistent. Social media use increases the frequency and intensity of social comparison, especially upward comparison with idealized content, and this comparison functions as the principal mechanism by which platform use affects the self. The typical consequences for identity-related outcomes (self-esteem, self-concept clarity, body image, and the exploration and stability of identity) are negative, and these outcomes are mediated and accompanied by related processes including fear of missing out, envy, self-objectification, and validation-seeking.

However, the magnitude and direction of the effects depend on the type of use (the active–passive distinction), on the affordances of the platform (visual versus text-oriented architecture, quantitative feedback infrastructure, algorithmic curation), on the direction and perception of comparison (contrast or assimilation), and on stable individual differences such as social comparison orientation, baseline self-esteem, psychological resilience, and the authenticity of self-presentation. Umbrella reviews conclude that the average association between social media use and adolescent mental health is small and highly heterogeneous (Valkenburg et al., 2022). The central question is therefore not whether social media affects the self but in whom, under what patterns of use, and through which processes that influence is strongest.

This conditionality is not an ordinary qualification but the most important practical message to emerge from the literature, especially for adolescents and emerging adults, for whom identity formation is the defining developmental task. These age groups are not only the most intensive users of social media but also the users engaged in resolving Erikson's (1968) identity-role-confusion crisis and sustaining the exploration and commitment processes in Marcia's (1966) model. As Avci et al.'s (2025) systematic review showed, adolescents who engage intensively in online social comparison exhibit both greater identity exploration and greater identity distress, suggesting that online comparison can keep the identity process continuously open rather than bringing it to resolution. This clarifies that the central issue is not how much young people engage with social media but how they engage with it.

To bring out the practical implications of the empirical findings, concrete axes of intervention and application can be drawn for four main groups. *For users* (especially adolescents and young adults) the most reliably documented risk is passive scrolling. Preferring connective and expressive active use, taking short pauses to consider the feed critically, and consciously curating the feed by unfollowing accounts that systematically prompt unfavorable comparisons may therefore be useful. *For parents and educators*, the emerging priority is media literacy education; understanding that online content is a systematically positivity-biased and curated selection can soften the cognitive and emotional impact of comparison. Open, nonjudgmental conversation within the family also allows young people to put their comparison experiences into words and to render them recognizable without normalizing them. *For mental-health professionals*, the evidence suggests several axes of intervention: when working with adolescents, assessing comparison behavior rather than time spent on social media, because this is essentially what predicts well-being. Specifically addressing body image and eating attitudes in adolescent girls and young women engaged in appearance-focused comparison and identifying early the contingent self-worth excessively dependent on external feedback and balancing it with internally focused evaluation processes. *For platform design and policy regulation*, practices such as hiding like counts, reducing the excessive weight algorithmic curation places on idealized content, and visibly marking filtered or edited content all carry the potential to soften the raw material of comparison.

In the Turkish context, while the national literature has expanded rapidly, three theoretical and methodological gaps stand out. First, studies that model social comparison as an explicit mediator remain limited. Yet, such modeling is essential for understanding the mechanisms underlying the relationships documented in the national literature. Second, almost all Turkish studies rest on cross-sectional designs and convenience sampling; longitudinal designs and especially daily diary methods could make visible how comparison operates within the fabric of everyday life among Turkish youth. Third, the national

literature has concentrated on self-esteem, body image, and problematic use; identity-specific outcomes such as self-concept clarity, identity exploration, and identity distress have not yet been examined systematically. Studies that investigate longitudinally and multivariately how the identity formation processes of Turkish adolescents and emerging adults are shaped by social media carry the potential to contribute distinctively to both the national and the international literature.

Considered holistically, social comparison in digital environments is not inevitable, but it is pervasive. Its consequences are not random, but they are not predetermined either. The human tendency to measure oneself against others, the role of similarity and closeness in shaping that process, the mediating effect of comparison on the self (Festinger, 1954) remain valid today, although they operate in an environment profoundly different from the conditions in which the theory was born. The way to limit the effect of social media on the self and identity is not to eliminate comparison entirely but to shape its direction, form, and perception. Interventions that support authentic engagement, critical media literacy, and reflective rather than passive use constitute the most promising paths to preserving the benefits of digital connection while limiting the costs of comparison.

References

- Andreassen, C. S. (2015). Online social network site addiction: A comprehensive review. *Current Addiction Reports*, 2(2), 175–184. <https://doi.org/10.1007/s40429-015-0056-9>
- Appel, H., Gerlach, A. L., & Crusius, J. (2016). The interplay between Facebook use, social comparison, envy, and depression. *Current Opinion in Psychology*, 9, 44–49. <https://doi.org/10.1016/j.copsyc.2015.10.006>
- Avci, H., Baams, L., & Kretschmer, T. (2025). A systematic review of social media use and adolescent identity development. *Adolescent Research Review*, 10, 219–236. <https://doi.org/10.1007/s40894-024-00251-1>
- Aydoğan, D. (2024). Sosyal medya bağımlılığı, benlik saygısı ilişkisinde beden memnuniyetinin aracılık rolü analizi [Analysis of the mediating role of body satisfaction in the relationship between social media addiction and self-esteem]. *Erciyes İletişim Dergisi*, 11(1), 135–153. <https://doi.org/10.17680/erciyesiletisim.1343524>
- Bahtiyar, M. (2021). Üniversite öğrencilerinde sosyal karşılaştırma, sosyal medya tutumu ve beden imgesi ilişkisinin incelemesi [An examination of the relationship between social comparison, social media attitude, and body image in university students]. *Online Journal of Technology Addiction and Cyberbullying*, 8(2), 23–38.
- Bargh, J. A., McKenna, K. Y. A., & Fitzsimons, G. M. (2002). Can you see the real me? Activation and expression of the "true self" on the Internet. *Journal of Social Issues*, 58(1), 33–48. <https://doi.org/10.1111/1540-4560.00247>
- Bayraktar, F., & Çelik, D. (2025). Ebeveyn öz-yeterliliği ile paylaşılan-ebeveynlik arasındaki ilişkide sosyal karşılaştırmanın aracı rolü [The mediating role of social comparison in the relationship between parental self-efficacy and sharenting]. *Türk Psikiyatri Dergisi*, 36, Article 24.
- Beer, D. (2017). The social power of algorithms. *Information, Communication & Society*, 20(1), 1–13. <https://doi.org/10.1080/1369118X.2016.1216147>
- Bonfanti, R. C., Melchiori, F., Teti, A., Albano, G., Raffard, S., Rodgers, R. F., & Lo Coco, G. (2025). The association between social comparison in social media, body image concerns and eating disorder symptoms: A systematic review and meta-analysis. *Body Image*, 52, Article 101841. <https://doi.org/10.1016/j.bodyim.2024.101841>
- Bucher, T. (2012). Want to be on the top? Algorithmic power and the threat of invisibility on Facebook. *New Media & Society*, 14(7), 1164–1180. <https://doi.org/10.1177/1461444812440159>
- Buran Köse, Ö. & Doğan, A. (2019). The relationship between social media addiction and self-esteem among Turkish university students. *Addicta: The Turkish*

- Journal on Addictions*, 6(1), 175–190. <https://doi.org/10.15805/addicta.2019.6.1.0036>
- Burnell, K., George, M. J., Vollet, J. W., Ehrenreich, S. E., & Underwood, M. K. (2019). Passive social networking site use and well-being: The mediating roles of social comparison and the fear of missing out. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, 13(3), Article 5. <https://doi.org/10.5817/CP2019-3-5>
- Burrow, A. L., & Rainone, N. (2017). How many likes did I get?: Purpose moderates links between positive social media feedback and self-esteem. *Journal of Experimental Social Psychology*, 69, 232–236. <https://doi.org/10.1016/j.jesp.2016.09.005>
- Buunk, A. P., & Gibbons, F. X. (2007). Social comparison: The end of a theory and the emergence of a field. *Organizational Behavior and Human Decision Processes*, 102(1), 3–21. <https://doi.org/10.1016/j.obhdp.2006.09.007>
- Campbell, J. D. (1990). Self-esteem and clarity of the self-concept. *Journal of Personality and Social Psychology*, 59(3), 538–549. <https://doi.org/10.1037/0022-3514.59.3.538>
- Chen, Y. (2025). A comparative study of state self-esteem responses to social media feedback loops in adolescents and adults. *Frontiers in Psychology*, 16, Article 1625771. <https://doi.org/10.3389/fpsyg.2025.1625771>
- Collins, R. L. (1996). For better or worse: The impact of upward social comparison on self-evaluations. *Psychological Bulletin*, 119(1), 51–69. <https://doi.org/10.1037/0033-2909.119.1.51>
- Crocetti, E., Rubini, M., & Meeus, W. (2008). Capturing the dynamics of identity formation in various ethnic groups: Development and validation of a three-dimensional model. *Journal of Adolescence*, 31(2), 207–222. <https://doi.org/10.1016/j.adolescence.2007.09.002>
- Crocker, J., & Wolfe, C. T. (2001). Contingencies of self-worth. *Psychological Review*, 108(3), 593–623. <https://doi.org/10.1037/0033-295X.108.3.593>
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Plenum.
- de Vries, D. A., & Kühne, R. (2015). Facebook and self-perception: Individual susceptibility to negative social comparison on Facebook. *Personality and Individual Differences*, 86, 217–221. <https://doi.org/10.1016/j.paid.2015.05.029>
- Erikson, E. H. (1968). *Identity: Youth and crisis*. W. W. Norton.
- Fardouly, J., Diedrichs, P. C., Vartanian, L. R., & Halliwell, E. (2015). Social comparisons on social media: The impact of Facebook on young women's

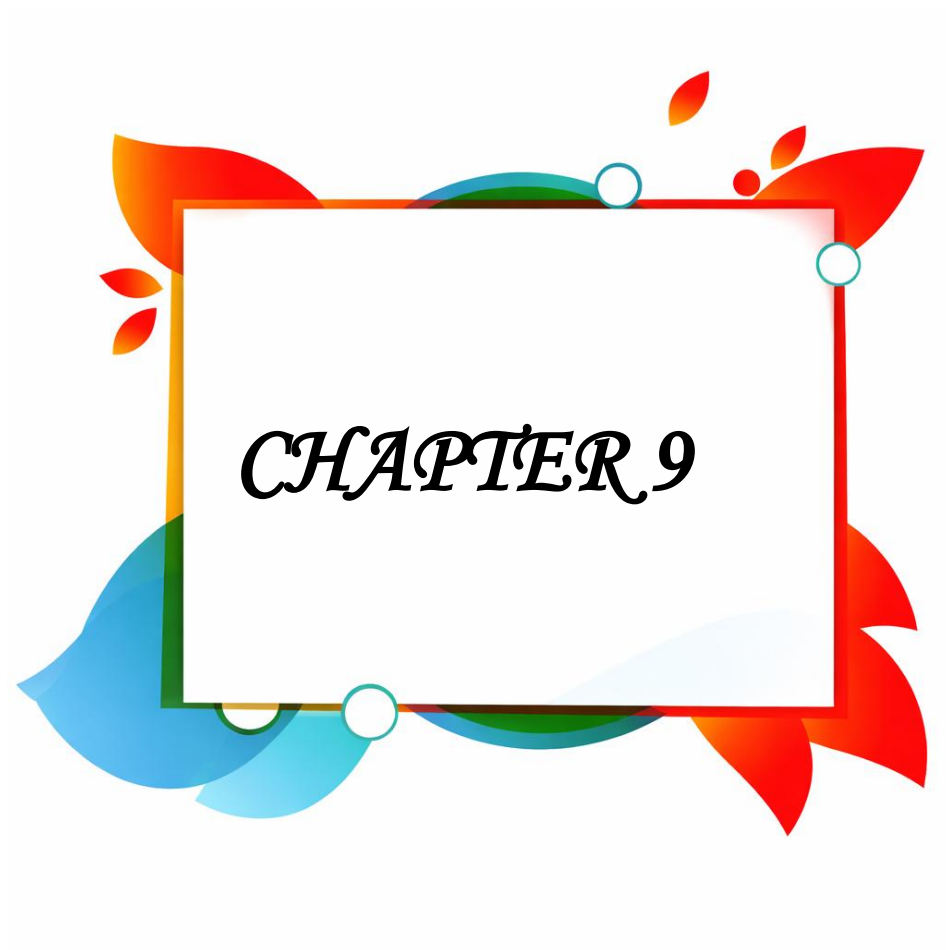
- body image concerns and mood. *Body Image*, 13, 38–45. <https://doi.org/10.1016/j.bodyim.2014.12.002>
- Fardouly, J., & Vartanian, L. R. (2016). Social media and body image concerns: Current research and future directions. *Current Opinion in Psychology*, 9, 1–5. <https://doi.org/10.1016/j.copsyc.2015.09.005>
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7(2), 117–140. <https://doi.org/10.1177/001872675400700202>
- Fox, J., & Vendemia, M. A. (2016). Selective self-presentation and social comparison through photographs on social networking sites. *Cyberpsychology, Behavior, and Social Networking*, 19(10), 593–600. <https://doi.org/10.1089/cyber.2016.0248>
- Fredrickson, B. L., & Roberts, T.-A. (1997). Objectification theory: Toward understanding women's lived experiences and mental health risks. *Psychology of Women Quarterly*, 21(2), 173–206. <https://doi.org/10.1111/j.1471-6402.1997.tb00108.x>
- Goffman, E. (1959). *The presentation of self in everyday life*. Doubleday.
- Granic, I., Morita, H., & Scholten, H. (2020). Beyond screen time: Identity development in the digital age. *Psychological Inquiry*, 31(3), 195–223. <https://doi.org/10.1080/1047840X.2020.1820214>
- Hanna, E., Ward, L. M., Seabrook, R. C., Jerald, M., Reed, L., Giaccardi, S., & Lippman, J. R. (2017). Contributions of social comparison and self-objectification in mediating associations between Facebook use and emergent adults' psychological well-being. *Cyberpsychology, Behavior, and Social Networking*, 20(3), 172–179. <https://doi.org/10.1089/cyber.2016.0247>
- Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review*, 94(3), 319–340. <https://doi.org/10.1037/0033-295X.94.3.319>
- Hogan, B. (2010). The presentation of self in the age of social media: Distinguishing performances and exhibitions online. *Bulletin of Science, Technology & Society*, 30(6), 377–386. <https://doi.org/10.1177/0270467610385893>
- Irmer, A., & Schmiedek, F. (2023). Associations between youth's daily social media use and well-being are mediated by upward comparisons. *Communications Psychology*, 1, Article 12. <https://doi.org/10.1038/s44271-023-00013-0>
- Jiang, X., Xie, X., & Lin, H. (2025). From social comparison to depression: The mediating role of self-perception and moderating role of psychological resilience. *Asian Journal of Communication*, 35(5), 533–557. <https://doi.org/10.1080/01292986.2025.2602127>

- Kavaklı, M., & Ünal, G. (2021). The effects of social comparison on the relationships among social media addiction, self-esteem, and general belongingness levels. *Current Issues in Personality Psychology*, 9(2), 114–124. <https://doi.org/10.5114/cipp.2021.105349>
- Kefeli Col, B., Gumusler Basaran, A., Birben Kurt, T., & Genc Kose, B. (2025). The effects of comparisons of physical appearance on social media and social approval on eating attitudes. *Risk Management and Healthcare Policy*, 18, 2091–2105. <https://doi.org/10.2147/RMHP.S517472>
- Krasnova, H., Widjaja, T., Buxmann, P., Wenninger, H., & Benbasat, I. (2015). Why following friends can hurt you: An exploratory investigation of the effects of envy on social networking sites among college-age users. *Information Systems Research*, 26(3), 585–605. <https://doi.org/10.1287/isre.2015.0588>
- Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D. S., Lin, N., Shablack, H., Jonides, J., & Ybarra, O. (2013). Facebook use predicts declines in subjective well-being in young adults. *PLOS ONE*, 8(8), Article e69841. <https://doi.org/10.1371/journal.pone.0069841>
- Litt, E. (2012). Knock, knock. Who's there? The imagined audience. *Journal of Broadcasting & Electronic Media*, 56(3), 330–345. <https://doi.org/10.1080/08838151.2012.705195>
- Marcia, J. E. (1966). Development and validation of ego-identity status. *Journal of Personality and Social Psychology*, 3(5), 551–558. <https://doi.org/10.1037/h0023281>
- Marino, C., Gini, G., Vieno, A., & Spada, M. M. (2018). The associations between problematic Facebook use, psychological distress and well-being among adolescents and young adults: A systematic review and meta-analysis. *Journal of Affective Disorders*, 226, 274–281. <https://doi.org/10.1016/j.jad.2017.10.007>
- Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist*, 41(9), 954–969. <https://doi.org/10.1037/0003-066X.41.9.954>
- Martinac Dorčić, T., Smojver-Ažić, S., Božić, I., & Malkoč, I. (2023). Effects of social media social comparisons and identity processes on body image satisfaction in late adolescence. *Europe's Journal of Psychology*, 19(2), 220–231. <https://doi.org/10.5964/ejop.9885>
- Marwick, A. E., & boyd, d. (2011). I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience. *New Media & Society*, 13(1), 114–133. <https://doi.org/10.1177/1461444810365313>
- McComb, C. A., Vanman, E. J., & Tobin, S. J. (2023). A meta-analysis of the effects of social media exposure to upward comparison targets on self-evaluations and emotions. *Media Psychology*, 26(5), 612–635. <https://doi.org/10.1080/15213269.2023.2180647>

- Midgley, C., Thai, S., Lockwood, P., Kovacheff, C., & Page-Gould, E. (2021). When every day is a high school reunion: Social media comparisons and self-esteem. *Journal of Personality and Social Psychology*, 121(2), 285–307. <https://doi.org/10.1037/pspi0000336>
- Nesi, J., & Prinstein, M. J. (2015). Using social media for social comparison and feedback-seeking: Gender and popularity moderate associations with depressive symptoms. *Journal of Abnormal Child Psychology*, 43(8), 1427–1438. <https://doi.org/10.1007/s10802-015-0020-0>
- Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior*, 29(4), 1841–1848. <https://doi.org/10.1016/j.chb.2013.02.014>
- Reinecke, L., & Trepte, S. (2014). Authenticity and well-being on social network sites: A two-wave longitudinal study on the effects of online authenticity and the positivity bias in SNS communication. *Computers in Human Behavior*, 30, 95–102. <https://doi.org/10.1016/j.chb.2013.07.030>
- Samra, A., Warburton, W. A., & Collins, A. M. (2022). Social comparisons: A potential mechanism linking problematic social media use with depression. *Journal of Behavioral Addictions*, 11(2), 607–614. <https://doi.org/10.1556/2006.2022.00023>
- Schaefer, L. M., & Thompson, J. K. (2014). The development and validation of the Physical Appearance Comparison Scale–Revised (PACS-R). *Eating Behaviors*, 15(2), 209–217. <https://doi.org/10.1016/j.eatbeh.2014.01.001>
- Scully, M., Swords, L., & Nixon, E. (2023). Social comparisons on social media: Online appearance-related activity and body dissatisfaction in adolescent girls. *Irish Journal of Psychological Medicine*, 40(1), 31–42. <https://doi.org/10.1017/ipm.2020.93>
- Shang, A., & Bao, H. (2025). Self-esteem and appearance anxiety among Chinese college students: The roles of social media use and upward social comparison. *Frontiers in Psychology*, 16, Article 1562711. <https://doi.org/10.3389/fpsyg.2025.1562711>
- Sherman, L. E., Payton, A. A., Hernandez, L. M., Greenfield, P. M., & Dapretto, M. (2016). The power of the like in adolescence: Effects of peer influence on neural and behavioral responses to social media. *Psychological Science*, 27(7), 1027–1035. <https://doi.org/10.1177/0956797616645673>
- Smith, R. H., & Kim, S. H. (2007). Comprehending envy. *Psychological Bulletin*, 133(1), 46–64. <https://doi.org/10.1037/0033-2909.133.1.46>
- Suls, J., Martin, R., & Wheeler, L. (2002). Social comparison: Why, with whom, and with what effect? *Current Directions in Psychological Science*, 11(5), 159–163. <https://doi.org/10.1111/1467-8721.00191>

- Tandoc, E. C., Ferrucci, P., & Duffy, M. (2015). Facebook use, envy, and depression among college students: Is facebooking depressing? *Computers in Human Behavior*, 43, 139–146. <https://doi.org/10.1016/j.chb.2014.10.053>
- Taylor, S. E., & Lobel, M. (1989). Social comparison activity under threat: Downward evaluation and upward contacts. *Psychological Review*, 96(4), 569–575. <https://doi.org/10.1037/0033-295X.96.4.569>
- Tesser, A. (1988). Toward a self-evaluation maintenance model of social behavior. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 21, pp. 181–227). Academic Press. [https://doi.org/10.1016/S0065-2601\(08\)60227-0](https://doi.org/10.1016/S0065-2601(08)60227-0)
- Thompson, J. K., Heinberg, L., & Tantleff, S. (1991). The Physical Appearance Comparison Scale (PACS). *The Behavior Therapist*, 14, 174.
- Tiggemann, M., & Anderberg, I. (2020). Social media is not real: The effect of 'Instagram vs reality' images on women's social comparison and body image. *New Media & Society*, 22(12), 2183–2199. <https://doi.org/10.1177/1461444819888720>
- Tiggemann, M., & Slater, A. (2013). NetGirls: The Internet, Facebook, and body image concern in adolescent girls. *International Journal of Eating Disorders*, 46(6), 630–633. <https://doi.org/10.1002/eat.22141>
- Valkenburg, P. M., Meier, A., & Beyens, I. (2022). Social media use and its impact on adolescent mental health: An umbrella review of the evidence. *Current Opinion in Psychology*, 44, 58–68. <https://doi.org/10.1016/j.copsyc.2021.08.017>
- van de Ven, N., Zeelenberg, M., & Pieters, R. (2009). Leveling up and down: The experiences of benign and malicious envy. *Emotion*, 9(3), 419–429. <https://doi.org/10.1037/a0015669>
- van Dijck, J. (2013). *The culture of connectivity: A critical history of social media*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199970773.001.0001>
- Vandenbosch, L., & Eggermont, S. (2012). Understanding sexual objectification: A comprehensive approach toward media exposure and girls' internalization of beauty ideals, self-objectification, and body surveillance. *Journal of Communication*, 62(5), 869–887. <https://doi.org/10.1111/j.1460-2466.2012.01667.x>
- Verduyn, P., Gugushvili, N., Massar, K., Täht, K., & Kross, E. (2020). Social comparison on social networking sites. *Current Opinion in Psychology*, 36, 32–37. <https://doi.org/10.1016/j.copsyc.2020.04.002>
- Verduyn, P., Ybarra, O., Résibois, M., Jonides, J., & Kross, E. (2017). Do social network sites enhance or undermine subjective well-being? A critical review.

- Vitak, J. (2012). The impact of context collapse and privacy on social network site disclosures. *Journal of Broadcasting & Electronic Media*, 56(4), 451–470. <https://doi.org/10.1080/08838151.2012.732140>
- Vogel, E. A., Rose, J. P., Okdie, B. M., Eckles, K., & Franz, B. (2015). Who compares and despairs? The effect of social comparison orientation on social media use and its outcomes. *Personality and Individual Differences*, 86, 249–256. <https://doi.org/10.1016/j.paid.2015.06.026>
- Vogel, E. A., Rose, J. P., Roberts, L. R., & Eckles, K. (2014). Social comparison, social media, and self-esteem. *Psychology of Popular Media Culture*, 3(4), 206–222. <https://doi.org/10.1037/ppm0000047>
- Wills, T. A. (1981). Downward comparison principles in social psychology. *Psychological Bulletin*, 90(2), 245–271. <https://doi.org/10.1037/0033-2909.90.2.245>
- Wood, J. V. (1989). Theory and research concerning social comparisons of personal attributes. *Psychological Bulletin*, 106(2), 231–248. <https://doi.org/10.1037/0033-2909.106.2.231>
- Yıldız, İ., & Yürekli, E. (2024). Dijital yaşamda gelişmeleri kaçırma korkusu (FoMO) ve sosyal medya: Üniversite öğrencileri üzerine bir araştırma [Fear of missing out (FoMO) in digital life and social media: A study on university students]. *Selçuk Üniversitesi Sosyal Bilimler Meslek Yüksekokulu Dergisi*, 27(2), 709–725. <https://doi.org/10.29249/selcuksbmyd.1529186>



History or Herstory? Women as Capital in Capitalist Society

Ali Sayilgan¹

Introduction

The most important factor that determines, shapes, and manages historical periods and the events affecting these periods is power. In this context, the person or group holding power has the ability to direct both individuals and societies. It is seen that political, economic, social, or physical power is not equally distributed among individuals or societies. On the other hand, one of the areas where the unequal distribution of power is seen most clearly is gender.

Sexism, or the distinction between men and women and the emphasis on one over the other, has existed since the earliest periods of history. At this point, it is seen that men have generally gained more power than women and historically brought themselves to the forefront. The most important factor in the formation of this male-dominated order, which is expressed as patriarchal order, is that the elements of political, social, economic, and physical power have generally been obtained by men and used to shape social conditions.

When historical periods are examined, this inequality is clearly revealed. In the pre-agricultural hunting and gathering period, men generally took on the task of catching large prey. On the other hand, women were given duties such as housework and small-scale food gathering or hunting. However, in the post-Agricultural Revolution period, women were increasingly confined to domestic spaces, and while men had a more comfortable lifestyle, women's responsibilities increased even more. In the Middle Ages, some meanings were attributed to women, especially in religious terms, but the understanding that women were pushed into the background in the historical flow continued in this period as well.

The capitalist political, economic, social, and cultural order is a period in which women were exploited from a different perspective. In this period, more rights and responsibilities were imposed on women in general. However, the physical and psychological violence imposed by the male-dominated world continued to increase. The feminist movement started in this period in order to emphasize the existence of women and their right to representation, and it still continues to exist in a multidimensional way.

¹ Research Assistant, Cappadocia University, Faculty of Humanities and Social Sciences, Department of Political Science and International Relations,
Orcid: 0009-0004-1645-1874

As a result of the approaches that aimed to bring women to the forefront in the capitalist order, the concept of herstory emerged. With this concept, the historical perspective that emphasizes male dominance and represents men at every point has been criticized. In this context, the concept of “history” has been questioned as a narrative that mostly represents men and male power in the historical flow, and an alternative herstory approach has been put forward.

In this context, the aim of this study is to examine the historical marginalization of women through the concepts of history, herstory, feminism, and capitalism. The study asks how women’s social roles have been shaped across different historical periods and how capitalist social relations have reproduced women’s secondary position in both public and private life. The main argument of the study is that women’s exclusion from dominant historical narratives is not only a cultural or political problem, but also a structural issue related to power, labor, and capitalist social relations. In this framework, a historical and comparative analysis will be presented. The study consists of three parts in total. In the first part, the concepts of history, herstory, feminism, and capitalism will be explained. In the second part, the social roles given to women in certain periods of history will be examined through four different periods: the pre-agricultural period, the post-Agricultural Revolution period, the Middle Ages, and the capitalist period. In the third part, the Second Wave or Radical Feminist Movement, which played an important role in the development of the herstory perspective, will be discussed. In the conclusion part, a general evaluation of the subject will be presented.

Conceptual Framework

Some concepts used throughout the study reveal the general outlines of the study. In this context, the concepts of history, herstory, feminism, and capitalism, which are important for the study, will be examined within the conceptual framework. Firstly, history is the discipline that studies the chronological record of events, as affecting a nation or people, based on a critical examination of source materials and usually presenting an explanation of their causes (The Editors of Encyclopaedia, 2019 s. 1-2). In this context, everything that happens in the historical flow can be the subject of history. Historians are people who interpret the past. To do this, they find evidence of past events and, from that evidence, come up with a coherent and logical explanation for past events, societies, and states. However, when the events recorded in world history are examined, it is seen that historians generally put men in the foreground and ignore women.

One of the most important concepts developed against male-centered historiography is herstory. Herstory refers to historical writing from a feminist perspective, emphasizing women’s experiences, roles, struggles, and agency within historical narratives (History). However, herstory should not be

understood merely as a linguistic opposition to the word history. Rather, it represents a feminist critique of the ways in which dominant historical narratives have often centered men's experiences while treating women's experiences as secondary or marginal. In this sense, the concept of herstory aims to make women visible not as an additional subject of history, but as active historical agents.

On the other hand, the concept of herstory has also begun to examine how the role of women has been shaped throughout history. In this context, many documents directly related to women, such as autobiographies, works, and letters, have been examined in an attempt to create an understanding that represents only women. Subsequently, all the stages a woman goes through while gaining a political identity within society (pregnancy, experiences, marriages according to traditions and customs, etc.) and the social identity that these stages impose on her have also become an important element (Lerner, 1975, s. 9-10).

Secondly, feminism, one of the most recent ideologies to emerge, attempts to analyze the social position of women, explain their apparent subsidiary role in history, and offer the basis for reform and the advancement of women in all areas of society (Harrison and Boyd, 2003 s. 296). The most important reason why feminist theory has been effective since its emergence, and especially in the postmodern period, is that it is an understanding that tries to defend the existence of women in every field. While this situation is considered positive, especially for women, it has also been subjected to constant criticism by the male-dominated order.

"Radical Feminism", which is the Second Wave of Feminism, has been influential in the emergence of the herstory understanding. This understanding was influential in the 1970s and 1980s. For radical feminists, "the first and fundamental theme is that women as social group are oppressed by men as a social group and that this oppression is the primary oppression for the women" (Rowland and Klein, 1996, s. 11). In this context, it can be said that Radical Feminism is one of the strongest currents of thought against the male-dominated order. This rigidity had a serious effect on the formation of the understanding of herstory.

Thirdly, historical periods have been shaped by certain political, economic, and cultural mechanisms of thought and practice. The last and one of the most important of these is the understanding of capitalism, which forms the basis of the current world systematic structure. Capitalism is an ideal type system which Marx conceives as opposed to the latter and which is production by the division of labor and the means of production; private property of the means of production (Zamagni and Bruni, 2013, s. 59-60). However, the capitalist understanding has brought with it an understanding that is based on the concentration of power in a single point in general.

In the capitalist understanding, it was men who held power in general terms. In this context, capitalist currents of thought, which centralize power more, have begun to stand in front of the struggle for women's representation. Capitalist thought and its effects on women are explained in more detail in the second part of the study.

The Role of Women According to Historical Periods

Many historical periods have emerged as a result of the important developments and changes that human societies have experienced in the historical flow. In these periods, the roles of both men and women in society have changed. In this context, the social role attributed to women will be analyzed within the framework of four periods. These periods are classified as the period before the Agricultural Revolution, the period after the Agricultural Revolution, the Medieval period, and the capitalist period.

Women's Role in Hunter-Gatherer Society

History is divided into periods according to the development of societies and the social revolutions that guide this development. In this context, the first period that mankind experienced is called the Paleolithic Age. The Paleolithic coincides almost exactly with the Pleistocene epoch of geologic time, which lasted from 2.6 million years ago to about 12,000 years ago ("The Pleistocene Epoch"). In this period, people had to be shaped according to nature in general, and a hunter-gatherer social structure was seen. The term "hunter-gatherers" refers specifically to people who currently or historically subsist on wild foods and live in small mobile populations that move several times a year for social or economic reasons (Woodburn, 1982, s. 431-451).

When these societies are examined, the existence of a division of labor is striking. The group that undertook the hunting part, the first pillar of the division of labor, was generally men. Because hunting requires physical power, this responsibility was mostly given to men. On the other hand, "women were subject to distinctions such as foraging, collecting food, dealing with housework within the framework of the division of labor" (Haviland et al., 2015, s. 332-333). In general, the division of labor seems fair. However, in addition to all these jobs, women also dealt with raising their children. Despite all these contributions, the female figure has not been praised in the social sphere in terms of the responsibilities it fulfills, and its representation in the administrative field has been severely restricted.

The Agricultural (Neolithic) Revolution and Women

The Neolithic Revolution, or the First Agricultural Revolution, was the wide-scale transition of many human cultures during the Neolithic period from a lifestyle of hunting and gathering to one of agriculture and settlement, making an increasingly large population possible (Bocquet-Appel, 2011, s. 560-561). With

this change, the foundations of very radical changes in human history were laid. Men, who were constantly engaged in hunting in the functioning of daily life, now started to deal with agricultural areas. However, in the continuation of this process, women were also burdened with agricultural work. As a result, obtaining food more easily and adopting a more comfortable lifestyle began to affect all settled societies. In addition, people who did not have to deal with hunting and gathering had more time to engage in science and art.

However, looking from the women's perspective, "with the advent of agriculture, their functions became increasingly marginal... males had taken over all active roles" (Shard, 1974, s. 165-170). As can be understood from here, the Agricultural Revolution seriously reduced the role of women in social life. In the pre-agricultural Paleolithic Period, women who were both foraging and helping to catch easy-to-catch animals were increasingly confined to the house after the Agricultural Revolution. In this context, their daily occupations became limited to taking care of children, looking after agricultural lands, and doing other things in the house. Men, on the other hand, attained a more luxurious and comfortable lifestyle.

The Medieval Period and Women

The Middle Ages refers to the period in European history from the collapse of Roman civilization in the 5th century CE to the period of the Renaissance. This period is very important because of the effects of the church and many other political, social, and economic events. During this period, there were many negative situations, especially due to the difficult conditions in Europe. In addition, women were brought to the fore at some points, especially in the religious field, but they were still considered inferior to men.

Women in the Middle Ages occupied a number of different social roles. Women held the positions of wife, mother, peasant, artisan, and nun, as well as some important leadership roles, such as abbess or queen regnant (Allen, 1997, s. 6). At this point, some researchers argue that the representation of women increased in the Middle Ages. However, while women were brought to the fore in a few issues, they were mostly able to take a place in society as figures who took care of their children at home, dealt with housework, or lived a monastic life away from politics.

Women's Role in Capitalist Society

The absolute impact of capitalism on all systems around the world is clear and indisputable. In this context, it is "called free market economy or free enterprise economy, economic system, dominant in the Western world since the breakup of feudalism" (Heilbroner et al., 2022, s. 1-2). The current strength of the Western world has also been thanks to capitalism. One of the most important problems of the capitalist order is that it makes a certain group or person superior to the other.

Karl Marx explained this as follows: “the capitalist bourgeoisie and their economists were promoting what he saw as the lie that the interests of the capitalist and of the worker are one and the same” (Marx, 1957, s. 14-45). As can be understood from here, one group was valued above the other.

This phenomenon of inequality, which is at the core of capitalism, has also led to an increase in inequalities between men and women. Although it is argued that the liberal ideas that dominated the system after the capitalist understanding gave wide rights to women, the negative situation of women remained largely the same. At this point, the thoughts attributed to women since ancient times continued. Thus, the traditional structure built on the male-dominated understanding oppresses women and limits them to the role of motherhood and housewife, while imprisoning women’s vital opportunities within narrow limits (Aktaş, 2013, s. 57).

In capitalist society, women’s subordination is not limited to political exclusion or cultural representation. It is also reproduced through labor relations, domestic responsibilities, and the unequal distribution of care work. Although capitalism formally opened new spaces for women in education, employment, and public life, it also continued to benefit from women’s unpaid domestic labor and their secondary position in the labor market. Therefore, women were not only marginalized as historical subjects, but also functionalized as a source of labor, reproduction, and social continuity within the capitalist order. In this sense, the capitalist system did not completely eliminate patriarchal relations; rather, it often reproduced them within new economic and social structures.

Another area where capitalism is thought to exploit women is the workplace. The treatment faced by men and women in the workplace is completely opposite. An example of this is the “Glass Ceiling” approach. The expression glass ceiling has been used to describe artificial barriers based on attitudinal or organizational bias that prevent qualified individuals from advancing to positions of power offering higher salaries and more responsibility and authority (Barnes, 2026, s. 2-3). At this point, women are constantly pushed into the background, and important jobs and titles are occupied by men. As a result of this situation, women are still outside the administrative field and are forced to assume a secondary role.

On the other hand, this situation has been criticized in many ways on the basis of some currents of thought that developed on the basis of feminism. At this point, Marxist Feminism comes first among the prominent understandings. For Marxist feminists, strengthening and equality for women cannot be achieved by accepting the borders of capitalism. In this context, the female figure was not accepted as a full member of capitalist society; however, it was used as capital. In addition, the idea of Radical Feminism, which will be explained in the next section, includes many approaches to capitalism.

Radical Feminism and the Herstory Perspective

Radical Feminism is a movement that radicalizes feminism and increases its social impact. Early Radical Feminism arose within second-wave feminism in the 1960s (Willis, 1984, s. 118). In the following period, it was seriously influential until the Third Feminist Movement. One of the reasons why Radical Feminism is important is the limited criticism of the male-dominated order in the modernist period, which continued until the postmodern period, and the emergence of Radical Feminism as a reaction to this.

Radical feminists assert that global society functions as a patriarchy in which the class of men are the oppressors of the class of women (Echols, 1989, s. 139). For this reason, women also need organizations to react to this situation. The development of the male-dominated order and the dominance of men over women are effective because men are constantly united around an understanding and approach. For this reason, radical feminists formed consciousness-raising groups. A consciousness-raising group is a small group process composed of peers for a particular minority group. The purpose of the group process is to examine the sociopolitical structures that create and sustain discrimination and disadvantage (Larson, 2014, s. 1-2). By establishing these groups, the understanding of standing together against the male-dominated order and seeking rights was encouraged.

The concept of “herstory”, which emerged as a result of these studies by Radical Feminism, is one of the most important reactions to the male-dominated understanding of history. In the context of this concept, women’s identity is brought to the fore more clearly in the historical context through some component groups and activist structures.

Conclusion

From the beginning of human history to the present day, the most important factor shaping people and societies has been power. In this context, regardless of the period, status, or understanding, the structure that obtained power has mostly succeeded in establishing dominance over other structures. The distribution of power within societies and among people has not been equal.

One of the areas where this difference is most clearly manifested is the situation of obtaining power between men and women. In this context, in almost every period of history, men have gained more power than women. Accordingly, the actions and breakthroughs of men in the majority of world history have been the subject of history. At this point, the female factor, whose physical and mental contribution to the growth of societies is incredibly large, has been pushed into the background. Women are among the most important actors in both the reproduction and development of societies and the upbringing of children. However, this has been mostly ignored.

When we look at pre-agricultural times, it is seen that hard and heavy work was generally done by men. On the other hand, housework, taking care of children, and easier tasks were done by women. At this point, men who did heavier and more powerful jobs used this status to dominate women. With the Agricultural Revolution that took place afterwards, the social role of women was further reduced. With the formation of agricultural societies and the transition to settled life, all tasks such as housework, maintenance of agricultural lands, and taking care of children were burdened on women. On the other hand, men achieved a much more comfortable lifestyle compared to the pre-agricultural period and had the chance to engage in science and art more. In the Middle Ages, women gained some titles and praise both in religious and social fields. However, most of them consisted of the discourses of churches and clergy. Women, on the other hand, remained in the background socially.

In the capitalist social structure, many rights have been granted to women in terms of both liberalization and developments. In addition, many rights have been given to women in political, economic, and business life, and they have been portrayed as equal with men. However, these situations, which were portrayed in a very optimistic way on paper, were implemented from a very pessimistic perspective in practice. While women have been given many rights in the political arena, they have often been characterized as emotional and weak figures and humiliated. In economic terms, they have lagged far behind men. In business life, their advancement has been hindered at every point, and they have been kept away from managerial positions.

The strongest reactions to all these practices came from the radical wing of feminism. Radical Feminism, which was effective after the 1960s, criticized men's domination over women at every point and underlined that women should be proud of their own identity. The most important concept developed on the basis of Radical Feminism is the concept of "herstory". According to this, the concept written as "history" is criticized as an understanding that mostly describes the achievements of men in history and serves the male-dominated order. However, with the concept of "herstory", feminists tried to defend the existence of women and to increase their representation. At this point, some successes have been achieved and some campaigns have been organized, but they are not enough.

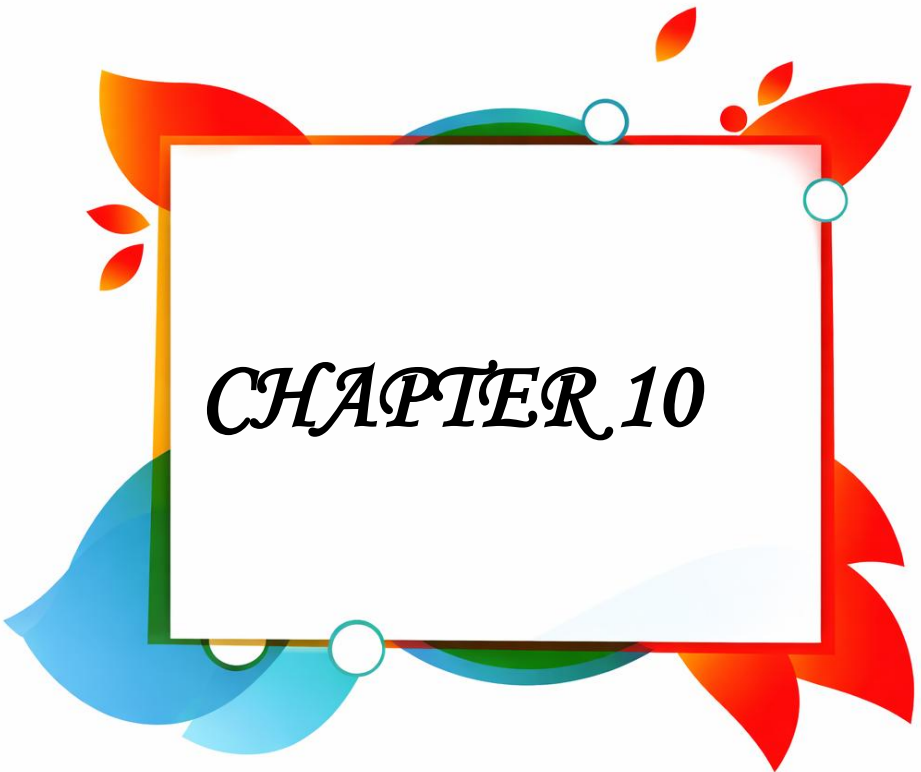
In order for women to have the right to be represented in the male-dominated order, they need to take more realistic and effective actions. These recommendations are listed below. First of all, awareness-raising groups, which are important in terms of establishing the best communication and interaction among women and raising awareness, should be built again and more effectively, just like the implementing mechanisms of Radical Feminism. Afterwards, comprehensive and detailed unions should be built that can represent women in

all areas of business life and protect their motherhood. In addition, all kinds of actions and historical arguments that women have achieved in the historical context should be created in a systematic way, just like the historical structure created by men. If necessary, all kinds of activist campaigns should be organized, and social awareness should be promoted. Finally, all students, especially boys, who are still in primary schools should be given systematic lessons that will enable them to understand gender equality. Thus, a generation that receives this basic education can be raised, and the difficulties faced by women can be prevented to a certain extent.

References

- Aktaş, G. (2013). Feminist söylemler bağlamında kadın kimliği: Erkek egemen bir toplumda kadın olmak. *Hacettepe Üniversitesi Edebiyat Fakültesi Dergisi*, 30(1). Retrieved from <https://dergipark.org.tr/pub/huefd/article/501952>
- Allen, P. (1997). *The concept of woman: The early humanist reformation, 1250–1500* (Vol. 2, Pt. 2). Grand Rapids, MI: Wm. B. Eerdmans Publishing.
- Barnes, M. W. (2026, May 30). Gender wage gap. In *Encyclopaedia Britannica*. Retrieved June 27, 2026, from <https://www.britannica.com/money/gender-wage-gap>
- Bocquet-Appel, J.-P. (2011). When the world's population took off: The springboard of the Neolithic Demographic Transition. *Science*, 333(6042), 560–561. doi:10.1126/science.1208880
- Echols, A. (1989). *Daring to be bad: Radical feminism in America, 1967–1975*. Minneapolis, MN: University of Minnesota Press.
- The Editors of Encyclopaedia Britannica. (2019, December 18). History. In *Encyclopaedia Britannica*. Retrieved June 15, 2022, from <https://www.britannica.com/topic/history>
- The Editors of Encyclopaedia Britannica. (2021, May 6). Middle Ages. In *Encyclopaedia Britannica*. Retrieved June 15, 2022, from <https://www.britannica.com/event/Middle-Ages>
- Harrison, K., & Boyd, T. (2003). *Understanding political ideas and movements*. Manchester, England: Manchester University Press.
- Haviland, W. A., Prins, H. E. L., Walrath, D., & McBride, B. (2015). *The essence of anthropology* (4th ed.). Boston, MA: Cengage Learning.
- Heilbroner, R. L., & Boettke, P. J. (2022, April 7). Capitalism. In *Encyclopaedia Britannica*. Retrieved June 15, 2022, from <https://www.britannica.com/topic/capitalism>
- History. (n.d.). In *Online Etymology Dictionary*. Retrieved June 11, 2022, from <https://www.etymonline.com/word/history>
- Larson, P. (2014). Consciousness-raising groups. In T. Teo (Ed.), *Encyclopedia of critical psychology* (pp. 1–2). New York, NY: Springer. doi:10.1007/978-1-4614-5583-7_603
- Lerner, G. (1975). Placing women in history: Definitions and challenges. *Feminist Studies*, 3(1/2), 5–14. doi:10.2307/3518951
- Marx, K. (1957). *Wage labour and capital*. Moscow, Russia: Foreign Languages Publishing House.

- Rowland, R., & Klein, R. (1996). Radical feminism: History, politics, action. In D. Bell & R. Klein (Eds.), *Radically speaking: Feminism reclaimed* (pp. 9–36). North Melbourne, Australia: Spinifex Press.
- Shard, D. (1974). The Neolithic revolution: An analogical overview. *Journal of Social History*, 7(2), 165–170. doi:10.1353/jsh/7.2.165
- The Pleistocene epoch. (n.d.). In *University of California Museum of Paleontology*. Retrieved June 10, 2022, from <https://web.archive.org/web/20140824111711/http://www.ucmp.berkeley.edu/quaternary/pleistocene.php>
- Willis, E. (1984). Radical feminism and feminist radicalism. *Social Text*, 9/10, 91–118. doi:10.2307/466537
- Woodburn, J. (1982). Egalitarian societies. *Man*, 17(3), 431–451.
- Zamagni, S., & Bruni, L. (Eds.). (2013). *Handbook on the economics of philanthropy, reciprocity and social enterprise*. Cheltenham, England: Edward Elgar Publishing.

A decorative rectangular frame with a white center. The frame is composed of a thick border with a color gradient from blue on the left to red on the right. The corners are adorned with stylized, colorful leaves in shades of red, orange, and blue. Small white circles are placed at the midpoints of the top and bottom edges of the frame.

CHAPTER 10

Competition Strategies in Public and Private Healthcare Institutions

Mevlut Karadag¹

1. The Nature of Competition in Healthcare

1.1. Why Is Competition in Healthcare Different?

Competition in healthcare differs substantially from competition in ordinary markets. Health services are shaped by uncertainty, information asymmetry, urgency, ethical responsibility, insurance mechanisms, and third-party payment systems. In classical economic terms, these features weaken the assumptions of fully informed and autonomous consumer choice. Arrow (1963) emphasized that uncertainty and the information gap between patients and physicians limit the functioning of conventional market mechanisms. Patients often cannot evaluate which service they need, which treatment is clinically superior, or which institution provides higher-quality care. Therefore, competition among healthcare institutions cannot be reduced to a simple relationship between supply and demand; it is mediated by trust, reputation, professional expertise, ethical responsibility, and perceived institutional quality (Arrow, 1963; Gaynor, Ho, & Town, 2015; Rice, 2015).

The concept of the consumer is also distinctive in healthcare. A patient is often not merely a customer making a discretionary purchase, but a vulnerable individual who depends on professional knowledge and timely access to care. This reality places clear limits on market-oriented and promotional strategies in healthcare. Competition should not be built on viewing the patient only as a customer; rather, it should be linked to patient safety, clinical quality, evidence-based practice, and value creation. Rice (2015) similarly argues that health markets do not fully conform to the assumptions of classical competition because insurance arrangements, payment models, public regulations, and ethical obligations transform the dynamics of demand and supply.

1.2. The Meaning of Competition in Public and Private Healthcare Institutions

In public healthcare institutions, competition is usually not defined through direct profit maximization. It is more closely associated with access to services, efficient use of public resources, patient satisfaction, quality of care, reduction of

¹ Associate Professor, Department of Medical Data Processing, Vocational School of Health Services, Lokman Hekim University, Ankara 06510, Türkiye, 0000-0001-7288-1925

waiting times, and the responsible management of public funds. For public hospitals, competitive advantage means the capacity to provide reliable, accessible, equitable, and sustainable care to broad segments of society. Strategic competition in public institutions therefore requires a balance between social benefit and operational efficiency.

In private healthcare institutions, competition is more visible through patient choice, brand value, service diversity, specialist physician capacity, technological infrastructure, hospitality services, the ability to attract international patients, and financial sustainability. Nevertheless, competition in private healthcare should not be equated solely with profitability. Because healthcare is an ethically sensitive service, private institutions must also remain committed to patient safety, clinical quality, evidence-based care, and transparency.

The principal difference between public and private institutions lies in their objective functions. Public institutions operate primarily within a framework of population health and public interest, whereas private institutions must also consider financial sustainability in a competitive market. Yet the common ground for both sectors is the ability to create value for the patient. According to Porter and Teisberg (2006), true competition in healthcare should be based not on service volume or price alone, but on the value created for patients. This perspective requires both public and private institutions to redefine competition through patient outcomes, cost-effectiveness, and quality indicators (Porter, 2010; Porter & Teisberg, 2006).

1.3. Core Dimensions of Competition in Healthcare Institutions

Competition in healthcare can be examined across five interrelated dimensions. The first is clinical quality, which includes diagnostic accuracy, treatment effectiveness, patient safety, and outcome indicators. The second is accessibility, including appointment availability, geographic access, financial access, and continuity of care. The third is cost management. Since healthcare costs are increasing rapidly, institutions must use resources more efficiently without compromising quality (Kaplan & Porter, 2011). The fourth dimension is patient experience, which includes communication, trust, information sharing, comfort, and process management. The fifth is organizational capability, including qualified human resources, information systems, leadership, and organizational culture. These elements are central to long-term competitive advantage (Agency for Healthcare Research and Quality [AHRQ], n.d.; Barney, 1991; Grant, 2018; World Health Organization [WHO], n.d.-b).

These dimensions are not independent. A hospital with advanced technology cannot create sustainable advantage if it fails to manage human resources effectively. Similarly, an institution with strong patient experience but weak clinical quality may lose trust over time. For this reason, competition strategies in healthcare require a multidimensional and integrated management approach.

2. Strategic Management in Public and Private Healthcare Institutions

2.1. The Importance of Strategic Management in Healthcare

Strategic management refers to the process by which healthcare institutions analyze environmental changes, define long-term objectives, allocate resources, and create competitive advantage. Healthcare organizations operate in a complex environment characterized by technological innovation, demographic change, epidemiological transition, rising patient expectations, evolving payment systems, public regulation, and intense competition for skilled professionals. Consequently, strategic management is not merely a planning activity; it is a core mechanism for institutional sustainability (Teece, Pisano, & Shuen, 1997; Top, 2018).

Grant (2018) defines strategy as the alignment of an organization's resources and capabilities with external opportunities and threats. In healthcare, this alignment is more complex because strategic decisions have financial, clinical, ethical, and social consequences. For example, a hospital's decision to invest in a specific specialty should not be evaluated only in terms of revenue potential; it must also be considered in relation to community needs, specialist workforce availability, technological requirements, ethical obligations, and quality of care. The dynamic capabilities perspective likewise emphasizes that the ability to adapt to changing environments, reconfigure resources, and learn continuously is essential for competitive advantage (Teece et al., 1997).

2.2. The Resource-Based View and Healthcare Institutions

The resource-based view argues that competitive advantage emerges from resources that are valuable, rare, difficult to imitate, and difficult to substitute (Barney, 1991). In healthcare institutions, strategic resources are not limited to physical infrastructure and medical devices. Specialist physicians, experienced nurses, clinical protocols, patient safety culture, digital health information systems, institutional reputation, managerial knowledge, and patient experience design can all function as strategic resources (Barney, 1991; Grant, 2018; Teece et al., 1997).

For public healthcare institutions, the resource-based view highlights the need to use existing workforce and infrastructure more effectively. Public hospitals often have large patient volumes, broad service networks, and high social legitimacy. However, these advantages become strategically meaningful only when patient flow, quality indicators, staff motivation, and process management are governed effectively.

For private healthcare institutions, the resource-based view is reflected in brand value, specialized clinical units, technological investments, patient relationship management, and international accreditation. Yet the crucial issue is whether these resources are transformed into organizational capabilities that

competitors cannot easily copy. Purchasing an expensive medical device, for example, does not by itself create a sustainable advantage. The device must be integrated into clinical processes, operated by qualified staff, and linked to improved patient outcomes (Grant, 2018; Türkiye Sağlık Hizmetleri Kalite ve Akreditasyon Enstitüsü [TÜSKA], 2024).

2.3. Competitive Positioning in Healthcare

Competitive positioning refers to how a healthcare institution differentiates itself in a market or service area. Public hospitals may position themselves through comprehensive service provision, emergency care, education and research capacity, contribution to population health, and accessibility. Private hospitals may position themselves through specialization in selected clinical areas, shorter waiting times, enhanced patient experience, advanced technology, health tourism capacity, and brand perception.

Herzlinger's (1997) market-driven healthcare perspective argues that institutions should consider patient preferences, payment systems, and service value in order to become more competitive. However, market orientation in healthcare must not be interpreted as uncontrolled commercialization. Healthcare institutions should take patient demand seriously while also preventing unnecessary utilization, excessive testing, and ethically questionable referrals.

2.4. Strategic Management Differences Between Public and Private Institutions

Public and private healthcare institutions differ in their strategic management conditions. Public institutions are more closely linked to public policy and central regulation. Budget, workforce, investment, and service delivery decisions often operate within a framework established by public authority. This may limit strategic flexibility compared with private institutions. Nevertheless, public institutions have important advantages in terms of service network, patient volume, social legitimacy, and continuity of care.

Private healthcare institutions can often make investment decisions more rapidly, adjust marketing strategies more flexibly, and create competitive advantage through specialization. At the same time, they may be more vulnerable to fluctuations in demand, insurance contracts, patient preferences, payment systems, and brand competition. Thus, strategic management in private healthcare requires a careful balance between financial sustainability and clinical quality.

For both sectors, the success of strategic management depends on integrating external environmental analysis with internal resource analysis. Healthcare institutions should develop strategies not only by monitoring competitors but also by evaluating their own clinical capacity, workforce, cost structure, patient experience, digital maturity, and quality performance.

3. The Competitive Environment in the Turkish Health System

3.1. Health Transformation and Institutional Competition

Türkiye's health system has undergone major structural changes over the last two decades. The Health Transformation Program played a central role in restructuring the system by aiming to expand access to care, strengthen service capacity, broaden health insurance coverage, and improve the quality of public hospitals (Akdağ, 2017; T.C. Sağlık Bakanlığı Sağlık Bilgi Sistemleri Genel Müdürlüğü, 2025). This transformation also changed the competitive relationship between public and private healthcare institutions.

Improvements in the infrastructure and service capacity of public hospitals have made it more difficult for private institutions to compete merely on physical comfort or speed of service. At the same time, the growth of the private health sector has created competitive pressure on public institutions in terms of patient satisfaction, waiting times, and service quality. As a result, competition in the Turkish health system has become multilayered, involving quality, access, cost, specialization, and patient experience rather than a simple opposition between public and private providers.

3.2. Competitive Advantages and Limitations of Public Hospitals

Public hospitals in Türkiye have important competitive advantages because of their broad reach, geographic distribution, emergency care capacity, and role as advanced referral centers. Training and research hospitals, city hospitals, and university hospitals are strategically significant for the management of complex cases, high-technology treatments, and education-research functions (T.C. Sağlık Bakanlığı Sağlık Bilgi Sistemleri Genel Müdürlüğü, 2025; TÜSKA, 2024).

However, public hospitals also face constraints that may limit their competitive capacity. Heavy patient volumes, staff shortages, bureaucratic decision-making processes, less flexible human resource systems, and problems in standardizing patient experience are among the major limitations. The key strategic challenge for public institutions is to manage high service volume together with quality, patient safety, and employee satisfaction.

Competitive strategies for public hospitals should therefore focus on reducing waiting times, improving patient flow, monitoring clinical quality indicators, optimizing resource utilization, and strengthening employee engagement. The lean hospital approach can be particularly useful because it aims to reduce waste, simplify processes, and increase value for patients (D'Andreamatteo, Ianni, Lega, & Sargiacomo, 2015; Graban, 2016; Mazzocato, Savage, Brommels, Aronsson, & Thor, 2010; Tlapa et al., 2020).

3.3. Competitive Advantages and Limitations of Private Healthcare Institutions

Private healthcare institutions may gain competitive advantage through flexibility in service delivery, rapid decision-making, patient experience design, branding, hospitality services, specialist physician capacity, and technology investments. Large private hospital groups in particular may strengthen their competitive position by specializing in selected clinical areas, investing in accreditation, and targeting international patient markets (TÜSKA, 2024; UŞAŞ, 2024).

Yet the competitive advantages of private institutions also involve strategic risks. High investment costs, workforce turnover, relationships with insurers and payment organizations, price sensitivity, limits of ethical marketing, and criticisms regarding unnecessary service use are important risk areas. If competition in healthcare is reduced to commercial pressure, it may lead to unnecessary testing, overtreatment, or unethical manipulation of patient expectations. Therefore, private-sector competition strategies must be supported by clinical governance, ethical oversight, and a value-based service orientation.

3.4. Strategic Importance of the Public-Private Balance

In health systems, public and private sectors are often complementary rather than purely alternative actors. Public-private partnerships have been widely discussed as a means of financing hospital infrastructure, increasing capacity, and diversifying management models. The success of such models depends on risk sharing, financial sustainability, accountability, and protection of the public interest (McKee, Edwards, & Atun, 2006; World Bank Group, 2024).

In Türkiye, the relationship between public and private healthcare institutions should be evaluated through both competition and complementarity. The public sector has a central role in access and social protection, while the private sector may contribute through service diversity, investment dynamism, and international market development. Strategically, the ideal objective is to create a competitive environment in which public and private institutions improve one another on the basis of patient value, quality, and cost-effectiveness.

4. Competition Strategies: Cost Leadership, Differentiation, Focus, and Blue Ocean

4.1. Cost Leadership in Healthcare Institutions

In the competitive strategy literature, cost leadership, differentiation, and focus are regarded as basic strategic positioning options. In healthcare, however, these strategies must be interpreted together with patient safety, clinical quality, ethical responsibility, and value-based care (Porter, 1980, 1985; Porter & Teisberg, 2006). Cost leadership refers to an institution's capacity to deliver

services at lower cost than competitors. In healthcare, this should never mean providing poor-quality or unsafe care. Rather, it involves reducing unnecessary tests, managing length of stay appropriately, improving supply chain efficiency, standardizing clinical pathways, and preventing process waste.

Kaplan and Porter (2011) argue that one of the major causes of the cost crisis in healthcare is the inability to measure service costs accurately. Many institutions cannot determine the real cost of specific services or patient pathways, which weakens pricing and strategic decision-making. Institutions seeking cost leadership should therefore implement patient-level cost analysis, clinical process mapping, and outcome-oriented performance measurement.

In public hospitals, cost leadership is important for the efficient use of public resources and the sustainability of service delivery. In private hospitals, it is central to competitive pricing, insurance agreements, and financial sustainability. In both sectors, however, cost reduction must not compromise clinical quality or patient safety (WHO, 2021a).

4.2. Differentiation Strategy

Differentiation strategy means that a healthcare institution offers a distinguishable value proposition to patients, physicians, insurers, or international patient groups. In healthcare, differentiation may be built through centers of excellence, advanced technology, strong academic staff, superior patient experience, rapid diagnostic processes, international accreditation, digital services, or integrated models of care (Porter, 1985; Porter & Teisberg, 2006).

Private institutions often use differentiation more visibly through brand management and patient experience. For instance, a hospital may become known for oncology, cardiology, in vitro fertilization, aesthetic surgery, or organ transplantation. In public institutions, differentiation may occur through being a referral center, providing education and research, managing highly complex cases, or contributing to public health.

The key point is that differentiation must be based on real value creation. Visual branding, building comfort, or advertising alone cannot create sustainable differentiation. The distinctive feature must be reflected in patient outcomes, safety, accessibility, and experience. Porter and Teisberg's value-based competition framework therefore links differentiation to measurable value for patients (Porter, 2010; Porter & Teisberg, 2006).

4.3. Focus Strategy

Focus strategy involves specialization in a particular patient group, clinical field, geographic region, or service segment. When healthcare institutions attempt to compete in all areas, they may distribute their resources too widely and fail to

develop strategic depth. Specialization can strengthen both clinical quality and brand perception (Porter, 1980, 1985).

For private healthcare institutions, focus strategy may be implemented through specialized centers such as cardiovascular surgery units, obesity surgery centers, physical therapy and rehabilitation centers, or international patient centers. For public institutions, focus may be developed through regional referral centers, training clinics, and specialized public service units.

The success of focus strategy depends on the level of need in the selected field, the intensity of competition, workforce capacity, and financial sustainability. A poorly selected focus area may restrict an institution to a narrow and unstable market. A well-selected area, by contrast, may generate clinical depth, stronger outcomes, and patient trust.

4.4. Blue Ocean Strategy and Healthcare Institutions

Blue ocean strategy aims to create new value spaces rather than compete directly with rivals in crowded markets (Kim & Mauborgne, 2005). In healthcare, this means developing new combinations of value for patients and communities instead of relying only on more expensive technology or stronger promotion.

Examples of blue ocean strategies in healthcare include home healthcare, digital follow-up programs, chronic disease management packages, integrated elderly care models, health tourism service packages, preventive health programs, and patient navigation systems. Such strategies can help institutions move beyond direct competition based on beds, physicians, or devices and create new service areas (Christensen, Grossman, & Hwang, 2009; Kim & Mauborgne, 2005).

For public institutions, blue ocean thinking may involve innovative population-health-oriented service models. For private institutions, niche service areas, digital health packages, and international patient experience design may create relatively uncontested spaces. However, these models should remain aligned with clinical evidence, patient safety, ethical principles, and accessibility.

5. Value-Based Healthcare and Competitive Advantage

5.1. The Logic of Value-Based Competition

The value-based healthcare approach argues that competition should be evaluated not by service volume, number of beds, or number of procedures, but by the relationship between health outcomes achieved for patients and the cost required to achieve those outcomes. Porter and Teisberg (2006) state that healthcare competition has often occurred in the wrong areas and that institutions should focus on creating genuine value for patients (Porter, 2010; Porter & Teisberg, 2006).

This perspective requires institutions to assess performance not only through financial indicators but also through clinical outcomes, patient safety, quality of life, recovery time, complication rates, and patient experience. For public hospitals, value-based healthcare supports the use of limited public resources to generate the highest possible health benefit. For private hospitals, it strengthens long-term trust and brand reputation.

5.2. How Can Value for the Patient Be Measured?

Patient value is not limited to completing a treatment successfully. It includes timely diagnosis, effective treatment, avoidance of complications, clear information, psychosocial support, financial predictability, and the sustainability of health outcomes. Therefore, value measurement in healthcare requires multidimensional indicators.

Clinical outcome indicators, process indicators, cost indicators, and patient experience indicators should be evaluated together. For example, the competitive strength of a surgical unit should not be assessed only by the number of operations performed. It should also be analyzed through complication rates, readmission rates, infection rates, patient satisfaction, average length of stay, and cost-effectiveness. Donabedian's structure-process-outcome model and the OECD's work on patient-reported outcomes and experiences provide useful frameworks for this logic (Donabedian, 1988; Organisation for Economic Co-operation and Development [OECD], 2025).

Kaplan and Porter's (2011) approach to cost measurement strengthens the cost dimension of value-based healthcare. An institution that does not know the real cost of care cannot accurately assess the value it creates. For this reason, healthcare institutions that pursue value-based competition must systematically monitor both outcomes and costs.

5.3. Value-Based Competition in Public Institutions

In public healthcare institutions, value-based competition is crucial for improving population health outcomes and using resources fairly. Because public hospitals serve very large patient populations, even small process improvements can produce major social benefits. Improvements in emergency department triage, reductions in outpatient waiting times, and strengthened chronic disease follow-up systems can all create public value (T.C. Sağlık Bakanlığı Sağlık Bilgi Sistemleri Genel Müdürlüğü, 2025; WHO, n.d.-b).

For public institutions, value-based strategy should include not only reducing cost per patient but also ensuring equitable access. Thus, competitive advantage in public hospitals is not a matter of appearing better than another institution; it is the ability to generate greater health benefit with public resources.

5.4. Value-Based Competition in Private Institutions

In private healthcare institutions, value-based competition is important for patient trust and sustainable brand value. When private institutions focus only on increasing procedure volume for short-term revenue, unnecessary utilization and ethical problems may emerge. A value-based orientation allows private institutions to create long-term competitive advantage by improving patient outcomes.

Private hospitals can strengthen their competitive position by transparently monitoring outcomes in selected clinical fields, systematically measuring patient experience, and managing costs without undermining care quality. In the international patient market, documented clinical outcomes, accreditation status, patient safety practices, and patient experience processes are particularly important sources of competitiveness (OECD, 2025; TÜSKA, 2024).

5.5. The Value Chain Approach

The healthcare value chain requires the evaluation of all processes from patient entry into the system to post-discharge follow-up. Burns (2002) emphasized that many actors participate in the healthcare value chain and that relationships among these actors affect the quality and cost of services. Hospitals, physicians, suppliers, pharmaceutical firms, insurers, public authorities, and patients are all part of this chain.

Healthcare institutions developing competition strategies should therefore focus not only on internal processes but also on supply chains, referral pathways, information flow, and payment mechanisms. Effective management of medical supplies, integration of laboratory processes, use of digital patient records, and coordination of post-discharge care can strengthen the entire value chain.

6. Human Resources, Talent Management, and Organizational Capability

6.1. Human Resources as the Core of Competition in Healthcare

Healthcare is both labor-intensive and knowledge-intensive. Consequently, the competitive strength of healthcare institutions depends largely on the quality, motivation, commitment, and teamwork of their human resources. Physicians, nurses, technicians, administrative staff, and support personnel directly shape patient experience and clinical quality. The functioning of health systems is closely related to the availability, accessibility, acceptability, and quality of health workers (Pfeffer, 1998; WHO, n.d.-a).

Pfeffer (1998) stresses the role of human resources in creating sustainable competitive advantage and argues that investing in employees strengthens organizational performance. This is particularly relevant in healthcare because service quality often becomes visible through employee behavior.

Communication with the patient, trust-building, clinical attention, team coordination, and empathy constitute the human-resource dimension of competitive advantage.

6.2. Strategic Human Resource Management

Strategic human resource management means viewing employees not merely as operational inputs but as central actors who contribute to institutional goals. Leggat (2007) argues that effective healthcare teams require effective team members and that teamwork competencies are essential for health service performance. This perspective requires recruitment, training, performance evaluation, career planning, and employee engagement processes to be aligned with organizational strategy.

In public healthcare institutions, strategic human resource management should focus on workforce planning, task distribution, in-service training, clinical leadership, and employee satisfaction. In private institutions, competitive compensation, talent attraction, collaboration with reputable physicians, employee experience, and performance management become more visible. However, in both sectors, the core objective is to increase the capacity of employees to create value for the institution and for patients.

6.3. Talent Management and Specialist Workforce

Talent management is especially important for specialist physicians, experienced nurses, clinical leaders, and managerial staff. Groysberg (2010) notes that the performance of star employees is shaped not only by individual ability but also by the organizational system in which they work. This insight is highly relevant to healthcare. The success of a physician or manager depends on teams, infrastructure, processes, culture, and support systems as well as personal competence.

Therefore, healthcare institutions should not only recruit talented individuals but also create an organizational environment in which talent can perform. A highly skilled surgeon, for example, requires a competent operating room team, intensive care infrastructure, sterilization systems, patient preparation processes, and clinical coordination. Likewise, a successful hospital manager cannot sustain performance without data-driven decision-making systems and strong team support.

6.4. The Relationship Between Employee Experience and Patient Experience

Employee experience and patient experience are closely related. Healthcare professionals who experience burnout, heavy workload, low organizational support, or a lack of recognition may find it more difficult to communicate effectively with patients. Institutions that seek to improve patient satisfaction

should therefore also improve employee well-being and engagement. Clinician well-being is a strategic condition for sustainable patient-centered and high-quality care (National Academies of Sciences, Engineering, and Medicine, 2019; West, Dyrbye, & Shanafelt, 2018).

Armstrong's (2020) approach to human resource management emphasizes the integrated management of performance, motivation, training, reward systems, and employee relations. In healthcare, this integrated approach should be supported by employee safety, fair workload distribution, continuous training, psychosocial support, career development, and participatory management.

6.5. Human Resource Strategies for Public and Private Institutions

For public healthcare institutions, human resource strategies should be based on improving employee motivation, strengthening in-service training, developing clinical leadership capacity, and balancing workloads. Since compensation and promotion systems are often centrally regulated, public managers may increase employee engagement primarily through organizational culture, fairness, communication, and participation mechanisms.

For private healthcare institutions, human resource strategies should focus on attracting and retaining talent, performance-oriented management, organizational culture, and the internalization of service standards. Workforce turnover in private institutions can directly affect service quality and patient experience. Therefore, competitive salaries should be complemented by strong leadership, professional development, and employee commitment.

7. Operational Excellence, Lean Hospital Management, and Patient Experience

7.1. What Is Operational Excellence?

Operational excellence is the capacity of healthcare institutions to deliver services safely, effectively, efficiently, timely, and in a patient-centered manner. From a competition strategy perspective, operational excellence is often an invisible but critical advantage. A hospital may have a strong building and advanced technology, yet if patient admission, appointment scheduling, laboratory testing, operating room use, hospitalization, discharge, and billing processes are poorly managed, its competitive strength will be limited (Institute of Medicine, 2001; TÜSKA, 2024; WHO, n.d.-b).

Operational excellence in healthcare is associated with reducing waiting times, preventing errors, standardizing processes, improving coordination among clinical and administrative units, and enhancing patient flow. These processes create competitive advantage in both public and private institutions.

7.2. The Lean Hospital Approach

The lean hospital approach aims to reduce waste, simplify processes, and eliminate activities that do not create value for the patient. Graban (2016) emphasizes that lean healthcare is not only a cost-reduction tool but also a method for improving quality and patient safety. Waste in healthcare may appear as unnecessary waiting, unnecessary movement, errors, repeated tests, capacity mismatch, information gaps, and poor process design. Reviews of lean healthcare indicate that this approach can produce useful results, especially in patient flow, waiting times, and process efficiency (D'Andreamatteo et al., 2015; Mazzocato et al., 2010; Tlapa et al., 2020).

In public hospitals, lean thinking can help manage heavy patient volumes more effectively. Redesigning outpatient flow, shortening laboratory turnaround times, improving operating room utilization, and standardizing discharge processes can support more efficient use of public resources. In private hospitals, lean practices can improve patient experience while helping to control costs.

7.3. Patient Experience as the Visible Face of Competition

Patient experience is the dimension of competitive strength most directly perceived by the patient. It includes appointment access, reception, waiting time, physician communication, nursing care, information, physical environment, privacy, discharge, and follow-up. AHRQ (n.d.) defines patient experience as the range of interactions that patients have with the healthcare system, including health plans, physicians, nurses, and staff in healthcare facilities. Lee (2004) also emphasizes that healthcare service design should consider empathy, attention, communication, and emotional experience.

Private institutions often use patient experience as a visible competitive advantage. However, patient experience is also increasingly important for public hospitals. Even when patient volume is high, clear orientation, understandable information, respectful communication, and process transparency can increase patient satisfaction.

7.4. Balancing Patient Experience and Clinical Quality

Patient experience cannot replace clinical quality, but it creates competitive advantage when evaluated together with clinical quality. A systematic review by Doyle, Lennox, and Bell (2013) found positive associations among patient experience, clinical effectiveness, and patient safety. An institution that offers comfort but has weak clinical outcomes will lose trust over time. Similarly, a clinically strong institution with poor communication may fail to maintain patient loyalty.

Healthcare institutions should therefore integrate patient experience strategies with clinical quality, patient safety, and ethical service delivery. It is not ethical

to increase patient satisfaction through unnecessary tests or scientifically unsupported practices. Competitive advantage is built through a balance between responding to patient expectations and protecting scientific and ethical boundaries.

7.5. Supply Chain and Process Management

Operational excellence in healthcare is not limited to clinical processes. Medical supplies, pharmaceuticals, devices, laboratories, imaging, and support services influence cost and quality performance. Burns's (2002) healthcare value chain perspective shows that relationships with suppliers and other actors are central to competitive capacity.

For public institutions, supply chain management is important for procurement, inventory control, and efficient resource use. For private institutions, it is strategic for both cost control and service continuity. In technology-intensive institutions, equipment maintenance, consumables, spare parts, and technical support processes may directly influence competitive advantage.

8. Digital Transformation, Artificial Intelligence, and Disruptive Innovation

8.1. Competitive Effects of Digital Transformation in Healthcare

Digital transformation has become increasingly central to competition strategies in healthcare. Electronic health records, hospital information systems, telehealth, artificial intelligence-supported decision systems, remote patient monitoring, digital appointment platforms, and data analytics are changing the delivery of health services. WHO's global strategy on digital health emphasizes that digital health initiatives should be implemented in an integrated manner with financial, organizational, human, and technological resources (WHO, 2021b). Topol (2019) argues that artificial intelligence and digital technologies have the potential to make healthcare more personalized, predictive, and human-centered.

For healthcare institutions, digital transformation is not merely an investment in technology. It requires the redesign of clinical processes, patient communication, data management, decision support systems, and managerial performance measurement. Digital competitive advantage therefore depends less on possessing technology and more on using it strategically.

8.2. Artificial Intelligence and Clinical Decision Support

Artificial intelligence offers important opportunities in medical imaging, pathology, laboratory medicine, risk prediction, clinical decision support, patient triage, and operational planning. However, AI applications do not remove clinical responsibility. On the contrary, transparency of algorithmic decisions, data quality, ethical use, patient privacy, and clinical validation become even more

important. WHO states that ethics, human rights, accountability, transparency, and governance should be central to the use of AI in health (WHO, 2021c, 2025).

In public healthcare institutions, AI can be used to manage high patient volumes, develop early warning systems, and optimize resource allocation. In private institutions, it can create competitive advantage by accelerating diagnosis, enabling personalized service, improving patient experience, and increasing operational efficiency. In both sectors, however, AI investments must be supported by scientific evidence and ethical governance.

8.3. Disruptive Innovation and Healthcare Institutions

The disruptive innovation perspective developed by Christensen et al. (2009) suggests that new technologies or service models can gradually transform established actors. In healthcare, disruptive innovation may occur through telehealth, home care, low-cost diagnostic tools, digital monitoring systems, retail clinics, or patient-centered care platforms.

Healthcare institutions may view disruptive innovations either as threats or opportunities. Institutions that remain tied exclusively to hospital-centered service models may lose competitiveness against digital health platforms. By contrast, institutions that develop their own digital service channels, establish remote monitoring systems, and move chronic disease management beyond the hospital can create new competitive domains.

8.4. Different Digitalization Strategies in Public and Private Institutions

In public institutions, digitalization offers major opportunities for population-level data, service integration, and public health management. Public health systems can integrate patient records, monitor service utilization, and develop early warning systems through digital infrastructure. However, public-sector digital transformation requires large-scale infrastructure investments, legislation, data security, and inter-institutional coordination (WHO, 2021b).

In private institutions, digitalization may be implemented more rapidly. Private hospitals can gain competitive advantage through mobile applications, digital patient portals, online consultations, customer relationship management systems, and personalized patient communication. Yet these strategies should be constrained by patient privacy, data security, and ethical marketing principles.

8.5. Strategic Risks in Digital Transformation

The main reasons digital transformation fails include poor alignment with institutional strategy, insufficient employee involvement, low data quality, and inadequate attention to patient needs. If healthcare institutions treat digitalization only as software or device procurement, expected competitive advantage will not emerge. Digital transformation should be integrated with process improvement, employee training, data governance, and patient experience (WHO, 2021b).

9. Health Tourism, International Competition, and Public-Private Partnerships

9.1. Health Tourism and Competitive Dynamics

Health tourism refers to the travel of patients across borders for treatment, rehabilitation, aesthetic services, dental care, thermal care, or advanced medical services. Hanefeld, Smith, Horsfall, and Lunt (2014) describe medical tourism as a multidimensional field with economic, clinical, ethical, and regulatory implications. Health tourism creates international competition opportunities for healthcare institutions, but it also involves risks related to quality, patient safety, follow-up care, and legal responsibility.

Türkiye has considerable potential in health tourism because of its geographic location, health infrastructure, specialist workforce, cost advantage, and tourism capacity. Incentives for health tourism and institutional support for international health services have become important policy tools for the development of international patient strategies (T.C. Ticaret Bakanlığı, 2022, 2025; USHAŞ, 2024).

9.2. Sources of Competitive Advantage in Health Tourism

Competitive advantage in health tourism cannot be achieved through low prices alone. International patients value trust, quality, accreditation, clinical outcomes, communication, cultural compatibility, transfer services, accommodation, interpreter support, and post-treatment follow-up. Therefore, health tourism strategy requires the integration of hospital services with tourism, logistics, and patient support services (Hanefeld et al., 2014; Lunt, Horsfall, & Hanefeld, 2016; WHO, 2021a).

Private healthcare institutions may play a more active role in health tourism because they can act flexibly in marketing, package services, international representation, and patient relations. Public institutions may have potential as referral centers in highly specialized areas. However, public-sector participation in health tourism should be planned in a way that does not negatively affect access for local patients.

9.3. Value-Based Approach in Health Tourism

Sustainable competition in health tourism is possible not merely by attracting patients, but by producing safe and effective value for them. Since international patients return to their home countries after treatment, follow-up, complication management, and medical record sharing become critical. Health tourism strategies should therefore include pre-treatment assessment, informed consent, multilingual communication, post-treatment follow-up, and complication management protocols (Hanefeld et al., 2014; Lunt et al., 2016).

Porter and Teisberg's (2006) value-based competition approach is also relevant to health tourism. For long-term international competitiveness, healthcare institutions should make clinical outcomes, patient experience, and cost-effectiveness visible and measurable.

9.4. Public-Private Partnerships and Competition

Public-private partnerships offer different models for financing and operating healthcare infrastructure. McKee et al. (2006) emphasize that hospital-based public-private partnerships involve both opportunities and risks, particularly in relation to contract design, financial obligations, accountability, and the public interest.

Public-private partnerships can influence competition in two ways. First, they may improve public-sector service quality by creating modern infrastructure and expanding capacity. Second, they may strengthen efficiency in public service delivery by incorporating private-sector management approaches. However, such models can be criticized if risks are transferred disproportionately to the public sector while benefits accrue mainly to private actors. Therefore, contract transparency, performance indicators, service quality, and financial sustainability should be central criteria in evaluating public-private partnerships.

10. Risk, Ethics, Defensive Medicine, and Sustainable Competition

10.1. Ethical Boundaries of Competition in Healthcare

Competition in healthcare cannot be considered separately from ethical principles. Patient vulnerability, information asymmetry, and the vital importance of health services impose a special responsibility on institutions. It is unacceptable for a healthcare institution to gain advantage by providing unnecessary services, using misleading advertising, manipulating patient expectations, or reducing quality under cost pressure (Arrow, 1963; T.C. Sağlık Bakanlığı, 2025; Türk Tabipleri Birliği, 2012).

Arrow's (1963) analysis of trust and uncertainty explains why ethical responsibility is central in health markets. Patients often have to rely on the recommendations of health professionals. This trust relationship requires institutions to maintain ethical boundaries in all competition strategies.

10.2. Defensive Medicine and Its Effects on Competition Strategies

Defensive medicine may be defined as the ordering of additional tests, procedures, referrals, or avoidance behaviors primarily to protect physicians from legal risk rather than to meet clinical need. Studdert et al. (2005) showed that perceived legal and professional risk can affect clinical decision-making among high-risk specialists. Defensive medicine may increase costs, complicate patient experience, and reduce the efficient use of resources.

From a competition strategy perspective, defensive medicine is a two-sided problem. Institutions must strengthen patient safety and legal risk management, but unnecessary tests and procedures contradict value-based healthcare. Healthcare organizations should manage this risk through clinical protocols, patient information processes, effective documentation systems, quality assurance mechanisms, and physician support programs.

10.3. Ethical Marketing and Healthcare Delivery

Marketing is an important component of competition in private healthcare institutions. Yet healthcare marketing has ethical limits that differ from those in many other sectors. It is unethical to direct patient expectations through unrealistic promises, exaggerate clinical outcomes, create unnecessary service demand, or use fear-based marketing. In Türkiye, promotion and information activities in healthcare are regulated by legislation, and professional ethical principles emphasize patient benefit, trust, and honest information (T.C. Sağlık Bakanlığı, 2025; Türk Tabipleri Birliği, 2012).

Marketing is more limited in public healthcare institutions, but communication, public information, and social trust remain strategically important. Public institutions should emphasize public health, accessibility, and reliability in their communication. For both sectors, ethical communication is a long-term foundation of competitive advantage.

10.4. Patient Safety and Sustainable Competition

Patient safety is an indispensable component of competition strategy in healthcare. Medical errors, infections, medication safety problems, communication failures, and process breakdowns create clinical risk and damage institutional reputation. A strong patient safety culture is therefore a fundamental source of sustainable competitive advantage (TÜSKA, 2024; WHO, 2021a).

Healthcare institutions should view patient safety not only as an accreditation requirement but as a strategic management issue. Incident reporting systems, root cause analysis, clinical protocols, team communication, patient participation, and continuous training are key components of patient safety strategy.

10.5. Competition and Social Responsibility

Healthcare institutions are responsible not only to individual patients but also to society. In public institutions, this responsibility is directly associated with the public interest. In private institutions, corporate social responsibility, ethical service delivery, and contribution to the sustainability of the health system are also important. Competition strategies should not weaken public health; rather, they should contribute to higher-quality, more accessible, and more sustainable healthcare (WHO, n.d.-b).

11. A Model for Developing Competition Strategy in Public and Private Healthcare Institutions

11.1. General Framework of the Model

A competition strategy development model for public and private healthcare institutions may include five stages: environmental analysis, internal resource analysis, strategic positioning, implementation planning, and performance evaluation. This model allows institutions to assess competitive advantage in a multidimensional manner rather than through a single variable. Its structure-process-outcome logic is compatible with Donabedian's quality assessment framework, and its emphasis on measurable strategic goals is consistent with the balanced scorecard approach (Donabedian, 1988; Kaplan & Norton, 1996).

The first stage is environmental analysis. The institution should evaluate patient profile, demographic trends, competing organizations, payment systems, legal regulations, technological developments, and community health needs. The second stage is internal resource analysis. Human resources, clinical capacity, financial status, technological infrastructure, patient experience, quality indicators, and organizational culture should be reviewed. This stage applies the resource-based view to healthcare institutions (Barney, 1991; Grant, 2018).

The third stage is strategic positioning. The institution should decide whether to prioritize cost leadership, differentiation, focus, blue ocean, or value-based competition. The fourth stage is implementation planning. Strategy should be translated into human resources, operations, finance, technology, quality, and communication plans. The fifth stage is performance evaluation. The institution should monitor the impact of strategy using clinical outcomes, costs, patient experience, employee satisfaction, and social contribution indicators.

11.2. Strategic Priorities for Public Healthcare Institutions

For public healthcare institutions, competition strategy should be based on the balance between public benefit and operational efficiency. Key strategic priorities include strengthening access to services, reducing waiting times, improving patient safety and clinical quality indicators, increasing resource-use efficiency, strengthening employee motivation and engagement, developing digital health systems, transforming education and research capacity into strategic advantage, and enhancing regional referral roles.

These priorities do not mean that public institutions should use the same competitive tools as private institutions. The competitive advantage of public institutions should be considered together with their capacity to generate social value.

11.3. Strategic Priorities for Private Healthcare Institutions

For private healthcare institutions, competition strategy should be based on managing financial sustainability together with clinical quality. Strategic priorities include specialization in selected clinical areas, strengthening patient experience and service design, supporting international accreditation and quality documentation, developing health tourism capacity, attracting and retaining qualified personnel, establishing digital patient relationship management, managing costs without reducing patient value, and creating ethical marketing and transparent communication standards.

The central risk for private institutions is that short-term financial objectives may overshadow long-term patient trust and clinical quality. Therefore, private-sector strategies should be supported by value-based care and ethical governance.

11.4. Strategy Map Proposal

Healthcare institutions may structure their competition strategies through a strategy map. The balanced scorecard approach makes it possible to connect strategy to measurable goals across financial, customer/patient, process, and learning-development dimensions (Kaplan & Norton, 1996). A healthcare strategy map may include four main dimensions: financial and resource dimension; patient and community dimension; process dimension; and learning and development dimension.

This structure can be adapted according to the differing aims of public and private institutions. In public institutions, the community dimension may be more central. In private institutions, financial sustainability and brand value may be more visible. For both sectors, however, patient value should remain the main axis.



Figure 1. Strategy Map for Healthcare Institutions

11.5. Implementation Checklist

Before implementing a competition strategy, a healthcare institution should evaluate its plan in terms of quality indicators, strategic goals, patient value, ethical appropriateness, and sustainable performance. The following questions can guide this evaluation (Donabedian, 1988; Kaplan & Norton, 1996; WHO, n.d.-b):

- Is the institution's target patient group and service area clearly defined?
- What is the institution's distinctive value compared with competitors?
- Are clinical quality and patient safety indicators monitored regularly?
- Is patient experience measured systematically?
- Are service costs calculated accurately?
- Is the human resources strategy aligned with the institutional strategy?
- Are digital technologies used only as tools, or as components of strategic transformation?
- Are marketing and communication activities consistent with ethical principles?
- Are strategic goals linked to measurable indicators?

- Is the strategy evaluated and updated at regular intervals?

Answers to these questions help assess the feasibility and sustainability of the institution's competition strategy.

12. Conclusion

Competition strategies in public and private healthcare institutions differ from classical business competition because of the distinctive nature of healthcare. Uncertainty, information asymmetry, ethical responsibility, public interest, payment systems, and patient safety define the boundaries of competition in this sector (Arrow, 1963; Gaynor et al., 2015; Rice, 2015; WHO, 2021a). For this reason, competition in healthcare should not be viewed merely as an effort to attract more patients or generate more revenue. Real competitive advantage arises from the ability to create higher value for patients, use resources effectively, develop employee competence, and provide reliable services to society.

For public healthcare institutions, the core of competition strategy should be accessibility, equity, efficient use of public resources, and service quality. Public institutions should improve patient flow and service processes, monitor waiting times and quality indicators, strengthen digital health infrastructure, and enhance employee engagement. Training and research hospitals should transform academic productivity and specialized service capacity into strategic advantage. The primary aim of competition in public institutions should be to generate more health value for the community.

For private healthcare institutions, competition strategy is associated with differentiation, patient experience, financial sustainability, health tourism, and brand value. Yet private institutions should not build their strategies only on marketing or physical comfort. Clinical quality, patient safety, specialist competence, patient experience, and ethical communication should be the central components of strategy. Private institutions operating in health tourism should support international patient processes with clinical outcome monitoring, multilingual communication, post-treatment follow-up, and complication management.

Ultimately, competition strategies in public and private healthcare institutions will shape the future of health systems. Rising costs, population ageing, chronic disease burden, technological transformation, increasing patient expectations, and international mobility require institutions to think more strategically. The institutions that succeed will not necessarily be the largest or the most technologically advanced. They will be those that create higher value for patients, empower their employees, protect ethical principles, and adapt effectively to change.

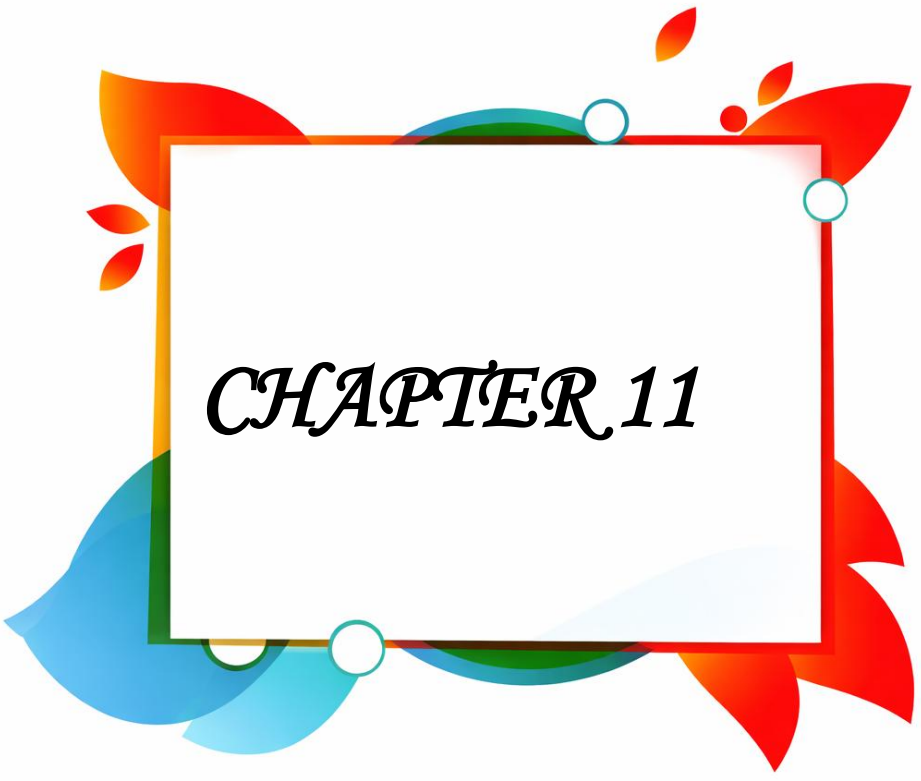
References

- Agency for Healthcare Research and Quality. (n.d.). What is patient experience? CAHPS. Retrieved May 20, 2026, from <https://www.ahrq.gov/cahps/about-cahps/patient-experience/index.html>
- Akdağ, R. (2017). Sağlıkta Dönüşüm Programı raporu [Health Transformation Program report]. Ankara, Türkiye: T.C. Sağlık Bakanlığı.
- Armstrong, M. (2020). Armstrong's handbook of human resource management practice (15th ed.). London, England: Kogan Page.
- Arrow, K. J. (1963). Uncertainty and the welfare economics of medical care. *American Economic Review*, 53(5), 941-973.
- Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120. doi:10.1177/014920639101700108
- Burns, L. R. (2002). The health care value chain: Producers, purchasers, and providers. San Francisco, CA: Jossey-Bass.
- Christensen, C. M., Grossman, J. H., & Hwang, J. (2009). The innovator's prescription: A disruptive solution for health care. New York, NY: McGraw-Hill.
- D'Andreanmatteo, A., Ianni, L., Lega, F., & Sargiacomo, M. (2015). Lean in healthcare: A comprehensive review. *Health Policy*, 119(9), 1197-1209. doi:10.1016/j.healthpol.2015.02.002
- Donabedian, A. (1988). The quality of care: How can it be assessed? *JAMA*, 260(12), 1743-1748. doi:10.1001/jama.1988.03410120089033
- Doyle, C., Lennox, L., & Bell, D. (2013). A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. *BMJ Open*, 3(1), e001570. doi:10.1136/bmjopen-2012-001570
- Gaynor, M., Ho, K., & Town, R. J. (2015). The industrial organization of health-care markets. *Journal of Economic Literature*, 53(2), 235-284. doi:10.1257/jel.53.2.235
- Graban, M. (2016). Lean hospitals: Improving quality, patient safety, and employee engagement (3rd ed.). Boca Raton, FL: CRC Press.
- Grant, R. M. (2018). Contemporary strategy analysis (10th ed.). Hoboken, NJ: Wiley.
- Groysberg, B. (2010). Chasing stars: The myth of talent and the portability of performance. Princeton, NJ: Princeton University Press.
- Hanefeld, J., Smith, R., Horsfall, D., & Lunt, N. (2014). What do we know about medical tourism? A review of the literature with discussion of its implications for the UK National Health Service as an example of a public

- health care system. *Journal of Travel Medicine*, 21(6), 410-417.
doi:10.1111/jtm.12147
- Herzlinger, R. E. (1997). *Market-driven health care: Who wins, who loses in the transformation of America's largest service industry*. Reading, MA: Addison-Wesley.
- Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC: National Academies Press.
doi:10.17226/10027
- Kaplan, R. S., & Norton, D. P. (1996). *The balanced scorecard: Translating strategy into action*. Boston, MA: Harvard Business School Press.
- Kaplan, R. S., & Porter, M. E. (2011). How to solve the cost crisis in health care. *Harvard Business Review*, 89(9), 46-64.
- Kim, W. C., & Mauborgne, R. (2005). *Blue ocean strategy: How to create uncontested market space and make the competition irrelevant*. Boston, MA: Harvard Business School Press.
- Lee, F. L. (2004). *If Disney ran your hospital: 9 1/2 things you would do differently*. Bozeman, MT: Second River Healthcare Press.
- Leggat, S. G. (2007). Effective healthcare teams require effective team members: Defining teamwork competencies. *BMC Health Services Research*, 7, 17.
doi:10.1186/1472-6963-7-17
- Lunt, N., Horsfall, D., & Hanefeld, J. (2016). Medical tourism: A snapshot of evidence on treatment abroad. *Maturitas*, 88, 37-44.
doi:10.1016/j.maturitas.2016.03.001
- Mazzocato, P., Savage, C., Brommels, M., Aronsson, H., & Thor, J. (2010). Lean thinking in healthcare: A realist review of the literature. *Quality and Safety in Health Care*, 19(5), 376-382. doi:10.1136/qshc.2009.037986
- McKee, M., Edwards, N., & Atun, R. (2006). Public-private partnerships for hospitals. *Bulletin of the World Health Organization*, 84(11), 890-896.
- National Academies of Sciences, Engineering, and Medicine. (2019). *Taking action against clinician burnout: A systems approach to professional well-being*. Washington, DC: National Academies Press. doi:10.17226/25521
- Organisation for Economic Co-operation and Development. (2025). *Does healthcare deliver? Results from the Patient-Reported Indicator Surveys (PaRIS)*. Paris, France: OECD Publishing. doi:10.1787/c8af05a5-en
- Pfeffer, J. (1998). *The human equation: Building profits by putting people first*. Boston, MA: Harvard Business School Press.
- Porter, M. E. (1980). *Competitive strategy: Techniques for analyzing industries and competitors*. New York, NY: Free Press.

- Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. New York, NY: Free Press.
- Porter, M. E. (2010). What is value in health care? *New England Journal of Medicine*, 363(26), 2477-2481. doi:10.1056/NEJMp1011024
- Porter, M. E., & Teisberg, E. O. (2006). *Redefining health care: Creating value-based competition on results*. Boston, MA: Harvard Business School Press.
- Rice, T. (2015). *The economics of health reconsidered* (4th ed.). Chicago, IL: Health Administration Press.
- Studdert, D. M., Mello, M. M., Sage, W. M., DesRoches, C. M., Peugh, J., Zapert, K., & Brennan, T. A. (2005). Defensive medicine among high-risk specialist physicians in a volatile malpractice environment. *JAMA*, 293(21), 2609-2617. doi:10.1001/jama.293.21.2609
- T.C. Sağlık Bakanlığı. (2025, November 12). Sağlık hizmetlerinde tanıtım ve bilgilendirme faaliyetleri hakkında yönetmelik [Regulation on promotion and information activities in health services]. *Resmî Gazete*, 33075.
- T.C. Sağlık Bakanlığı Sağlık Bilgi Sistemleri Genel Müdürlüğü. (2025). Sağlık istatistikleri yılı 2024 [Health statistics yearbook 2024]. Ankara, Türkiye: T.C. Sağlık Bakanlığı. Retrieved from <https://www.saglik.gov.tr/TR-114952/saglik-istatistikleri-yilligi-2024.html>
- T.C. Ticaret Bakanlığı. (2022). 5448 sayılı Hizmet İhracatının Tanımlanması, Sınıflandırılması ve Desteklenmesi Hakkında Karar [Decision no. 5448 on the definition, classification, and support of service exports]. Ankara, Türkiye: Author.
- T.C. Ticaret Bakanlığı. (2025). Sağlık ve spor turizmi hizmetlerine yönelik uygulama usul ve esaslarına ilişkin genelge [Circular on implementation procedures and principles for health and sports tourism services]. Ankara, Türkiye: Author.
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509-533.
- Tlapa, D., Zepeda-Lugo, C. A., Tortorella, G. L., Baez-Lopez, Y. A., Limon-Romero, J., Alvarado-Iniesta, A., & Rodriguez-Borbon, M. I. (2020). Effects of lean healthcare on patient flow: A systematic review. *Value in Health*, 23(2), 260-273. doi:10.1016/j.jval.2019.11.002
- Top, M. (2018). Sağlık kurumlarında stratejik yönetim [Strategic management in healthcare institutions]. Ankara, Türkiye: Siyasal Kitabevi.
- Topol, E. J. (2019). *Deep medicine: How artificial intelligence can make healthcare human again*. New York, NY: Basic Books.

- Türk Tabipleri Birliği. (2012). Hekimlik meslek etiği kuralları [Rules of medical professional ethics]. Ankara, Türkiye: Author.
- Türkiye Sağlık Hizmetleri Kalite ve Akreditasyon Enstitüsü. (2024). Sağlıkta akreditasyon standartları: Hastane seti [Healthcare accreditation standards: Hospital set]. Ankara, Türkiye: TÜSEB. Retrieved from <https://files.tuseb.gov.tr/tuska/files/akreditasyon/2024-11-04-13-13-28.pdf>
- USHAŞ. (2024). USHAŞ Uluslararası Sağlık Hizmetleri A.Ş. 2024 faaliyet raporu [2024 annual report]. Retrieved from <https://www.uste.org.tr/wp-content/uploads/USHAS-2024-Faaliyet-Raporu-2024.pdf>
- West, C. P., Dyrbye, L. N., & Shanafelt, T. D. (2018). Physician burnout: Contributors, consequences and solutions. *Journal of Internal Medicine*, 283(6), 516-529. doi:10.1111/joim.12752
- World Bank Group. (2024). Public-private partnerships reference guide: Version 3.0. Retrieved from <https://ppp.worldbank.org/sites/default/files/2024-08/PPP%20Reference%20Guide%20Version%203.pdf>
- World Health Organization. (2021a). Global patient safety action plan 2021-2030: Towards eliminating avoidable harm in health care. Geneva, Switzerland: Author. Retrieved from <https://www.who.int/publications/i/item/9789240032705>
- World Health Organization. (2021b). Global strategy on digital health 2020-2025. Geneva, Switzerland: Author. Retrieved from <https://www.who.int/publications/i/item/9789240020924>
- World Health Organization. (2021c). Ethics and governance of artificial intelligence for health: WHO guidance. Geneva, Switzerland: Author. Retrieved from <https://www.who.int/publications/i/item/9789240029200>
- World Health Organization. (2025). Ethics and governance of artificial intelligence for health: Guidance on large multi-modal models. Geneva, Switzerland: Author. Retrieved from <https://www.who.int/publications/i/item/9789240084759>
- World Health Organization. (n.d.-a). Health workforce. Retrieved May 20, 2026, from <https://www.who.int/health-topics/health-workforce>
- World Health Organization. (n.d.-b). Quality of care. Retrieved May 20, 2026, from <https://www.who.int/health-topics/quality-of-care>

A decorative rectangular frame with a white center. The frame is composed of a thick border with a color gradient from blue on the left to red on the right. The corners are adorned with stylized, colorful leaves in shades of blue, green, and red. Small white circles are placed at the midpoints of the top and bottom edges of the frame.

CHAPTER 11

Statistical Analysis of Smart City Components

Emre Ekin¹ & Umay Evsa Han Şahin²

1. INTRODUCTION

The world's population is growing every day, and this growth is rapidly increasing the rate of urbanization. Cities are at the center of economic activity, production, and consumption; however, increasing population and unplanned urbanization bring problems such as water, air, and soil pollution, traffic congestion, energy consumption, rising crime rates, and resource shortages. In this regard, the idea of "smart cities" has surfaced to provide creative and long-lasting answers to urban issues. Smart cities aim to improve urban life, optimize resource use, and enhance quality of life by utilizing information and communication technologies. Smart systems developed in the fields of energy management, transportation, environmental protection, security, and public services ensure that cities are more orderly, safe, and livable (Özkaya, 2017). However, the concept of smart cities is not based solely on technological infrastructure; it offers a holistic approach that also encompasses governance, social participation, environmental sustainability, and economic development.

Academic literature reveals that smart cities are a holistic model with social, economic, and environmental dimensions beyond technological transformation. Caragliu, Del Bo, and Nijkamp (2011) defined smart cities as structures that improve urban life using information and communication technologies; Batty and colleagues (2012) emphasized that data collection and analysis capacity plays a fundamental role in urban planning. Studies conducted between 2013 and 2015 highlighted energy efficiency, transportation, and environmental sustainability, demonstrating the importance of governance and social dimensions in addition to technology (Neirotti et al., 2014; Albino, Berardi & Dangelico, 2015). The Internet of Things (IoT), big data, and artificial intelligence applications have gained prominence in smart city research since 2016 (Hashem et al., 2016; Dameri, 2017).

In Turkey, smart city strategies have become one of the priority areas of public policy since 2015, with an increase in digitalization and sustainability-focused applications, particularly in municipal services (Öztürk & Yalçınkaya, 2018; Aydın, 2020). With the COVID-19 pandemic, studies after 2020 expanded to

¹ Assoc. Prof., National Defence University, ORCID: 0000-0002-4043-9750.

² Econometrician, ORCID: 0009-0004-6462-0310.

focus on health, security, and digital infrastructure. Cocchia (2021) noted that digitalization has transformed the vision of sustainable cities. Recently, the focus has shifted to green energy, combating climate change, and reducing carbon emissions (Yigitcanlar et al., 2022; Bibri & Krogstie, 2023). Compared to the international literature, smart city applications in Europe and Asia are generally implemented through large-scale projects integrated with institutional structures. While sustainable transportation systems and citizen-focused governance are prominent in European examples (Giffinger et al., 2007), the effective use of digital information technologies and the integration of institutional structures are prioritized in Asia (Hsu et al., 2017). In Turkey, smart city applications in Istanbul and Ankara are still at the pilot stage and are reflected to a limited extent in comprehensive digitalization projects (Trade.gov, 2023). This situation stems from factors such as the immaturity of institutional structures, limited stakeholder participation, and the small scale of projects.

The results emphasize the significance of considering the relationships between sub-dimensions in the development of cities in Turkey as smart cities. In particular, smart living, as a central variable that both supports and is influenced by other dimensions, carries strategic priority in urban planning and policy development processes. This result is consistent with the integrated and sustainable smart city approach proposed in international studies (Nam & Pardo, 2011). This study aims to statistically examine the fundamental components of the smart city concept and identify the factors that influence the classification of cities as “smart.” In light of the literature, smart cities are considered a holistic model that encompasses not only technology but also governance, social participation, environmental sustainability, and economic development. Thus, it is emphasized that technology and human-centered approaches must be applied together for cities to be smart.

Advancing technology has brought the concept of smart cities to the forefront by offering innovative solutions to environmental and social problems arising in urban life. Smart cities aim to improve quality of life through information and communication technologies, enhance efficiency in energy, transportation, and public services, and create sustainable cities. This study examines the six universal components of smart cities (smart economy, smart environment, smart governance, smart living, smart mobility, and smart people). The developed 25-item scale was administered to 150 expert participants working in the fields of urban planning, zoning, and environmental urbanism. The results and evaluations of the statistical analysis conducted on the six universal components of smart cities are presented in the conclusion section. The findings are important in demonstrating the strategic importance of smart city components in sustainable urban planning.

2. SMART CITY

In the 21st century, rapid urbanization, increasing population density, and limited resources have made it imperative for cities to be managed in a sustainable, efficient, and livable manner. According to United Nations (2022) data, 56% of people on Earth currently reside in cities, and by 2050, that number is predicted to rise to 68%. This situation brings new issues with energy use, transportation, environmental sustainability and security.

Batty (2012) and Caragliu (2011) highlight the concept of smart cities as an approach that aims to offer innovative solutions to these problems through information and communication technologies (ICT), the Internet of Things (IoT), big data analytics, and artificial intelligence. Smart cities have been defined in different ways in the literature. These definitions are as follows: A smart city is more than just a technological advancement. it is also a holistic development model that encompasses social, economic, and environmental components. The European Commission (2014) defines smart cities as cities that aim to improve citizens' quality of life, guarantee resource efficiency and promote sustainable growth. In this context, smart city applications cover a variety of areas, from city management to transportation, energy efficiency, and environmental protection.

A smart city is a city or region that is sustainable, environmentally friendly, integrates advanced technologies into its activities, and offers a superior standard of living for its inhabitants. Smart cities are cities with a high level of R&D, learning capacity, and awareness of innovation (Özkaya, 2017). Becoming a smart city requires making maximum use of available resources and technology. A smart city provides citizens with maximum service in areas such as transportation, education, health, and infrastructure, and does so by utilizing the creativity of the population information and communication's power technologies (Hall, 2000).

A smart city consists of a mixture of human capital, infrastructure capital, social capital, and venture capital. A smart city can collect information, share data, and transfer knowledge to physical infrastructure to provide numerous benefits such as increasing comfort, improving efficiency, saving energy, reducing water and air pollution, providing barrier-free transportation, minimizing traffic problems, making better and more accurate decisions, and using resources effectively and efficiently (Nam, Pardo, 2011).

2.1. Smart City Components

There are six components of a smart city. These are connected to different aspects of city life. These components consist of smart governance, smart economy, smart people, smart transportation and mobility, smart environment and smart living. An analysis of the literature reveals that smart cities can be successfully implemented through six universal components.

2.1.1. Smart Governance

Smart governance aims to improve accountability, openness, and public involvement in city administration (Dameri, 2017; Caragliu et al., 2011). This component is supported by e-government applications, online service portals, and data-driven decision support systems. For example, many cities in the European Union have increased citizen participation by transparently sharing municipal expenditures and decision-making processes in a digital environment (Nam & Pardo, 2011; Anthopoulos, 2017). The literature shows that the governance dimension is directly connected not just to technical elements but also to institutional capacity and managerial skills (Dameri & Rosenthal-Sabroux, 2014).

2.1.2. Smart Economy

The smart economy refers to economic structures based on digitalization and creativity in urban areas. In this context, start-up ecosystems, creative industries, innovation centers, and business incubators come to the fore (Dameri, 2017; Giffinger et al., 2007). The smart economy supports sustainable development and employment while increasing the global competitiveness of cities. In particular, economic efficiency and entrepreneurial opportunities provided through big data and digital platforms form the economic core of modern smart cities (Caragliu et al., 2011; Albino et al., 2015).

2.1.3. Smart People

This component encompasses developing the knowledge and skills of city dwellers increasing digital literacy and social participation (Nam & Pardo, 2011; Dameri, 2017). The literature emphasizes that the level of education and citizens' capacity to use technology are critical to the success of smart cities. Furthermore, the community's openness to innovative thinking and collaborative processes increases social capital in the city and enhances the effectiveness of smart solutions (Bibri, 2021; Meijer & Bolívar, 2016).

2.1.4. Smart Mobility

Smart transportation encompasses solutions that optimize urban mobility and reduce environmental impacts. Concrete examples of this component include monitoring traffic density with sensors, digital integration of public transportation, electric and shared vehicle systems, and smart bicycle lanes (Neirotti et al., 2014; Cocchia, 2014). The literature emphasizes that smart transportation systems directly affect energy savings, time management and carbon emission reduction (Hashem et al., 2016; Zhang et al., 2020). Furthermore, the use of data analytics and IoT enables cities to produce real-time and proactive solutions in traffic planning (Batty et al., 2012).

2.1.5. Smart Environment

This component involves the conservation of natural resources and the minimization of environmental impacts. Air quality monitoring systems, waste management, water management, energy efficiency, and renewable energy use support the environmental sustainability goals of smart cities (Bibri & Krogstie, 2023; Yigitcanlar et al., 2022). In the literature, this component is crucial to the context of combating climate change and reducing carbon emissions (Silva et al., 2024; Bibri, 2021). Furthermore, the environmental component must work in tandem with other components to enhance cities' long-term resilience and ensure sustainable development (Neirotti et al., 2014).

2.1.6. Smart Living

Smart living quality and infrastructure encompass the effective management of health, safety, energy management, and digital services. Big data and artificial intelligence-supported systems enable the monitoring of city infrastructure, crisis management, and service efficiency (Zhang et al., 2020; Silva et al., 2024). The importance of this component became even more apparent amid the COVID-19 outbreak as the digitization of health and safety services increased the resilience of cities (Cocchia, 2021; Bibri & Krogstie, 2023). Furthermore, the infrastructure and quality of life component enables the development of citizen-focused services and the improvement of living standards in cities (Dameri, 2017).

3. METHOD

3.1. Research Universe and Sample

Employees of public institutions make up the research's population and local government representatives working in the fields of smart city applications, digital transformation processes, and urban planning in Turkey. These groups were selected from individuals with knowledge and experience in the sub-dimensions of the smart city concept: smart life, smart economy, smart people, smart governance, smart mobility, and smart environment. The research sample consisted of 150 expert participants from this population. Participants were selected from public and municipal employees working in various cities in Turkey and involved in smart city policies, digital infrastructure projects, or urban sustainability practices. The sample was determined using purposive sampling. This method ensures the selection of individuals who are directly relevant to the topic and can provide information in keeping with the goal of the study. Information was gathered using a structured survey designed to measure the sub-dimensions of smart cities. The data obtained were evaluated using descriptive statistics and multivariate analysis techniques.

3.2. Smart City Scale

The scale employed in this investigation was created to measure the factors that influence a city's classification as a smart city. The scale consists of 25 items organized under 6 sub-dimensions, with each item measuring the defining characteristic of the relevant sub-dimension. Measurement was conducted utilizing a Likert-style scale with a range of ("Not at all effective") to 10 ("Very effective").

The structure of the scale was designed to be consistent with smart city models and indicators in the literature. In the literature, smart cities are generally explained in terms of the dimensions of economy, human resources, governance, mobility, environment, and quality of life (Albino, Berardi & Dangelico, 2015; Giffinger et al., 2007; Nam & Pardo, 2011).

3.3. Hypotheses

This study examines the impact of sub-dimensions regarding a city's designation as a smart city based on expert opinions. The scale consists of a total of 25 items under six dimensions: Smart Economy, Smart People, Smart Governance, Smart Mobility, Smart Environment, and Smart Living. In this regard, the following hypotheses were developed:

- H1: According to expert opinions, the Smart Economy dimension has a significant and positive effect on the classification of a city as a smart city.
- H2: According to expert opinions, the Smart People dimension has a significant and positive effect on the classification of a city as a smart city.
- H3: According to expert opinions, the Smart Governance dimension has a significant and positive effect on the classification of a city as a smart city.
- H4: According to expert opinions, the Smart Mobility dimension has a significant and positive effect on the classification of a city as a smart city.
- H5: According to expert opinions, the Smart Environment dimension has a meaningful and positive effect on the classification of a city as a smart city.
- H6: According to expert opinions, the Smart Living dimension has a meaningful and positive effect on the classification of a city as a smart city.

3.4. Statistical Analysis

In this study, the factors that influence the designation of a city as a smart city were examined through sub-dimensions created based on expert opinions. Descriptive statistics, exploratory factor analysis, internal consistency analysis, and multiple regression methods were used in the data analysis. Every analysis was carried out utilizing the SPSS 27 software package.

3.5. Findings

3.5.1. Descriptive Statistics

Table 1. Descriptive Statistics of Items

Item	Item Text	Min	Max	$\bar{x}$	SD	Skewness	Kurtosis
1	Economic competitiveness is essential.	1	10	7.80	2.08	-1.05	0.74
2	Keeping pace with technological developments is essential.	5	10	9.64	0.81	-2.85	9.91
3	Production activities and commercial ventures must be active.	1	10	8.46	1.72	-1.30	1.98
4	The city must be branded.	1	10	7.60	2.25	-1.04	0.71
5	International harmony and unity are effective.	1	10	8.46	1.81	-1.58	2.69
6	The educational level of individuals living in the city is important.	1	10	8.26	2.03	-1.29	1.25
7	The social and ethnic diversity of individuals living in the city is effective.	1	10	6.59	2.76	-0.64	-0.67
8	The lifelong learning levels of individuals living in the city are effective.	1	10	8.65	1.67	-1.59	3.06
9	The use of information technology in the city's transportation services is effective.	5	10	9.55	0.93	-2.82	9.10
10	The use of information technology in the provision of public services is effective.	5	10	9.53	0.90	-2.84	10.06
11	Efficient and transparent management is effective.	5	10	8.98	1.56	-1.43	0.82
12	The city's advanced ICT infrastructure and its active use are effective.	4	10	9.63	1.06	-3.74	14.84
13	Providing transportation services to individuals with disabilities and disadvantaged groups and their quick and easy access to local municipal services is effective.	5	10	9.41	1.21	-2.38	5.20
14	The structured transportation network is effective.	5	10	9.45	0.95	-2.23	5.58
15	The city's air quality level is effective.	1	10	7.65	2.24	-1.17	0.83
16	The awareness of individuals living in the city regarding ecological and natural resources is effective.	3	10	8.22	1.73	-1.03	0.42
17	The ICT integration of the city's water and sewage systems is effective.	1	10	8.92	1.45	-2.30	7.27
18	The ICT integration of the city's solid waste collection systems is effective.	3	10	8.97	1.32	-1.73	3.30

Item	Item Text	Min	Max	$\bar{x}$	SD	Skewness	Kurtosis
19	Quality of life levels are effective in becoming a smart city.	3	10	8.61	1.58	-1.52	2.41
20	The city's educational opportunities are effective in becoming a smart city.	5	10	8.81	1.29	-1.16	0.97
21	The city's healthcare opportunities are influential in becoming a smart city.	3	10	8.64	1.57	-1.46	1.94
22	Ensuring public safety in the city is influential in becoming a smart city.	3	10	8.72	1.54	-1.32	1.63
23	The city's cultural and tourism opportunities are influential in becoming a smart city.	2	10	8.35	1.80	-1.16	0.69
24	Disaster and emergency management is influential in becoming a smart city.	5	10	9.08	1.37	-1.53	1.33
25	Social solidarity and mutual aid are influential in becoming a smart city.	1	10	7.96	2.02	-1.10	0.69

The 25 items in the pilot sample were scored between 1 and 10. The means of the items ranged from 6.59 to 9.64. According to Table 1, participants generally tended to give high scores. Standard deviations ranged from 0.81 to 2.76, and low variance was observed in some items, while medium variance was observed in others. Skewness values were mostly negative, indicating a left-skewed distribution. Kurtosis values were quite high in some items, indicating a peaked distribution. In general, no extreme values were observed in the items; despite high skewness and flatness in some items. The information is appropriate for exploratory factor analysis.

3.5.2. Factor Analysis Prerequisites

Table 2. KMO and Bartlett's Test

Test	Value
Kaiser-Meyer-Olkin (KMO) Measure	0.812
Bartlett's Test of Sphericity χ^2	2345.672
Bartlett p	<0.001

The Kaiser-Meyer-Olkin (KMO) sample adequacy test and Bartlett's Sphericity test were used to determine whether the sample was appropriate for exploratory factor analysis of the scale. The KMO value was found to be 0.812, indicating that the sample is adequate for factor analysis (≥ 0.60 is acceptable, ≥ 0.70 is ideal). Bartlett's Test was found to be significant with $\chi^2 = 2345.672$, $p < 0.001$, demonstrating the suitability of the correlation matrix for factor analysis.

These results support that the data contained a sufficient level of correlation to discover the factor structure and that factor analysis was applicable.

3.5.3. Exploratory Factor Analysis (EFA) Results

Table 3. Exploratory Factor Analysis

Factor	Explained (%)	Variance	Items
F1 – Economic and Management	31.05		2, 3, 11, 12, 16, 19, 20, 21
F2 – Transportation and Public Services	9.24		9, 10
F3 – Brand and International Compliance	7.14		1, 4, 5
F4 – Social and Educational Dimension	6.80		6, 7, 8
F5 – Infrastructure and Service Accessibility	5.89		13, 14, 17, 18
F7 – Environmental Dimension	4.51		15

The pilot sample's exploratory factor analysis (EFA) results showed that the scale's six-component structure is reliable and meaningful. Most items showed strong relationships with their respective factors, supported by high communality values (0.576–0.929). For example, the third item (“Production activities and commercial ventures must be active.”) showed a high loading (0.844) under the F7 factor, with low loadings on other factors; this indicates that the item clearly and distinctly represents the relevant dimension. Similarly, items measuring the economic and managerial dimension (e.g., 11, 16, 19, 20, 25) carry meaningful loadings under the F1 factor and have high communalities (0.611–0.743). Items measuring the social and educational dimension (6, 7, 8, 23, 24) are strongly loaded under the F4 factor, and cross-loading issues are minimal. Items related to transportation and public services (9, 10) are under the F2 factor, items measuring the infrastructure and access dimension (13, 14, 18) are under the F5 factor, and items related to the environmental dimension (15) are under the F6 factor. Overall, the items showed a consistent structure with their own factors, cross-loading issues were limited, and they explained 65.63% of the total variance, supporting the scale's construct validity. Although the seventh factor (F6) was technically obtained, it explained just a tiny percentage of the variance and did not carry a meaningful load on some items, so It was left out of the analysis for interpretation. These findings indicate that the scale's factor structure is both consistent with theoretical expectations and reliable in terms of measurement validity.

3.5.4. Internal Consistency of the Scale

Cronbach's α was used to evaluate the scale's internal consistency coefficient. The analysis was performed on 150 valid responses, and 2 responses (1.3%) were excluded from the analysis due to missing data (Listwise Deletion). The Cronbach's α value obtained was 0.889, demonstrating the scale's high degree of internal consistency. Therefore, there is strong consistency among the items, supporting the reliable use of the scale.

Table 4. Internal Consistency of the Scale

Factor / Scale	N Item	Cronbach's α	Average
General Scale	25	0.889	0.45–0.72

Table 5. Correlation Between Factor Scores

Factor Score	1	2	3	4	5	6	7
1	1.00	–	–	–	–	–	–
2	–	1.00	–	–	–	–	–
3	–	–	1.00	–	–	–	–
4	–	–	–	1.00	–	–	–
5	–	–	–	–	1.00	–	–
6	–	–	–	–	–	1.00	–
7	–	–	–	–	–	–	1.00

When examining the Pearson correlations between the seven factor scores obtained from factor analysis, it was observed that each factor had a perfect correlation with itself ($r = 1.00$) and showed no linear relationship with the other factors (–). None of the correlations were statistically significant ($p = 1.000$). This finding indicates that the obtained factors are distinct from each other and that the factor analysis resulted in successful factor separation.

3.5.5. Examination of Relationships Between Subdimensions

Table 6. Relationship Between Scale Subdimensions

Dependent Variable	Independent Variable	β	p
Smart Living	Smart Economy	.188	.004
	Smart People	.174	.006
	Smart Movement	.285	<.001
	Smart Environment	.330	<.001
Smart Economy	Smart People	.060	.439
	Smart Governance	.320	<.001
	Smart Movement	-.058	.544
	Smart Environment	.131	.160
	Smart Living	.239	.016
Smart People	Smart Management	.184	.061
	Smart Movement	-.182	.076
	Smart Environment	.147	.143
	Smart Living	.272	.011
	Smart Economy	.070	.439
Smart Governance	Smart Movement	.400	<.001
	Smart Environment	-.013	.874
	Smart Living	.089	.327
	Smart Economy	.267	.000
	Smart People	.131	.061
Smart Mobility	Smart Environment	.313	.000
	Smart Living	.366	.000
	Smart Economy	.064	.399
	Smart People	-.084	.247
Smart Environment	Smart Mobility	.277	.000
Smart Living	Smart People	.099	.143
	Smart Economy	.101	.153
	Smart Living	.375	.000

Multiple regression analysis was used in this study to look at how several factors affected a city's classification as a smart city. According to the analysis's findings, every model was statistically significant. (F values for all models were $p < .001$). In the analysis of smart living, Smart Economy ($\beta = .188$, $p = .004$), Smart People ($\beta = .174$, $p = .006$), Smart Mobility ($\beta = .285$, $p < .001$), and Smart Environment ($\beta = .330$, $p < .001$) significantly beneficial effects of the factors were discovered; this reveals that smart living quality is most strongly influenced by environmental and mobility-related dimensions. When examining the relationships between sub-dimensions, it is observed that the strongest effects on Smart Economy are provided by Smart Governance ($\beta = .320$, $p < .001$) and Smart Life ($\beta = .239$, $p = .016$). Only Smart Living ($\beta = .272$, $p = .011$) was found to have a significant effect on Smart People. Smart Governance is influenced particularly by Smart Mobility ($\beta = .400$, $p < .001$) and Smart Economy ($\beta = .267$, $p < .001$); Smart Mobility is significantly supported by Smart Environment ($\beta = .313$, $p < .001$) and Smart Living ($\beta = .366$, $p < .001$). Similarly, Smart Environment is influenced by Smart Mobility ($\beta = .277$, $p < .001$) and Smart Living ($\beta = .375$, $p < .001$). These findings show that the idea of smart cities has a multidimensional structure that supports each other and that Smart Living, in particular, stands out as a central variable that both influences other sub-dimensions and can be influenced by them.

4. CONCLUSION AND DISCUSSION

This study is one of the first to comprehensively examine the interaction between sub-dimensions in the qualification of cities as smart cities in the Turkish context. The analysis results show that the dimensions of smart living, smart economy, smart people, smart governance, smart mobility, and smart environment exhibit meaningful relationships with each other and, in particular, that smart living stands out as a central variable that both influences and is influenced by other sub-dimensions. For example, smart living receives the highest impact from the environmental ($\beta = .330$, $p < .001$) and mobility dimensions ($\beta = .285$, $p < .001$), while smart economy is significantly influenced by the governance ($\beta = .320$, $p < .001$) and living ($\beta = .239$, $p = .016$) dimensions.

This study examines the six universal components of smart cities (smart economy, smart environment, smart governance, smart living, smart mobility, and smart people). The scale's KMO value was 0.812, the Bartlett test was significant ($\chi^2 = 2345.672$, $p < .001$), and a six-factor structure explaining a total of 65.63% variance was obtained (Cronbach's $\alpha = 0.889$). According to regression analysis, the smart living dimension was strongly influenced by the smart environment ($\beta = .330$, $p < .001$) and smart mobility ($\beta = .285$, $p < .001$) variables. Furthermore, the smart governance component ($\beta = .320$, $p < .001$) was found to be decisive for economic development. These results demonstrate that environment, mobility, and governance are of strategic importance in sustainable

urban planning. Compared to the international literature, smart city applications in Europe and Asia are generally implemented through large-scale projects integrated with institutional structures. While sustainable transportation systems and citizen-focused governance are prominent in European examples the effective use of digital information technologies and the integration of institutional structures are prioritized in Asia. In Turkey, smart city applications in Istanbul and Ankara are still at the pilot stage and are reflected to a limited extent in comprehensive digitalization projects. This situation stems from factors such as the immaturity of institutional structures, limited stakeholder participation, and the small scale of projects. The results emphasize the significance of considering the relationships between sub-dimensions in the development of cities in Turkey as smart cities. In particular, smart living, as a central variable that both supports and is influenced by other dimensions, carries strategic priority in urban planning and policy development processes. This result is consistent with the integrated and sustainable smart city approach proposed in international studies. In conclusion, the study emphasizes the multidimensional and interconnected nature of the idea of a smart city in Turkey, showing that sub-dimensions such as economy, human resources, governance, environment, and mobility must be considered at both the individual and systemic levels. Considering the limitations of the pilot study, future research with a larger sample size and covering different cities will increase the generalizability of the findings and enhance the success of Turkey's smart city initiatives.

REFERENCES

- Albino, V., Berardi, U., & Dangelico, R. M. (2015). Smart cities: Definitions, dimensions, performance, and initiatives. *Journal of Urban Technology*, 22(1), 3–21. <https://doi.org/10.1080/10630732.2014.942092>
- Anthopoulos, L. G. (2017). Governing a smart city. In L. G. Anthopoulos (Ed.), *Understanding smart cities: A tool for smart government or an industrial trick?* (pp. 215–262). Springer International Publishing. https://doi.org/10.1007/978-3-319-57015-0_5
- Aydın, M. (2020). Smart city applications and digital municipal administration in Turkey. *Journal of Local Governments*, 28(2), 45–63.
- Batty, M., Axhausen, K. W., Giannotti, F., Pozdnoukhov, A., Bazzani, A., Wachowicz, M., Ouzounis, G., & Portugali, Y. (2012). Smart cities of the future. *The European Physical Journal Special Topics*, 214(1), 481–518. <https://doi.org/10.1140/epjst/e2012-01703-3>
- Bibri, S. E. (2021). Data-driven smart eco-cities of the future: An empirically informed integrated model for strategic sustainable urban development. *World Futures*, 79(7–8), 703–746. <https://doi.org/10.1080/02604027.2021.1969877>
- Bibri, S. E., & Krogstie, J. (2023). Smart sustainable cities of the future: The integration of big data, IoT and AI. *Sustainable Cities and Society*, 89, <https://doi.org/10.1016/j.scs.2023.104212>
- Caragliu, A., Del Bo, C., & Nijkamp, P. (2011). Smart cities in Europe. *Journal of Urban Technology*, 18(2), 65–82. <https://doi.org/10.1080/10630732.2011.601117>
- Cocchia, A. (2021). Smart city and digital transformation: Opportunities and challenges. *Government Information Quarterly*, 38(1), 101–117. <https://doi.org/10.1016/j.giq.2020.101572>
- Cocchia, A. (2014). Smart and digital city: A systematic literature review. In R. P. Dameri & C. Rosenthal-Sabroux (Eds.), *Smart city: How to create public and economic value with high technology in urban space* (pp. 13–43). Springer International Publishing. https://doi.org/10.1007/978-3-319-06160-3_2
- Dameri, R. P., & Rosenthal-Sabroux, C. (Eds.). (2014). *Smart city: How to create public and economic value with high technology in urban space*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-06160-3>
- Dameri, R. P. (2017). *Smart city implementation: Creating economic and social value*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-48591-6>

- Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanović, N., & Meijers, E. (2007). *Smart cities: Ranking of European medium-sized cities*. Vienna University of Technology Press.
- Hall, R. E., Bowerman, B., Braverman, J., Taylor, J., Todosow, H., & Von Wimmersperg, U. (2000). The vision of a smart city. In *Proceedings of the 2nd International Life Extension Technology Workshop*. Paris, France. <https://www.osti.gov/biblio/773961>
- Hashem, I. A. T., Chang, V., Anuar, N. B., Adewole, K., Yaqoob, I., Gani, A., Ahmed, E., & Chiroma, H. (2016). The role of big data in smart city. *International Journal of Information Management*, 36(5), 748–758. <https://doi.org/10.1016/j.ijinfomgt.2016.05.002>
- Hsu, C. W., Chang, Y. H., & Chen, H. T. (2017). Smart city implementation in Asia: Strategies and practices. *Asian Journal of Technology Innovation*, 25(1), 33–49.
- Manville, C., Cochrane, G., Cave, J., Millard, J., Pederson, J. K., Thaarup, R. K., Liebe, A., Wissner, M., Massink, R., & Kotterink, B. (2014). Mapping smart cities in the EU (Study for the European Parliament's Committee on Industry, Research and Energy). European Union. <https://doi.org/10.2861/3408>
- Meijer, A., & Bolívar, M. P. R. (2016). Governing the smart city: A review of the literature on smart urban governance. *International Review of Administrative Sciences*, 82(2), 392–408. <https://doi.org/10.1177/0020852314564308>
- Nam, T., & Pardo, T. A. (2011). Smart city as urban innovation: Focusing on management, policy, and context. In M. Janssen, H. J. Scholl, M. A. Wimmer, & Y. Tan (Eds.), *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance* (pp. 185–194). Association for Computing Machinery.
- Neirotti, P., De Marco, A., Cagliano, A. C., Mangano, G., & Scorrano, F. (2014). Current trends in smart city initiatives: Some stylised facts. *Cities*, 38, 25–36. <https://doi.org/10.1016/j.cities.2013.12.010>
- Öztürk, A., & Yalçinkaya, M. (2018). Smart cities and application examples in Turkey. *Journal of Information Technologies*, 11(2), 34–50.
- Özkaya, E. (2017). Smart cities and sustainability. *Journal of Urban and Environmental Studies*, 5(1), 12–28.
- Silva, B. N., Khan, M., & Han, K. (2024). Towards sustainable smart cities: A review of trends, architectures, components, and open challenges in smart cities. *Sustainable Cities and Society*, 16, 1–16. <https://doi.org/10.1016/j.scs.2024.101212>
- U.S. Department of Commerce. (2023). *Smart cities: Opportunities in Turkey*. <https://www.trade.gov/smart-cities-turkey>

United Nations, Department of Economic and Social Affairs, Population Division.
(2022). World urbanization prospects: The 2018 revision.
<https://population.un.org/wup/>

Yigitcanlar, T., Kamruzzaman, M., & Foth, M. (2022). Smart and sustainable urbanism: The role of smart technologies in sustainability transitions. *Journal of Urban Management*, 11(1), 1–14. <https://doi.org/10.1016/j.jum.2022.03.001>

ANNEX-1 (Survey Form)

Smart Economy	For a city to be classified as a smart city;											
	1.	Economic competitiveness is essential.	1	2	3	4	5	6	7	8	9	10
	2.	Keeping pace with technological developments is essential.										
	3.	Production activities and commercial ventures must be active.										
	4.	The city must be branded.										
	5.	International harmony and unity are effective.										

Smart People	For a city to be classified as a smart city;											
	6.	The educational level of individuals living in the city is important.	1	2	3	4	5	6	7	8	9	10
	7.	The social and ethnic diversity of individuals living in the city is effective.										
	8.	The lifelong learning levels of individuals living in the city are effective										

Smart Governance	For a city to be classified as a smart city;											
	9.	The use of information technology in the city's transportation services is effective	1	2	3	4	5	6	7	8	9	10
	10.	The use of information technology in the provision of public services is effective										
	11.	Efficient and transparent management is effective.										

Smart Mobility	For a city to be classified as a smart city;											
	12.	The city's advanced ICT infrastructure and its active use are effective..	1	2	3	4	5	6	7	8	9	10
	13.	Providing transportation services to individuals with disabilities and disadvantaged groups and their quick and easy access to local municipal services is effective.										
	14.	The structured transportation network is effective.										

Smart Environment

For a city to be classified as a smart city;

15. The city's air quality level is effective.
16. The awareness of individuals living in the city regarding ecological and natural resources is effective.
17. The ICT integration of the city's water and sewage systems is effective.
18. The ICT integration of the city's solid waste collection systems is effective.

1	2	3	4	5	6	7	8	9	10

Smart Living

For a city to be classified as a smart city;

19. Quality of life levels are effective in becoming a smart city..
20. The city's educational opportunities are effective in becoming a smart city.
21. The city's healthcare opportunities are influential in becoming a smart city.
22. Ensuring public safety in the city is influential in becoming a smart city..
23. The city's cultural and tourism opportunities are influential in becoming a smart city.
24. Disaster and emergency management is influential in becoming a smart city..
25. Social solidarity and mutual aid are influential in becoming a smart city.

1	2	3	4	5	6	7	8	9	10

Smart Economy: This includes integration with local and global economic networks, as well as entrepreneurship, innovation, economic image, branding, productivity, and the flexibility of the labor market within the scope of economic competitiveness.

Smart People: This encompasses citizens having smart, conscious, and high-quality social capital, competency level, lifelong learning tendency, social and ethnic diversity, flexibility, creativity, and participation in social life.

Smart Governance: This includes the institutional capacity and awareness levels of the state and municipalities regarding smart cities, the plans and policies they develop, e-governance applications, and the participation of citizens in decision-making processes.

Smart Mobility: This includes transportation and logistics services supported by information and communication technologies. Barrier-free access is also included in this scope. Smart Environment: This encompasses applications such as infrastructure automation, water and sewage system monitoring, solid waste collection/sorting systems, environmental quality measurement, and energy consumption reduction, and their implementation through information and communication technologies.

Smart Environment: This encompasses applications such as infrastructure automation, water and sewage system monitoring, solid waste collection/sorting systems, environmental quality measurement, and energy consumption reduction, all implemented using information and communication technologies.

Smart Living: This includes applications related to public safety, crime fighting (camera or voice surveillance systems), urban emergency response and monitoring, disaster management, fire services, health and education services, and communication/guidance in culture and tourism services. **Note: This survey has been prepared for use in a scientific study on Smart Cities. We respectfully request that you rate the items on a scale of 1 to 10, from least important to most important, to ensure consistent results.**

ANNEX-2 (Survey Data)

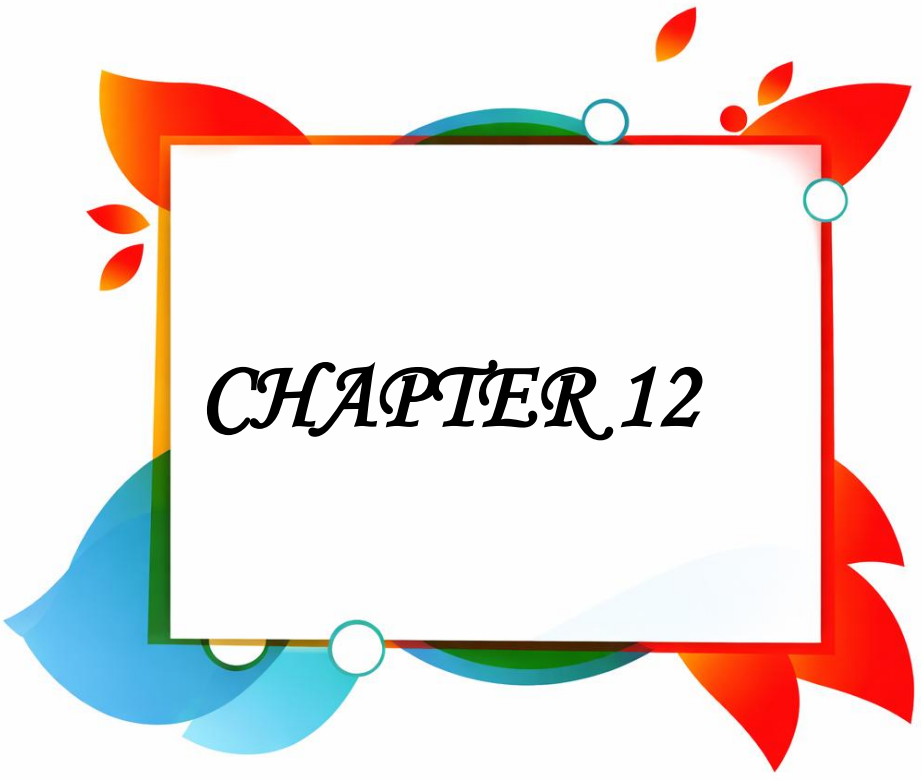
Candidate	Smart Economy					Smart People			Smart Governance			Smart Mobility			Smart Environment				Smart Living						
	1	2	3	4	5	1	2	3	1	2	3	1	2	3	1	2	3	4	1	2	3	4	5	6	7
1	1	1	1	1	1				1	1	1	1	1	1			1	1						1	1
2	0	0	0	0	0	7	9	9	0	0	0	0	0	0	1	9	0	0	9	9	9	9	9	0	0
3	8	0	8	9	9	6	5	5	0	0	7	0	0	9	9	9	0	0	8	9	8	7	5	6	5
4	1	1				1					1	1	1	1			1	1		1	1				
5	8	0	0	5	7	0	6	7	9	9	0	0	0	0	7	6	0	0	9	0	0	9	8	9	8
6	1					1			1	1	1	1	1		1	1		1					1		
7	9	0	9	9	9	8	6	9	0	0	0	0	9	9	0	0	9	9	0	9	8	7	6	0	6
8	1	1				1					1	1			1	1	1								
9	7	0	0	6	9	9	7	0	9	9	9	0	0	9	9	0	0	0	9	8	8	7	7	9	8
10	6	9	8	0	9	0	9	9	0	0	0	0	0	0	8	9	9	8	9	0	8	0	7	9	4
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1								
12	8	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	8	8	8	9	9	5	9	8	9
13	1					1			1	1		1			1	1		1	1				1		
14	9	0	7	9	8	9	9	9	0	0	9	0	9	9	9	9	0	0	9	8	9	8	8	0	8
15	1	1		1					1	1		1	1	1									1		
16	0	0	9	0	7	9	3	9	0	0	7	0	0	0	3	4	9	9	9	9	8	8	7	0	1
17	1	1				1		1				1	1				1	1	1		1	1	1	1	
18	9	0	0	2	6	0	5	0	9	9	9	5	0	0	8	9	0	0	8	0	0	8	0	0	9
19	1	1	1			1			1		1				1				1						
20	0	0	0	7	0	7	0	9	0	9	7	9	7	0	7	7	9	0	9	9	0	9	9	9	9
21	1	1	1	1	1	1		1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	0	0	0	0	0	6	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	1	1				1	1	1	1	1	1	1	1				1	1					1	1	
24	6	0	0	8	5	0	9	0	0	0	0	0	0	0	9	8	9	9	0	9	0	8	0	7	
25	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
26	8	0	9	6	6	9	8	0	0	9	8	0	9	9	8	0	9	9	0	0	0	0	0	0	9
27	1					1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
28	9	8	0	9	9	0	8	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	8	0	0
29	7	9	7	8	7	8	6	8	0	0	7	9	0	8	9	6	9	9	9	8	8	6	5	6	5
30	1					1			1			1			1										
31	7	8	6	6	8	8	4	7	9	9	5	0	0	8	9	5	9	9	8	8	9	6	5	7	6
32	1					1		1	1	1		1			1										
33	7	8	6	6	9	7	6	9	0	0	6	0	0	9	9	6	9	9	8	8	8	6	4	7	5
34	1					1																			
35	8	8	5	3	6	4	1	8	7	8	0	7	8	8	3	3	5	7	8	8	3	3	5	8	7
36	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
37	1					1																			
38	7	9	8	8	9	7	4	7	9	9	9	9	0	9	7	8	8	8	9	9	9	8	9	8	9
39	1					1			1	1	1	1	1	1					1	1	1	1	1	1	1
40	4	0	8	5	7	0	9	7	0	0	0	0	0	0	4	8	9	9	8	0	0	0	0	0	0
41	1					1			1			1			1										
42	7	8	7	5	6	5	3	7	7	6	7	9	0	0	9	0	8	8	8	9	9	8	7	7	8
43	1	1	1	1	1	1		1	1	1	1	1			1		1	1	1		1	1		1	
44	0	0	0	0	0	0	5	0	0	0	0	0	5	8	0	6	9	0	0	0	6	0	0	6	0
45	1					1			1			1			1		1		1			1			
46	5	0	7	4	8	5	7	0	6	0	6	4	8	0	7	0	1	5	0	6	3	5	0	5	3

[illegible]

		1		1	1					1	1	1	1	1			1	1	1										
59	8	0	7	0	0	9	8	9	0	0	0	0	0	9	9	0	0	0	9	8	8	8	8	8	9	8			
		1							1	1		1			1										1				
60	7	0	8	6	7	7	3	7	0	0	7	0	9	0	6	8	9	9	7	9	4	7	9	0	0	8			
	1	1	1	1		1		1	1	1	1	1		1			1	1						1					
61	0	0	0	0	4	0	1	0	0	0	0	0	6	0	1	8	0	0	6	9	5	7	9	0	8				
		1				1			1	1		1																	
62	6	0	7	7	8	0	7	8	0	0	5	0	5	7	2	3	9	9	7	8	6	8	5	6	5				
	1	1	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1				1	1					
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	0	0	0	9	9	9	0	0	9				
	1	1			1	1	1	1	1	1	1	1	1	1			1	1							1				
64	0	0	9	9	0	0	0	0	0	0	0	0	0	0	6	6	0	0	9	9	9	8	8	9	0				
	1	1	1						1	1	1	1												1					
65	0	0	0	9	8	8	7	6	0	0	0	0	9	9	9	9	9	9	6	8	9	8	9	0	9				
		1						1	1	1	1	1	1	1			1	1				1							
66	9	0	8	8	9	6	2	0	0	0	0	0	0	0	8	8	0	0	9	9	9	0	9	9	7				
				1										1		1													
67	9	8	7	0	8	5	3	9	8	9	5	8	0	8	5	0	9	9	9	6	6	8	9	7	6				
	1	1			1	1	1					1					1												
68	0	0	7	7	7	0	0	0	9	9	9	0	8	9	5	6	0	8	7	9	9	9	9	7	6				
		1			1				1	1	1	1	1	1	1		1	1	1	1	1	1		1					
69	9	0	9	8	9	0	5	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	9	0	9				
		1			1	1	1	1				1																	
70	5	0	9	5	0	0	0	0	0	9	8	0	8	8	5	6	7	7	7	9	8	7	9	9	7				
		1				1			1	1		1				1	1							1					
71	7	0	7	9	9	0	7	9	0	0	9	0	9	9	7														

	1	1	1		1	1	1	1	1	1	1	1					1	1	1	1					
91	0	0	0	6	0	0	0	0	0	0	0	0	9	9	9	9	9	0	0	0	0	9	9	8	
	1	1			1	1		1	1	1	1	1	1	1	1	1	1	1	1		1	1			
92	9	0	0	7	9	0	0	9	0	0	0	0	0	0	0	0	0	0	0	9	9	0	0	9	
	1							1																	
93	6	0	7	6	8	5	6	9	0	9	8	8	5	6	3	6	9	9	7	6	6	9	5	5	5
	1	1	1		1			1	1	1	1	1	1	1		1	1	1				1			
94	0	0	0	7	9	0	7	9	0	0	0	0	0	0	8	9	0	0	0	7	9	9	0	9	7
	1	1			1		1	1	1	1	1	1	1	1	1	1	1	1	1			1			
95	6	0	0	8	8	0	7	0	0	0	0	0	0	0	7	0	0	0	9	0	9	8	5	0	8
														1											
96	9	8	8	9	9	7	7	7	9	8	7	9	9	0	9	9	9	9	9	8	9	8	9	9	8
	1								1	1		1	1	1			1	1	1		1	1	1		
97	9	0	7	7	9	6	6	8	0	0	8	0	0	0	8	8	0	0	0	8	8	0	0	0	7
	1							1	1	1	1	1	1	1					1	1	1	1	1		
98	9	0	8	7	8	5	5	5	0	0	0	0	0	0	6	7	9	9	9	0	0	0	0	0	9
	1				1		1				1	1	1	1							1	1			
99	0	9	8	6	7	0	7	0	9	9	8	0	0	0	7	7	9	9	9	9	9	9	0	0	8
10	1	1	1						1	1	1	1	1									1			
0	0	0	0	9	8	9	3	7	0	0	0	0	0	6	6	8	9	9	9	9	9	8	0	7	
10	1			1					1		1														
1	7	0	8	9	0	8	9	8	9	0	8	0	8	9	8	7	7	7	7	8	7	7	8	7	8
10	1			1	1			1			1	1	1	1			1	1	1	1					
2	8	0	6	8	0	0	2	9	0	9	9	0	0	0	8	9	0	0	0	0	9	7	8	9	8
10	1							1	1	1	1	1	1	1					1				1		
3	6	0	9	3	6	9	3	7	0	0	0	0	0	0	8	8	8	7	9	0	8	7	6	0	9
10	1							1	1		1	1	1	1											
4	7	0	7	9	9	8	8	8	0	0	9	0	0	0	7	7	9	9	8	7	7	8	9	9	9
10	1		1	1	1		1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	
5	9	0	9	0	0	0	9	0	0	0	0	0	0	0	7	9	0	0	0	0	0	0	0	0	9
10	1				1		1	1	1	1	1	1	1	1					1				1	1	
6	9	0	9	3	6	0	2	7	0	0	0	0	0	0	8	8	8	6	9	0	8	7	6	0	0
10	1		1		1			1	1		1		1	1								1			
7	8	0	5	0	9	0	1	9	0	0	5	0	7	0	5	5	9	9	3	5	5	8	8	0	2
10	1	1	1	1	1		1	1		1	1	1	1		1	1	1					1			
8	0	0	0	0	0	9	4	0	0	9	0	0	0	0	9	0	0	0	8	9	9	8	8	0	6
10	1	1					1	1	1	1	1	1										1			
9	0	0	9	6	8	9	8	0	0	0	0	0	8	9	8	9	9	9	7	9	9	9	9	0	9
11	1						1	1	1	1	1	1	1	1		1	1			1		1			
0	8	0	7	8	8	8	8	0	0	0	0	0	0	0	9	9	0	0	8	8	8	0	9	0	8
11	1	1	1	1	1		1			1		1	1	1	1	1					1	1	1	1	1
1	0	0	0	0	0	9	8	0	8	9	0	9	0	0	0	0	7	7	8	8	8	0	0	0	0
11			1	1				1	1		1	1	1	1			1				1	1			
2	7	9	6	0	0	6	8	9	0	0	9	0	0	0	0	8	9	0	9	9	9	0	0	9	8
11																									
3	9	9	9	9	9	9	5	9	9	9	9	9	9	9	8	8	8	8	9	9	9	9	9	9	9
11								1	1	1	1		1					1			1	1	1	1	1
4	9	9	8	9	8	8	9	8	0	0	0	0	9	0	8	9	9	9	0	9	9	0	0	0	0
11								1	1	1	1	1	1	1				1							1
5	9	9	8	9	9	9	8	9	0	0	0	0	0	0	9	8	9	9	9	0	9	9	7	9	0
11	1	1	1	1	1			1	1	1	1	1	1	1											
6	9	0	0	0	0	0	7	9	0	0	0	0	0	0	7	8	9	9	9	9	9	8	8	8	8
11	1							1		1		1		1		1	1			1	1	1			
7	4	0	3	4	8	5	3	3	9	0	7	0	5	0	4	5	0	0	8	8	0	0	0	9	5
11	1	1						1	1		1	1				1	1						1		
8	8	0	0	8	8	6	7	7	0	0	8	0	0	9	7	6	0	0	8	7	8	9	9	0	7
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	8
12					1	1	1		1	1		1	1							1		1		1	1
0	8	9	9	7	8	0	0	0	9	0	0	9	0	0	9	9	9	9	9	9	0	9	0	9	0
12	1	1	1					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	0	0	0	9	9	8	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1				1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1		1	
2	9	0	9	9	9	0	0	0	0	0	0	0	0	0	9	9	0	0	0	0	0	0	9	0	9

12	1	1	1	1	1	1			1	1	1	1	1	1							1	1		1		
3	0	0	0	0	0	0	1	6	0	0	0	0	0	0	8	8	7	6	6	6	6	0	0	6	0	
12	1	1	1		1	1	1	1	1	1	1	1	1	1		1	1	1		1	1	1	1	1	1	
4	0	0	0	5	0	0	0	0	0	0	0	0	0	0	9	0	0	0	9	0	0	0	0	0	0	
12		1	1								1	1			1											
5	9	0	0	8	9	9	2	8	9	9	0	0	8	9	0	9	9	9	9	7	8	9	9	9	8	
12		1			1			1	1	1	1	1	1		1				1	1	1			1	1	
6	6	0	9	7	0	8	7	0	0	0	0	0	9	0	9	9	8	8	0	0	0	9	8	0	0	
12		1	1					1		1		1														
7	6	0	0	6	3	9	4	4	0	9	0	4	0	9	3	3	9	9	4	8	8	6	6	6	3	
12		1	1	1		1		1	1	1	1	1	1	1	1	1		1		1	1	1		1		
8	7	0	0	0	8	0	8	0	0	0	0	0	0	0	0	0	8	0	7	9	0	0	0	9	0	
12					1			1	1	1	1	1	1	1												
9	5	9	9	9	0	3	2	6	0	0	0	0	0	0	9	9	9	9	3	5	5	8	4	8	7	
13					1			1	1	1	1	1	1	1												
0	5	9	9	9	0	4	2	7	0	0	0	0	0	0	7	8	8	8	3	5	5	8	5	9	8	
13		1	1	1							1		1					1	1	1	1	1	1	1	1	
1	3	0	0	0	6	8	4	8	8	9	0	9	0	9	9	9	9	9	0	0	0	0	0	0	0	
13		1	1					1	1	1	1	1	1		1						1		1			
2	0	0	9	9	9	5	8	9	0	0	0	0	0	8	9	0	9	9	6	7	8	0	9	0	9	
13				1	1						1	1	1							1	1	1	1	1	1	
3	8	8	9	0	0	9	8	8	8	9	9	0	0	0	9	9	9	9	8	8	0	0	0	0	0	
13		1						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	8	0	9	7	8	8	5	9	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	
13			1		1			1	1	1	1	1	1	1			1	1			1	1	1	1	1	
5	8	9	0	7	0	8	9	0	0	0	0	0	0	0	7	8	0	0	9	9	9	0	0	0	8	
13																1	1		1	1	1	1	1	1	1	
6	8	9	9	8	9	8	8	8	8	9	9	9	9	9	9	8	0	0	9	0	0	0	0	0	9	
13		1	1	1		1		1	1	1	1	1	1	1												
7	0	0	0	6	6	0	5	5	0	0	0	0	0	0	6	8	7	7	6	8	8	8	5	9	9	
13								1		1	1	1	1	1	1	1	1	1	1	1	1		1			
8	5	9	8	9	5	8	9	0	9	0	0	0	9	0	0	9	0	9	0	0	0	8	8	0	8	
13		1			1	1		1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	5	0	5	5	0	0	1	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	
14		1	1	1		1	1	1		1	1	1	1	1		1	1		1		1	1	1	1	1	
0	0	0	0	9	0	0	8	0	9	0	0	0	0	0	9	9	0	0	9	0	9	0	0	0	8	
14		1	1			1					1		1													
1	0	0	8	8	9	0	9	9	8	9	8	0	7	0	8	7	9	9	9	9	9	9	9	9	9	
14		1			1		1	1	1	1	1	1	1	1	1	1	1	1	1	1		1		1		
2	9	0	8	1	8	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	9	0	9	
14		1					1	1	1		1					1	1	1								
3	3	0	5	2	4	9	5	0	0	0	5	0	9	9	9	8	0	0	0	9	9	6	7	6	3	
14		1									1	1	1			1	1						1			
4	5	0	8	9	8	9	6	9	9	9	9	0	0	0	4	7	0	0	9	9	8	9	9	0	9	
14		1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	
5	0	0	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	0	0	0	0	
14		1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
14		1	1		1			1	1	1		1	1	1				1	1	1	1	1	1	1	1	
7	0	0	6	0	6	8	1	0	0	0	6	0	0	0	6	6	6	6	0	0	0	0	0	0	0	
14		1		1	1	1		1		1	1	1	1					1	1	1	1	1	1	1	1	
8	8	0	8	0	0	0	7	9	0	8	0	0	0	8	8	7	7	7	0	0	0	0	0	0	0	
14				1				1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	9	9	7	8	0	7	7	7	9	0	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	
15		1	1			1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
0	1	0	0	1	1	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	
To tal		1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		1	4	2	1	2	2	9	2	4	4	3	4	4	4	1	2	3	3	2	3	2	3	2	3	1
		7	4	6	4	6	3	8	9	3	2	4	4	1	4	3	3	4	9	2	9	0	5	6	9	
Av era ge		0	6	9	0	9	9	8	8	2	9	7	4	2	8	8	3	8	6	2	2	6	8	3	2	4
								6							9	7		8	8	8		8				
		7	9	8	7	8	8	5	6	5	5	8	6	4	5	5	2	9	7	1	1	6	7	5	0	9
		8	6	4	6	4	2	8	5	4	2	9	2	1	3	3	2	2	3	3	3	4	2	3	8	6

A decorative rectangular frame with a white background. The frame is surrounded by stylized, colorful leaves in shades of red, orange, yellow, green, and blue. Four small white circles are positioned at the corners of the frame, each with a thin blue outline.

CHAPTER 12

The Social Formation of the Rural and Otherness: An Analysis from Feminist and Queer Geography Perspectives

Miyase Yalçın¹

Introduction

In the 1990s, a significant paradigm shift occurred within the discipline of rural geography, a shift that has been characterized as the “cultural turn.” Influenced by the broader cultural turn, the social sciences and particularly the field of geography witnessed a renewed focus on space and a more intensive engagement with social theory. This process paved the way for cultural themes such as meaning, identity, representation, otherness, difference, and resistance to move to the center of scholarly inquiry. Studies such as *Revealing Rural Others* (Milbourne, 1997), *Contested Countryside Cultures* (Cloke & Little, 1997), and *Country Visions* (Cloke, 2003) have made the social diversity and forms of exclusion present in rural areas visible, thereby ensuring that cultural issues are discussed at the center of rural geography.

Feminist approaches have critiqued rural studies for insufficiently emphasizing the diversity of gendered experiences, while queer theory has opened up both theoretical and empirical discussions on how rurality shapes sexuality and how sexuality, in turn, reproduces the rural. (Gorman-Murray, 2013; Gorman-Murray, Pini & Bryant, 2013; Johnston & Longhurst, 2009; Phillips, Watt & Shuttleton, 2000). Thus, these studies began to respond to the new issues emerging from the cultural turn by focusing on social differences and the fluidity of gender. In this context, Philo (1992) critiqued rural geography research for predominantly defining the rural subject as white, healthy, able-bodied, heterosexual men without religious or political identities, emphasizing that overlooked social groups also need to be examined. Women, children, the elderly, and particularly marginalized lesbian, gay, bisexual, transgender, and queer (LGBTQ) individuals are included among these groups. Therefore, it is important for rural geography to be open to diverse identities and experiences, developing a more inclusive perspective by making the voices of these marginalized “other” groups visible.

Social identities are relational constructs (McDowell, 2004), and this includes “rural,” “feminist,” and “rural feminist” identities. Identities are shaped,

¹ Dr., Milli Eğitim Bakanlığı, Ataşehir Harezmî Anadolu Lisesi, Coğrafya Öğretmeni, ORCID: 0009-0002-1232-0506

reproduced, and contested within everyday interactions under conditions of unequal power. Therefore, the critical frameworks offered by feminist theory since the 1960s and queer theory since the 1990s have provided an important theoretical foundation for highlighting social differences, understanding intersections between identities, and making the complexities of categorization processes visible. Until recently, feminist theorists and activists have often avoided openly discussing issues of sexuality and gender due to fear of being accused of “promoting homosexuality.” In particular, researchers focusing on gender in rural areas have rarely addressed the issue of sexuality.

The topic of sexuality in rural spaces has become a focus of academic attention (Bell & Valentine, 1995b; Bell, 2000; Browne, 2011; Bryant, 2013; Gorman-Murray, 2013; Johnston & Longhurst, 2009; Little, 2003, 2007). Studies have shown in detail how sexualities are constructed and shaped within rural landscapes by relating the everyday lives, experiences, and aspirations of sexual subjects to rural spaces (Gorman-Murray, Pini & Bryant, 2013). Bell and Valentine (1995a) made an important distinction between the concepts of “identity” and “identification,” drawing attention to the differences between individuals’ sexual orientations and the socially constructed ways in which these orientations are defined. Accordingly, individuals may be attracted to people of the same sex and position themselves as bisexual or homosexual; however, they may refuse to be identified with these identities within their social context. Therefore, some individuals living in rural areas may tend to conceal their sexual identities or express them only away from home due to the intensity of heteronormative pressures. This situation is directly related to the strong connection between heterosexuality, marriage, and reproduction, which shapes the social fabric of rural life. Indeed, marriage functions as a fundamental institution that ensures the continuity of agricultural production and rural communities (Little, 2003).

The aim of this section is to evaluate the social formation of the rural from feminist and queer geography perspectives, framing it through the concept of “otherness” and increasing the visibility of gender, sexuality, and identity based differences in the rural geography literature. The longstanding portrayal of rural areas as heterosexual, male dominated, and homogeneous spaces has resulted in the invisibility of women, LGBTQ individuals, and non-normative identities. This gap is even more pronounced in the context of the Turkish literature, as gender and sexuality dimensions are often overlooked in rural studies. This study aims to address this gap by theoretically repositioning the rural as a dynamic social space where multiple subjectivities, diverse identities, and practices of resistance are enacted. In this way, it contributes to rethinking rural geography in a more inclusive, critical, and pluralistic manner. This study is organized around the following themes: the social formation of the rural, rural geography and otherness, and feminist and queer theory in the context of rural geography.

The Social Construction of the Rural

When considered as a socially constructed concept, the meaning of rurality emerges primarily within the framework of cultural, social, and moral values associated with rural spaces and rural life. This perspective necessitates examining how the social and cultural meanings attributed to rural spaces shape and contextualize everyday practices, behaviors, decision making processes, and life routines. Such an examination should be conducted both from the outside in, considering structural influences, and from the inside out, taking into account dimensions of identity, embodiment, and difference. In this regard, Philo (1992) argues that most accounts of rural life tend to interpret the relationships between rurality and culture from the perspective of white, male, and middle-class narratives, emphasizing the necessity of examining the rural world from diverse perspectives.

As Abraham (2003) notes, “seeing” involves the active organization of what we observe; what we see is socially structured, and visual stimuli acquire meaning through our subjective interpretations. This organized and systematic “way of seeing” has been explained through Foucault’s (1976) concept of the “gaze.” The “gaze” is a form of power that not only shapes how we interpret what we see but also determines what we see and where we direct our attention, guided by collective social norms. Moreover, the “reality” of any landscape is open to debate. Marxist art critics have defined landscape as a “visual ideology” employed by ruling elites to legitimize their positions and obscure the understanding of the power relations underlying those positions (Berger, 1972; Wylie, 2007). Within this framework, while land ownership and “improvement” processes are glorified, the labor sustaining agricultural production and the social inequalities in rural areas are often overlooked or rendered invisible. In this way, power relations in rural areas can be aesthetically presented, rendering the structural functioning of these relations beyond critique. Thus, unequal relations materialize within a field of power where the consent of the subordinated is also produced, while this field simultaneously serves as a site of struggle where power dynamics are constantly shifting (Zengin, 2021).

Since the 1990s, studies on rural power have increasingly focused on political and social marginalization in rural areas. These studies particularly focus on groups such as women, children and youth, low-income individuals, the homeless, and gay individuals. Power has often been conceptualized as the capacity of one actor whether individual, collective, or institutional to exert a constraining or negative influence over another actor. This approach has been associated with processes such as oppression and social conflict, the cultural and political domination of elites, the exclusion and marginalization of “other” social and cultural groups, and the state’s control over the population (Cloeke & Little, 1997; Murdoch & Abram, 2002; Shortall, 2008). Therefore, studies of power in rural areas have largely focused on the structural and institutional dimensions related to the organization and reorganization of rural society and space.

Cloke (2006) argued that functional, political economy, and social constructivist approaches are decisive in the conceptualization of rurality. The functional approach emphasizes the distinction between urban and rural areas and is inspired by classical rurality theory based on Tönnies' (1963) community-society dichotomy. This perspective defines rural communities as agriculture-based, homogeneous structures and assumes that identities are primarily shaped along the axes of whiteness, middle-class status, and masculinity (Philo, 1992). The representation of rural areas in state policies and official data collection processes through population density, distance from urban centers, and agricultural-based economic indicators reflects a practical manifestation of this approach. The political economy approach, on the other hand, aims to situate the rural in national and global contexts, examining the organization of agricultural production, consumption relations, and their impacts on rural social dynamics (Cloke & Goodwin, 1992). The social constructivist perspective, meanwhile, focuses on the negotiated and experienced meanings of rurality, emphasizing both the relationships established with nature and the role of pastoral imagery in the process of social construction.

Practices and values acquire meaning within their specific contexts. At this point, the concepts of space and place become particularly important (Tuan, 1977). Space carries the quality of being unknown and unfamiliar, whereas place is familiar and known (Bilgili & Yıldırım, 2024). Human geographers emphasize the view that space is culturally constructed (Okur, 2022a), linked to identity, and shaped by the place/outside dichotomy (Buttimer, 1998). Understanding space requires not only grasping its physical characteristics but also comprehending the power relations, values, and legitimate forms of space use of specific groups. This shapes and limits individuals' spheres of movement (Liepins, 2000; Okur, 2023). Massey (1994) argued that spaces, while retaining their uniqueness, are influenced by global dynamics and are shaped over time within a network of "extended social relations." This approach emphasizes the relational and fluid aspects of space and place. Therefore, the social constructivist perspective demonstrates that the rural is not a static entity but is continuously reproduced through social values, identities, and power relations. This understanding is concretized through the concept of the "rural idyll."

According to Stewart (1996), the "idyll" is a product of bourgeois imagination that emerged alongside modern urban-industrial culture, aiming to establish an orderly social spatialization of the center and the margin. In this context, the rural is positioned simultaneously as an object of desire and fear: it is desirable because it is assumed to remain distant from the "positive" aspects of modernity. However, precisely its distance from the aspects of modernity deemed "negative" also leads to the rural being perceived simultaneously as a place that evokes fear. This dual positioning has, since the 1990s, increased academic attention to groups referred to as "rural others," who are excluded from rural life (Cloke & Little, 1997; Philo, 1992). While the city is conceived as a space of diversity and multiculturalism, the rural has often been constructed as a socially homogeneous space closed to difference.

In this context, the rural idyll literature has been shaped around four main themes. Firstly, the social meanings of rurality have been associated with concepts such as harmony with nature, social cohesion, safety, family values, and national identity (Rye, 2006). These meanings idealize the rural as a pure and peaceful place, free from the negativities of urban life (Halfacree, 1993). Secondly, the contextual and variable nature of the rural idyll demonstrates that rurality is a concept that evolves over time. Thirdly, the rural idyll plays a significant role in determining who is considered a “legitimate” part of rural life; groups that do not conform to these norms are marginalized as “rural others” (Short, 2006). Finally, the rural idyll is closely linked to social inequalities and power relations; in this regard, it reveals rurality not merely as a natural phenomenon but also as an ideological and political construct. These approaches demonstrate that the rural is not merely a spatial category but a dynamic space where social values, identities, and power relations are continuously reproduced.

The relational approach explains the formation of space and place through networks, connections, flows, and mobilities, emphasizing the significance of the associated economic, social, political and cultural processes. This theory conceptualizes the rural as a hybrid space by eliminating the nature-society dichotomy (Murdoch, 2003). Therefore, the rural should be understood not merely as a reflection of social relations, but as a constantly reproduced assemblage where nature and society are intertwined. The relational approach treats space not as a static backdrop, but as the product of interactions, practices, and relationships. As Wylie (2007) notes, space is not merely a stage where relations occur; it is constituted through the relations themselves, and the geography of the world is formed by the sum of these relational spaces. With Thrift’s (2007) contribution, the relational approach extends beyond social and spatial networks to encompass non-representational dimensions such as emotions, bodily practices, and affective relations (Uysal & Güngör, 2016).

The contrast between rural and urban areas is one of the oldest and most enduring dualities in geographical thought. This distinction originally arose from the need to separate the enclosed and defensible areas of early cities from the open, uncontrolled spaces outside; over time, it has come to signify not only a spatial difference but also a cultural and symbolic meaning. According to Williams (1973), the rural and the urban are historically interdependent concepts that leave deep imprints on human experience; this relationship reflects the progression of societies and their value systems. While the rural has long been associated with nature, purity, and tranquility, the urban has been perceived as a center of knowledge, communication, and progress. However, alongside these positive images, the city has often been represented as a symbol of corruption and ambition, while the rural has been depicted as a symbol of backwardness and ignorance. Therefore, rurality has become a discourse continuously reproduced through academics, media, politics, and everyday life practices, rather than being merely a geographical phenomenon. According to Halfacree (1993), in the contemporary world, popular images of rural areas often do not correspond to the material realities of these spaces. While pastoral discourses associate the rural

with purity, peace, and naturalness, they have rendered invisible the historical processes of exploitation, inequality, and transformation that the countryside has experienced.

The phenomenon of the “ruralization” of society and urban space indicates the increasingly blurred boundaries between the rural and the urban. This process is shaped not only by the movement of rural populations and practices into urban areas, but also by cities internalizing rural representations and aesthetic elements. Historically, the acquisition of property by rural elites in cities and their influence on urban policies has demonstrated the mutual dependence between the two spaces (Woods, 2005). Today, this interaction becomes visible in spatial forms such as gated communities, parks, and urban agriculture practices that reproduce the image of “village life” (Jones & Wills, 2005). The adoption of rural-specific practices by urban consumer culture for example, the popularity of traditional shalwar-style clothing or the use of SUVs demonstrates how the rural is being reproduced in urban representations. As Urbain (2002) notes, this dynamic reflects not only the urbanization of the rural but also the ruralization of the urban. This bidirectional transformation paves the way for the emergence of “hybrid spaces,” where rural and urban characteristics intertwine, as seen in districts like Gölbaşı in Ankara. As observed, this process of articulation indicates the formation of a new spatial and social order.

Rural Geography and Otherness

The early studies on the “rural other” in the early 1990s were shaped under the influence of postmodern and poststructuralist theories; these approaches brought a new sensitivity to issues of pluralism, difference, and representation in rural geography. Philo’s (1992) article *Neglected Rural Geographies: A Review* and Murdoch and Pratt’s (1993) response to this work laid the foundation for discussions on rural otherness. During this period, increasing gentrification, migration, and social transformation processes also heightened interest in the concept of the “other.” Researchers such as Philo (1992, 1993), Murdoch and Pratt (1993), and Milbourne (1997) have made visible the diverse positionalities within rural communities by conceptualizing rural “others” as hidden, marginalized, excluded, and silenced groups. Moreover, Philo (1993) discusses the forms of exploitation and exclusion experienced by rural others, thereby moving “otherness” beyond a merely representational concept and transforming it into an analytical framework linked to social justice.

Cloke and Little (1997) discuss the philosophical origins of the concept of the “other,” elucidating the meanings it has acquired within academic discourse. Drawing on Said’s (1978, 1986, 1993) analyses of Orientalism, they conceptualize the “other” as an analytical tool that makes visible the distinction between the center and the periphery, and between those who “belong” and those who remain “outside.” By adapting this approach to the rural context, they argue that rurality has been historically constituted through colonizing practices and discourses of belonging. Cloke (2006a, 2006b) criticizes the concept for being used in rural studies in ways that are often vague and reductionist. According to

him, the “other” is often reduced to single categories such as race (Kinsman, 1997), poverty (Cloke, 1997), sexuality (Valentine, 1997), and homelessness (Cloke, 2006a), thereby limiting its analytical depth. To address this issue, Cloke centers the question of “how the other is known and constructed,” and, through the notion of the “other’s other,” proposes a more self-reflexive approach that also interrogates the researcher’s own positionality.

Harvey’s (1989) warning about the “seductive nature of otherness” has added an important critical dimension to these debates. According to him, placing excessive emphasis on the “other” carries the risk of “drawing a veil over real geography.” However, Harvey emphasizes that this “reality” is not a fixed phenomenon, but always the product of evaluations made from specific positionalities. For example, the heteronormative and family centered structure of rural areas may normalize certain ways of life while marginalizing those who do not conform to these norms. In this context, homosexual individuals may be excluded from public spaces and social voice, and often may choose to remain invisible. Similarly, single women, divorced individuals, or people from different religious sects may also encounter exclusionary practices, as belonging is often defined through family structures and social roles. This situation demonstrates that rural space is not merely a site for the reproduction of social norms, but also a social arena where these norms are contested and, at times, forms of quiet resistance emerge.

Understanding the “others” requires focusing on the social and spatial contexts in which othering occurs. Sibley (1995) emphasizes that the relationship between the self and the other must be understood in conjunction with social structures and the material world. In this context, boundaries are constructed through the cultural representations of people, spaces, and objects, and always take on spatial forms embedded within social contexts. Morley and Robbins (1995) note that identities are not fixed, but dynamic structures that change across different times and spaces. Therefore, Philo and Thrift (1995) suggest focusing on the processes between categories rather than the categories themselves in analyses. This perspective allows the self to be approached not as a fixed essence but as an ever evolving process, enabling the study of hybrid geographies that emerge in the interstices or “third spaces.”

Postcolonial scholars, particularly Bhabha (1990), define the concept of the “third space” as an in-between, fluid, and intertextual realm. This space makes the Other visible while necessitating a reassessment of the Same, revealing the unsustainability of the rigid boundaries between Us and Them. Thus, fixed and binary oppositions are replaced by fluid, incomplete, and continuously reshaping forms of identity. As Chambers (1994) emphasizes, recognizing the manifestations of economic, political, and cultural differences even those that are radically incommensurable in ethnicity, gender, and sexuality requires understanding identity not as a fixed structure, but as a constantly moving, processual, and transformative formation. In this context, the call to focus on the Others, long overlooked in rural studies, necessitates the adoption and analysis of “fluid space” perspective.

Mol and Law (1994) argue that the “social” cannot be understood as a singular, fixed, and homogeneous spatial form. Social life is shaped within multiple spatial arrangements in which different modes of operation coexist. The first is “regional space,” in which objects cluster and boundaries are drawn around them; the second is “network space,” in which relationships between elements are defined based on distance. However, in some cases, neither boundaries nor relationships are sufficient to separate one space from another; in such instances, boundaries may become temporary and permeable, while relationships persist through a continuous process of transformation. In this context, social space acquires a “fluid” character as a third form. Fluid space is a formation in which there are no fixed boundaries, differences are continuously reproduced, and relationships are flexible, variable, and transformable. Thus, fluidity allows social order to be understood not as a static and closed structure, but as a dynamic, permeable, and continually reconstructed process.

According to Bilgili (2020), in geography, liminal spaces are areas where social order is not clearly felt, and where identity and boundaries are ambiguous and open to different interpretations. According to him, the liminal condition can be explained through the metaphor of “Araf” in Islamic belief, which represents the transitional space between Heaven and Hell. Such spaces represent “in-between” areas that are in constant flux and transformation, belonging neither entirely to a place nor completely outside of it. According to Karaçetin and Kaymaz (2022), the concept of “in-between space” refers to an area situated between two distinct spaces or identities, characterized by ambiguous boundaries and constant transformation. This space has the potential not only to separate the parties but also to bring them together, integrate them, and transform them into new combinations. In this space, those who are different encounter each other; differences become visible, yet they also interweave. This space, containing tension, contradiction, and openness to otherness, offers a dynamic spatial structure that allows differences to flourish and diversity to increase.

Geographers have developed a significant literature linking discussions of sexuality with spatial analysis, exploring the interaction between sexuality and space. These studies reveal the spatial experiences of different forms of sexuality and the determining role of space in the performance of sexual identities (Bell & Valentine, 1995a; Bell & Valentine, 1995b). While studies of lesbian and gay spaces emphasize the reciprocal relationship between identity and space (Knopp, 1990; Adler & Brenner, 1992; Valentine, 1993), research focusing on the enactment of sexuality in rural communities addresses marginalization through the dominance of heterosexuality (Fellows, 1996; Kramer, 1995).

Hubbard (2000) emphasizes that place and space play a critical role in the performance of heterosexuality in its various forms. This approach, on one hand, allows for the analysis of “threatening” forms of heterosexuality in prostitution spaces, while on the other hand, it enables an understanding of how heterosexuality is sexualized in more traditional ways in rural areas. For example, public spaces such as village halls may appear to promote inclusivity through family centered activities, yet in reality, they can suppress differences and

reproduce normative identities. In addition, coffeehouses serve as significant social spaces for the male population in villages; men visit them to chat, meet friends and acquaintances, and hear news related to the village (Ergün & Oruç, 2021). Gender specific activities, such as the Mothers' Association, reinforce gender roles, while the village square promotes "acceptable" interactions that represent social cohesion and continuity, serving to uphold the heteronormative order against boundary crossing behaviors (Little, 2002). Similarly, Fuss (1991) notes that the rigid boundaries established between heterosexuality (male-female relationships) and homosexuality (same-sex relationships) function primarily to reinforce the continuity and dominance of heterosexual identity. According to Fuss, heterosexuality positions homosexuality as a "threat" and a "contagious other" in order to reinforce its own boundaries and secure its identity. Thus, in order to sustain itself, heterosexuality typically suppresses, excludes, and distances itself from homosexuality, thereby constituting its own identity.

In the 1970s, radical feminists argued that heterosexuality underlies the oppression of all women whether lesbian, bisexual, or heterosexual and advocated breaking away from the heteropatriarchal society as the only possible response to this oppression. However, heterosexuality has been discussed relatively narrowly as a theoretical form of sexual orientation. By contrast, the same does not hold for homosexuality; conceptualizations of sexual identity have largely been developed around homosexual identities and discourses of "deviance" associated with same-sex relationships. This tendency is also evident in rural studies; discussions of sexuality and identity have primarily focused on the nature and significance of homosexuality in rural areas.

Bell (2000) considers the rural as a space where specific homosexual practices and forms of identity emerge, offering a more comprehensive theoretical framework that links the rural/urban distinction with gender and sexuality binaries. According to him, rural gay masculinity is not merely a geographical location; it is a multilayered experiential space where social norms, power relations, and cultural representations intersect. However, many conceptual frameworks used to understand human relationships largely rely on naturalized heterosexuality, reproducing this norm as an unquestionable assumption (Richardson, 1996).

Feminist geographers, aiming to challenge this heteronormative framework, have drawn on post-structuralist approaches to destabilize the distinction between sexuality and gender. These approaches argue that heterosexuality is not biological, but socially constructed and maintained through institutional practices (Rich, 1980). In this context, Butler's (1990) theory of performativity demonstrates that heterosexuality is not a fixed identity, but a practice reproduced through repeated social actions. In this framework, the construction of gender identities in rural communities, the structuring of family forms, and the reproduction of gender norms are of particular importance for understanding how heterosexuality operates both as a normative order and as a site of resistance.

One of the central debates in gender identity studies is whether the recognition of differences transforms gender divisions in rural areas and whether these divisions lose their validity. Ironically, although debates surrounding exclusion and otherness raise awareness of these divisions, such differences may become more visible in processes of marginalization. In this context, the number of studies examining dominant yet variable forms of masculinity in rural areas has increased. Research conducted in the 1990s addressed the experiences of lesbians and gay men living in rural areas, challenging the neglect of homosexuality in rural studies (Valentine, 1997; Bell & Valentine, 1995). These studies reveal the invisibility of homosexuals in rural areas, social exclusion, and the lack of support services; meanwhile, some research, particularly Valentine's (1997) study, demonstrates that rural spaces can also provide room for alternative ways of life. However, these initiatives have been limited due to the new exclusions and boundaries that accompany the desire for unity and communal living.

Bell and colleagues (1994) highlight that although homosexuality may be deemed acceptable in certain spaces, these spaces are simultaneously perceived by homosexual individuals as "corrupted" or "colonized," drawing attention to the assumption that space is inherently heterosexual. This situation underscores the necessity of questioning heteronormative assumptions in geographical analyses. Indeed, the authors assert that the "flat," or heterosexual, nature of everyday life spaces should be considered not as a natural reality but as a social construct, emphasizing that "we need to understand the flatness of our streets as a work of art" (Bell et al., 1994).

Researchers examining how different sexual identities for example, skinhead, butch dyke, or lipstick lesbian are performed in space have highlighted the potential of such transgressive spatial practices to undermine the stability of heterosexual identities. However, the relative absence of homosexual representations in rural areas stems not only from the assumption of heterosexuality but also from the exclusion of homosexuals from dominant rural cultures and from the stronger senses of belonging and familiarity experienced by queer communities in urban areas. In this context, Binnie (2000) highlights the association of gay men with the city, arguing that their visibility in global cities carries a cosmopolitan significance for queer culture. According to him, this cosmopolitanism is based on being "conscious and sophisticated" and on the rejection of rural and provincial life. Thus, the strong relationship gay men establish with the city reflects, on one hand, a cultural choice, and on the other, the spatial mobility that becomes necessary when they encounter homophobia.

Unlike the stable structure of rural communities, the city is characterized by variable social relationships. The portrayal of homosexual relationships as short lived and unstable aligns with the image of the city as a constantly moving and transforming space. Moreover, the city can emerge as a space where homosexual relationships are accepted and can flourish to a degree that rural communities cannot offer. Therefore, the city is not only a space of more economic and dynamic social life but also a space of anonymity and a sense of freedom. On the other hand, Bell (2000) argues that the rural also serves as an important focal

point for homosexual imagery. In his study *Farm Boys and Wild Men*, he demonstrates how gay men sexualize the rural in their imaginations, revealing that the countryside is reconfigured as a space for the expression and performance of homosexual cultures. However, gay and lesbian individuals living in rural areas have generally avoided disclosing their identities due to invisibility, marginalization, and safety concerns. Bell and Valentine (1995b) note that the countryside is shaped by a strong moral code, which centers heterosexuality and ensures that rural life is represented within a simple and orderly “moral economy.” Thus, popular culture confines non-normative sexualities to superficial and humorous images, such as “love in the hayloft.” Consequently, understandings of gender and sexuality are not fixed or natural; they are reproduced through cultural and social processes.

Studies focusing on the positioning of gendered bodies in rural areas have comprehensively examined how gender identities are constructed, negotiated, and enacted within spatial contexts (Brandth & Haugen, 2000; Bryant & Pini, 2011; Little, 2002, 2006; Little & Leyshon, 2003). This literature discusses the relationship between rural space and the social meanings of female and male bodies, particularly through the interaction of farmer bodies with idealized gender norms. As Little and Leyshon (2003) emphasize, it is surprising that studies on corporeality remain relatively limited in rural geography, as the rural context provides a unique setting where place, identity, and performative forms of sexuality intersect. Research indicates that the “rural body” is often rendered invisible or suppressed. Little (2003) interprets this invisibility as a result of the hegemonic heterosexuality prevailing in rural communities, while Leyshon (2002), in her study on rural youth identity, demonstrates that sexual identities in rural life are constrained within traditional patterns. Leyshon’s interviews with young women reveal that the spaces for expressing corporeality and sexuality are restricted in rural areas, leading many young women to turn outside the countryside in order to experience their identities freely. These findings demonstrate that the body and sexuality are not only individually but also spatially constructed phenomena, highlighting the decisive role of the rural context in shaping gender identities.

Rural Geography Feminist and Queer Theory

The development of feminist perspectives in rural studies has emerged not through political struggle, as in other social science fields, but rather through a slower and more gradual process. In the 1980s and 1990s, the relative distance of rural research from social theory debates delayed the adoption of radical and critical approaches in the field (Cloke, 2006a). Feminist geography, in turn, has considered the analysis of patriarchal power relations necessary to understand gender differences and, in particular, the marginalization of women, aiming to make the spatial and structural dimensions of gender visible. However, the concentration of feminist geography debates largely in urban and political contexts has left rural areas outside these intellectual transformations, resulting in rural gender relations receiving limited attention on the research agenda for an extended period.

From the 1970s onward, studies examining the position of women farmers in agricultural production began to make gender-based divisions of labor in rural areas visible; however, these early studies were not directly linked to feminist theory (Gasson, 1980). The integration of feminist perspectives into the field occurred not through rapid political intervention but through the gradual internalization of theoretical ideas. This indicates that the rural has long been marginalized in knowledge production. Little and Morris (2005) and Little and Panelli (2003) have shown that rural women's labor has historically been systematically devalued. Women play a decisive role in all processes, from land preparation and sowing to harvesting, processing, and storing crops; however, this contribution often remains invisible as "unpaid family labor." Nevertheless, the sustainability of agricultural production largely depends on this invisible labor (Kandemir & Kutlar, 2024).

The rural geography literature, which has not adequately considered the theoretical and methodological contributions of feminist perspectives, exhibits two main shortcomings. First, the unique experiences of women in rural areas have long been neglected. Although the "geography of women" approach has created significant awareness by placing women at the center of geographical research, issues such as accessibility, domestic labor, access to social services, and labor market relations have not been examined in depth within the rural context. This situation has largely resulted in a missed opportunity to analyze women's everyday lives and the tangible manifestations of gender inequalities in rural communities. Second, the absence of a clear feminist approach has led to the neglect of gender's constitutive role in rural household and community structures, thereby complicating the understanding of rural power relations and the forms of patriarchy in the rural context.

Since the late 1980s, gender-oriented research in rural geography has gained significant momentum. Initially centred on the roles of farm women within agricultural production processes, this body of work has progressively expanded to address a broader range of dimensions shaping rural space. Feminist approaches have shifted the focus beyond women's experiences to analyse the multi-layered and dynamic nature of gender relations. Fields such as labour markets (Little et al., 1991), tourism (Bouquet, 1987), rural community structures (Middleton, 1986), and the environment (Sachs, 1994) have been re-evaluated through this lens. These studies have brought significant theoretical depth to the rural geography literature by making visible the decisive role of gender in the organisation of rural space. However, until the 1990s, feminist research continued to be regarded as occupying a somewhat marginal position and was even characterized by Whatmore et al. (1994) as "fugitive literature." Nevertheless, by the late 1990s, gender studies had increasingly become an integral component of mainstream rural geography, and Little's (2002) *Gender and Rural Geography* emerged as one of the institutionalized exemplars of this transformation.

Situating rural gender studies within a broader framework of feminist geography significantly enhances the theoretical depth and analytical capacity of the field. The fact that the direction of early rural gender studies was shaped

largely by feminist geographers is also indicative of this. Feminist geographers have emphasized that it is not sufficient merely to identify the inequalities experienced by women; the primary objective is to explain how and through which mechanisms these inequalities are produced. Therefore, understanding women's experiences requires situating them within broader gender relations and patterns of structural power. Indeed, as Bowlby and colleagues (1986) note in the context of "locality studies" in Britain, approaches focusing solely on gender roles remain static, whereas examining gender relations reveals the dynamic processes through which male power is reproduced. Therefore, the analysis of gender relations should be regarded as a fundamental component for understanding economic and social transformations at the local scale.

As with broader gender studies, rural gender research has been critiqued for initially adopting a descriptive approach. These critiques have focused on the tendency of studies to merely describe women's lives without adequately analyzing the power relations that produce gender inequalities. As Hirdman (2001) notes, the gender order establishes "cages" that, both visibly and invisibly, embed themselves in individuals' lives and reproduce inequality. In this context, Acker (1990) argues that the gender order operates according to two fundamental logics: first, a hierarchy in which the masculine is taken as the norm; and second, a dichotomy that sharply separates the masculine from the feminine. Although these structures manifest differently across various historical and cultural contexts, they persist as fundamental mechanisms that sustain gender inequalities. Therefore, the radical feminist Firestone (1971) argued that the aim of feminist struggle is not merely to challenge male privilege but to eliminate the very basis of gender differentiation. Lorber (2005), in turn, argues that genuine equality can only be achieved through liberation from gender, asserting that a genderless social order should be the ultimate goal of feminism.

In Western societies, the representation of the rural as pastoral and idealized has reinforced traditional expectations regarding women's domestic and social roles and has legitimized the patriarchal order. Dinç's (2020) study shows that rural women's labor is positioned not as a subject directly engaging with capital, but as an element incorporated into production indirectly through the male head of the household. Consequently, women's labor becomes both invisible within feudal relations and unable to attain legitimacy on the economic-political plane. Rural womanhood has been equated with motherhood, spousal support, and care labor, while women's individual desires and presence in the public sphere have often been relegated to the background. The feminist concept of "doing gender" emphasizes how these patterns are reproduced through everyday practices, whereas the approach of "undoing gender" aims to challenge and transform these norms. While Deutsch (2007) views this as the reduction of gender differences, West and Zimmerman (2009) argue for the complete abandonment of gender.

Butler's approach, as articulated in *Gender Trouble* (1990), emphasizes that gender is continuously reproduced through discursive and practical processes, reinforcing the understanding that rural gender is not a static category. This perspective has facilitated the development of new approaches in rural research

that focus on the dynamic, relational, and spatial dimensions of gender. Accordingly, a significant portion of the studies has focused on examining forms of rural masculinity. The association of qualities such as heroism, strength, and resilience with the “wild nature” has led to the conceptualization of rural spaces as sites that reproduce heteronormative masculinity (Hogan & Pursell, 2008; Woodward, 1998). Connell’s (2005) concept of hegemonic masculinity emphasizes that masculinity functions as a form of power regulating gender relations; however, this power is always defined relationally with non-hegemonic masculinities and established in contrast to femininity. However, Messerschmidt (2012) notes that in some studies this concept has been used in a static and uncritical manner, emphasizing that the complexity of the relationship between masculinity and power should not be overlooked. This critical approach, while questioning hegemonic masculinity, highlights the need to carefully distinguish between forms of masculinity that legitimize male power and those that do not.

Today, it is acknowledged that rural masculinities are diverse and sometimes contradictory, and that these forms complicate relationships with both men and women (Yalçın, 2024). Research shows that while a dominant and persuasive form of rural masculinity is recognized, there is an increasing tendency to explore alternative and contested masculine identities. Studies indicate that while a dominant and compelling form of rural masculinity is acknowledged, there is also a growing tendency to investigate diverse and contested masculine identities. Therefore, Munkejord (2006) emphasizes that understanding rural gender relations is of fundamental analytical importance, particularly in the context of restrictions on women’s roles and the construction of domestic gender identities.

Feminist rural research has demonstrated that economic and social inequalities between male and female farmers constitute a fundamental component of rural life (Whatmore, 1991). In this context, Brandth (2002) notes that many female farmers perceive feminism as an anti-male ideology and a threat to family relations, which complicates the adoption of feminist identities in rural areas. Sachs (1996) emphasizes that even when women recognize their socially subordinate positions, they may struggle to fully exercise agency within existing power relations. Furthermore, women’s reproductive bodies have historically played central role in naturalizing heterosexual marriage and patriarchal family structures. Feminist studies have shown that the category of “woman” is often defined on a biological basis, with this definition discursively constructed within historical and cultural contexts. Consequently, rural womanhood is shaped not only by economic and social roles but also by biological and ideological constructions.

Feminist geography has laid the theoretical groundwork for queer geography by critiquing the spatial distribution of gender roles, the public/private divide, and the effects of normative heteronormativity on space (Okur, 2022b). Queer theory provides an important analytical framework for examining the meanings of rural spaces and social institutions; however, its application in rural studies remains limited and fragmented. However, a queer approach can make significant contributions to rural studies at both theoretical and empirical levels. Over the

past thirty years, particularly in the Australia, United Kingdom, and New Zealand, studies have critically examined the intersections of rural spaces and sexuality, making visible the experiences of marginalized LGBTQ communities (Bell & Valentine, 1995a; Browne, Lim & Brown, 2009; Johnston & Longhurst, 2009; Little, 2007). In this context, the examination of rural places from a queer perspective is becoming increasingly important in queer studies.

Queer theory focuses on deconstructing the concept of identity and celebrating the diversity of different sexual identities. This approach, which rapidly developed in the 1990s under the influence of poststructuralist theories and body-focused studies, has made significant contributions to feminist debates, particularly on issues of sexuality and gender. Stein and Plummer (1994) describe queer theory as an “elite academic movement.” Key figures influencing the development of this theory include scholars such as Judith Butler, Michael Warner, and Eve Sedgwick. Queer theory critiques the exclusionary and rigidly gendered structures of “gay” and “lesbian” identities (Segal, 1999). Butler (1990) emphasizes that these subversive practices disrupt the heterosexual matrix, generating “gender troubles.” As exemplified by drag performances (Bell et al., 1994), the imitation of heterosexuality challenges the stability of masculine and feminine identities and reveals that heterosexuality itself is a socially constructed performance.

Queer theory is built upon three core components: the deconstruction of the categories of gender, sex, and sexuality; the role of performance and the interrogation of power relations in identity formation; and the critical examination of sexual identity politics (Seidman, 1996; Valocchi, 2005). The first component makes visible how sex, gender, and sexuality are socially and historically constructed, stripping these categories of claims to naturalness or essentialism. Thus, sexuality is approached not as an individual orientation but as a dynamic process shaped within the framework of social norms and power relations (Foucault, 1977). This approach reveals that conceptualizing through binary oppositions, such as female/male or heterosexual/homosexual, reinforces the normativity of heterosexuality and positions homosexuality as the “other.”

The second component of queer theory focuses on performativity and the operation of power, drawing particularly on Butler’s (1990) work. Butler argues that identities are produced not as fixed “selves” but through the repeated performative acts of normative signifiers; power operates through the discourses internalized by individuals (Valocchi, 2005). This perspective reveals heteronormative discourses, thereby providing the possibility for their deconstruction. The third component addresses the nature of identity and its relationship with politics, viewing identity not as a singular and fixed category but as a historical, contextual, and plural process. In doing so, queer theory critiques the inclusionary and exclusionary practices of identity politics and emphasizes the fluidity of identities.

Little (2003, 2007) employs the conceptual tools of queer theory to interrogate heteronormativity, performativity, and the relationship between space and gender

in the study of rural sexuality. According to him, spaces are often coded as heterosexual, and gender and gender identities mutually shape one another. Spaces function both as sites open to gender relations and as structures that reproduce these relations, while places represent the concrete expression of local and extended relational networks (Massey, 1994). For instance, while a rural woman cohabiting before marriage may face social disapproval, similar behavior by a man may be considered acceptable; this illustrates how heterosexism functions to maintain social order and reinforce gender hierarchies.

Discussion and Conclusion

According to the above discussion, the fact that the rural is socially, culturally, and ideologically constructed clearly demonstrates that space is not merely a physical geography; rather, it constitutes a dynamic arena in which social relations, forms of power, and identity negotiations are concretely manifested. The rural, represented through romanticized images such as naturalness, purity, belonging, and local authenticity has rendered the social inequalities concealed behind discourses of property, production, and development invisible through this idealized imagination. In this context, the rural is not merely a living environment but constitutes a site of power in which class, gender, sexuality, and identity based distinctions are continually reproduced.

The contemporary trend toward the “ruralization” of urban space and society demonstrates that the boundaries between the urban and the rural are increasingly blurred, thereby reproducing the ideological power of the rural within urban life practices. Just as the movement of rural populations, values, and practices toward the city reshapes urban life, the incorporation of rural aesthetics and representational forms into urban contexts further intensifies this transformation. Thus, this intersection, emerging at both spatial and social levels, necessitates a reconsideration of the rural–urban dichotomy and demonstrates that contemporary spatial arrangements have evolved into a more complex, permeable, and multilayered structure.

Feminist geography has approached the rural as a field in which power relations can be analyzed, revealing the impact of the public/private distinction on rural ways of life, the invisibilization of women’s labor, and the spatial manifestations of patriarchal order. Women’s positions within rural production processes have been constructed as “auxiliary labor” that is undervalued both economically and culturally, while masculinity is closely associated with ownership, control, and authority. Thus, the gendered organization of rural spaces shapes not only modes of production but also the very meanings attributed to these spaces. At this juncture, feminist geography has effected a significant transformation by conceptualizing the rural not merely as a category of “nature” or “production,” but through the spatial organization of gender relations.

Queer geography has further advanced this transformation by interrogating heteronormative understandings of space and analyzing how sexuality, identity, and belonging are produced in rural contexts. Rural areas have often been imagined as spaces where heterosexual norms are most rigidly enforced and

alternative sexual orientations or identities are suppressed. However, the queer perspective emphasizes that this suppression simultaneously contains the potential for resistance. Silence, concealment, anonymity, or everyday practices demonstrate that the rural can open up an alternative space for identity and existence. Thus, the countryside is not only a stage for exclusionary norms but also for the micro forms of resistance developed against those norms.

In conclusion, examining rural spaces from the perspective of gender and sexuality necessitates rethinking these spaces not only in economic or geographic terms but also within cultural and political dimensions. The nature of the rural, interwoven with otherness, identities, and power relations has demonstrated that space can also be relational, fluid, and productive. Understanding the rural in its plural, contradictory, and fluid nature will provide not only the discipline of geography but also studies of gender, identity, and otherness with a new level of analytical depth.

References

- Abram, S. (2003). The rural gaze. In Cloke, P. (Ed.) *Country Visions*. Harlow: Pearson.
- Acker, J. (1990). Hierarchies, Jobs, Bodies: A Theory of Gendered Organizations. *Gender & Society*, 4, 2, 139-158. <https://doi.org/10.1177/089124390004002002>
- Adler, S. and Brenner, J. (1992). Gender and space: Lesbians and gay men in the city. *International Journal of Urban and Regional Research*, 16, 24-34. <https://doi.org/10.1068/d110395>
- Bell, D. (2000). Farm boys and wild men: Rurality, masculinity, and homosexuality. *Rural Sociology*, 65(4), 547-561. <https://doi.org/10.1111/j.1549-0831.2000.tb00043.x>
- Bell, D. (2006). Variations on the rural idyll. İçinde *Handbook of rural studies*, (Ed.) P. Cloke, T. Marsden and P. Mooney, (pp.149-160). London: Sage.
- Bell, D. and Valentine, G. (1995b). Queer Country: Rural Lesbian and Gay Lives. *Journal of Rural Studies*, 11, 113-122. [https://doi.org/10.1016/0743-0167\(95\)00013-D](https://doi.org/10.1016/0743-0167(95)00013-D)
- Bell, D. and Valentine, G. (Ed.), (1995a). *Mapping Desire: Geographies of Sexualities*. London: Routledge.
- Bell, D., Binnie, J., Cream, J. and Valentine, G. (1994). All hyped up and no place to go. *Gender, Place and Culture: A Journal of Feminist Geography*, 1(1), 31-47. <https://doi.org/10.1080/09663699408721199>
- Berger, J. (1972). *Ways of Seeing*. Harmondsworth: Penguin.
- Bhabha, H. (1990). Interview with Homi Bhabha: The Third Space. İçinde *Identity: Community, Culture, Difference*, (Ed.) J. Rutherford (pp.137-222). London: Lawrence and Wishart.
- Bilgili, M. (2020). Coğrafyada Mekân Felsefesi Üzerine Yaklaşımlar. *International Journal of Geography and Geography Education*, 41, 88-102. <https://doi:10.32003/igge.674936>
- Bilgili, M. and Yıldırım, S. (2024). Coğrafyada Temel Kavramların İlişkiseliliği: Mekân, Yer, Peyzaj ve Bölge. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 62, 283-293. <https://doi.org/10.30794/pausbed.1445668>
- Binnie, J. (2000). Cosmopolitanism and the sexed city. İçinde *City Visions*, (Ed.) D. Bell and A. Haddour. Harlow: Pearson.
- Bouquet, M. (1987). Bed, breakfast and evening meal: Commensality in the nineteenth and twentieth century farm household. İçinde *Who From Their Labours Rest? Conflict and Practice in Rural Tourism*, (Ed.), M. Bouquet, and M. Winter. Aldershot: Avebury.

- Bowlby, S., Foord, J. and McDowell, L. (1986). The place of locality in gender studies. *Area*, 18, 327-331.
- Brandth, B. (2002). On the Relationship between Feminism and Farm Women. *Agriculture and Human Values*, 19, 107-117.
- Brandth, B. and Haugen, M. (2000). From lumberjack to business manager: Masculinity in the Norwegian forestry press. *Journal of Rural Studies*, 16, 343-356. [https://doi.org/10.1016/S0743-0167\(00\)00002-4](https://doi.org/10.1016/S0743-0167(00)00002-4)
- Browne, K. (2011). Beyond Rural Idylls: Imperfect Lesbian Utopias at Michigan Womyn's Music Festival. *Journal of Rural Studies* 27, 13-23.
- Browne, K., Jason L. and Gavin B. (Ed.) (2009). *Geographies of Sexualities*. Burlington, VT: Ashgate.
- Bryant, L. and Barbara, P. (2011). *Gender & Rurality*. London: Ashgate.
- Butler, J. (1990). *Gender Trouble: Feminism and the Subversion of Identity*. London: Routledge.
- Buttimer, A. (1998). Geography's Contested Stories: Changing States-of-the-art. *İçinde Tijdschrift voor Economische en Sociale Geografie*, (pp.90-99). London: Routledge.
- Chambers, I. (1994). *Migrancy, Culture, Identity*. London. Routledge.
- Cloke, J.P. (2003). *Country Visions*. Pearson/Prentice Hall.
- Cloke P. (1997). Poor country: Marginalisation, poverty and rurality. *İçinde Contested countryside cultures: Otherness, marginalisation and rurality*, (Ed.) P. Cloke and J. Little. (pp. 252-271). London: Routledge.
- Cloke, P. (2006a). Rurality and otherness. *İçinde Handbook of rural studies*, (Ed.) P. Cloke, T. Marsden and P. Mooney, (pp.447-456). London: Sage.
- Cloke, P. (2006b). Rurality and racialized others: Out of place in the countryside. *İçinde Handbook of rural studies*, (Ed.) P. Cloke, T. Marsden, and P. Mooney. (pp.379-387). London: Sage.
- Cloke, P. (2006c). Conceptualizing rurality. *İçinde Handbook of Rural Studies*. (Ed.) Cloke, P., Marsden, T. and Mooney, P. London: Sage.
- Cloke, P. and Goodwin. M. (1992). Conceptualising countryside change: From post fordism to rural structured coherence. *Transactions of the Institute of British Geographers*, 17, 321-336.
- Cloke P. and Little J. (Ed.) (1997). *Contested Countryside Cultures*. London: Routledge.
- Connell, R. W. (2005). *Masculinities*. Cambridge: Polity Press.
- Deutsch, F. (2007). Undoing Gender. *Gender and Society*, 21, 106-127. <https://doi.org/10.1177/0891243206293577>

- Dinç, Ö. A. (2020). Kırsal Emeğin Dolayımında Aracı Formlar ve Egemenlik İlişkileri: Dünya Ekonomisinde Hane ve Emek Tartışması. *Politik Ekonomik Kuram*, 4(2), 310-329. <https://doi.org/10.30586/pek.817746>
- Ergün, A. and Oruç, E. (2021). Kırsal Alanda Kahvehane Alışkanlığı: Tokat İli Merkez İlçe Örneği. *Gaziosmanpaşa Bilimsel Araştırma Dergisi (GBAD)*, 10(3), 242-255.
- Fellows, W. (1996). *Farm Boys: Lives of gay men from the rural Midwest*. Madison: University of Wisconsin Press.
- Firestone, S. (1971). *The Dialectic of Sex: The Case for Feminist Revolution*. New York: Bantam.
- Foucault, M. (1976). *The Birth of the Clinic*. London: Tavistock.
- Foucault, M. (1977). *The History of Sexuality*. New York: Vintage Books.
- Fuss, D. (1991). *Inside/Out: Lesbian Theories, Gay Theories*. New York: Routledge.
- Gasson, R. (1980). Roles of farm women in England. *Sociologia Ruralis*, 20, 165-180. <https://doi.org/10.1111/j.1467-9523.1980.tb00706.x>
- Gorman-Murray, A. (2013). Documenting Lesbian and Gay Lives in Rural Australia. *İçinde Sexuality, Rurality and Geography*, (Ed.) A. Gorman-Murray, B. Pini, and L. Bryant. (pp. 81–94). Lanham, MD: Lexington Books.
- Gorman-Murray, A., Pini, B. and Bryant, L. (Ed.) (2013). *Sexuality, Rurality, and Geography*. Lexington Books.
- Halfacree, K. (1993). Locality and social representation: Space, discourse and alter native definitions of the rural. *Journal of Rural Studies*, 9(1), 1-15. [https://doi.org/10.1016/0743-0167\(93\)90003-3](https://doi.org/10.1016/0743-0167(93)90003-3)
- Harvey, D. (1989). *The Condition of Postmodernity*. Oxford: Blackwell.
- Hirdman, Y. (2001). *Genus—Om det Stablas Föränderliga Former [Gender—On the Changing Forms of Stability]*. Malmö: Liber.
- Hogan, M. and Pursell, T. (2008). The ‘Real Alaskan’: Nostalgia and Rural Masculinity in the ‘Last Frontier’. *Men and Masculinities*, 11(1), 63-85.
- Hubbard, P. (2000). Desire/disgust: Mapping the moral contours of heterosexuality. *Progress in Human Geography*, 24(2), 191-217. <https://doi.org/10.1191/030913200667195279>
- Johnston, L. and Longhurst, R. (2009). *Space, Place, and Sex: Geographies of Sexualities*. Lanham, MD: Rowman and Littlefield.
- Jones, K.R. and Wills, J. (2005). *The Invention of the Park*. Malden, MA: Polity.
- Kandemir, I. Y. and Kutlar, İ. (2024). Kırsal Alanda Doğanın Korunmasında Kadının Rolü ve Ekofeminizm. *Kadin/Woman 2000*, 25(1), 111-118.

- Karaçetin, S.G. and Kaymaz, S. (2022). Postmodern düşüncenin mekan açılımı üzerine kavramsal bir deneme: Arada mekan. *bab Journal of FSMVU Faculty of Architecture and Design*, 3(1), 124-133.
- Kinsman, P. (1997). Re-negotiating the boundaries of race and citizenship: The Black Environmental Network and conservation bodies. *İçinde Revealing rural 'others': Representation, power and identity in the British countryside*, (Ed.) P. Milbourne, (pp.13–36). London: Cassell.
- Knopp, L. (1990). Some theoretical implications of gay involvement in an urban land market. *Political Geography Quarterly*, 9, 337-352.
- Kramer, J. (1995). Bachelor farmers and spinsters: Gay and lesbian identities and communities in rural North Dakota. *İçinde Mapping Desire: Geographies of sexualities*, (Ed.) D. Bell and G. Valentine. London: Routledge.
- Leyshon, M. (2002). Youth identity, culture and marginalisation in the countryside. PhD thesis, Department of Geography: University of Exeter.
- Liepins, R. (2000a). Exploring Rurality Through “Community”: Discourses, Practices and Spaces Shaping Australian and New Zealand Rural “Communities”. *Journal of Rural Studies*, 16(3),325-342. [https://doi.org/10.1016/S0743-0167\(99\)00067-4](https://doi.org/10.1016/S0743-0167(99)00067-4)
- Little, J. (2002). *Gender and Rural Geography: Identity, Sexuality and Power in the Countryside*. London: Pearson.
- Little, J. (2003). Riding the Rural Love Train: Heterosexuality and the Rural Community. *Sociologia Ruralis*, 43, 401–417. <https://doi.org/10.1046/j.1467-9523.2003.00252.x>
- Little, J. (2006). Gender and Sexuality in Rural Communities. *İçinde The Handbook of Rural Studies*, (Ed.) P. Cloke, T. Marsden and P. Mooney, (pp.365–378). London: Sage Publications.
- Little, J. (2007). Constructing Nature in the Performance of Rural Heterosexualities. *Environment and Planning D: Society and Space* 25(5), 851–866.
- Little, J. (2014). The Development of Feminist Perspectives in Rural Gender Studies. *İçinde Feminisms and Ruralities*, (Ed.) B. Pini, B. Brandth and J. Little, (pp.107-118). New York and London: Lexington books.
- Little, J. and Morris, C. (Ed). (2005). *Critical Perspectives in Rural Gender Studies*. Aldershot: Ashgate.
- Little, J. and Leyshon, M. (2003). Embodied Rural Geographies: Developing Research Agendas. *Progress in Human Geography*, 27(3), 257-272.
- Little, J. and Panelli, R. (2003). Gender Research in Rural Geography. *Gender, Place and Culture*, 10, 281–289. <https://doi.org/10.1080/0966369032000114046>

- Little, J., Ross, K. and Collins, I. (1991). Women and Employment in Rural Areas, Rural Development Commission Research Report 10. Salisbury: RDC.
- Lorber, J. (2005). *Breaking the Bowls: Degendering and Feminist Change*. London: W.W. Norton & Co.
- Massey, D. (1994). *Space, Place and Gender*. Cambridge: Polity Press.
- McDowell, L. (2004). Masculinity, Identity and Labour Market Change: Some Reflections on the Implications of Thinking Relationally about Difference and the Politics of Inclusion. *Geografiska Annaler*, 86, 45–56. <https://doi.org/10.1111/j.0435-3684.2004.00153.x>
- Messerschmidt, J. (2012). Engendering Gendered Knowledge: Assessing the Academic Appropriation of Hegemonic Masculinity. *Men and Masculinities*, 15, 56–76. <https://doi.org/10.1177/1097184X11428384>
- Middleton, A. (1986). Marking boundaries: Men's space and women's space in a Yorkshire village. İçinde *Deprivation and Welfare in Rural Areas*, (Ed.) T. Bradley, P. Lowe and S. Wright. Norwich: Geo Books.
- Miele, M. (2006). Consumption culture? The case of food. İçinde *Handbook of rural studies*, (Ed.) P. Cloke, T. Marsden, and P. Mooney, (pp.345–364). London: Sage.
- Milbourne, P. (Ed.) (1997). *Revealing Rural "Others"*. London: Cassel.
- Mol, A. and Law, J. (1994). Regions, networks and fluids: Anaemia and social topology. *Social Studies of Science*, 24(4), 641-671. <https://doi.org/10.1177/030631279402400402>
- Morley, D. and Robbins, K. (1995). *Spaces of Identity*. London: Routledge.
- Munkejord, M.C. (2006). Challenging Discourses of Rurality: Women and Men In Migrants' Constructions of the Good Life in a Rural Town in Northern Norway. *Sociologia Ruralis*, 46, 241–251. <https://doi.org/10.1111/j.1467-9523.2006.00415.x>
- Murdoch, J. (2003). Co-constructing the countryside: Hybrid networks and the extensive self. İçinde *Country Visions*, (Ed.) Cloke, P. Harlow: Pearson.
- Murdoch, J. and A. Pratt. (1993). Rural studies: Modernism, post-modernism and the post-rural. *Journal of Rural Studies*, 9(4), 411-428.
- Murdoch, J. and Abram, S. (2002). *Rationalities of Planning*. Aldershot: Ashgate.
- Okur, M. (2022a). Kültürel coğrafya perspektifinden mekânın eleştirisi. *International Journal of Geography and Geography Education (IGGE)*, 45, 134-147. <https://doi.org/10.32003/igge.1041260>

- Okur, M. (2022b). Feminist ve Kuir Teori: Cinsiyet ve Cinsel Kimliğin Toplumsal Oluşumu. İçinde *Sosyal, Beşeri ve İdari Bilimler Alanında Yeni Trendler III*, (Ed.) S. Sönmez, (pp.51-67). İzmir: Duvar Yayınları.
- Okur, M. (2023). Beden Cinsiyet ve Mekân. *Marmara Üniversitesi Kadın ve Toplumsal Cinsiyet Araştırmaları Dergisi*, 7(1), 22-43.
- Phillips, R., Diane W. and David S. (2000). *De-centering Sexualities: Politics and Representations Beyond the Metropolis*. New York: Routledge.
- Philo, C. (1992). Neglected rural geographies: A review. *Journal of Rural Studies*, 8(2), 351-366. [https://doi.org/10.1016/0743-0167\(92\)90077-J](https://doi.org/10.1016/0743-0167(92)90077-J)
- Philo, C. (1993). Post-modern rural geography? A reply to Murdoch and Pratt. *Journal of Rural Studies*, 9 (4), 427-436. [https://doi.org/10.1016/0743-0167\(93\)90054-N](https://doi.org/10.1016/0743-0167(93)90054-N)
- Pile, S. and Thrift, N. (1995). 'Mapping the subject'. İçinde *Mapping the Subject*, (Ed.) S. Pile and N. Thrift. London: Routledge.
- Rich A. (1980). Compulsory heterosexuality and lesbian existence. *Signs: Journal of Women in Culture and Society*, 5(4), 631-660.
- Richardson, D. (Ed.) (1996). *Theorising Heterosexuality: Telling it Straight*. Buckingham: Open University Press.
- Rye, J.F. (2006). Rural youths' images of the rural. *Journal of Rural Studies*, 22(4), 409-421.
- Sachs, C. (1994). Rural women's environmental activism in the USA. İçinde *Gender and Rurality*, (Ed.) S. Whatmore, T. Marsden, and P. Lowe. London: David Fulton.
- Sachs, C.E. (1996). *Gendered Fields: Rural Women, Agriculture, and Environment*. Boulder: Westview Press.
- Said, E. (1978). *Orientalism: Western conceptions of the orient*. London: Pantheon Books.
- Said, E. (1986). Orientalism reconsidered. İçinde *Literature, politics and theory: Papers from the Essex Conference 1976-84*, (Ed.) F. Barker, P. Hulme, M. Iversen and D. Loxley, (pp.210-229). London: Methuen.
- Said, E. (1993). *Culture and imperialism*. New York: Knopf.
- Segal, L. (1999). *Why Feminism? Gender, Psychology and Politics*. Cambridge: Polity Press.
- Seidman, S. (1996). *Queer Theory/Sociology*. Oxford: Wiley-Blackwell.
- Short, B. (2006). Idyllic ruralities. İçinde *Handbook of rural studies*, (Ed.) P. Cloke, T. Marsden and P. Mooney (pp.133-148). London: Sage.

- Sibley, D. (1995). *Geographies of Exclusion: Society and Difference in the West*. London: Routledge.
- Stein, A. and Plummer, K. (1994). 'I Can't Even Think Straight': 'Queer' Theory and the Missing Sexual Revolution in Sociology. *Sociological Theory*, 12, 178-187.
- Stewart, K. (1996). *A Space on the Side of the Road: Cultural Poetics in an 'Other' America*. Princeton, NJ: Princeton University Press.
- Thrift, N. (2007). *Non-representational Theory: Space, Power, Affect*. London: Routledge.
- Tönnies, F. (1963). *Community and Society*. New York: Harper and Row.
- Tuan, Y-F. (1977). *Space and Place: The Perspective of Experience*. Minneapolis, MN: University of Minnesota Press.
- Urbain, J. (2002). *Paradis Verts: Désirs de Campagne et Passions Résidentielles*. Paris: Payot.
- Uysal, A. and Güngör, Ş. (2016). *Postyapısalcı ve İlişkisel Coğrafyalarda Bir Tarz Olarak Temsil Ötesi Teori(ler)*. *İstanbul Üniversitesi Edebiyat Fakültesi Coğrafya Dergisi*, 33, 73-81.
- Valentine, G. (1993). (Hetero) sexing space: Lesbian perceptions and experiences of everyday space. *Environment and Planning D: Society and Space*, 11, 395-413. <https://doi.org/10.1068/d110395>
- Valentine, G. (1997). Making space: Lesbian separatist communities. *İçinde Contested countryside cultures: Otherness, marginalisation and rurality*, (Ed.) P. Cloke and J. Little. (pp.109-122). London: Routledge.
- Valocchi, S. (2005). Not Yet Queer Enough: The Lessons of Queer Theory for the Sociology of Gender and Sexuality. *Gender & Society*, 19(6), 750-770. <https://doi.org/10.1177/0891243205280294>
- West, C. and Zimmerman, D. H. (2009). Accounting for Doing Gender. *Gender & Society*, 23(1), 112–122. <https://doi.org/10.1177/0891243208326529>
- Whatmore, S. (1991). *Farming Women: Gender, Work and Family Enterprise*. London: MacMillan.
- Whatmore, S., Marsden, T. and Lowe, P. (Ed.) (1994). *Gender and Rurality. Critical Perspectives on Rural Change Series VI*. London: David Fulton.
- Williams, R. (1973). *The Country and the City*. New York: Oxford University Press.
- Woods, M. (2005). *Contesting Rurality: Politics in the British countryside*. Aldershot: Ashgate.

- Woodward, R. (1998). 'It's a Man's Life!' Soldiers, Masculinity and the Countryside. *Gender, Place and Culture*, 5(3), 277-300. <https://doi.org/10.1080/09663699825214>
- Wylie, J. (2007). *Landscape*. London: Routledge.
- Yalçın, M. (2024). Coğrafyaya Erkeklik Kavramının Yerleşmesi ve Hegemonik Erkekliğe Yaklaşımlar. *Coğrafi Bilimler Dergisi/ Turkish Journal of Geographical Sciences*, 22(2), 645-665. <https://doi.org/10.33688/aucbd.1446520>
- Zengin, E. S. (2021). Av Tutkusu: Avlanma, Ekofeminizm ve Erkeklikler. *Moment Hacettepe Üniversitesi İletişim Fakültesi Kültürel Çalışmalar Dergisi*, 8(1), 205-226. <https://doi.org/10.17572/mj2021.1.205226>



BÖLÜM 13

The Twin Transition and Its Analytical Limits: A Typology of Articulation Forms in Green and Digital Transformation

Umur Aşkın¹

1. Introduction

Concepts have lifespans. Born in response to particular institutional needs, they accrue authority as they circulate through policy and scholarship, whilst losing their connection to the conditions that gave rise to them. The twin transition is an unusually swift instance of this process. Emerging from the European Commission's post-pandemic recovery agenda, it presented green and digital transformation as mutually reinforcing drivers of a renewed European economy (European Commission, 2021) – and within a few years had spread across national recovery plans, corporate sustainability strategies and a rapidly expanding body of scholarship.

What is striking, given that ascent, is how little scrutiny the concept's foundational assumptions have received. The literature has largely engaged with the relationship on the concept's own terms, treating complementarity as given and cataloguing instances of synergy (European Court of Auditors, 2020; Kovacic et al., 2024). It migrated from policy to academia with its normative freight largely intact (Kovacic et al., 2024; Meijer, 2024), while systematic critical interrogation of its underlying assumptions has remained comparatively limited.

This article addresses precisely that gap – not to dismiss the twin transition concept, but to subject its core logic to sustained scepticism and to offer an analytically more robust alternative to the complementarity–tension binary. The 'twin' image evokes shared origin and natural affinity, assumptions that are rarely stated and almost never tested. Yet the relationship is not inherently synergic; it takes qualitatively different forms depending on sector, scale, institutional context and actor preferences (Köhler et al., 2019). A literature that presupposes complementarity is poorly positioned to identify when the two transformations work against one another, or when one appropriates the other instrumentally.

¹ Assoc. Prof. Dr., Tokat Gaziosmanpaşa Üniversitesi, Orcid: 0000-0001-8456-2411

The article offers two connected contributions: a critical genealogy that traces the political origins of the concept and shows how the ‘twin’ metaphor obscures the diversity of the relationship, and a constructive typology of four articulation forms – synergic, parallel, conflictual and instrumental. Drawing on Hall (1980), the concept of articulation underscores that connection is contingent rather than necessary, produced and undone through specific decisions and relations of power. The fragmented architecture of green and digital policy is treated not as a temporary coordination problem yet to be resolved, but as a structural condition invisible from within the complementarity assumption.

This is a critical review, not an empirical study. Its contribution lies in mapping the literature, exposing its internal tensions and proposing a more differentiated framework. The discomfort that critical reviews produce is not incidental to these purposes – in many respects, it is the purpose.

2. Methodology

This is an analytical and synthetic critical review of academic and grey literature on the twin transition; it presents no original empirical data.

Search strategy and corpus construction. The corpus was assembled through systematic searches in Scopus, Web of Science and Google Scholar using the following terms: twin transition, green digital transition, dual transition sustainability, green digitalisation, digital green nexus and co-deployment green digital. The timeframe ran from the publication of the European Green Deal (January 2019) to December 2025. No language restriction was applied, though the corpus is predominantly English-language, reflecting the distribution of indexed output. Grey literature was included only where it constituted primary evidence of policy framings not reproduced in full in peer-reviewed sources.

Inclusion and exclusion criteria. Studies analytically engaging with the relationship between green and digital transformation – at a conceptual, empirical or governance level – were included; those using ‘twin transition’ merely as a label were excluded. Foundational theoretical contributions predating 2019 were retained where they underpin the analytical framework: sustainability transitions research, science and technology studies, political economy and institutional theory. The final corpus comprises approximately eighty peer-reviewed articles and book chapters alongside twenty grey literature sources.

Analytical approach and theoretical positioning. The article draws on critical political economy. Institutional analysis unpacks the conditions under which the twin transition was produced; Hall’s (1980) theory of articulation provides the typology’s conceptual vocabulary; and comparative governance literature informs the assessment of disjuncture between policy discourse and institutional practice. The framework does not presuppose that the twin transition is purely ideological; it holds, rather, that concepts produced in political contexts require critical

examination of their constitutive assumptions before they can serve as reliable analytical instruments.

Researcher reflexivity. The author's engagement with sustainability transitions research and European governance analysis shapes this review's perspectives. The principal risk – that familiarity with the governance fragmentation literature may lead to disproportionate emphasis on institutional obstacles – is managed in two ways: synergic articulation is accorded first position and the most extensive evidential treatment in the typology, and the strongest arguments for the complementarity assumption are engaged systematically before the critical analysis proceeds.

3. Conceptual Framework: The Twin Transition and Its Analytical Limits

3.1 The Genealogy of a Concept: From Brussels to the Academy

When terms originate in the world of policy, the conditions of their production can be highly revealing – both of the assumptions they carry and of the interests they serve. The term 'twin transition' is not the product of scholarly efforts to theorise the relationship between green and digital transformations. It is, rather, a political construction that took shape within the Commission's policy apparatus surrounding the European Green Deal (European Commission, 2019). Under the von der Leyen Commission, this framing was elevated to the centre of the EU's strategic agenda, aligning climate neutrality, competitiveness and sustainable growth within a single discursive structure (European Commission, 2021; Tabares et al., 2025; Maucorps et al., 2023). High-level policy documents presented the two transformations as mutually reinforcing; yet research has shown the relationship to be considerably more complex, with digitalisation both facilitating sustainability objectives and generating risks such as increased energy consumption and regional inequalities (Barbero et al., 2025; Chatzistamoulou, 2023).

Such processes of concept absorption are not unusual in the history of European integration, which is in large measure a history of discursive framings aligning competing interests around shared institutional projects (Majone, 1996). The more pressing problem is that the twin transition framing entered academic literature with remarkable speed and without the critical scrutiny such discourses would ordinarily undergo. A substantial portion of early contributions treated the complementarity assumption not as a proposition to be examined but as an unquestioned foundation (Bianchini et al., 2023; Müller et al., 2024). Transferring the concept from the political to the academic domain carried with it particular value commitments and prior assumptions; adopting these unreflectively heightens the risk of producing analyses that appear internally coherent but possess limited capacity to account for empirical reality.

3.2 Two Literatures, Two Blind Spots

To understand the twin transition concept, it is necessary to appreciate how far apart the two intellectual traditions that constitute it have travelled – and which questions each has rendered invisible as a result.

The green transformation literature extends from ecological modernisation² to socio-technical sustainability transitions. Hajer (1995) and Mol and Spaargaren (2000) established its foundational concerns; Geels's (2002, 2004) multi-level perspective³ provided a framework for analysing transitions in energy, transport and food systems. Until comparatively recently, however, this tradition largely overlooked how digital technologies might simultaneously enable and constrain sustainability transitions (Kanger and Schot, 2019). Kanger and Schot's (2019) 'deep transitions' framework⁴ reflects this clearly: it positions digitalisation not as an autonomous transformation with its own logic and ecological consequences, but as a component of a techno-economic paradigm shift. Digital technologies thus appear primarily as instruments of sustainability rather than as objects of critical inquiry.⁵

² Ecological Modernisation Theory holds that market competition can be reoriented towards eco-efficiency and pollution prevention (Bilali, 2019), though critics contest this from a 'green capitalism' perspective, pointing to the growth imperative, core–periphery inequalities and the practical limits of ecological rationality (Murphy, 1996). In EU environmental policy this tension may produce 'double depoliticisation', whereby ecological modernisation discourse privileges market rationality whilst crowding out alternatives (Mol and Spaargaren, 2000). On Ewing's (2017) reading of Hajer, ecological modernisation softens radical environmentalism to secure its institutional visibility, but the structural power of capital coalitions limits the reform capacity of this framework.

³ The multi-level perspective explains socio-technical transitions through the interaction of niche innovations, regimes and landscape pressures (Geels, 2018). Extensions to incorporate policy dynamics, power relations, and regime resistance have deepened its reach and broadened its applicability (C. Wang et al., 2022; Goel et al., 2024), though applications to agri-food systems have exposed inconsistent operationalisation and evidence of multiple graduated reconfigurations rather than single regime shifts (Tsybuliak, 2025).

⁴ The deep transitions framework conceptualises 250 years of industrialisation as the co-evolution of socio-technical systems around shared meta-rules – resource intensity, fossil fuel dependence, growth orientation – but does not disaggregate digitalisation as a transformation process with its own logic (Gao, 2025; Kharb et al., 2024), positioning digital technologies as components of a new 'great surge' rather than examining their distinctive institutional logics and ecological footprints.

⁵ The digital rebound phenomenon demonstrates that efficiency improvements may, at the macro level, stimulate growth and resource consumption in ways that compound ecological harm (Kunkel and Tyfield, 2021; Geels et al., 2017). Regional patent data further complicate matters: big data and computing infrastructure tend to increase

The digital transformation literature has followed a different trajectory. Drawing on information systems research, science and technology studies, and platform economy scholarship, it has developed sophisticated tools for understanding how digital technologies reshape organisational structures and market relations (Castells, 2001; Zuboff, 2019). Recent work on platform capitalism has foregrounded power, inequality and democratic governance (Srnicek, 2016; Zuboff, 2019);⁶ yet the literature has remained largely inattentive to the ecological footprint of digital infrastructure⁷ (Freitag et al., 2021).

The twin transition literature has, in sum, emerged from two communities each carrying its own blind spots. Green transition scholars have treated digital technologies primarily as instruments for accelerating the transition; digital transformation scholars have positioned sustainability as a background condition rather than a constitutive dimension. Neither was adequately equipped to examine the intersection where the most consequential dynamics of the twin transition reside.

3.3 The Analytical Limits of the 'Twin' Metaphor

Metaphors are never analytically neutral. They structure perception, direct attention and – once sufficiently naturalised – make certain questions easy to ask whilst rendering others nearly unspeakable. As Lakoff and Johnson (2003) show, the metaphors through which we make sense of complex phenomena illuminate certain features whilst systematically concealing others. The 'twin' metaphor is a case in point.

emissions, an effect only partially offset where strong green capacity exists (Rosário and Dias, 2022). Whilst the EU's 'twin transition' discourse acknowledges potential digital–green conflicts, it typically reduces these to a 'win-win' framing (Țigănașu et al., 2025; Widdicks et al., 2023). The bulk of the literature continues to frame digital technologies as instruments of sustainability, pushing their contradictory transformation logic into the background (Ben Youssef, 2025; Schot and Kanger, 2018; Bianchini et al., 2023).

⁶ Platform firms are creating new accumulation regimes and forms of inequality through data-driven business models, transforming democratic governance and state–market relations (Zeqiri et al., 2025; Tariq, 2025; Luccioni et al., 2025). Through centralised value capture and regulatory gaps, digital platforms are enabling power concentrations characterised as 'digital feudalism', whilst producing algorithmic governance and income inequality in creative industries, and driving monopolisation and outcomes at odds with the SDGs in tourism (Kotlarsky et al., 2023; Rahman and Thelen, 2019).

⁷ US data centres alone consume approximately 1.8% of total electricity and account for approximately 0.5% of national emissions, with water use falling disproportionately on water-stressed catchments (Siddik et al., 2021). The carbon, water and land footprints of global data storage are growing, with 'dark data' deepening this burden invisibly (Charfeddine and Umlai, 2023). Data centres have been conceptualised as part of a global infrastructure regime entangled with colonial histories and uneven climate impacts (Afolabi et al., 2025), with regional comparisons pointing to the need for a global 'digital infrastructure sustainability index' (Almutairi, 2026).

In everyday usage, twins share a common origin, develop in parallel and are assumed to possess a natural affinity. The twin transition metaphor imports all of these connotations into the analysis: shared genesis, parallel development at comparable rates, and a complementarity in which each transition reinforces the other. Each inference is, at best, a hypothesis awaiting empirical testing; at worst, it actively misleads.

The assumption of shared origin is historically questionable. Digital transformation has been under way since at least the 1970s;⁸ the green transition acquired institutional footing only after the 2015 Paris Agreement and gained decisive momentum with the 2019 Green Deal.⁹ Their convergence in the early 2020s reflects a specific conjunctural moment rather than any natural kinship (Corti and Vesan, 2022).¹⁰ The assumption of parallel development is difficult to sustain, as the diffusion of digital technologies has been rapid, extensive and largely market-driven, whereas decarbonisation processes remain comparatively slow, uneven and strongly dependent on policy intervention (Fouquet & Hippe, 2022; Labhard et al., 2025). Shared space on the policy agenda does not guarantee coherent co-development.

The complementarity assumption is the most consequential and the most contestable. Digital transformation consumes significant and growing quantities of energy, generates unevenly distributed electronic waste, and concentrates

⁸ Digitalisation is characterised as the third great meta-paradigm after material and energy revolutions (Currie et al., 2024). Digital formats accounted for only 1% of stored information in the late 1980s but exceeded 99% by 2012, with data generation capacity doubling approximately every two and a half to three years. A strand of the literature treats the digital revolution as a long-wave fifth technological surge and suggests that humanity is currently in the 'second half' of this wave (Borghesi and Vergalli, 2022; Hainsch et al., 2022).

⁹ EU climate and energy policy evolved from fragmented instruments to integrated packages after the Paris Agreement, reaching institutional maturity with the 2019 European Green Deal (Knell, 2021; Ben Youssef, 2025). The Green Deal and 'Fit for 55' embed decarbonisation within a concrete architecture structured around the 2050 neutrality target and 2030 milestones (Von Homeyer et al., 2022; Hafner and Raimondi, 2020). Despite the energy crisis and geopolitical pressures, the EU has largely maintained the Green Deal trajectory (Hafner and Raimondi, 2020; Ben Youssef, 2025; Quimba et al., 2023).

¹⁰ Whilst digital competitiveness concerns shaped the EU agenda in the late 2010s, convergence of digital and climate policy axes became possible discursively only in the early 2020s (Hilbert, 2020; Hafner and Raimondi, 2020). The 'twin transition' emerged largely as a post-2020 framing, yoking a digital transformation 'already under way' to comparatively more recently institutionalised green objectives (Nadkarni and Prügl, 2021; Skjærseth, 2021). Kovacic et al. (2024) argue that this pairing reflects a specific political-economic conjuncture in which 'digital imaginaries' discursively reconcile the tension between competitiveness and sustainability – a construction built on top of a long history of separate actors, institutions and knowledge bases in the two domains (Nadkarni and Prügl, 2021; Skjærseth, 2021; Brueck et al., 2025).

economic power in ways that frequently distort the political economy of the green transition (Freitag et al., 2021). These are not marginal complications; they are genuine structural features of the relationship that the twin metaphor systematically obscures. To accept it uncritically is to place these features beyond the reach of analytical attention.

3.4 Theoretical Positioning: Articulation as an Analytical Alternative

What is required is not a better metaphor but an altogether different analytical approach: one that treats the green–digital relationship as an empirical question rather than a conceptual given, and that provides the theoretical vocabulary needed to describe the forms it takes across different contexts.

Hall's (1980) concept of articulation offers a powerful instrument for understanding connections that are contingent rather than necessary. Articulation denotes not a spontaneous fit between elements but a relationship that is actively constructed and sustained. Applied to the green–digital relationship, it means challenging the assumption of naturalness and inevitability that twin transition discourse produces – a discourse that presents the connection as technical necessity, rendering political choices invisible. These linkages are, rather, historically constructed through specific interests, institutional arrangements and configurations of power. It should be noted that this usage does not derive directly from Hall's original context: the concept is redirected here from ideological subject formation towards the relationships between socio-technical systems and governance structures. The approach places greater weight on structural conditions than Latour's (1987) actor-network framework, whilst focusing on governance and policy dimensions rather than cultural processes. Articulation thus serves as a middle-range analytical instrument that renders contingency and constructed-ness visible against the assumption of alignment pervading the existing twin transition literature.

The typology that follows translates this framework into four analytical articulation forms. No claim is made that these are exhaustive or mutually exclusive; in practice, any given green–digital relationship is likely to exhibit elements of more than one form, and shifts may occur as conditions change. The typology is designed to provide a conceptual vocabulary for navigating this complexity and observable indicators for determining which configuration is dominant in any given context.

4. A Typology of Articulation Forms: How Green and Digital Transformation Actually Relate

The twin transition literature treats the relationship between green and digital transformation as a matter of degree rather than of kind. The dominant question – to what extent is there synergy, and how can it be increased? – presupposes that the relationship is harmonious, reducing the analysis to a technical optimisation

problem and rendering invisible both its political construction and the tensions produced by competing interests and institutional choices. The central claim of this section is that the relationship is neither fixed nor harmonious; it is variable – sometimes overlapping, sometimes openly conflictual – depending on context, sector, scale and institutional-political conditions.

The typology identifies four articulation forms: synergic, parallel, conflictual and instrumental. These are analytical idealisations; real-world contexts typically bear traces of more than one form, and shifts between them may occur as conditions change. The typology is designed to provide a conceptual vocabulary for this complexity and observable indicators for determining which configuration is dominant in any given context (Table 1).

Table 1. Typology of Articulation Forms Between Green and Digital Transformation

Form	Core Dynamic	Observable Indicators	Primary Risk
Synergic	Mutual reinforcement	Joint deployment; shared metrics; cross-cutting investment design	Overestimation of natural synergy
Parallel	Mutual indifference	Separate governance; absence of cross-impact assessment; additive budgeting	Systematic missed opportunity
Conflictual	Structural tension	Growing digital energy demand; rebound effects; platform growth logic	Net ecological regression
Instrumental	Asymmetric capture	Green discourse concealing digital expansion; digital framing of environmental targets	Conceptual capture; accountability deficit

4.1 Synergic Articulation

Synergic articulation denotes a configuration in which digital technologies improve the cost, effectiveness or pace of decarbonisation, and in which sustainability imperatives direct digital capacity towards broader value creation. It is the most extensively documented form in the twin transition literature, and it is real: denying synergy altogether would be as problematic as celebrating it without scrutiny. Such mutual reinforcement is not, however, the product of spontaneous alignment; it is constructed and sustained under specific technical,

institutional and political-economic arrangements. Synergy is accordingly a conditional outcome, not a generalisable property.¹¹

The empirical evidence is strongest in the energy sector. Smart grid technologies – optimising the integration of variable renewables through digital sensors, real-time data processing and automated control – represent the most concrete instance of digital–green complementarity (IEA, 2017; Strielkowski et al., 2021). Integrating solar and wind energy into electricity grids introduces significant challenges due to their inherent variability and intermittency, which complicate supply–demand balancing and grid stability (Khalid, 2024; Meliani et al., 2021). At scale, these challenges cannot be effectively managed without advanced digital systems—such as smart grids, data-driven optimization, and real-time monitoring infrastructures—that enable dynamic coordination, predictive control, and system-wide balancing (Worighi et al., 2019; Ugwu et al., 2026). Comparable evidence exists in precision agriculture, where digital sensing reduces input use whilst increasing yields (Wolfert et al., 2017); in buildings, which account for 36% of EU energy consumption, where digital management systems can substantially reduce demand (European Commission, 2020); and in industrial production, where predictive maintenance contributes to decarbonisation by reducing material waste and energy consumption (Rajnai and Kocsis, 2018).

Synergic articulation can be identified through: joint deployment within a single investment framework; performance metrics capturing both outputs simultaneously; cross-cutting investment design in which green and digital objectives shape one another; and documented evidence of cost reduction or accelerated diffusion attributable to the co-presence of the technologies. As Vinuesa et al. (2020) make explicit, artificial intelligence can both enable and inhibit sustainability depending on how it is governed. This observation transforms the policy question from 'how do we capture the synergies?' to 'what conditions are necessary for synergic articulation to obtain?'

¹¹ Synergic effects are documented across four levels. At the system level, AI-assisted forecasting, digital twins and multi-agent energy management enhance efficiency and flexibility in buildings, grids and multi-energy systems (Cao et al., 2023; Lu et al., 2023; Martínez-Peláez et al., 2023). At the grid level, IoT, AI and blockchain solutions optimise energy flows and strengthen renewable integration (Rosário and Dias, 2022; Kwiliński et al., 2023). At the firm and industry level, data analytics and automation improve energy efficiency and stimulate low-carbon innovation (Yang et al., 2023; Rosário and Dias, 2022). At the institutional level, the digital economy improves resource allocation and contributes to carbon efficiency (Mahmood et al., 2024; Li et al., 2023; Guandalini, 2022). These findings demonstrate how synergy is produced under specific technical and institutional arrangements rather than existing as a generalised property.

4.2 Parallel Articulation

Parallel articulation describes the configuration in which the two transformations proceed simultaneously but in institutional and political isolation – driven by different actors, financed through different instruments, governed by different frameworks and directed towards different objectives. The transitions do not conflict; they simply cannot connect, because the institutional architectures required to realise their potential synergies are absent.

This configuration is considerably more prevalent than the twin transition literature's emphasis on synergy suggests. Within the European Commission, climate and energy policy falls within the remit of DG Climate Action and DG Energy; digital policy within DG CONNECT. These are not merely different administrative units; they constitute different epistemic communities – sharing distinct bodies of knowledge, normative commitments and problem-framing conventions (Haas, 1992). The World Bank's (2024) comprehensive analysis of 197 countries' Nationally Determined Contributions (NDCs) confirms that digital and energy/climate policies are rarely integrated at the national strategy level; these efforts are typically conducted in isolation, even in countries with strong commitments to both. Evidence from national recovery and resilience plans indicates that integration of green and digital investment flows frequently remains discursive: countries label existing commitments as twin transition investment without developing the cross-cutting strategies that genuine complementarity requires (Claeys et al., 2021).

Parallel articulation can be identified through: green and digital budgets managed separately without a formal coordination mandate; the absence of cross-impact assessment evaluating the digital consequences of green investment decisions (and vice versa); skills development programmes designed separately for green and digital profiles; and the absence of shared performance frameworks. The consequences are less visible than those of conflictual articulation but no less significant: opportunities for mutual reinforcement are routinely foregone, producing not catastrophic failure but chronic underperformance – a twin transition delivering far less than its potential because that potential was never genuinely designed for (Fiorini et al., 2017; Muench et al., 2022).

4.3 Conflictual Articulation

Conflictual articulation is the form the twin transition literature has most consistently avoided examining, and the one most urgently warranting analytical attention. It describes conditions in which green and digital transformation are in structural tension – in which pursuing one actively undermines the other as a consequence of the core logic driving each process, not merely as a marginal side effect.

The most concrete instance concerns the energy demand and carbon footprint of digital infrastructure. The ICT sector accounts for between 2% and 4% of global greenhouse gas emissions – comparable to aviation and almost certainly growing (Freitag et al., 2021). Data centres consumed approximately 200–250 terawatt-hours of electricity globally in 2022, a figure expected to increase substantially as AI workloads – considerably more energy-intensive than conventional computing – continue to expand (IEA, 2024:34), with inference workloads from deployed models potentially surpassing training costs as the primary source of AI-related demand (Luccioni et al., 2023). The tension is structural: digital transformation is driven by a growth logic – more data, more processing, more connectivity, more services – that stands in fundamental tension with the constraints that decarbonisation imposes. The 'dematerialisation' thesis – that digital efficiency gains will more than compensate for digital infrastructure demand – faces persistent empirical challenge. Lange et al. (2020) demonstrate that efficiency gains in digital systems have historically coincided with growth in digital activity that more than offsets those gains at the system level: precisely the mechanism Jevons (1865) identified in the context of nineteenth-century coal efficiency.¹² Sorrell's (2007) comprehensive assessment found direct rebound effects typically offsetting between 10% and 30% of efficiency gains, with economy-wide effects potentially considerably larger.

A second instance concerns platform economies and sustainable consumption. The business models of dominant digital platforms are structured around growth in transaction volume, data generation and user engagement – dynamics associated with increases in consumption, logistics activity and packaging waste that may offset their concurrent efficiency gains (Söderholm, 2020). The profit-maximisation logic of platform capitalism (Srnicsek, 2016) is constitutive rather than incidental in its ecological consequences.

Conflictual articulation can be identified through: documented growth in digital sector energy demand outpacing energy savings from digital optimisation; rebound effect evidence showing efficiency gains offset by activity growth; platform business model characteristics structurally incompatible with sufficiency-oriented consumption; and the absence of binding ecological constraints on digital infrastructure expansion.

¹² Lower effective prices encourage greater consumption of the same good or service – the 'direct rebound effect' (Gillingham, 2014); financial savings from efficiency improvements may be redirected to other, often energy-intensive, goods and services – the 'indirect rebound effect' (Greening *vd.*, 2000); and cost reductions may prompt producers to expand output, increasing aggregate activity – the 'macro rebound effect' (Hanley *vd.*, 2009). Together, these mechanisms constitute the Jevons paradox: that efficiency improvements may partially or wholly eliminate the expected savings (Sorrell, 2009; Fich *vd.*, 2022).

4.4 Instrumental Articulation

The fourth form is perhaps the most politically significant and the least analytically explored. Instrumental articulation describes the configuration in which one transformation is enlisted in the service of the other – not as a genuine partner but as a legitimising instrument – in ways that may actively distort the instrumental process's own stated goals.

Its most concrete contemporary instance flows from green to digital: the instrumentalisation of sustainability discourse in the service of the strategic interests of large digital technology companies. By positioning digital technology as a natural partner of the green transition, the twin transition framing provides institutional and reputational ground for digital companies to present their expansion as contributing to sustainability objectives, irrespective of the empirical evidence. The data centre strategies of Amazon, Google and Microsoft illustrate this tension: their net-zero commitments often rely on carbon offsetting and renewable energy certificates, mechanisms that balance emissions on paper but do not necessarily result in absolute emission reductions (Judge, 2023; Furness, 2024; Energy BI, 2024). Moreover, growing evidence suggests that such accounting practices may obscure the real carbon footprint of data centres, which can be significantly higher than officially reported (The Guardian, 2024).¹³ The language of the green transition is being used to legitimise digital expansion, not to constrain it.

Instrumental articulation can also flow from digital to green: using digital framing to advance sustainability agendas where direct environmental arguments encounter political resistance. Presenting smart city, precision agriculture and industrial digitalisation investments primarily as digital – economically productive, technologically progressive – rather than environmental, in contested contexts, constitutes a deliberate discursive strategy (Haarstad and Wathne,

¹³ Arendt (2024), examining 115 large companies, found that only 22% of net-zero declarants planned to reduce emissions to a genuinely low residual level, with residual rates ranging from 0% to 80% (median 10%) and more than half of above-threshold emissions originating outside 'hard to abate' sectors. Modelling indicates that data centre carbon footprints may continue to grow through 2030 despite operational improvements (Aslan et al., 2025), whilst 'green' data centres claiming net-zero status continue to generate significant emissions when assessed against hourly grid mix (Cao et al., 2022; F. Wang et al., 2022). An analysis of 482 companies found that the majority based net-zero targets on credit purchases (Kreibich and Hermwille, 2021), with 87% of offsets used by the 20 largest credit users being high-risk and low-quality (Trencher et al., 2024); such claims have been characterised as largely unaudited and carrying a risk of net harm (Trouwloon et al., 2023). Google and Microsoft increased absolute emissions between 2018/2019 and the most recent reporting year, whilst Amazon and Meta trajectories remain inconsistent with stated targets (Vrikki, 2024). Independent audit mechanisms and mandatory disclosure standards are necessary conditions for translating carbon neutrality claims into genuine climate outcomes (Rogelj et al., 2021; Sasaki, 2025).

2019).¹⁴ This may occasionally prove effective, but carries the risk of displacing sustainability metrics with digital performance metrics as the primary measure of programme success.

Observable features of instrumental articulation include: sustainability commitments resting primarily on offsetting rather than absolute emission reductions; green policy labels on programmes whose primary logic is digital expansion; the substitution of sustainability by digital performance metrics in programme evaluation; and the strategic framing of environmental investment as technological or economic in politically contested contexts.

4.5 The Typology in Practice: Smart City Initiatives

To demonstrate the typology's analytical value, this section applies it briefly to smart city initiatives. Smart cities – urban environments deploying digital technologies to optimise energy use, transport, waste management and public services – are presented in both policy discourse and academic literature as paradigmatic instances of the twin transition (Haarstad and Wathne, 2019; Vinuesa et al., 2020).

The typology reveals a considerably more differentiated picture. At the technical level, smart city investments frequently exhibit synergic articulation: smart lighting, real-time traffic management and digitally optimised district heating have produced documented energy savings in specific contexts (IEA, 2017).¹⁵ At the governance level, however, the same investments typically exhibit

¹⁴ Smart city frameworks frequently subordinate sustainability to narratives of innovation and economic growth, with environmental objectives receding to secondary components (Haarstad, 2017; Miller, 2020; Viitanen and Kingston, 2014). In Barcelona, smart city discourse became an instrument for depoliticising urban transformation (March and Ribera-Fumaz, 2016); Hamburg's smart city rhetoric has been analysed as an ideological structure legitimising economic interests (Bär et al., 2020). In precision agriculture, environmental claims gain legitimacy through productivity narratives (Duncan et al., 2021; Benegiamo et al., 2023), with precision farming positioned as a 'technical solution' that softens structural critiques of the chemical input system (Wolf and Wood, 1997; Marquis, 2024); in African contexts, digital agriculture narratives risk deepening neoliberal dynamics where political-economic dimensions are neglected (Abdulai, 2022). Digital–green articulation thus operates as a discursive strategy legitimising responses to environmental problems through the lens of economic efficiency and technological progress, obscuring relations of power in the process.

¹⁵ Smart lighting, real-time traffic management and digital heating deliver measurable energy gains in specific urban contexts; Shenzhen demonstrates that concrete CO₂ savings can be achieved through integrated smart grids and traffic systems (Zhao, 2025). IoT, AI and digital optimisation tools create strong technical synergies in transport and grid modernisation from the building to the grid level (Esfandi et al., 2024). This integration potential finds no institutional counterpart: energy, transport and buildings continue to be governed in isolated domains (Onyango et al., 2025); digital units administer smart city projects whilst environmental offices independently maintain climate programmes, with coordination remaining exceptional (Meijer and Bolívar, 2016; Mora et al., 2023).

parallel articulation: smart city programmes are administered by urban digital or innovation units whilst energy efficiency and climate programmes fall to separate environmental offices, with limited formal coordination between the two (Fiorini et al., 2017; Muench et al., 2022). The technical synergies identified at the deployment level rarely find expression in integrated planning, monitoring or accountability.

At the political-economy level, instrumental articulation predominates. Siemens, IBM, Cisco and others have strong incentives to define smart city success in terms of digital infrastructure deployment rather than verified sustainability outcomes, and the twin transition framing – attracting public finance and political legitimacy – directly serves those incentives (Söderholm, 2020). Whether smart city investment produces genuine, measurable reductions in urban carbon footprints remains inadequately evidenced (Haarstad and Wathne, 2019:93). Conflictual articulation is also present, if less visible: the data infrastructure smart city systems require generates its own energy demand and electronic waste, rarely incorporated into the sustainability assessments of the investments that create it.

The same policy initiative may simultaneously exhibit all four articulation forms at different analytical levels. Recognising this complexity is not a counsel of pessimism about smart city investment; it is a necessary precondition for designing programmes that actually deliver genuine sustainability outcomes, rather than merely claiming to do so.

5. The Governance Gap: Integration in Discourse, Fragmentation in Practice

The articulation typology developed in Section 4 immediately raises an institutional question: what structural conditions determine which articulation form predominates in any given context? This section argues that the fragmentation of green and digital policy architectures at EU and national levels is not a temporary problem awaiting resolution but a constitutive feature of contemporary governance systems — one that systematically produces parallel articulation as the default whilst creating the institutional vacuums in which conflictual and instrumental articulation take hold.

The significance of this governance gap extends beyond administrative tidiness. When green and digital transformation are governed in institutional silos

Comparative analysis across five sectors found digital transformation to be the element most weakly articulated with sustainability and climate adaptation objectives (Onyango et al., 2025). The EU Cities Mission's governance tools and digital dashboards have yet to adequately overcome leadership-driven silos (Buylova et al., 2025; Alméstar et al., 2025). A simplified governance architecture, clear accountability chains and data-driven monitoring are necessary conditions for technical synergies to find genuine expression at the urban scale.

— when those responsible for each transition operate according to different logics, answer to different authorities and are held accountable through different mechanisms — the compound consequences of pursuing both simultaneously receive systematically insufficient scrutiny. Risks invisible within any single domain become apparent only when domains are examined together; synergy opportunities are missed when relevant actors never share a common institutional arena; and the conditions for conflictual and instrumental articulation are structurally reproduced. The governance gap is not merely an efficiency problem; it is a structural condition that determines which articulation forms remain possible and which are foreclosed.

5.1 EU Policy Architecture: Epistemic Communities in Parallel Operation

The European Union, as the context in which the twin transition concept has been articulated most explicitly and ambitiously, is also the most instructive setting in which to examine the gap between integrative discourse and fragmented practice. The Commission's presentation of green and digital transitions as mutually reinforcing strategic pillars — in the European Green Deal (European Commission, 2019) and the Digital Compass (European Commission, 2021) — generates strong expectations of institutional coherence that are largely unmet in practice.

Green and digital policy portfolios are administered by separate institutional actors with distinct mandates, budgetary authorities and political constituencies: climate falls to DG CLIMA, energy to DG ENER, and digital to DG CONNECT. In Haas's (1992) terms, these are different epistemic communities — professional networks bound by shared knowledge, normative commitments and distinctive problem-framing. The assignment of the Green Deal and the digital agenda to different Executive Vice-Presidents reinforced this separation at the highest management level; no single coordination umbrella has been established (Gao, 2025), ensuring that conceptual alignment has consistently outpaced operational alignment¹⁶.

¹⁶ The institutional fragmentation of the EU's twin transition architecture extends beyond administrative organisation. Energy, environment, industry, transport and digital domains fall under different Directorates-General operating according to independent institutional logics (Gao, 2025); the assignment of the Green Deal and the digital agenda to different Executive Vice-Presidents reinforced this separation at the highest management level, ensuring that conceptual alignment has consistently outpaced operational alignment (Gao, 2025). In Haas's (1992; 2001) terms, these DGs constitute distinct epistemic communities — professional networks bound by shared normative beliefs, common policy knowledge and a shared understanding of the boundaries of legitimate knowledge — and Zito (2001), Kourtellis (2020) and Palladino (2021) document that such communities develop their own problem frames and instruments autonomously. At the discursive level, framing the two transitions as mutually necessitating has become standard EU policy language (Gao,

Coordination mechanisms exist — inter-service consultation, inter-directorate working groups, overarching political guidance — but they fall well short of the genuine policy integration that twin transition discourse implies. Fiorini et al. (2017) document significant gaps in the coordination of green and digital investment flows under the Recovery and Resilience Facility: member states' plans frequently allocate expenditure to separate domains without the cross-cutting strategies that genuine complementarity requires. Integration operates at the level of budget labelling, not at the level of design, where the decisions that determine whether synergies materialise or conflicts proliferate are actually taken.

The regulatory dimension reveals the same pattern. The frameworks governing the green transition — the EU ETS, the Renewable Energy Directive, the Energy Efficiency Directive, the Carbon Border Adjustment Mechanism — and those governing the digital — the GDPR, the Digital Markets Act, the AI Act, the Data Act — have largely been developed through separate legislative processes, by separate policy communities and in response to separate political pressures (Kovacic et al., 2024; Meijer, 2024). Their interactions, including the ways they may work at cross-purposes, have received only intermittent analytical attention. The framing of both transitions as mutually necessitating has become standard EU policy language (Kovacic et al., 2024; Gao, 2025), yet articulating digital objectives through the lens of innovation and competitiveness tends to reframe genuine tensions as win-win synergies whilst operational and legal alignment lags well behind (Kovacic et al., 2024; Epstein, 2025). Where discursive convergence conceals institutional and epistemic separation, genuine progress depends on building bridges between knowledge communities that currently operate in parallel.

5.2 National Policy Architectures: The Reproduction of Fragmentation

The institutional fragmentation observed at EU level is largely replicated — and in many cases deepened — at national level. Across most member states, green and digital policy rests with different ministries, is financed through different instruments, draws on different advisory bodies and is monitored through different performance frameworks. The structural prerequisites for integrated governance — shared institutional responsibility, integrated financial planning, cross-cutting impact assessment, joint monitoring — are present in very

2025; Kovacic et al., 2024), yet articulating digital objectives through the lens of 'innovation' and competitiveness contains genuine tensions within a 'win-win' framing whilst operational and legal alignment lags behind (Kovacic et al., 2024; Epstein, 2025). Where discursive convergence conceals institutional and epistemic separation, genuine progress depends on building bridges between knowledge communities that currently operate in parallel.

few national systems (Gao, 2025; Faggian et al., 2025; Behnke and Hegele, 2024).

National recovery and resilience plans offer a revealing window onto this. Claeys et al. (2021) found substantial variation in the quality of green–digital integration: whilst some countries demonstrated meaningful cross-cutting work in smart buildings and digital agriculture, the majority exhibited 'additive' rather than 'integrative' planning — the juxtaposition of investments without the strategic logic that would enable them to reinforce one another. The regulatory environment deepens the problem. Dispersed, multi-ministerial legislation constrains access to finance and digital capacity development, particularly for SMEs (Bekerta and Leibus, 2025), whilst the EU's AI and smart city compliance regime raises costs that impede adoption (Jørgensen and Ma, 2025). Energy grid digital twins illustrate the issue concretely: such investments lack regulatory recognition in most member states, innovation incentive mechanisms are widely absent, and this gap directly obstructs diffusion of digital solutions (Jørgensen and Ma, 2025).

The variation in governance capacity across member states is itself analytically significant: it demonstrates that the governance gap is variable, shaped by institutional traditions, political economy and administrative capacity. Countries with stronger traditions of cross-sectoral coordination — Finland and Denmark are frequently cited in this respect (Lægreid and Verhoest, 2010:14) — appear better placed to sustain integrated governance than those with more siloed administrative traditions. The implication for the articulation typology is direct: the dominant articulation form in any national context is determined not only by the technologies deployed or the markets in which they operate, but frequently and decisively by the institutional architecture of the governance system within which those technologies and markets are embedded.

Sub-national governance has received even less academic attention, despite the fact that much of the most consequential twin transition investment — in buildings, transport, local energy systems and digital infrastructure — is implemented at regional and local level. Capacity gaps between national objectives and sub-national implementation remain a persistent source of the implementation deficits characterising the practical record of the twin transition in many countries (Hooghe and Marks, 2003), and are particularly acute in less developed regions — precisely those identified by EU cohesion policy as priority beneficiaries, and precisely those with the weakest institutional capacity to translate investment into integrated outcomes. Evidence from beyond Europe confirms the pattern: in China, a strong top-down framework is producing heterogeneous and partial implementation at regional level (Brueck et al., 2025), whilst urban networks that could generate collective capacity find their

transformative potential suppressed by power dynamics and austerity (Moragues-Faus and Sonnino, 2019).

5.3 The Joint-Decision Trap and Its Manifestations in the Twin Transition

The governance challenge extends beyond coordinating policy domains within a single level of government; it is equally a challenge of coordinating across levels. The vertical dimension of the governance gap — the disjuncture between EU-level objectives, national strategies and sub-national implementation capacity — compounds horizontal fragmentation in analytically distinct and practically significant ways.

Multi-level governance of the twin transition generates what Scharpf (1988) identified as the joint-decision trap: collective action problems at one governance level preventing beneficial outcomes at another. In the twin transition context, this takes several forms. National governments may commit to objectives requiring local implementation capacities that neither exist nor receive sufficient national support. EU regulatory requirements may, without complementary financial and technical support, impose compliance costs on sub-national actors that obstruct rather than enable investment. Local initiatives developing innovative green–digital co-deployment approaches may be unable to scale because national funding mechanisms are not designed for cross-cutting local experimentation. At EU level, twin transition discourse has reframed tensions between economic and environmental objectives as win-win synergies through digital 'imaginaries' (Kovacic et al., 2024), yet no coordinated green–digital framework has been established, and fragmented architecture continues to obstruct operational coherence (Gao, 2025; Faggian et al., 2025). In China, national policy documents articulate objectives and instruments but lack a comprehensive strategic framework, and regions are implementing them inconsistently (Brueck et al., 2024; Antonietti et al., 2026).

Current monitoring frameworks are poorly designed to make these dynamics visible. EU-level monitoring through the European Semester, the Recovery and Resilience Scoreboard and DESI tracks green and digital indicators separately, lacking the integrated metrics required to assess whether the twin transition is succeeding as a whole rather than as two parallel processes (European Commission, 2022). The result is a monitoring architecture capable of tracking individual green and digital targets but incapable of determining whether their simultaneous pursuit is generating the promised synergies — or the tensions that the articulation typology identifies as structurally probable. Existing studies compound this problem by measuring digitalisation through subscription-based proxies and environmental impact through macro carbon metrics, rendering channel-level mechanisms invisible (Charfeddine and Umlai, 2023); country-level evidence confirms that the energy dimension of green-labelled digital

expenditure cannot be overlooked (Zulfiqar et al., 2023; Huang vd., 2022). Critically, digitalisation's effect on environmental sustainability is strengthened when modelled interactively with green innovation, renewable energy and financial development (Karlilar et al., 2023), suggesting that digital prerequisites should be treated as structural inputs to the green transition rather than its outputs. Firm-level evidence reinforces this: multi-dimensional projects produce stronger effects on value added, employment and productivity than single-focus ones (Marrocu et al., 2026), whilst 'twin disclosure' analysis has identified the gap between symbolic compliance and genuine integration as a key accountability issue (Spilotro et al., 2026). Without integrated monitoring, the governance gap continues to evade the accountability mechanisms that could generate pressure to close it.

5.4 The Conditions for Narrowing the Governance Gap

The governance gap is real, consequential and overwhelmingly structural — a feature of systems designed for a world in which policy domains are more separable than the twin transition requires, rather than a product of political unwillingness or administrative incompetence. Narrowing it — not eliminating it, since doing so would require institutional redesign that is not politically feasible in the short term — requires change at three levels.¹⁷

At the institutional level, it requires genuinely cross-cutting policy communities: not merely inter-service consultation but shared epistemic frameworks, professional networks and accountability structures transcending the green–digital divide¹⁸. Cross-sectoral coordination capacity depends not only on formal structural arrangements but also on sustained investment in social capital, including shared knowledge, communicative alignment, and trust, which

¹⁷ At EU level, digital 'imaginaries' have reframed economic–environmental tensions as win-win synergies in twin transition discourse (Kovacic et al., 2024), yet no coordinated green–digital framework has been established and institutional fragmentation continues to obstruct operational coherence (Gao, 2025; Faggian et al., 2025). The Chinese case confirms the pattern: national policy documents articulate objectives and instruments but lack a comprehensive strategic framework, and regions implement them inconsistently (Brueck et al., 2025; Antonietti et al., 2026). In energy systems, cross-cutting metrics indicate that shared accountability structures remain conceptual and that new data infrastructures are required before they can become operational (Sareen, 2023).

¹⁸ The literature identifies three complementary requirements for the cross-cutting policy communities that integrated governance demands: simultaneous horizontal and vertical alignment through multi-stakeholder forums essential for breaking silo logic (Gao, 2025; Oliver et al., 2021); credible standards and auditability without which rebound risks deepening energy demand and inequality become unavoidable (Santarius et al., 2023); and the adaptation of existing frameworks through instruments such as performance-based contracts, data governance and regulatory sandboxes (Holubiev, 2025). Empirical evidence that digital environmental governance accelerates green transformation supports the complementarity of these three requirements (Zhao et al., 2025).

enable actors from different institutional backgrounds to collaborate effectively (Bryson et al., 2006; Weber et al., 2022; Lee et al., 2011; Bodin & Crona, 2009). Such communities require three complementary conditions: the simultaneous strengthening of horizontal and vertical alignment through multi-stakeholder forums and coordination mechanisms (Gao, 2025; Oliver et al., 2021); credible standards and auditability to prevent rebound effects deepening energy demand and inequality (Santarius et al., 2023); and adaptive instruments — performance-based contracts, data governance frameworks and regulatory sandboxes — to refunctionalise existing frameworks (Holubiev, 2025).

At the regulatory level, narrowing the gap between green and digital transitions requires more than technical coherence; it demands a critical assessment of the political economy underpinning regulatory design and implementation. While the concept of policy coherence for sustainable development provides a formal framework for aligning sectoral policies (OECD, 2019; Nilsson et al., 2012), in practice such alignment is mediated by competing economic interests, institutional path dependencies and asymmetries of power between actors. The European Union's Better Regulation framework offers procedural tools—such as impact assessments and regulatory scrutiny—intended to enhance coordination (European Commission, 2021b). However, existing scholarship on policy integration suggests that these instruments often operate within a depoliticised, technocratic logic that prioritises efficiency and regulatory predictability over transformative change (Candel & Biesbroek, 2016; Jordan & Lenschow, 2010).

This limitation becomes particularly visible at the intersection of digital regulation and energy systems. Data governance requirements under the GDPR, while framed as fundamental rights protections, can introduce compliance complexities for smart energy infrastructures, yet these tensions are not merely technical inconsistencies but reflections of deeper contradictions between data commodification, market expansion and sustainability objectives (Purtova, 2018a; Purtova, 2018b). In this sense, regulatory fragmentation at the green–digital interface should be understood not simply as a failure of coordination, but as an outcome of structurally embedded priorities that favour capital-intensive digital expansion while externalising its environmental costs. Consequently, the absence of systematic coherence is less an oversight than a manifestation of the underlying political economy of the twin transition, in which regulatory frameworks stabilise existing accumulation regimes rather than reconfiguring them toward substantive decarbonisation.

At the monitoring level, it requires integrated twin transition metrics capable of capturing the energy footprint of digital investments made under green labels,

the digital prerequisites linked to green transition benefits¹⁹, and the cross-cutting distributional consequences of joint investment decisions²⁰. Frameworks integrating green metrics with digital twins have been proposed, but siloed approaches remain the principal constraint (Corrado et al., 2022); embedding digital and environmental indicators within a common KPI/KRI framework is positioned as a structural precondition for governance genuinely aligned with the twin transition (Osadcha et al., 2025). The conditions for narrowing the governance gap are considerably more demanding than the optimistic integration rhetoric of twin transition discourse acknowledges. This is not a counsel of despair but an argument for realism — and for honesty about the distance between existing institutional realities and the conditions under which the concept's most ambitious promises could be fulfilled. It is also a compelling argument for the analytical value of the articulation typology: a framework premised on natural complementarity cannot see the governance gap, for it lacks the conceptual vocabulary to describe the parallel, conflictual and instrumental forms that the gap makes possible. A framework premised on contingent articulation can see it — and must.

6. Conclusion: Towards an Analytically More Adequate Framework for the Twin Transition

This article has pursued two connected aims: to subject the foundational assumptions of the twin transition concept to critical scrutiny, and to propose an

¹⁹ Comprehensively measuring the energy and carbon costs of digital investments is not yet established practice. Belkhir and Elmeligi (2018) estimated that the ICT sector's carbon footprint could account for a significant share of global emissions by 2040, yet existing studies rely on subscription-based proxies and macro carbon metrics that render channel-level mechanisms invisible (Charfeddine and Umlai, 2023); country-level evidence confirms that internet intensity and ecological footprint are mediated through energy consumption (Zulfiqar et al., 2023; Huang vd., 2022). The conditional nature of digitalisation's effects compounds this problem: the impact on environmental sustainability is strengthened when modelled interactively with green innovation, renewable energy and financial development (Karlilar et al., 2023), whilst digital infrastructure performs an equalising function in reducing inter-regional innovation inequality (Feng et al., 2022). Together, these findings point to the need for digital prerequisites to be modelled as structural inputs to the green transition rather than its outputs

²⁰ Marrocu et al. (2026), using a difference-in-differences approach, find that multi-dimensional projects produce stronger effects on value added, employment and productivity than single-focus ones — substantiating the argument that synergy effects cannot be captured through separate measurement categories. 'Twin disclosure' profiles have identified the gap between symbolic compliance and genuine integration as a key accountability issue (Spilotro et al., 2026). Corrado et al. (2022) propose frameworks integrating green metrics with digital twins, identifying siloed approaches as the principal constraint, whilst Osadcha et al. (2025) position a common KPI/KRI framework as a structural precondition for governance genuinely aligned with the twin transition.

analytically more adequate alternative to the complementarity assumption that dominates the literature. This concluding section draws the principal findings together and sets out a research agenda for the empirical development of the articulation typology.

6.1 What This Article Has Established

The twin transition concept is not an analytically neutral category but a politically produced one. Shaped by strategic purposes within the European Commission's institutional processes, it was not subjected to sufficiently critical scrutiny during academic adoption. The central assumption of natural complementarity is a political claim that proves considerably more fragile than customary academic confidence would suggest when examined against the available evidence (Corti and Vesan, 2022; Freitag et al., 2021).

The two constituent literatures developed largely in isolation, each bringing its own blind spots. Green transformation scholars treated digital technologies primarily as enabling instruments; digital transformation scholars positioned sustainability as a contextual backdrop. Neither tradition was equipped to examine what was occurring at the intersection where the most consequential dynamics of the twin transition — ecological costs, political economy and governance challenges — actually reside. The 'twin' metaphor compounds this: its assumptions of shared genesis, parallel development and natural complementarity systematically deflect attention from articulation forms for which empirical evidence is absent. Drawing on Hall (1980) and Lakoff and Johnson (2003), the argument underscores that metaphor choice bears directly on analysis: because the twin metaphor renders synergy visible and conflict invisible, a literature built upon it will systematically underestimate the conditions under which the two transitions work against one another or one appropriates the other instrumentally.

The typology of four articulation forms — synergic, parallel, conflictual and instrumental — offers an analytically more adequate vocabulary than the complementarity–tension binary. The illustrative application to smart city initiatives in Section 4.5 demonstrated that the same policy initiative may simultaneously exhibit all four forms at different analytical levels — a finding invisible within a synergy-based framework but tractable from the articulation perspective. And the governance gap between integrative discourse and fragmented institutional practice is a structural feature of governance systems designed for a world in which policy domains are more separable than the twin transition requires; it is not a temporary deviation, but one that systematically produces parallel articulation as the default whilst creating vacuums in which conflictual and instrumental articulation take hold.

6.2 Preserving the Concept, Transforming the Framework

The argument for abandoning the twin transition concept carries genuine intellectual weight: the concept, on this view, is so compromised by its political origins and unexamined assumptions that genuine reform is no longer possible. The degrowth critique, the Global South's challenge to its Eurocentrism and feminist analysis of its productionist blind spots each identify structural rather than peripheral limitations.

Within the analytical scope of this article, however, the case for critical reform is the stronger. Despite its limitations, the twin transition concept has mobilised unprecedented public investment, has placed the green–digital relationship on the governance agenda, and has generated research that retains substantial empirical value. The articulation typology is best understood as a reform rather than a replacement: it preserves the concept's integrative ambition whilst displacing its naturalising assumption with a framework capable of describing the full range of forms that green–digital articulation actually takes. Researchers, policymakers and practitioners should approach the twin transition not as a naturally occurring phenomenon whose synergic properties can be assumed, but as a research question whose answer — synergic, parallel, conflictual or instrumental — must be determined empirically in each context.

6.3 A Research Agenda for the Articulation Framework

The typology's analytical value depends on whether it can be operationalised and tested, and whether the findings it generates prove more illuminating than those of the complementarity framework. Four questions constitute an initial agenda.

The first concerns the conditions under which synergic articulation predominates, and the minimum governance requirements — cross-cutting coordination, shared performance frameworks, regulatory coherence — for technical synergies to be realised in practice. Comparative case study research across sectors and member states with varying governance capacities is likely to prove particularly fruitful.

The second targets the dynamics through which parallel articulation does or does not convert into synergic articulation over time. Longitudinal analyses of twin transition investment programmes, tracking coordination and articulation form across the programme life cycle, could generate evidence currently absent from the literature.

The third asks under what conditions instrumental articulation produces accountability failures, and which monitoring and regulatory mechanisms are most effective at identifying and correcting them — a question with direct relevance for the design of the EU's post-2027 investment architecture.

The fourth examines how dominant articulation forms vary across member states with different institutional traditions, infrastructure levels and investment patterns. A systematic comparative analysis drawing on national recovery and resilience plan data could provide the first large-N empirical test of the typology's analytical power.

The twin transition — given the scale of investment it directs and the implications it carries for whether the most ambitious promises of decarbonisation and digitalisation are fulfilled — is too consequential to be governed on the basis of an unexamined assumption. Making that assumption visible, and replacing it with an analytically adequate framework, constitutes the principal contribution of this article.

Translation Note

The English translation of this text was produced by the Claude (Anthropic), ChatGPT, and Manus 1.6 Lite artificial intelligence language models and has been reviewed and revised as necessary by the author of this study.

References

- Abdulai, A. R. (2022). A new green revolution (GR) or neoliberal entrenchment in agri-food systems? Exploring narratives around digital agriculture (DA), food systems, and development in Sub-Sahara Africa. *The J. of Development Studies*, 58(8), 1588–1604.
- Afolabi, S., Malachi, I. O., Olawumi, A. O., & Oladapo, B. I. (2025). Data process of net-zero revolution for transforming earth and beyond sustainably. *Sustainability*, 17, 5367.
- Alméstár, M., Romero-Muñoz, S., & Mestre, N. (2025). Breaking silos: A systemic portfolio approach and digital tool for collaborative urban decarbonisation. *Sustainability*, 17, 5145.
- Almutairi, A. (2026). Carbon footprint of digital infrastructure: Assessing the environmental impact of data centers and cloud computing. *Int. J. of Innovative Research in Engineering & Multidisciplinary Physical Sciences*, 14(1). IJIRMP52601232944
- Antonietti, R., Bettiol, M., Di Maria, E., Montresor, S., & Vargiu, L. (2026). The twin transition and its geographical dimensions: A systematic literature review. *European Planning Studies*, 34(4), 824–847.
- Arendt, R. (2024). Residual carbon emissions in companies' climate pledges: Who has to reduce and who gets to remove? *Climate Policy*, 24(9), 1195–1210.
- Aslan, T., Holzapfel, P., Stobbe, L., Grimm, A., Nissen, N. N., & Finkbeiner, M. (2025). Toward climate neutral data centers: Greenhouse gas inventory, scenarios, and strategies. *iScience*, 28, 111637.
- Bär, L., Ossewaarde, R., & Gerven, M. V. (2020). The ideological justifications of the smart city of Hamburg. *Cities*, 105, 102811.
- Barbero, J., Collado, L. A., Rodríguez-Crespo, E., & Santos, A. (2025). The twin transition in the European Union: Assessing regional patterns of EU-funded investments. *European Planning Studies*, 33(10), 1801–1821.
- Behnke, N., & Hegele, Y. (2024). Achieving cross-sectoral policy integration in multilevel structures — loosely coupled coordination of "energy transition" in the German "Bundesrat." *Review of Policy Research*. 41:160–183.
- Bekerta, I., & Leibus, I. (2025). Digital transformation of financial management to promote regional development. *Research for Rural Development*, 40, 633–639.
- Belkhir, L., & Elmeligi, A. (2018). Assessing ICT global emissions footprint: Trends to 2040 and recommendations. *J. of Cleaner Production*, 177, 448–463.
- Ben Youssef, A. (2025). Twin transition: Digital transformation pathways for sustainable innovation. *Sustainability*, 17, 9491.

- Benegiamo, M., Corrado, A., & Fama, M. (2023). Agricultural digitalisation and just transition: A framework for the analysis. *Italian Review of Agricultural Economics*, 78(2), 5–17.
- Bianchini, S., Damoli, G., & Ghisetti, C. (2023). The environmental effects of the "twin" green and digital transition in European regions. *Environmental & Resource Economics*, 84, 877–918.
- Bilali, H. E. (2019). The multi-level perspective in research on sustainability transitions in agriculture and food systems: A systematic review. *Agriculture*, 9, 74.
- Bodin, Ö., & Crona, B. (2009). The role of social networks in natural resource governance: What relational patterns make a difference? *Global Environmental Change*, 19(3), 366–374.
- Borghesi, S., & Vergalli, S. (2022). The European Green Deal, energy transition and decarbonization. *Environmental & Resource Economics*, 83, 1–3.
- Brueck, C., Losacker, S., & Liefner, I. (2025). China's digital and green (twin) transition: Insights from national and regional innovation policies. *Regional Studies*, 59(1), 2384411
- Bryson, J. M., Crosby, B. C., & Stone, M. M. (2006). The design and implementation of cross-sector collaborations: Propositions from the literature. *Public Administration Review*, 66(s1), 44–55.
- Buylova, A., Nasiritousi, N., Bergman, J., Sanderink, L., Wickenberg, B., Flores, C. C., & McCormick, K. (2025). Bridging silos through governance innovations: The role of the EU cities mission. *Frontiers in Sustainable Cities*, 6:1463870.
- Candel, J. J. L., & Biesbroek, R. (2016). Toward a processual understanding of policy integration. *Policy Sciences*, 49(3), 211–231
- Cao, L., Hu, P., Li, X., Sun, H., Zhang, J., & Zhang, C. (2023). Digital technologies for net-zero energy transition: A preliminary study. *Carbon Neutrality*, 2, 7.
- Cao, Z., Zhou, X., Hu, H., Wang, Z., & Wen, Y. (2022). Toward a systematic survey for carbon neutral data centers. *IEEE Communications Surveys & Tutorials*, 24(2), 895–936.
- Castells, M. (2001). *The internet galaxy: Reflections on the internet, business, and society*. Oxford University Press.
- Charfeddine, L., & Umlai, M. (2023). ICT sector, digitization and environmental sustainability: A systematic review of the literature from 2000 to 2022. *Renewable and Sustainable Energy Reviews*, 184, 113482.

- Chatzistamoulou, N. (2023). Is digital transformation the deus ex machina towards sustainability transition of the European SMEs? *Ecological Economics*, 206, 107739.
- Claeys, G., Tagliapietra, S., & Zachmann, G. (2021). *How to make the European Green Deal work* Bruegel Policy Contribution, No. 2019/13, Bruegel, Brussels, https://www.bruegel.org/system/files/wp_attachments/PC-13_2019-151119.pdf
- Corrado, C. R., DeLong, S. M., Holt, E., Hua, E. Y., & Tolk, A. (2022). Combining green metrics and digital twins for sustainability planning and governance of smart buildings and cities. *Sustainability*, 14, 12988.
- Corti, F., & Vesan, P. (2022). On the political economy of the European social policy agenda: The case of the twin transition. *J. of European Social Policy*, 31(5), 584–597.
- Currie, W. L., Weerakkody, V., & Van Vliet, B. (2024). Digital transformation: The geopolitical-organizational nexus. *J. of Information Technology*, 39(4), 618–629.
- Duncan, E., Glaros, A., Ross, D. Z., & Nost, E. (2021). New but for whom? Discourses of innovation in precision agriculture. *Agriculture and Human Values*, 38, 1181–1199.
- Energy BI. (2024). *Scope 2 Carbon Accounting: Offsetting vs. Impact — Google and Microsoft vs. Meta and Amazon*, <https://energy-bi.com/resources/scope-2-carbon-accounting-offsetting-vs-impact-google-and-microsoft-vs-meta-and-amazon>
- Epstein, A.-S. (2025). EU environmental law in the digital age: A critical outlook on the twin transition's legal structure. *European Journal of Risk Regulation*, 1–17. <https://doi.org/10.1017/err.2025.10029>
- Esfandi, S., Tayebi, S., Byrne, J., Taminiau, J., Giyahchi, G., & Alavi, S. A. (2024). Smart cities and urban energy planning: An advanced review of promises and challenges. *Smart Cities*, 7, 414–444.
- European Commission. (2019). *The European Green Deal* (COM(2019) 640 final). Brussels, Belgium
- European Commission. (2020). *A renovation wave for Europe: Greening our buildings, creating jobs, improving lives* (COM(2020) 662 final). Brussels, Belgium
- European Commission. (2021a). *2030 digital compass: The European way for the digital decade* (COM(2021) 118 final). Brussels, Belgium
- European Commission. (2021b). *Better Regulation Guidelines*. Brussels.
- European Commission. (2022). *Digital economy and society index (DESI) 2022*.

- European Court of Auditors. (2020). *Digitising European Industry: An ambitious initiative whose success depends on the continued commitment of the EU, governments and businesses* (Special Report No. 20/2020). Luxembourg: Publications Office of the European Union.
- Ewing, J. (2017). Hollow ecology: Ecological modernization theory and the death of nature. *Journal of World-Systems Research*, 23(1), 126–155.
- Faggian, A., Marzucchi, A., & Montresor, S. (2025). Regions facing the 'twin transition': Combining regional green and digital innovations. *Regional Studies*, 59(1), 2398555.
- Feng, S., Chong, Y., Li, G., & Zhang, S. (2022). Digital finance and innovation inequality: Evidence from green technological innovation in China. *Environmental Science and Pollution Research*, 29, 87884–87900.
- Fich, L. E., Viola, S., & Bentsen, N. S. (2022). Jevons paradox: Sustainable development goals and energy rebound in complex economic systems. *Energies*, 15, 5821.
- Fiorini, A., Georgakaki, A., Jimenez Navarro, J., Marmier, A., Pasimeni, F. and Tzimas, E., (2017) Energy RandI financing and patenting trends in the EU: Country dashboards 2017 edition, EUR 29003 EN, Publications Office of the European Union, Luxembourg,
- Freitag, C., Berners-Lee, M., Widdicks, K., Knowles, B., Blair, G. S., & Friday, A. (2021). The real climate and transformative impact of ICT: A critique of estimates, trends, and regulations. *Patterns*, 2(9), 100340.
- Fouquet, R., & Hippe, R. (2022). Twin transitions of decarbonisation and digitalisation: A historical perspective on energy and information in European economies. *Energy Research & Social Science*, 91, 102736
- Furness, V. (2024) Exclusive: Corporate climate watchdog document deems carbon offsets largely ineffective, <https://www.reuters.com/sustainability/corporate-climate-watchdog-document-deems-carbon-offsets-largely-ineffective-2024-05-09/>
- Gao, X. (2025). The EU's twin transitions towards sustainability and digital leadership: A coherent or fragmented policy field? *Regional Studies*, 59(1), 2360053.
- Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. *Research Policy*, 31(8–9), 1257–1274.
- Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy*, 33(6–7), 897–920.

- Geels, F. W. (2018). Socio-technical transitions to sustainability. In H. Shugart (Ed.), *Oxford research encyclopedia of environmental science*. New York, NY: Oxford Academic.
- Geels, F., Sovacool, B., Schwanen, T., & Sorrell, S. (2017). Sociotechnical transitions for deep decarbonization. *Science*, 357(6357), 1242–1244.
- Gillingham, K., Rapson, D., & Wagner, G. (2014). *The rebound effect and energy efficiency policy* (FEEM Working Paper No. 107.2014). Fondazione Eni Enrico Mattei.
- Goel, A., Masurkar, S., & Pathade, G. R. (2024). An overview of digital transformation and environmental sustainability: Threats, opportunities, and solutions. *Sustainability*, 16(24), 11079.
- Greening, L. A., Greene, D. L., & Difiglio, C. (2000). Energy efficiency and consumption — the rebound effect — a survey. *Energy Policy*, 28(6–7), 389–401.
- Haarstad, H. (2017). Constructing the sustainable city: Examining the role of sustainability in the 'smart city' discourse. *Journal of Environmental Policy & Planning*, 19(4), 423–437.
- Haarstad, H., & Wathne, M. W. (2019). Are smart city projects catalysing urban energy sustainability? *Energy Policy*, 129, 918–925.
- Haas, P. M. (1992). Introduction: Epistemic communities and international policy coordination. *International Organization*, 46(1), 1–35.
- Hafner, M., & Raimondi, P. (2020). Priorities and challenges of the EU energy transition: From the European Green Package to the new Green Deal. *Russian J. of Economics*, 6, 374–389.
- Hainsch, K., Löffler, K., Burandt, T., Auer, H., Del Granado, C. P., Pesciella, P., & Zwickl-Bernhard, S. (2022). Energy transition scenarios: What policies, societal attitudes, and technology developments will realize the EU Green Deal? *Energy*, 239, 122067.
- Hajer, M. A. (1995). *The politics of environmental discourse: Ecological modernisation and the policy process*. Oxford University Press.
- Hall, S. (1980). Race, articulation and societies structured in dominance. In UNESCO (Ed.), *Sociological theories: Race and colonialism* (pp. 305–345). Paris, France: UNESCO.
- Hanley, N., McGregor, P. G., Swales, J. K., & Turner, K. (2009). Do increases in energy efficiency improve environmental quality and sustainability? *Ecological Economics*, 68(3), 692–709.

- Hilbert, M. (2020). Digital technology and social change: The digital transformation of society from a historical perspective. *Dialogues in Clinical Neuroscience*, 22(2), 189–194.
- Holubiev, O. (2025). Institutional mechanisms for state regulation of human development in conditions of transformational instability: The green transition, circular economy, and digitalisation. *Problems of Modern Transformations. Series: Economics and Management*, 22.
- Hooghe, L., & Marks, G. (2003). Unravelling the central state, but how? Types of multi-level governance. *American Political Science Review*, 97(2), 233–243.
- Huang, Y., Haseeb, M., Usman, M., & Ozturk, I. (2022). Dynamic association between ICT, renewable energy, economic complexity and ecological footprint: Is there any difference between E-7 (developing) and G-7 (developed) countries? *Technology in Society*, 68, 101853.
- International Energy Agency. (IEA) (2017). *Digitalisation and energy*. <https://iea.blob.core.windows.net/assets/6b2fd954-2017-408e-bf08-952fdd62118a/Electricity2024-Analysisandforecastto2026.pdf>
- International Energy Agency. (2024). *Electricity 2024: Analysis and forecast to 2026*. <https://iea.blob.core.windows.net/assets/18f3ed24-4b26-4c83-a3d2-8a1be51c8cc8/Electricity2024-Analysisandforecastto2026.pdf>
- Jordan, A., & Lenschow, A. (2010). Environmental policy integration: A state of the art review. *Environmental Policy and Governance*, 20, 147–158.
- Jørgensen, B. N., & Ma, Z. G. (2025). Digital twin of the European electricity grid: A review of regulatory barriers, technological challenges, and economic opportunities. *Applied Sciences*, 15(2), 6475.
- Judge, P. (2023). *Most net-zero energy strategies have no real emissions benefits, researchers warn*. Data Center Dynamics. <https://www.datacenterdynamics.com/en/news/most-net-zero-energy-strategies-have-no-real-emissions-benefits-researchers-warn/>
- Kanger, L., & Schot, J. (2019). Deep transitions: Theorising the long-term patterns of socio-technical change. *Environmental Innovation and Societal Transitions*, 32, 7–21.
- Karlilar, S., Balcılar, M., & Emir, F. (2023). Environmental sustainability in the OECD: The power of digitalization, green innovation, renewable energy and financial development. *Telecommunications Policy*, 47, 102568.
- Khalid, M. (2024). Smart grids and renewable energy systems: Perspectives and grid integration challenges. *Energy Reports*, 51, 101299.
- Kharb, R., Shri, C., Saini, N., & Kumar, D. (2024). Strategies for environmental sustainability: Analyzing the green and digital transitions. *Sustainability Accounting, Management and Policy Journal*, 17(1), 117–150.

- Knell, M. (2021). The digital revolution and digitalized network society. *Review of Evolutionary Political Economy*, 2, 9–25.
- Kotlarsky, J., Oshri, I., & Sekulic, N. (2023). Digital sustainability in information systems research: Conceptual foundations and future directions. *J. of the Association for Information Systems*, 24(4), 936–952.
- Kourtellis, C. (2020). The role of epistemic communities and expert knowledge in the European neighbourhood policy. *J. of European Integration*, 43, 279–294.
- Kovacic, Z., Casañas, C. G., Argüelles, L., Serrano, P. Y., Ribera-Fumaz, R., Prause, L., & March, H. (2024). The twin green and digital transition: High-level policy or science fiction? *Environment and Planning E: Nature and Space*, 7, 2251–2278.
- Köhler, J., Geels, F. W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., ... Wells, P. (2019). An agenda for sustainability transitions research: State of the art and future directions. *Environmental Innovation and Societal Transitions*, 31, 1–32.
- Kreibich, N., & Hermwille, L. (2021). Caught in between: Credibility and feasibility of the voluntary carbon market post-2020. *Climate Policy*, 21, 939–957.
- Kunkel, S., & Tyfield, D. (2021). Digitalisation, sustainable industrialisation and digital rebound — asking the right questions for a strategic research agenda. *Energy Research & Social Science*, 82, 102295.
- Kwiliński, A., Lyulyov, O., & Pimonenko, T. (2023). Unlocking sustainable value through digital transformation: An examination of ESG performance. *Information*, 14, 444.
- Labhard, V., Lehtimäki, J., & Baccianti, C. (2025). Digitalisation, institutions and governance, and diffusion: mechanisms and evidence. *Economics of Innovation and New Technology*, 1–33.
- Lakoff, G., & Johnson, M. (2003). *Metaphors we live by*. Chicago, IL: University of Chicago Press.
- Lange, S., Pohl, J., & Santarius, T. (2020). Digitalization and energy consumption: Does ICT reduce energy demand? *Ecological Economics*, 176, 106760.
- Latour, B. (1987). *Science in action: How to follow scientists and engineers through society*. Harvard University Press.
- Lægreid, P., & Verhoest, K. (Eds.). (2010). *Governance of public sector organisations: Proliferation, autonomy and performance*. Basingstoke, UK: Palgrave Macmillan.
- Lee, H.-W., Robertson, P. J., Lewis, L. B., Sloane, D., Galloway-Gilliam, L., & Nomachi, J. (2011). Trust in a cross-sectoral interorganizational network: An

- exploratory study. *Nonprofit and Voluntary Sector Quarterly*, 41(4), 609–631.
- Li, G., Wu, H., Jiang, J., & Zong, Q. (2023). Digital finance and the low-carbon energy transition (LCET) from the perspective of capital-biased technical progress. *Energy Economics*, 120, 106623.
- Lu, L., Liu, P., Yu, J., & Shi, X. (2023). Digital inclusive financing and firms' energy transitions towards carbon neutrality: Evidence from China. *Energy Economics*, 127(Part B), 107059.
- Luccioni, A. S., Viguier, S., & Ligozat, A.-L. (2023). Estimating the carbon footprint of BLOOM, a 176B parameter language model. *J. of Machine Learning Research*, 24(253), 1–15.
- Luccioni, A., Strubell, E., & Crawford, K. (2025). From Efficiency Gains to Rebound Effects: The Problem of Jevons' Paradox in AI's Polarized Environmental Debate. In *The 2025 ACM Conference on Fairness, Accountability, and Transparency (FAccT '25)*, June 23–26, 2025, Athens, Greece. ACM, New York, NY, USA, 13 pages.
- Mahmood, M., Chowdhury, P., Yeassin, R., Hasan, M., Ahmad, T., & Chowdhury, N.-U.-R. (2024). Impacts of digitalization on smart grids, renewable energy, and demand response: An updated review of current applications. *Energy Conversion and Management: X*, 24, 100790.
- Majone, G. (1996). *Regulating Europe*. London, UK: Routledge.
- March, H., & Ribera-Fumaz, R. (2016). Smart contradictions: The politics of making Barcelona a self-sufficient city. *European Urban and Regional Studies*, 23(4), 816–830.
- Marquis, S. (2024). Optimizing stewardship of the land? *Canadian Food Studies* 11(3), 113–141.
- Marrocu, E., Paci, R., & Serafini, L. (2026). Leveraging the twin transition: The impact of green and digital investment on firms' performance. *Economics of Innovation and New Technology*. Advance online publication.
- Martínez-Peláez, R., Ochoa-Brust, A., Rivera, S. I., Félix, V., Ostos, R., Brito, H., ... Mena, L. J. (2023). Role of digital transformation for achieving sustainability: Mediated role of stakeholders, key capabilities, and technology. *Sustainability*, 15, 11221.
- Martens, P., & Zscheischler, J. (2022). The Digital Transformation of the Agricultural Value Chain: Discourses on Opportunities, Challenges and Controversial Perspectives on Governance Approaches. *Sustainability* 14, 3905.
- Maucorps, A., Römisch, R., Schwab, T., & Vujanović, N. (2023). The impact of the green and digital transition on regional cohesion in Europe. *Intereconomics*, 58(2), 102–110.

- Meijer, A. (2024). Perspectives on the twin transition: Instrumental and institutional linkages between the digital and sustainability transitions. *Information Polity*, 29(1), 35–51
- Meijer, A., & Bolivar, M. (2016). Governing the smart city: A review of the literature on smart urban governance. *International Review of Administrative Sciences*, 82, 392–408.
- Meliani, M., El Barkany, A., El Abbassi, I., Darcherif, A. M., & Mahmoudi, M. (2021). Energy management in the smart grid: State-of-the-art and future trends. *Energy & Environment*, 32(7), 1–20.
- Miller, T. R. (2020). Imaginaries of sustainability: The techno-politics of smart cities. *Science as Culture*, 29(3), 365–387.
- Mol, A. P. J., & Spaargaren, G. (2000). Ecological modernisation theory in debate: A review. *Environmental Politics*, 9(1), 17–49.
- Mora, L., Gerli, P., Ardito, L., & Petruzzelli, A. M. (2023). Smart city governance from an innovation management perspective: Theoretical framing, review of current practices, and future research agenda. *Technovation*, 123, 102717.
- Moragues-Faus, A., & Sonnino, R. (2019). Re-assembling sustainable food cities: An exploration of translocal governance and its multiple agencies. *Urban Studies*, 56(4), 778–794.
- Muench, S., Stoermer, E., Jensen, K., Asikainen, T., Salvi, M. and Scapolo, F., (2022) Towards a green and digital future, EUR 31075 EN, European Union, Luxembourg,
- Murphy, J. S. (1996). [Review of the book *The politics of environmental discourse: Ecological modernisation and the policy process*, by M. A. Hajer]. *Business Strategy and the Environment*, 5, 279–280.
- Müller, M., Lang, S., & Stöber, L. F. (2024). Twin Transition – Hidden Links between the Green and Digital Transition, *J. of Innovation Economics & Management*. 45(3), 57 -94
- Nadkarni, S., & Prügl, R. (2021). Digital transformation: A review, synthesis and opportunities for future research. *Management Review Quarterly*, 71, 233–341.
- Nilsson, M., Zamparutti, T., Petersen, J. E., Nykvist, B., Rudberg, P., & McGuinn, J. (2012). Understanding policy coherence: Analytical framework and examples of sector–environment policy interactions in the EU. *Environmental Policy and Governance*, 22(6), 395–423.
- OECD. (2019). *Policy coherence for sustainable development 2019: Empowering people and ensuring inclusiveness and equality*. Paris: OECD Publishing

- Oliver, T., Benini, L., Borja, Á., Dupont, C., Doherty, B., Grodzińska-Jurczak, M., ... Tarrason, L. (2021). Knowledge architecture for the wise governance of sustainability transitions. *Environmental Science & Policy*, 126, 152–163.
- Onyango, V., Forghaniallahabadi, M., Santos, S. C., & Gazzola, P. (2025). Sectoral interconnectedness: Insights from five sectors in 'smart' urban planning (energy, transport, waste management, buildings, and cities). *European Scientific Journal, ESJ*, 23(13), 23–47.
- Osadcha, O., Levytska, S., Zinkevych, O., Rozdopcheniuk, V., & Didukh, R. (2025). Formation of a resilient economy through the integration of digital risk management and "green" modernization of enterprises. *IOP Conference Series: Earth and Environmental Science*, 1576, 012002.
- Palladino, N. (2021). The role of epistemic communities in the "constitutionalization" of internet governance: The example of the European Commission High-Level Expert Group on Artificial Intelligence. *Telecommunications Policy*, 45(6), 102149.
- Purtova, N. (2018a). The law of everything: Broad concept of personal data and future of EU data protection law. *Law, Innovation and Technology*, 10(1), 40–81.
- Purtova, N. (2018b). Between the GDPR and the Police Directive: navigating through the maze of information sharing in public–private partnerships, *International Data Privacy Law*, 8(1), 52–68,
- Quimba, F., Serafica, R. B., Bayudan-Dacuycuy, C., Andrada, A., & Moreno, N. (2023). *Green and digital: Managing the twin transition toward sustainable development* (PIDS Discussion Paper No. 2023-21). Philippine Institute for Development Studies.
- Rahman, K. S., & Thelen, K. (2019). The rise of the platform business model and the transformation of twenty-first-century capitalism. *Politics & Society*, 47(2), 177–204.
- Rajnai, Z., & Kocsis, I. (2018). Assessing industry 4.0 readiness of enterprises. In *Proceedings of the 2018 IEEE 16th World Symposium on Applied Machine Intelligence and Informatics* (pp. 489–494). IEEE.
- Rogelj, J., Geden, O., Cowie, A., & Reisinger, A. (2021). Net-zero emissions targets are vague: Three ways to fix. *Nature*, 591, 365–368.
- Rosário, A. T., & Dias, J. C. (2022). Sustainability and the digital transition: A literature review. *Sustainability*, 14(7), 1–18.
- Santarius, T., Dencik, L., Diez, T., Ferreboeuf, H., Jankowski, P., Hankey, S., ... Staab, P. (2023). Digitalization and sustainability: A call for a digital green deal. *Environmental Science & Policy*, 147, 11–14.
- Sareen, S. (2023). Cross-sectoral metrics as accountability tools for twin transitioning energy systems. *Environmental Policy and Governance*, 33, 593–603.

- Sasaki, N. (2025). Addressing scandals and greenwashing in carbon offset markets: A framework for reform. *Global Transitions*, 7, 375–382.
- Scharpf, F. W. (1988). The joint decision trap: Lessons from German federalism and European integration. *Public Administration*, 66(3), 239–278.
- Schot, J., & Kanger, L. (2018). Deep transitions: Emergence, acceleration, stabilization and directionality. *Research Policy*, 47, 1045–1059.
- Siddik, M. A. B., Shehabi, A., & Marston, L. T. (2021). The environmental footprint of data centers in the United States. *Environmental Research Letters*, 16, 064017.
- Skjærseth, J. B. (2021). Towards a European Green Deal: The evolution of EU climate and energy policy mixes. *International Environmental Agreements: Politics*, 21, 25–41.
- Söderholm, P. (2020). The green economy transition: The challenges of technological change for sustainability. *Sustainable Earth*, 3, 6.
- Sorrell, S. (2007). *The rebound effect: An assessment of the evidence for economy-wide energy savings from improved energy efficiency*. UK Energy Research Centre. <https://d2e1qxpsswcpgz.cloudfront.net/uploads/2020/03/the-rebound-effect-an-assessment-of-the-evidence-for-economy-wide-energy-savings-from-improved-energy-efficiency.pdf>
- Sorrell, S. (2009). Jevons' paradox revisited: The evidence for backfire from improved energy efficiency. *Energy Policy*, 37(4), 1456–1469.
- Spilotro, C., Posa, M., Secundo, G., & De Turi, I. (2026). Disclosing the twin transition: Digital and green transformation in Italian universities from an institutional perspective. *Journal of Innovation & Knowledge*, 14, 100964.
- Smniecek, N. (2016). *Platform capitalism*. Polity Press.
- Strielkowski, W., Cívín, L., Tarkhanova, E., Tvaronavičienė, M., & Petrenko, Y. (2021). Renewable energy in the sustainable development of electrical power sector: A review. *Energies*, 14(24), 8240.
- Tabares, S., Parida, V., & Chirumalla, K. (2025). Twin transition in industrial organizations: Conceptualization, implementation framework, and research agenda. *Technological Forecasting and Social Change*, 213, 123995.
- Tariq, B. (2025). Sustainable digital infrastructure: Assessing the energy efficiency and environmental impact of global data centers. *Journal of Sustainable Development Indicators*, 1(4), 1–18.
- The Guardian. (2024). *Data center emissions probably 662% higher than big tech claims*. <https://www.theguardian.com/technology/2024/sep/15/data-center-gas-emissions-tech>

- Țigănașu, R., Bănică, A., & Wong, P.-H. (2025). Catalyzing digital and environmental transformations by institutions in a diverse socio-economic world. *World Development*, 193, 107052.
- Trencher, G. P., Nick, S., Carlson, J., & Johnson, M. S. (2024). Demand for low-quality offsets by major companies undermines climate integrity of the voluntary carbon market. *Nature Communications*, 15, 6863.
- Trouwloon, D., Streck, C., Chagas, T., & Martinus, G. (2023). Understanding the use of carbon credits by companies: A review of the defining elements of corporate climate claims. *Global Challenges*, 7, 2200158.
- Tsybuliak, A. (2025). Evolution of theories of ecological modernization as a manifestation of the increasing risk of the international economy: Actualization of sustainable business practices in the conditions of digital transition. *Economic Scope*, 202, 370–377.
- Ugwu, C. N., Ogenyi, F. C., Ugwu, J. N., & Okon, M. B. (2026). Integration of AI-driven digital twins for real-time optimization of renewable energy grids. *Frontiers in Energy Research*, 14:1748233.
- Viitanen, J., & Kingston, R. (2014). Smart cities and green growth: Outsourcing democratic and environmental resilience to the global technology sector. *Environment and Planning A: Economy and Space*, 46(4), 803–819.
- Vinuesa, R., Azizpour, H., Leite, I., Balaam, M., Dignum, V., Domisch, S., ... Fuso Nerini, F. (2020). The role of artificial intelligence in achieving the Sustainable Development Goals. *Nature Communications*, 11, 233.
- Von Homeyer, I., Oberthür, S., & Dupont, C. (2022). Implementing the European Green Deal during the evolving energy crisis. *JCMS: Journal of Common Market Studies*, 60(S1), 125–136.
- Vrikki, P. (2024). Measuring up? The illusion of sustainability and the limits of big tech self-regulation. *Sustainability*, 16, 10197.
- Wang, C., Lv, T., Cai, R., Xu, J., & Wang, L.-Y. (2022). Bibliometric analysis of multi-level perspective on sustainability transition research. *Sustainability*, 14, 4145.
- Wang, F. L., Nian, V., Campana, P., Jurasz, J., Li, H., Chen, L., ... Yan, J. (2022). Do 'green' data centres really have zero CO₂ emissions? *Sustainable Energy Technologies and Assessments*, 53(Part D), 102769.
- Worighi, I., Maach, A., Hafid, A., Van Mierlo, J., & Hegazy, O. (2019). Integrating renewable energy in smart grid system: Architecture, virtualization and analysis. *Sustainable Energy, Grids and Networks*, 18, 100226.
- Weber, C., Haugh, H., Göbel, M., & Leonardy, H. (2022). Pathways to lasting cross-sector social collaboration. *Journal of Business Ethics*, 177, 613–639.

- Widdicks, K., Lucivero, F., Samuel, G., Croxatto, L. S., Smith, M. T., Holter, C. T., ... Penzenstadler, B. (2023). Systems thinking and efficiency under emissions constraints: Addressing rebound effects in digital innovation and policy. *Patterns*, 4.
- Wolf, S. A., & Wood, S. D. (1997). Precision farming: Environmental legitimization, commodification of information, and industrial coordination. *Rural Sociology*, 62(2), 180–206.
- Wolfert, S., Ge, L., Verdouw, C., & Bogaardt, M.-J. (2017). Big data in smart farming: A review. *Agricultural Systems*, 153, 69–80.
- World Bank (2024) *Green Digital Transformation How to Sustainably Close the Digital Divide and Harness Digital Tools for Climate Action*, Climate Change and Development Series. Washington, DC: World Bank
- Yang, G., Nie, Y., Li, H., & Wang, H. (2023). Digital transformation and low-carbon technology innovation in manufacturing firms: The mediating role of dynamic capabilities. *International Journal of Production Economics*. 263, 108969
- Zeqiri, A., Youssef, A. B., & Zahar, T. M. (2025). The role of digital tourism platforms in advancing sustainable development goals in the industry 4.0 era. *Sustainability*, 17, 3482.
- Zhao, W. (2025). Smart city technologies for sustainable urban planning: Evidence and equity lessons from Shenzhen. *Sustainable Futures*, 10, 101198.
- Zhao, X., Zhang, S., & Lu, F. (2025). The impact of digital environmental governance on green transformation: Theoretical mechanism and empirical test from China. *Sustainability*, 17, 157.
- Zito, A. R. (2001). Epistemic communities, collective entrepreneurship and European integration. *J. of European Public Policy*, 8(4), 585–603.
- Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. New York, NY: PublicAffairs.
- Zulfiqar, M., Tahir, S. H., Ullah, M. R., & Ghafoor, S. (2023). Digitalized world and carbon footprints: Does digitalization really matter for sustainable environment? *Environmental Science and Pollution Research*, 30(38), 88789–88802



BÖLÜM 14

Structural Inequalities at The Intersection of Green and Digital Transition: The Limits of Growth, Justice, and Technology Optimism

Umur Aşkın¹

1. Introduction: The Question the Twin Transition Literature Does Not Ask

The concept of twin transition has rapidly acquired institutional authority within the EU's policy architecture. Aşkın (2026) approaches the relationship between green and digital transformation as contingent rather than inherently synergistic, proposing a typology encompassing four articulation modes — synergistic, parallel, conflictual, and instrumental.

This article brings a complementary question to the fore: regardless of articulation mode, who bears the costs of transition and who captures its benefits? These questions, which the twin transition literature systematically defers, are nominally present in policy discourse yet relegated to a secondary position in analytical practice. This deferral is not incidental; it is the product of a deep-seated commitment to a growth-oriented and technology-centric conception of transformation.

Three interrelated lacunae motivate the article. The *distributional gap*: the twin transition literature has generated a substantial body of work in technological innovation and macroeconomic modelling (Acemoglu et al., 2016; Aghion et al., 2021), yet has examined the distribution of costs across income groups, generations, and geographies far less thoroughly. Labour market transformation, energy poverty, digital exclusion, and spatial inequality are interlocking outcomes whose full weight becomes apparent only when they are considered together. The *normative gap*: the concept of just transition has found a place in the policy literature but in practice lags behind the rhetorical commitments made in its name (Stavis & Felli, 2015:30); moreover, it was not designed to address the novel forms of exclusion produced when green transformation is mediated through digital technologies. A transition that reproduces existing inequalities is not a successful transformation with certain

¹ Assoc. Prof. Dr., Tokat Gaziosmanpaşa Üniversitesi, Orcid: 0000-0001-8456-2411

side effects — it is a transition that has failed on its own terms. The *epistemic gap*: the dominant literature has not engaged seriously with degrowth perspectives, Global South critiques, or feminist analyses. These traditions are not marginal positions; they are intellectual resources that offer analytical purchase on dimensions the mainstream cannot see.

The article makes contributions at three levels — conceptual, empirical, and normative: applying Fraser's (2009) justice framework as an analytical instrument, synthesising the distributional evidence, and evaluating alternative frameworks that challenge the dominant discourse.

2. Methodology

This article constitutes a critical review of academic and grey literature on the social justice dimensions of twin transition; its contribution is analytical, integrative, and normative in character.

The corpus rests on searches conducted in Scopus, Web of Science, and Google Scholar using keyword combinations including *twin transition justice*, *green transition inequality*, *just transition digital*, *energy poverty digitalisation*, *degrowth digital economy*, *feminist green transition*, and *Global South digital green*. The search covers the period January 2015 to April 2026; the earlier starting point relative to Aşkın's (2026) 2019 threshold reflects the necessity of encompassing the just transition and energy poverty literature as well as the tradition of feminist political economy. Grey literature from the European Commission, the ILO, IRENA, and Eurofound has also been included. The final corpus comprises approximately 85 peer-reviewed sources and 22 grey literature documents.

Studies genuinely engaged with the distributional or justice dimensions of green and/or digital transition were included; those focused solely on economic efficiency without addressing distributional outcomes were excluded. Foundational contributions from feminist political economy, ecological economics, and postcolonial studies were drawn upon irrespective of publication date.

The article is situated within the tradition of critical feminist political economy: a tradition that offers multidimensional distributional analysis, centres questions of power, and takes seriously the care and reproductive economy rendered invisible by productivist frameworks. The work is written from a Global North perspective; the Global South analysis in Section 6 draws on secondary literature, and this limitation is acknowledged. The risk that a critical posture may understate the redistributive potential of well-designed programmes is counterbalanced throughout the analysis by the principle of presenting the strongest available version of each argument.

3. Theoretical Framework: Justice, Growth, and the Invisible Economy of Care

3.1 Fraser's Three-Dimensional Framework of Justice

Engaging with the social justice dimensions of twin transition requires an analytical framework that goes beyond the question of 'who wins and who loses?' — one that also interrogates whose experiences are rendered visible within governance structures and whose voices are admitted into decision-making processes. Fraser's (2009:16) approach to justice, grounded in the triad of redistribution, recognition, and representation — a structure in which each dimension is analytically distinct yet mutually conditioning — offers precisely this capacity.

The *redistribution* dimension asks who bears the material costs of twin transition and who captures its benefits. It is the domain on which the existing just transition literature focuses most directly: financial support, economic diversification, and retraining (Stevis & Felli, 2015:29). The distributional record is most straightforwardly measured along this dimension, even if measurement has yet to achieve adequate scope.

The *recognition* dimension asks whether the experiences, identities, and forms of knowledge of those affected by the transition are rendered visible within governance frameworks. Failures in the context of twin transition take multiple forms: the invisibility of care labour within productivist discourses, the marginalisation of community knowledge in infrastructure planning, the erasure of digitally excluded populations from transition design, and the subordination of Global South perspectives to North Atlantic frameworks. Fraser's (2009:63) observation is decisive here: recognition failures are not merely cultural affronts but forms of exclusion that produce concrete disadvantages in policy design. The actors who make decisions frequently operate within epistemic frameworks that exclude the perspectives of those most profoundly affected.

The *representation* dimension concerns the inclusion of affected populations in decision-making processes. Failures here are structural: digital consultation processes exclude the most vulnerable populations, large technology and energy corporations occupy dominant positions in governance processes, and a Eurocentric architecture marginalises Global South populations. These populations bear the costs of global value chains without participating in the processes that shape them (Ndlovu-Gatsheni, 2018:14).

The framework's principal value lies in its integrative character: redistribution, recognition, and representation are not isolated problems but mutually reinforcing structural patterns. Addressing any one of them independently of the others is analytically and practically insufficient.

3.2 Critique of the Growth Paradigm: Constructing the Strongest Argument and Its Limits

The European Commission's twin transition agenda positions green and digital transformations as sources of new industries, employment, and competitive advantage (European Commission, 2021:3). Before subjecting this growth-centred framework to critique, intellectual honesty requires that the case for growth compatibility be presented in its strongest form.

The sophisticated version of the green growth thesis does not claim that growth and ecological sustainability are spontaneously compatible; rather, it holds that directed technological change can decouple growth from emissions within the timescales and at the pace demanded by climate science (Acemoglu et al., 2016:53). According to Aghion et al. (2021:214), even if the creative destruction entailed by this transformation generates severe costs in the short term, it ultimately constructs a more productive and sustainable economic structure over the longer run. Furthermore, a growing economy can finance redistributive outcomes far more readily than a contracting one. The cost reductions and diffusion rates observed in renewable energy lend genuine empirical support to this proposition (IRENA, 2023:8).

The critical response does not assert that green growth is impossible; rather, it establishes that it has not in practice been achieved at global scale. Parrique et al. (2019:4) demonstrate that absolute decoupling between GDP growth and resource use and emissions has not yet been achieved at the pace required globally, and cannot be reliably projected from historical trends. Hickel and Kallis (2020:480) show that the gap between the emissions trajectories implied by current policies and those required to meet the 1.5°C target demands a rate of change within a growth framework that is without historical precedent. It follows that the growth-centred framing of twin transition constitutes not merely an analytical limitation but a structural constraint: a transition conceived in these terms will systematically prioritise outputs compatible with growth, whilst relegating distributional justice and ecological sufficiency to a secondary position.

3.3 Feminist Political Economy: Care, Reproduction, and the Blind Spot of Productivism

The twin transition literature shares a structural blind spot with mainstream economics: the invisibility of care and reproductive labour. Both transformations are concerned with the productive economy conceived in terms of paid employment and market transactions; unpaid care activities — child-rearing, support for older people and disabled persons, household management — appear in twin transition discourse not as a constitutive economic dimension but merely as contextual background.

Federici (2004:8) demonstrates that this invisibility is not incidental: the unpaid appropriation of reproductive labour is a structural feature of capitalist economies that subsidises the costs of production. When twin transition restructures productive systems without attending to this infrastructure, it reproduces — and potentially deepens — gender-based inequalities. Women, who bear the greater share of care labour, face disproportionate exposure to energy poverty, are disadvantaged in accessing digital interfaces, and remain underrepresented in high-skilled technical occupations (ILO, 2019:22). Daggett's (2018:26) concept of petro-masculinity reveals that the cultural dimensions of transition directly shape the conditions of democratic legitimacy, whilst MacGregor's (2010:124) feminist environmental politics perspective demonstrates that techno-scientific and market-centred understandings of green transition exclude relational, place-specific, and care-based traditions of knowledge.

This article constructs its theoretical backbone by integrating feminist political economy with Fraser's justice framework and the critique of growth. This framework makes it possible to attend simultaneously to the distribution of costs and benefits, to questions of visibility and representation, and to the structural conditions that narrow the possibilities available to the transition.

4. Structural Tensions: The Contradictions Twin Transition Conceals

The argument of this section does not rest on the claim that the twin transition concept is fundamentally mistaken: the synergistic articulation between green and digital transformation is real. The problem is that the structural tensions the concept — in its dominant form — presents as marginal complications are in fact constitutive features of this relationship. Four such tensions are examined below through the lens of Fraser's framework of redistribution, recognition, and representation.

4.1 The Ecological Costs of Digitalisation: The Arithmetic Twin Transition Ignores

The twin transition consensus has found it convenient to believe that digital technologies are instruments of decarbonisation — that their contribution exceeds their own environmental footprint. The evidence does not sustain this comfort; and the failure to incorporate these findings into mainstream analysis represents both an analytical and a recognition failure: it renders invisible the experiences of communities whose environments are being degraded whilst benefits accumulate elsewhere.

Freitag et al. (2021:2) estimate that the ICT sector consumed approximately 4–6 per cent of global electricity in the early 2020s, with associated emissions equivalent to 2–4 per cent of the global total — comparable in scale to aviation. What is more troubling is the trajectory: as artificial intelligence workloads, data

centre capacity, and connected devices expand, energy demand is expected to increase substantially over the coming decade (IEA, 2024:34).

Artificial intelligence warrants particular attention in this context, given that AI is positioned as the technological core of twin transition. Luccioni et al. (2023:12) demonstrate that the carbon footprint of training a large-scale language model is equivalent to that of hundreds of transatlantic flights, and further show that cumulative inference workloads may exceed even the training process itself. The continuous proliferation of models and the scaling pressures imposed by the competitive dynamics of the AI industry constitute a concrete tension with decarbonisation objectives.

The rebound effect is of decisive importance here. Identified by Jevons (1865) and documented across a wide range of energy technologies, this effect applies equally to ICT. Lange et al. (2020:105) demonstrate that the empirical record does not support the assumption that digital efficiency gains will outpace digital energy demand. Sorrell's (2007:vi) assessment finds that direct rebound effects offset between 10 and 30 per cent of efficiency gains, with economy-wide effects potentially exceeding this considerably. The dematerialisation thesis — the assumption that digital efficiency will outstrip digital energy demand — remains, in the light of available evidence, an assumption rather than an established finding.

Finally, the distributional dimensions of this cost are unevenly spread. The environmental burdens running from rare earth mining to the informal processing of electronic waste fall disproportionately on the Global South and the peripheral regions of high-income economies, whilst the economic benefits flow overwhelmingly to high-income populations (Forti et al., 2020:6). Viewed through Fraser's framework, this constitutes a double failure: ecological costs are externalised onto those least responsible for producing them and least equipped to resist them, whilst mainstream analysis renders invisible the communities bearing these burdens.

4.2 The Risk That Green Transition Will Deepen Digital Inequality: The Conditionality Trap

The second structural tension operates in the inverse direction of the most frequently discussed relationship: what is at issue here is not the ecological costs of digitalisation but the risk that green transformation will entrench existing patterns of digital exclusion. This risk is structural rather than incidental, yet it has not received the analytical attention it warrants.

Green transition in Europe has increasingly become a transformation conducted through digital mediation. Smart meter interpretation, demand response programmes, electric vehicle charging management, energy performance certificates, and retrofit grant applications — all of these now

operate via digital platforms (Sovacool et al., 2018). The concrete gains of transition — lower energy bills, access to renewable energy tariffs, and access to green subsidies — are becoming progressively contingent on digital competence.

This conditionality is not distributionally neutral. The populations most exposed to climate risk — low-income households, older individuals, those living in rural areas, disabled people, and informal workers — are systematically those with the lowest levels of digital competence and access (van Dijk, 2005:78; Helsper, 2012:404). This overlap is not coincidental; it reflects structural inequalities along the axes of class, geography, age, and education. A transition designed through digital channels without adequate countermeasures does not address these inequalities — it reinforces, and potentially deepens, them. Within Fraser's framework, this constitutes a simultaneous double failure: a redistribution failure, in that material benefits are rendered inaccessible to those most in need; and a recognition failure, in that the digital access preconditions remain invisible to the institutions designing the transition.

The energy poverty dimension sharpens this tension considerably. Energy poverty, which affects between 50 and 125 million people in the EU (Bouzarovski & Petrova, 2015:31), encompasses precisely those for whom the promise of clean and affordable energy through green transition carries the greatest significance — and who simultaneously possess the most limited capacity to realise that promise through digital channels. The electric vehicle transition illustrates this trap concretely: in practice, only those able to meet high upfront costs, those with access to home charging, and those with sufficient digital competence to navigate charging network interfaces stand to benefit (Sovacool et al., 2018). For those who cannot meet these conditions, the transition to electric vehicles represents not an opportunity but an additional source of disadvantage.

Salemink et al. (2017:361) demonstrate that the rural–urban gap in digital infrastructure and skills is persistent and widening. When transition is designed with urban populations as the primary point of reference, rural communities face a spatial double penalty: they are more disadvantaged in capturing the benefits of both transitions and more exposed to the costs of each.

4.3 The Growth Paradox: Can Twin Transition Deliver Structural Transformation?

The third tension is perhaps the most fundamental: the question of whether twin transition, in its current form, can bring about genuine structural transformation, or whether it serves instead as a mechanism for modernising the existing economy without disturbing the growth logic that has produced the ecological crisis.

The European Commission's twin transition agenda positions green and digital transformations as engines of economic dynamism: new industries, new employment, enhanced competitiveness (European Commission, 2021:3). The imperative of sustainability is acknowledged, yet it is presented from within a growth-oriented logic. The question of whether aggregate growth in resource consumption and energy use can be reconciled with ecological sustainability within the timescales demanded by climate science is not seriously addressed in the mainstream literature.

Hickel's (2021:1106) analysis is unambiguous: no credible pathway to the Paris targets can exclude a significant reduction in aggregate material and energy flows in high-income economies. The efficiency gains on which green growth scenarios depend have historically failed to deliver absolute decoupling between growth and resource consumption — a finding corroborated by the empirical evidence assembled by Parrique et al. (2019).

The digital dimension of the growth paradox has received particularly little scrutiny. Platform business models rest on network effects that drive growth in transaction volume and data generation (Srnicsek, 2016:30), whilst the advertising-based revenue models of dominant platforms depend on consumption maximisation that is in direct tension with the sufficiency orientation that ecological sustainability demands (Zuboff, 2019:93). The claim that digital transformation can simultaneously serve the growth imperatives of the platform economy and the sustainability objectives of green transition is incoherent; the failure of the literature to examine this contradiction adequately represents one of its most fundamental analytical shortcomings.

Raworth's (2017:44) doughnut economy framework offers a post-growth alternative. Its application in Amsterdam's post-pandemic strategy (Doughnut Economics Action Lab, 2020) demonstrates what this framework looks like in governance practice. In the context of twin transition, what the framework reveals is this: the measure of success is not growth but whether economies are held within the safe and just space of the doughnut — and the current trajectory falls well short of that standard.

The feminist dimension adds a further layer. The growth-centred framing of twin transition reproduces a productivist logic that renders invisible not only ecological limits but also care and reproductive labour. A sufficiency-oriented transition that measured success by wellbeing and care capacity rather than output would look radically different from what is currently being designed (Federici, 2004:16). The invisibility of care within twin transition metrics is not a technical oversight; it is a political choice whose costs fall disproportionately on women.

4.4 The Political Economy of Twin Transition: Who Sets the Agenda, and Who Benefits?

The fourth tension places the question of power at the centre: who shapes the twin transition agenda, who benefits from the current trajectory, and what the concentration of power implies for democratic governance. This is the dimension most conspicuously absent from mainstream twin transition analysis — and that absence is not incidental.

Twin transition is not a neutral technical process; it is a political and economic process shaped by actors with specific interests. Those who most effectively shape the agenda — large technology and energy corporations and financial institutions — are not disinterested parties. They have powerful incentives to promote definitions that align with their commercial interests, to favour technology-centred solutions that generate revenue streams for their products, and to resist regulation that would impose costs on their operations.

Mazzucato (2021:214) analyses this dynamic incisively: the state assumes risk whilst the private sector captures the returns, and the language of public–private partnership obscures this asymmetry. In the context of twin transition, public investment in green-digital infrastructure lays the foundations for private value creation by technology companies, whilst the costs of the transition — including the costs of managing distributional outcomes — are displaced disproportionately onto public budgets and vulnerable populations.

The carbon offsetting commitments of Amazon, Google, and Microsoft give concrete expression to this dynamic. Google's longstanding approach to carbon neutrality via carbon credits, and Microsoft's emphasis on carbon removal mechanisms as part of its ambition to become 'carbon negative' by 2030, illustrate that the climate strategies of major technology companies rest not solely on direct emissions reductions but also on offsetting and carbon removal instruments (Google, 2011; Microsoft, 2020; Smith, 2020). In this context, green transition discourse functions less as a framework that constrains digital expansion than as one that legitimises growing digital infrastructures and data centre investments within the language of sustainability — what Aşkın (2026) conceptualises as instrumental articulation. From Fraser's perspective, this constitutes a representation failure: the actors whose interests stand most in need of constraint are those who most powerfully shape governance, whilst the communities whose voices most need to be heard are those least able to make themselves heard in institutional processes.

5. The Social Justice Dimensions of Twin Transition

A striking asymmetry marks the twin transition literature. The technological dimensions of transition — innovation dynamics, diffusion trajectories, efficiency gains — have attracted sustained academic attention. The social

dimensions — who bears the costs, who captures the benefits, how the transition intersects with existing inequalities — have received far less. This asymmetry is not merely an observation; it is the reflection of a policy agenda in which justice is acknowledged in discourse whilst being systematically subordinated, in practice, to technological and economic priorities.

This section argues that justice is not a secondary concern to be appended once the technical and economic framework of twin transition has been settled: it is a constitutive dimension of what twin transition is and what it is for. Applying Fraser's (2009) tripartite framework across four analytical domains, this section demonstrates that the justice deficits of twin transition are structural, mutually reinforcing, and inadequately addressed by existing policy instruments.

5.1 The Distribution of Costs and Benefits: An Uneven Picture

A rigorous accounting is required of how the costs and benefits of twin transition are distributed across income groups, generations, regions, and populations with differing capacities to integrate into the green-digital economy. When that accounting is undertaken, a far more unequal picture emerges than policy discourse is willing to acknowledge.

Benefits are concentrated in environments of high skill, capital, and connectivity: major urban centres with strong research ecosystems, established green-digital industrial clusters, and firms with the capital to invest simultaneously in both transitions (Rodríguez-Pose & Ketterer, 2020). Households able to invest in rooftop solar and heat pumps, and possessing the digital competence to navigate smart tariffs, are amongst those best placed to realise the promise of lower energy costs. Those who gain most from digital employment are those with higher levels of education, strong digital skills, and broad geographical mobility — attributes that are themselves unequally distributed along axes of class, age, gender, and ethnicity.

On the costs side, the mainstream literature offers a more limited accounting, though sectoral and community-level research is illuminating. The most immediate and concentrated costs of green transition fall on communities whose economic base is built on fossil fuel extraction: coal mining communities in Silesia and the Ruhr, fossil fuel-dependent regions in Romania and Bulgaria, and the wider employment ecosystem organised around these industries (Jolly et al., 2012:204). For these communities, green transition is not an abstract policy imperative but a lived dissolution of livelihoods and community identities.

The costs of digital transition follow a different distributional pattern, though they are no less real. Workers in routine cognitive tasks face automation at a pace and scale that exceeds the capacity of existing retraining systems (Autor, 2019). Older, lower-skilled workers and those in regions with limited economic foundations are disproportionately represented in this group — and are

simultaneously those with the least access to the retraining support that a just transition would provide (Eurofound, 2019:36).

The compound character of these distributional patterns — the concentration of green and digital costs on overlapping populations — constitutes the least examined dimension of twin transition's social impact. The existing literature shows that digital and green transformations are frequently treated as separate policy domains, yet in practice they generate combined pressures on the same vulnerable groups (OECD, 2023; OECD, 2024; Kalantzi et al., 2026). Indeed, the fact that many institutions continue to operate in silos contributes to a fragmented approach to the transitions underway, impeding the integrated responses that are needed (ILO et al., 2024). Those who bear the greatest costs from both transitions are frequently the same people: older, lower-skilled, more peripherally situated, and lacking the resources to navigate simultaneous transformation. Workers in energy-intensive industries, fossil fuel-dependent regions, older and lower-skilled workers, and individuals in rural areas with limited digital skills or connectivity face disproportionate challenges arising from twin transition (Eurofound, 2025, p. 13). Older workers in particular are at greater risk because they lack the ICT skills required to adapt to a digitalising economy (Eurofound, 2025, p. 14), whilst individuals with lower levels of education encounter more frequent difficulties in accessing digital infrastructure and services (European Commission, 2024). In sum, low-skilled workers, older individuals, and those living in peripheral regions face heightened exposure to both digital skills deficits and job displacement arising from green transition (OECD, 2019; European Commission, 2023).

This compound vulnerability cannot be adequately grasped by analyses that treat the two transitions separately, or by frameworks that manage just transition and digital inclusion as independent agendas. It is of critical importance to move beyond siloed approaches across key domains — decent work, digital participation, social protection, climate, energy, and green economy policy — and to adopt a governance approach grounded in holistic and mutually integrated thinking (ILO et al., 2024, p. 7). Existing sectoral approaches make it difficult to implement a coordinated and integrated policy framework capable of simultaneously addressing the multidimensional development needs of underdeveloped regions (Maucorps et al., 2023, p. 25). From Fraser's perspective, this constitutes both a redistribution and a recognition failure: the compound burden itself is invisible within the policy frameworks that produce it.

5.2 Labour Market Transformation: The Double Pressure on Vulnerable Workers

The labour market is perhaps the domain in which the social justice dimensions of twin transition manifest most visibly. Both transitions are

simultaneously restructuring labour markets, yet when taken together they produce pressures considerably more severe than either generates in isolation.

The extensive research on the labour market effects of green transition has not sufficiently foregrounded the most obvious mismatch problem: the jobs that green transition creates are not accessible to the workers it displaces. Renewable energy sector jobs require different skill profiles and are located in different places (Vona et al., 2018:716). A coal worker with thirty years' experience in Silesia cannot readily be retrained as a wind turbine technician in the Baltic. Overcoming these structural mismatches requires active investment in place-specific retraining, community economic diversification, and robust social protection systems.

Digital transition deepens these difficulties in ways that the just transition literature has yet to integrate adequately. Acemoglu and Restrepo (2019:8) demonstrate that the labour market effects of automation are concentrated in mid-skilled routine tasks — precisely the occupational profile of manufacturing and processing sector workers most affected by green transition. A worker displaced from a coal plant faces difficulty not only in finding employment in a contracting sector but in competing in a market where the very skills that might open routes to alternative employment are being automated away. This compound displacement — simultaneous and multidimensional — remains invisible to policy frameworks that address the two transitions separately.

The gender dimension has been systematically underanalysed. Women are overrepresented in service sector occupations most susceptible to digital automation, and underrepresented in the technical occupations where green and digital job creation is concentrated (ILO, 2019). Twin transition risks producing a dynamic in which the jobs created accrue predominantly to men, whilst those destroyed fall disproportionately on women. MacGregor (2010:128) connects this dynamic to the productivist epistemology of green transition: a framework that measures success by the number of technical jobs created systematically marginalises the care-intensive forms of work on which ecological sustainability ultimately depends.

The unpaid care economy adds a dimension that neither mainstream twin transition literature nor conventional just transition policy addresses adequately. Transformations in energy systems and digital infrastructure directly affect the conditions under which care is performed — energy costs, navigating administrative systems, household budgets — and these effects fall disproportionately on women (Federici, 2004:20). A labour market analysis that counts only paid employment will underestimate the true cost of transition for those who bear the greatest share of its unrecorded burdens.

Finally, the communities most exposed to job displacement are the small towns and cities undergoing deindustrialisation — places that have faced

successive rounds of restructuring over decades and have yet to recover the vitality they possessed in earlier waves of transformation (McCann, 2019:260). For these communities, twin transition is not a new beginning but the next chapter in a long story of economic disruption — and the political consequences of that experience are plainly visible in the electoral geography of anti-transition politics across Europe. Grasping the labour market effects not merely as aggregate statistics but as a story about specific places and the people who live in them is a precondition for developing policies that are both economically adequate and politically sustainable.

5.3 Spatial Inequalities: The Metropolitan Bias of Twin Transition

The spatial dimension of twin transition points to an injustice that extends well beyond the labour market. Green-digital transformation is shaped largely around the needs of metropolitan areas, and in doing so it frequently reproduces — and deepens — the inequalities that predated the transition.

Metropolitan bias operates through several interconnected mechanisms. Digital infrastructure investment — broadband, data centres, smart city systems — is spatially uneven, with urban areas achieving far greater capacity than rural ones (Salemink et al., 2017:362). Green infrastructure and innovation ecosystems are similarly concentrated in cities with the institutional capacity to attract them (Iammarino et al., 2019:280). The result is that metropolitan areas accumulate talent and investment whilst rural and peripheral regions must navigate the same transformation with more limited resources and weaker institutions. Rodríguez-Pose (2018:195) argues that the concentration of economic opportunity in metropolitan centres — what he terms the 'geography of discontent' — is a principal driver of the populist dynamics that threaten ambitious policy agendas. Spatial justice is therefore not merely an ethical concern but a political economy problem.

Within Fraser's framework, metropolitan bias encompasses three simultaneous failures: the direction of investment towards already advantaged regions constitutes a redistribution failure; the invisibility of rural communities within policy institutions constitutes a recognition failure; and the systematic exclusion of these communities from the processes that determine transition priorities constitutes a representation failure.

5.4 Just Transition: Promise, Practice, and the Missing Digital Dimension

Born from the encounter between the labour movement and environmental policy, the concept of just transition remains the most developed framework within twin transition discourse for addressing the social justice dimensions of green transformation (Stavis & Felli, 2015:29). The EU's adoption of the concept through the Just Transition Mechanism and Fund represents a significant — if partial — acknowledgement that green transition produces redistributive

consequences. Understanding what the concept currently offers, and what it systematically overlooks, is essential for evaluating the social justice credentials of the twin transition agenda.

In current EU practice, just transition comprises three components: support for workers and communities affected by the exit from fossil fuels; economic diversification in transition-affected regions; and retraining support (European Commission, 2020). These are valuable commitments. The Just Transition Fund provides an important redistribution mechanism intended to ease the economic and social costs of transformation in fossil fuel-dependent regions. Nevertheless, one dimension that the existing just transition framework systematically neglects is digital exclusion. Many regions dependent on coal and carbon-intensive industries appear comparatively more vulnerable in terms of their capacity to adapt to digital transformation, owing to structural disadvantages including ageing demographic profiles, low educational attainment, and limited skill bases. The inequalities observable across Europe in digital skill levels and internet access suggest that just transition must engage not only with employment and income compensation but also with digital access, digital skill acquisition, and the accessibility of algorithmically mediated public services² (Eurostat, 2024;

² The inequalities observable across Europe in digital skill levels and internet access are substantiated by concrete evidence demonstrating that just transition is a multidimensional problem. In 2023, only 56 per cent of individuals aged 16 to 74 in the EU possessed at least basic digital skills, with the highest rates recorded in the Netherlands (83 per cent) and Finland (82 per cent), and the lowest in Romania (28 per cent) and Bulgaria (36 per cent) — countries where the burden of coal and industrial transition is most acutely felt. The 55-percentage-point gap between these extremes signals that digital transformation risks deepening regional vulnerabilities (Eurostat, 2023). Age and educational attainment stand out as the two principal structural determinants of this vulnerability. According to 2023 data, the gap in basic digital skills between those with high levels of education and those with low or no educational qualifications reached 46 percentage points across the EU: 80 per cent of highly educated individuals possessed at least basic digital skills, compared with only 34 per cent of those with low levels of education. The picture is even more striking by age: the basic digital skills rate among men aged 65 to 74 (34 per cent) was less than half that of those aged 25 to 34 (69 per cent), and the disparity was more pronounced still among women — only 25 per cent of women aged 65 to 74 possessed basic digital skills. Whilst 82.3 per cent of individuals with high levels of education exceeded the basic digital skills threshold, this figure fell to 37.6 per cent among those with no or low levels of education (Eurostat, 2024a; Eurostat, 2026). The rural-urban divide carries particular significance for regions with a heavy industrial legacy, such as coal basins. In 2023, 55.6 per cent of the EU population possessed at least basic general digital skills, but this figure was 62.6 per cent in cities, 53.3 per cent in towns and suburbs, and only 47.5 per cent in rural areas. A similar pattern obtains in internet access: in 2023, 95 per cent of households in EU cities could access the internet, compared with 91 per cent in rural areas. The daily internet use rate among individuals in rural areas (80.3 per cent) lagged behind that of those living in cities (89.5 per cent), a disparity attributable in part to the comparatively older age profile of rural populations and to inadequate internet service provision in some rural and remote

European Commission Joint Research Centre, 2023). Digital exclusion is not a separate issue from just transition; it is one of its constitutive dimensions — and the one that most directly determines whether retraining and support resources will be genuinely accessible.

Fraser's (2009:16) framework clarifies these limitations. On redistribution, the 17.5 billion euro Just Transition Fund falls short of the scale of the transformation it is designed to manage (Claeys et al., 2019:14). On recognition, the framework sees the worker displaced by the energy transition but not the digitally excluded resident; it sees the displaced miner but not the care worker. On representation, the online processes through which Territorial Just Transition Plans are developed structurally exclude the very communities they are meant to represent. This representation failure simultaneously becomes a redistribution failure, insofar as resources are effectively redirected towards those with high digital competence rather than the most vulnerable.

Extending just transition to encompass its digital dimension in an organic rather than supplementary manner would have concrete implications: it would require that investment in digital infrastructure and skills be treated as an integral element of just transition support; that programmes be designed to be accessible through non-digital channels; and that monitoring frameworks incorporate digital access indicators alongside labour market metrics.

6. Alternative Frameworks: Thinking Beyond the Dominant Terms of Twin Transition

The preceding sections have documented what the twin transition concept conceals — the ecological costs of digitalisation, its inequality-generating risks, its dependence on growth, and the subordination of social justice to economic imperatives. A critique that only documents, however, deconstructs without constructing. This section takes on that responsibility by engaging with four bodies of literature that challenge the dominant framework: triple transition proposals, degrowth perspectives, Global South critiques, and feminist political economy. These are overlapping, dialogically related, and mutually complementary approaches.

areas (Eurostat, 2024b; Eurostat, 2024c; Eurostat, 2025). The disadvantaged position of rural regions is further confirmed by demographic data. As of 1 January 2023, the EU's age dependency ratio stood at 70.8, rising from 66.9 in predominantly urban regions to 76.0 in predominantly rural ones. This structural inequality indicates that limiting the scope of just transition to employment and income compensation will be insufficient. Indeed, the 2024 State of the Digital Decade Report projects that, absent additional measures, only approximately 60 per cent of the EU population will have attained basic digital skills by 2030 — falling significantly short of the Digital Decade target of 80 per cent (Eurostat, 2024d)

6.1 Triple Transition Proposals: Making the Social Dimension Constitutive

The most direct challenge from within mainstream debate argues for conducting green-digital transformation with an equally weighted commitment to social transformation. In this context, an increasingly prominent critical strand in the literature contends that the prevailing twin transition framework treats the social dimension not as a constitutive objective but merely as a matter of managing distributional outcomes. Sabato and Fronteddu (2020) argue that the European Green Deal's social dimension is reduced primarily to sectoral and regional instruments aimed at compensating for the costs of green-economic transformation, and that the emphasis on employability and reskilling cannot substitute for a comprehensive protective social policy framework that secures social rights. This assessment is reinforced by the analytical distinction that Zimmermann and Gengnagel (2023) draw between 'protective' and 'productive' social policy: they demonstrate that social inclusion in EGD documents is framed largely within an economy-oriented productivist logic, and that redistributive protective policies — which democratic legitimacy requires — do not feature as an integrated priority. Crespy and Munta (2023) argue that this limitation is concretely embodied in the principal transition instruments, the Just Transition Fund and the Social Climate Fund: rather than engaging comprehensively with large-scale social transformation, both instruments reflect a narrow and reactive conception of transition grounded in reskilling and targeted compensation for vulnerable groups, a structure that will prove insufficient to prevent a deepening of inequalities in the future. The social-green-digital triple transition proposed within this critical framework calls for the agenda to be restructured so that objectives such as equity, inclusion, and care are built into the design as constitutive elements. This restructuring requires that social policy be positioned not as a corrective mechanism appended after the fact to green and digital transformation processes, but as a structural framework that determines how the transition itself is defined and steered.

Dølvik and Steen (2018:14) demonstrate that the capacity of the Nordic model to manage technological change without generating excessive distributional tensions — a capacity grounded in strong trade unions, collective bargaining, and active labour market policy — is itself being eroded by the financialisation processes that digital transition is accelerating. In this context, triple transition means less adding social policy than defending the institutional solidarity that makes managed transition possible.

O'Neill et al. (2018:88) provide empirical evidence that high levels of human wellbeing can be achieved at resource consumption levels far below those of existing economies. This finding directly challenges the growth-dependence assumption embedded in twin transition. The shared limitation of triple transition

proposals, however, is that they seek to make growth more inclusive rather than to interrogate its logic at a more fundamental level. It is the degrowth literature that brings this more radical questioning to the fore.

6.2 Degrowth and Post-Growth Perspectives

The degrowth literature conceptualises degrowth as a democratic social transformation that prioritises the equitable reduction of production and consumption, the principle of sufficiency, and collective wellbeing within ecological limits (Demaria et al., 2013; Hickel, 2020). Hickel (2021:1108) extends this argument to the specific digital dimension: the growth logic of the platform economy is not an incidental but a constitutive element of the ecological crisis; a twin transition that fails to address this logic will work against its own ecological objectives. The political challenge posed by degrowth cannot be dismissed lightly.

Resistance from growth-dependent business interests, governments, and workers is substantial; moreover, a contraction in growth that is not managed with robust social protection would fall hardest on the most vulnerable.

Raworth's (2017:44) Doughnut Economics translates post-growth thinking into an analytical framework more amenable to policy processes. Amsterdam's adoption of the doughnut framework as an instrument of urban governance during its post-pandemic recovery (Doughnut Economics Action Lab, 2020) represents one of the most advanced examples of institutionalising these principles at the local scale. Nevertheless, the experiment demonstrates that whilst the framework has influenced discourse and planning, it has not produced genuine systemic change in resource consumption or social equality. This distance between analytical adequacy and political feasibility is itself a significant finding, and points to the structural conditions — including the power concentrations discussed in Section 4.4 — that constrain the translation of post-growth analysis into post-growth governance.

6.3 Global South Critiques: Challenging the Eurocentric Assumptions of Twin Transition

The twin transition concept is, both in its origins and in its primary institutional elaboration, a European concept: it was formed in response to European policy problems, by European institutions, and shaped predominantly by frameworks generated within European and North American academic communities. This does not render the concept invalid beyond Europe; it does mean, however, that it carries implicit assumptions about institutional capacity, economic structure, and policy objectives that do not hold universally.

The climate justice dimension is acute. Global South countries are, by virtually every measure, the least responsible for the historical accumulation of greenhouse gases; yet they are simultaneously the most exposed to the

consequences of climate change and the most constrained in their capacity to pursue low-carbon development pathways (Roberts & Parks, 2007:8). The existing twin transition framework does not take this injustice seriously.

The global value chain dimension is equally significant. Both green and digital transition depend on global supply chains for the raw materials and components they require. Rare earth minerals, cobalt, and silicon are largely extracted in low- and middle-income countries, frequently under conditions of severe environmental degradation, labour exploitation, and inadequate regulatory oversight (Sovacool et al., 2020:8). The electronic waste generated by the rapid obsolescence of digital technology is processed predominantly in the informal sectors of low-income countries, causing serious health harms (Forti et al., 2020:6). Twin transition, in its current form, thus externalises its environmental and social costs onto the Global South whilst concentrating its economic gains in high-income economies.

Ndlovu-Gatsheni's (2018:21) concept of epistemic freedom reveals what a genuinely decolonial approach to twin transition would require: not the export of European transition frameworks, but genuine epistemic pluralism in which the experiences and development priorities of Global South communities shape the international governance of transition on equal terms.

6.4 Feminist Political Economy: Care, Reproduction, and the Productivist Blind Spot of Twin Transition

Feminist political economy renders visible a dimension of twin transition's justice deficit that other critical traditions do not fully capture: the invisibility of care and reproductive labour within a transition framework structured around the transformation of productive systems.

Federici's (2004:8) analysis — of capitalism's structural dependence on the unpaid appropriation of reproductive labour — provides the theoretical foundation for this critique. In the context of twin transition, this dependence takes a specific form: the transformations the transition generates in labour markets and community economies impose costs on households that bear the human consequences of economic disruption, whilst the productivist metrics of the transition itself exclude these costs from its accounting.

Daggett's (2018:30) concept of petro-masculinity extends this analysis to the politics of transition: the cultural association between fossil fuel consumption and political identity directly shapes the conditions under which green transition policies can achieve legitimacy in affected communities. For MacGregor (2009), a genuinely feminist green transition cannot rest content with adding gender-disaggregated employment statistics to existing metrics; it must interrogate not only how the transition can generate jobs, but how it might shape the conditions under which people are able to care for one another and for ecological systems.

These four alternative frameworks do not constitute a ready-made substitute for the twin transition concept. They are intellectual resources that prepare the ground for more honest thinking about the simultaneous transformation of energy and digital infrastructures, and that insist on taking seriously those dimensions of injustice that the dominant framework renders invisible.

7. Conclusion: Justice as a Constitutive Dimension of Twin Transition

7.1 What This Article Has Established

This article set out from a question that the twin transition literature systematically defers: who bears the costs, who captures the benefits, and what does the current trajectory mean for those populations most exposed to the disruptive force of these transformations?

First finding: The distributional outcomes of twin transition are structural. The concentration of green and digital transition costs on older, lower-skilled, and geographically peripheral workers (OECD, 2025; Eurofound, 2025b; Gao, 2025) is not a manageable side effect; it is a constitutive feature of growth-centred design (Hickel, 2021; Bianchi et al., 2024). The literature's tendency to treat these outcomes as separate concerns — just transition here, digital inclusion there, labour market policy elsewhere — consistently produces policy frameworks that fall short (Gao, 2025).

Second finding: Growth-centred framing is not merely an analytical limitation but a structural constraint. The empirical record on absolute decoupling does not support the plausibility of green growth scenarios (Parrique et al., 2019:4; Hickel & Kallis, 2020:480). The growth logic of the platform economy, rebound effects, and the accelerating energy demand of artificial intelligence all place digital transition in tension with decarbonisation objectives (Lange et al., 2020:105; Freitag et al., 2021).

Third finding: The just transition concept is not adequate to the twin transition challenge. The failure to integrate the digital dimension creates a serious contradiction: the populations for whom the concept was developed — workers in fossil fuel-dependent regions — are simultaneously those who are excluded from just transition programmes by virtue of their digital exclusion. Incorporating the digital dimension is not an optional improvement; it is a structural prerequisite for delivering on the commitments the concept makes (Fraser, 2009:16).

Fourth finding: Alternative frameworks are not ideological additions; they are intellectual traditions that possess genuine analytical purchase on dimensions the mainstream literature cannot grasp. Their marginalisation constitutes a form of epistemic closure whose costs are ultimately borne by the very communities those traditions seek to illuminate.

7.2 Saving the Concept or Moving Beyond It?

Aşkın (2026) reached the analytically grounded conclusion that twin transition, in a critically reformed version, is worth preserving. This article occupies a more ambiguous position from a normative standpoint.

The argument in favour of critical reform carries real weight: the concept has mobilised public investment at an unprecedented scale, created a space in which the relationship between the two transitions has entered the governance agenda, and demonstrated that it can be extended without losing its integrative coherence. A twin transition concept that positions justice as a constitutive dimension, incorporates the digital dimension, and holds itself honestly accountable to ecological limits would be both analytically and politically more adequate than its current form.

The argument for going further cannot, however, be set aside. Degrowth analysis, feminist critique, and the Global South challenge each identify structural limitations inherent to the concept. A twin transition concept that genuinely internalises these critiques would be compelled to abandon growth-centred framing, productivist metrics, and Eurocentric development assumptions. These are not modest revisions; in practice, they amount to a different concept.

This article does not resolve that tension, for it reflects a genuine political and ethical dilemma between pragmatic and principled grounds. The more circumscribed question the article does answer is this: regardless of whether the concept can be saved, what does the twin transition literature minimally require for analytical and normative adequacy?

7.3 Policy Implications

At EU level: The just transition framework should structurally integrate digital access and competence as prerequisites for programmes rather than as a separate agenda. Just Transition Fund criteria and Territorial Just Transition Plans should require member states to assess and address digital barriers in affected communities. Integrated impact assessment examining the compound distributional outcomes of green and digital investment together should become a standard component of Recovery and Resilience Facility design.

At national level: Green and digital skills development programmes should be designed in an integrated manner that explicitly accounts for the mismatch between displaced workers and those able to access new employment. Care-sensitive impact assessment should be standard practice across all twin transition labour market policies.

At local level: Digital infrastructure investment should be treated and managed as a component of just transition support. Programmes must be designed to be

accessible through non-digital channels; those most in need should not be excluded by digital prerequisites.

7.4 A Research Agenda

First: How does the overlap of green and digital transition costs on the same populations vary across EU member states with different welfare state traditions and patterns of fossil fuel dependence? This comparative analysis would provide the first systematic empirical mapping of compound vulnerability.

Second: What are the measurable effects of just transition programmes on communities' digital access and competence, and how do these effects vary with programme design? Longitudinal evaluation research tracking digital inclusion indicators alongside labour market indicators would fill a fundamental gap in the literature.

Third: How do feminist political economy frameworks alter what is rendered visible in twin transition impact assessment, and what policy implications follow from this shift? Comparative case study research applying care-sensitive methodologies across different sectoral and national contexts would prove particularly productive.

Fourth: What conditions would enable Global South countries to pursue green and digital pathways in accordance with their own development priorities? This question demands genuine research partnerships that embody the equality called for by Ndlovu-Gatsheni's (2018:21) concept of epistemic freedom.

Twin transition is too consequential a process — in terms of the scale of investment it structures and the lives of the communities it will affect — to be governed without honest engagement with the justice dimensions examined in this article. Rendering these dimensions visible and insisting on their constitutive status within the twin transition agenda is the contribution this article has sought to make.

Translation Note: The English translation of this text was produced by Claude (Anthropic), ChatGPT, and Manus 1.6 Lite artificial intelligence language models and has been reviewed and revised as necessary by the author of this study.

References

- Acemoglu, D., Akcigit, U., Hanley, D., & Kerr, W. (2016). Transition to clean technology. *Journal of Political Economy*, 124(1), 52–104.
- Acemoglu, D., & Restrepo, P. (2019). Automation and new tasks: How technology displaces and reinstates labour. *Journal of Economic Perspectives*, 33(2), 3–30.
- Aghion, P., Antonin, C., & Bunel, S. (2021). *The power of creative destruction: Economic upheaval and the wealth of nations*. Harvard University Press.
- Aşkın, U. (2026). The twin transition and its analytical limits: A typology of articulation forms in green and digital transformation. In Y. A. Ünvan (Ed.), *Theory and practice in social sciences* (pp. 280–316). Platanus Publishing.
- Autor, D. H. (2019). Work of the past, work of the future. *AEA Papers and Proceedings*, 109, 1–32.
- Bianchi, P., De Propriis, L., & Labory, S. (2024). People-centred policies for a just transition (digital, green and skills). *Contemporary Social Science*, 19(1–3), 262–282.
- Bouzarovski, S., & Petrova, S. (2015). A global perspective on domestic energy deprivation: Overcoming the energy poverty–fuel poverty binary. *Energy Research & Social Science*, 10, 31–40.
- Claeys, G., Tagliapietra, S., & Zachmann, G. (2019). *How to make the European Green Deal work*. Bruegel Policy Contribution No. 13. Bruegel.
- Crespy, A., & Munta, M. (2023). Lost in transition? Social justice and the politics of the EU green transition. *Transfer: European Review of Labour and Research*, 29(2), 235–251..
- Daggett, C. (2018). Petro-masculinity: Fossil Fuels and Authoritarian Desire. *Millennium: Journal of International Studies*, 47 (1), 25–44.
- Demaria, F., Schneider, F., Sekulova, F., & Joan Martinez-Alier. (2013). What is degrowth? From an activist slogan to a social movement. *Environmental Values*, 22(2), 191–215.
- Dølvik, J. E., & Steen, J. R. (2018). *The Nordic future of work: Drivers, institutions, and politics*. Nordic Council of Ministers.
- Doughnut Economics Action Lab. (2020). *Creating city portraits: A methodological guide from the Doughnut Economics Action Lab*. DEAL. <https://doughnuteconomics.org>
- Eurofound (2019), The future of manufacturing in Europe, Publications Office of the European Union, Luxembourg

- Eurofound (2025), *Company restructuring and the twin transitions: Evidence from the European Restructuring Monitor*, Eurofound research paper, Publications Office of the European Union, Luxembourg
- Eurofound (2025b), *Living and working in Europe 2024*, Publications Office of the European Union, Luxembourg
- European Commission. (2020). *Just transition mechanism*. COM(2020) 22 final.
- European Commission. (2021). *2030 digital compass: The European way for the digital decade*. COM(2021) 118 final.
- European Commission. (2023). *European Green Deal: ensuring a just transition*. Brussels.
- European Commission. (2024). *Digital inclusion and accessibility - Issue Paper (31 July 2024)*. Brussels: Digital Working Group.
- European Commission. (2025). How to reach the EU target of 80% of adults with basic digital skills by 2030, https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/how-reach-eu-target-80-adults-basic-digital-skills-2030-2025-03-05_en
- European Commission Joint Research Centre. (2023). *JRC annual report 2023*. Luxembourg: Publications Office of the European Union.
- Eurostat. (2023) 56% of EU people have basic digital skills, <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20231215-3>
- Eurostat. (2024a) Digital skills in 2023: impact of education and age, <https://ec.europa.eu/eurostat/en/web/products-eurostat-news/w/ddn-20240222-1>
- Eurostat. (2024b) Urban-rural Europe - digital society, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Urban-rural_Europe_-_digital_society
- Eurostat. (2024c) Access to internet in urban and rural areas in 2023, <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20241122-1>
- Eurostat. (2024d) Urban-rural Europe - demographic developments in rural regions and areas, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Urban-rural_Europe_-_demographic_developments_in_rural_regions_and_areas
- Eurostat. (2025) Digital society statistics at regional level, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Digital_society_statistics_at_regional_level

- Eurostat. (2026) SDG 4 - Quality education, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=SDG_4_-_Quality_education
- Federici, S. (2004). *Caliban and the witch: Women, the body and primitive accumulation*. Autonomedia.
- Forti, V., Baldé, C. P., Kuehr, R., & Bel, G. (2020). *The global e-waste monitor 2020: Quantities, flows and the circular economy potential*. United Nations University.
- Fraser, N. (2009). *Scales of justice: Reimagining political space in a globalising world*. Columbia University Press.
- Freitag, C., Berners-Lee, M., Widdicks, K., Knowles, B., Blair, G. S., & Friday, A. (2021). The real climate and transformative impact of ICT: A critique of estimates, trends, and regulations. *Patterns*, 2(9), Article 100340.
- Gao, X. (2025). The EU's twin transitions towards sustainability and digital leadership: a coherent or fragmented policy field? *Regional Studies*, 59(1), 2360053.
- Google. (2011). *Google's carbon offsets: Collaboration and due diligence*. Mountain View, CA: Google. Retrieved from <https://sustainability.google/reports/google-carbon-offsets>
- Helsper, E. J. (2012). A corresponding fields model for the links between social and digital exclusion. *Communication Theory*, 22(4), 403–426.
- Hickel, J. (2020). *Less is more: How degrowth will save the world*. London, England: Penguin.
- Hickel, J. (2021). What does degrowth mean? A few points of clarification. *Globalizations*, 18(7), 1105–1111.
- Hickel, J., & Kallis, G. (2020). Is Green Growth Possible? *New Political Economy*, 25(4), 469–486. <https://doi.org/10.1080/13563467.2019.1598964>
- Iammarino, S., Rodríguez-Pose, A., & Storper, M. (2019). Regional inequality in Europe: Evidence, theory and policy implications. *Journal of Economic Geography*, 19(2), 273–298.
- IEA. (2024). *Electricity 2024: Analysis and forecast to 2026*. International Energy Agency.
- ILO. (2019). *Working on a warmer planet: The impact of heat stress on labour productivity and decent work*. International Labour Organisation.
- ILO, FAO, UNDP, UNICEF, UN Women & WFP, (2024) Global Accelerator on Jobs and Social Protection for Just Transitions: Annual report 2023-2024, Geneva: Global Accelerator

- IRENA. (2023). *Renewable power generation costs in 2022*. International Renewable Energy Agency.
- Jolly, S., Raven, R., & Romijn, H. (2012). Upscaling of business model experiments in off-grid PV solar energy in India. *Sustainability Science*, 7, 199–212.
- Kalantzi, E., Kakderi, C., & Panori, A. (2026). *The unequal twin transition: A bibliometric analysis of digital and green inequality research*. Social Sciences & Humanities Open (SSRN preprint)
- Lange, S., Pohl, J., & Santarius, T. (2020). Digitalization and energy consumption: Does ICT reduce energy demand? *Ecological Economics*, 176, Article 106760.
- Luccioni, A. S., Viguier, S., & Ligozat, A.-L. (2023). Estimating the carbon footprint of BLOOM, a 176B parameter language model. *Journal of Machine Learning Research*, 24(253), 1–15.
- MacGregor, S. (2009). A Stranger Silence Still: The Need for Feminist Social Research on Climate Change. *The Sociological Review*, 57(2_suppl), 124–140.
- Maucorps, A., Römisch, R., Schwab, T., & Vujanović, N. (2023). *The Future of EU Cohesion: Effects of the Twin Transition on Disparities across European Regions*. Research Report 467, The Vienna Institute for International Economic Studies, <https://wiiw.ac.at/the-future-of-eu-cohesion-effects-of-the-twin-transition-on-disparities-across-european-regions-dlp-6560.pdf>
- Mazzucato, M. (2021). *Mission economy: A moonshot guide to changing capitalism*. Allen Lane.
- McCann, P. (2020). Perceptions of regional inequality and the geography of discontent: insights from the UK. *Regional Studies*, 54(2), 256–267.
- Microsoft. (2020). *Microsoft announces it will be carbon negative by 2030*. Retrieved from <https://news.microsoft.com/source/canada/2020/01/16/microsoft-announces-it-will-be-carbon-negative-by-2030/>
- Ndlovu-Gatsheni, S. J. (2018). *Epistemic freedom in Africa: Deprovincialization and decolonization*. Routledge.
- OECD. (2019). *How's Life in the Digital Age?* OECD Publishing.
- OECD. (2023). *OECD Skills Outlook 2023: Skills for a resilient green and digital transition*. OECD Publishing.
- OECD. (2024). Digital technologies and the environment. *OECD Digital Economy Outlook 2024 (V.2)*. (87-116)
- OECD (2025), Empowered Citizens, Informed Consumers and Skilled Workers: Designing Education and Skills Policies for a Sustainable Future, OECD Publishing, Paris,

- O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature Sustainability*, 1(2), 88–95.
- Parrique, T., Barth, J., Briens, F., Kerschner, C., Kraus-Polk, A., Kuokkanen, A., & Spangenberg, J. H. (2019). *Decoupling debunked: Evidence and arguments against green growth as a sole strategy for sustainability*. European Environmental Bureau.
- Raworth, K. (2017). *Doughnut economics: Seven ways to think like a 21st-century economist*. Random House Business Books.
- Roberts, J. T., & Parks, B. C. (2007). *A climate of injustice: Global inequality, north-south politics, and climate policy*. MIT Press.
- Rodríguez-Pose, A. (2018). The revenge of the places that don't matter (and what to do about it). *Cambridge Journal of Regions, Economy and Society*, 11(1), 189–209.
- Rodríguez-Pose, A., & Ketterer, T. (2020). Institutional change and the development of lagging regions in Europe. *Regional Studies*, 54(7), 974–986.
- Sabato, S., & Fronteddu, B. (2020). *A socially just transition through the European Green Deal?* (ETUI Working Paper No. 2020.08). European Trade Union Institute.
- Salemink, K., Strijker, D., & Bosworth, G. (2017). Rural development in the digital age: A systematic literature review on unequal ICT availability, adoption, and use in rural areas. *Journal of Rural Studies*, 54, 360–371.
- Smith, B. (2020, January 16). *Microsoft will be carbon negative by 2030*. Microsoft. Retrieved from <https://blogs.microsoft.com/blog/2020/01/16/microsoft-will-be-carbon-negative-by-2030/>
- Sorrell, S. (2007). *The rebound effect: An assessment of the evidence for economy-wide energy savings from improved energy efficiency*. UK Energy Research Centre.
- Sovacool, B. K., Axsen, J., & Sorrell, S. (2018). Promoting novelty, rigor, and style in energy social science: Towards codes of practice for qualitative, quantitative, and mixed methods research. *Energy Research & Social Science*, 45, 12–42.
- Sovacool, B. K., Turnheim, B., Martiskainen, M., Brown, D., & Kivimaa, P. (2020). Guides or gatekeepers? Incumbent-oriented transition intermediaries in the European low-carbon electricity sector. *Energy Research & Social Science*, 70, Article 101716.
- Srnicek, N. (2016). *Platform capitalism*. Polity Press.

- Stavis, D., & Felli, R. (2015). Global labour unions and just transition to a green economy. *International Environmental Agreements: Politics, Law and Economics*, 15(1), 29–43.
- van Dijk, J. A. G. M. (2005). *The deepening divide : inequality in the information society*. Sage Publications.
- Vona, F., Marin, G., Consoli, D., & Popp, D. (2018). Environmental regulation and green skills: An empirical exploration. *Journal of the Association of Environmental and Resource Economists*, 5(4), 713–753.
- Zimmermann, K., & Gengnagel, V. (2023). Mapping the social dimension of the European Green Deal. *European Journal of Social Security*, 25(4), 523-544.
- Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. PublicAffairs.



BÖLÜM 15

Analysis Of Alternative Islamic Taxes and Tax Systems

Heiko Schuss¹

1. Introduction

Since decades there is an increasing interest in Islamic economics which also comprises the economic basis of an Islamic state and its tax system. This book chapter tries to analyze alternatives of Islamic tax systems. It therefore analyzes the different elements of those systems, that is the most important different taxes and other revenue sources highlighting the points which are controversial among Islamic economists and law scholars. As these scholars use references to precedents in the past, works of economic historians of the Middle East will also be considered. The text is explorative in nature and uses qualitative methods, especially the research of secondary literature of the different strands of Islamic economists, law scholars and economic historians. As these different strands of research communicate only partially with each other, this small study fills a research gap. In the restricted space of book chapter, the topic cannot be treated exhaustively and this text tries therefore to confront the views of typical representatives of these strands of literature with each other. Another limitation of this text is that it mainly uses Sunni Islamic sources and does not cover the Shī'ī positions.

2. The Place of Zakāt in the Islamic Tax Systems

Historically the Islamic taxes and tax system starts with a tax which is not a tax in the narrow sense, that is zakāt which might be translated as alms-tax or obligatory donation. On the one hand zakāt is much more than a tax as it is one of the central religious duties of every Muslim who can afford to pay it. On the other hand, it has become a common and accepted practice that zakāt is paid by the individuals directly to its beneficiaries and in most countries, it is not gathered and distributed by the state and therefore lacks one of the main characteristics of a conventional tax.

Zakāt is a religious and moral obligation which is often mentioned in the Quran. Muslims take care that they individually fulfill this obligation. But at the beginning of Islam some newly converted Arab tribes thought that it was a kind of tribute and stopped paying it after death of the Prophet. The first Caliph Abū Bakr made war on them and forced them to pay it again to his emerging government. This incident is a strong proof that zakāt should be enforced by the state and that it originally had the character of a tax. This did not change during

¹ Assist. Prof. Dr., Abdullah Gül University, Faculty of Managerial Sciences, Department of Economics, Kayseri, Türkiye, ORCID: 0000-0001-9909-9255

the following Caliphs and dynasties, but during the reign of the Umayyads and 'Abbāsids the zakāt collectors and administrators became more and more corrupt and as a result the believers started to reject the claim of the state to gather and distribute zakāt. Instead, they distributed their payments directly to beneficiaries in their vicinity. It became even a discussion if a believer would fulfill the religious obligation when paying to a corrupt state zakāt collector. Islamic law scholars which were critical towards the state and its practices would deny that, while other Islamic law scholars close to the government would confirm it. Eventually, the states in the Muslim world would rely more on other Islamic and secular taxes and zakāt would be paid by the individual believers as obligatory donation to the beneficiaries of their choice (May 2013).

Based on its important place in the Quran and the state enforcement and administration of zakāt in the early period of Islam some modern scholars interpret zakāt and its principles as the basis of an Islamic tax system. Murat Çizakça, for example, thinks that the Quran mentions intentionally only one tax, that is zakāt, in order to limit the size of the state. This would be a minimal state which mainly provides defence. The other social services, Çizakça argues, should be provided by waqfs, which might be translated as pious or charitable foundations, trusts or endowments. The economic and social function of zakāt and waqf are therefore related to the system he proposes. Şadaqa (voluntary donations), which is mentioned in the Quran, and waqf are also closely related, waqf being the instrument which makes the benefit of a donation perpetual (Çizakça 1998, 46-47). Not the state, but the people would via this institution produce a lot of the services, like education, health care, also care for the poor, which nowadays are more often financed or managed by the state. This choice of a minimalist state with a strong waqf sector would imply that the rich founders and administrators of the waqf sector would decide about which social services would be offered and for which beneficiaries they would be provided.

Timur Kuran is an author who does not share Çizakça's very positive view on historical waqfs, rather he sees them as an instrument for the protection of the property of the rich from tax and expropriation and even thinks that they strengthened the authoritarianism in the Middle East (Kuran 2016; Adiguzel & Kuran 2024). With regard to zakāt Timur Kuran also thinks that it financed the state at the early Islamic period. He characterizes zakāt as predictable and mildly progressive. While the poor of the society which do not possess a minimum of wealth or income (nişāb) are not obliged to pay this tax, the wealthy and rich which earn or possess more than this minimum know how much they have to pay. The rates are modest and cannot be changed by the government. All this provides protection of private property from exaggerated and arbitrary taxation. Kuran sees here the principles of private property protection and constraints of the government which offered the chance to develop political liberties over time. But in reality, strong interest groups found reasons to exempt specific categories of wealth and income from zakāt and thus the state turned towards other taxes which it gathered in a more arbitrary and oppressive way (Kuran 2020).

What both Çizakça and Kuran do not consider when they contend that it was zakāt which financed the nascent Islamic state is that the groups of beneficiaries of zakāt were fixed by the Quran and did not mention many essential state services, like the payment of judges or the provision of basic infrastructure, etc. How could zakāt then be the primary source of income for the state? While zakāt could finance some state tasks at the beginning of the Islamic period, another source was probably more general and flexible. During the fast expansion of the Islamic territory and successful wars there was an abundance of spoils of war (ghanīma). Four fifth of them were distributed among the participating warriors, which might have been enough incentive and reward during the first successful wars to finance most of the armies. Considering that the military was the largest burden on a pre-modern state budget, it may explain why in the first years no additional tax was needed. One fifth (khums) of the spoils of war, according Quranic command, was for God, the Prophet, his relatives, orphans, the needy and the wayfarer. Already under the second Caliph ‘Umar valuable conquered agricultural land in Iraq was not distributed according to the formula explained, but its tax or rent was used for the general state budget (Abū Yūsuf 1969, 55, 78-83, 94-117).

Zakāt cannot be spent on whatever the state or the government might need, but has to be distributed among eight categories of recipients, namely the poor, the needy, the zakāt workers, those whose hearts are being reconciled, for liberating slaves, persons in debt, for the sake of God and the wayfarer. The category of “for the sake of God” was interpreted as helping men who wanted to participate in a holy war (jihād), but did not have the material means to do so. After some time, it was thought that the category of “those whose hearts are being reconciled” had stopped to exist, but modern Islamic law scholars discuss probable modern interpretations of this category. Besides the necessity to pay the livelihood of the zakāt administrators, the other categories are all about people who were in need for support in a general sense during the time of the Prophet. This shows the strong social commitment of Islam, but it also shows that zakāt does not cover all state tasks. Modern Islamic law scholars and economists try to broaden the coverage of zakāt by interpreting the different categories in a wider sense, for example for financing health and educational infrastructure. One can therefore distinguish zakāt distribution concepts which are narrow and other which are broader (Farschid 2012, 216-222; Nasir & Rahman 2020; Qaradawi 2000).

There is also a difference between minimalist and maximalist concepts defining which types of wealth and income can be taxed by zakāt. The categories which were included in the early period of Islam are not controversial. Zakāt has to be paid on assets like silver, gold, trade goods, camels, sheep, goats, barley, wheat, grapes and dates. While there are specific schedules on how much has to be paid for the mentioned animals, the rate for silver, gold and trade goods is 2,5% on these assets if they are owned for a moon year. For the agricultural harvests mentioned the tax rate is 10% (‘ushr) if they were watered by rain and 5% if they were produced with irrigation. Without going into details, it might be

mentioned that later some of these categories were enlarged via analogical reasoning (*qiyās*). For example, other harvests, like rice, were taxed based on the analogy that rice is also basic food which can be stored and measured (Qaradawi 2000).

For the modern economic systems, it is important if only the traditional categories of wealth and income are taxed with *zakāt* or if these categories are broadened to include capital or profits from modern factories and firms, stock shares, (Islamic) bonds, wages and salaries, etc. These categories are reflecting the majority of modern wealth and incomes. The answer to this question decides if *zakāt* can be a major part of a modern Islamic tax system and would be able to make a significant impact on the reduction of poverty, or if its economic and social impact remains marginal due to a small *zakāt* budget. There is no consensus on the issue, some Islamic law scholars want to restrict *zakāt* to the traditional types of assets and incomes. Others want to include all kinds of income and productive assets. With some simplification it can be stated that either the asset is taxed or the income, not both together for the same asset. The tax rate is 2,5% on the value of the asset and 10% on profits and incomes. For wages and salaries Qaradawi prefers a tax rate of 2,5%, he argues that the rate should be lower – not 10% - because wages and salaries are more than the profits of a company the results of human effort (Qaradawi 2000). The economic distortion created by *zakāt* depends on which *zakāt* definition is used, a minimalist or maximalist. A minimalist interpretation would lead to distortions against the traditional goods and sectors, while modern types of assets and income would have the advantage. A maximalist interpretation would avoid those allocative distortions to a high degree. Still the difference between sectors taxed with 2,5% on their assets, like trade, and sectors taxed with 10% on the profit, like agriculture, would cause some distortions.

3. Other Taxes and Government Revenues in the Classical Islamic Period

3.1. Kharāj

It was already mentioned that the second Caliph ‘Umar did not distribute agricultural land in Iraq to the conquering warriors, but dedicated it to the whole Islamic community. The revenues of this land would be administered by the government. Based on this example, a theory was developed that *zakāt* or ‘*ushr* had to be paid on agricultural land which was private property of Muslims, while farmers on land of the Islamic community or state land had to pay a higher levy, essentially combining land rent and tax, the *kharāj*. Originally the lower ‘*ushr* was taken from Muslims on this land and the higher *kharāj* from non-Muslims. But the new definition which depended on the status of the land and not on the religion of the tenant prevented that the tax basis eroded through conversion to Islam. The tax rate in the past was variable and ranged from 20% to 66,6% depending on the productivity of the land (Abū Yūsuf 1969; Lokkegaard 1950; Oran 1988, 13). A view on the tax rates of *kharāj* explains already partially what Timur Kuran sees as predatory taxation. While the ‘*ushr*, the agricultural form of *zakāt*, only takes a fixed and modest share of the harvest, the *kharāj* seems to be

designed to maximize state revenues. It was a real burden on the farmers and might have reduced their investments in agriculture.

3.2. Customs Duties

The second Caliph 'Umar also introduced customs duties for trade goods entering from outside the Islamic territory. Goods imported by non-Muslim foreigners would be taxed with 10% which was reciprocal to what Muslim traders had to pay entering Byzantine territory. Non-Muslims living in Islamic territory under Muslim protection would pay 5% importing goods, and Muslims just 2,5%. The customs duties of Muslims would be interpreted as a form of zakāt (Abū Yūsuf 1969, 140-141). Customs duties are on the one hand, flexible, the rates can change depending on the behavior of the trading partners. On the other hand, they contain an element of religious discrimination which would have been evaluated as normal in the past, but would be problematic in our times.

3.3. Poll Tax (Jizya) on non-Muslims

The poll tax (jizya) had to be paid by non-Muslims who lived in Islamic territory and had accepted Islamic rule and were protected by the Islamic state. It was a payment for the protection of their life and property. It is also mentioned that they had no obligation to fight in military campaigns and the jizya was therefore a substitute for the burden of military service. While its rate was first 1 dinar per capita, it was changed to 48 dirham for the rich, 24 dirham for the middle class and 12 dirham for the poor. 12 dirham which is a silver coin would represent ca. the value of 1 dinar which is a gold coin. Women, children, the sick and monks did not have to pay the jizya (Aghnides 1969, 403-404).

The argument that the jizya is mainly substitute for military service seems convincing when one considers the situation in the 19th century where the population was eager to avoid conscription. For the early time of Islam that seems less plausible. Being a warrior in one of the conquering armies would have been attractive providing the chance to win large amounts of spoils of war (ghanīma) as mentioned before. Being excluded from it was rather a disadvantage. Thus, the jizya was an expression of the rule of Muslims which were first few in number over large populations of non-Muslims in the conquered territories. It provided a predictable source of revenue for the Islamic state. Nowadays, in Muslim-majority countries, the theoretical importance of such a tax on religious minorities has diminished and the discriminatory character makes it problematic in a modern environment.

4. Government Revenues from Mineral Resources and Rentier States

In classical Islamic law large roads, rivers, mineral resources at the surface, wasteland, etc. belong to the whole Islamic community and are therefore administered by the state. In which form the state uses these resources, for example with its own personal or renting it out to private entrepreneurs is up to the government. For mineral resources under the earth which needed considerable investment to make them productive, the opinions of Islamic law scholars differed. Māliki law scholars were of the opinion that these belonged to the whole

community represented by the state. Other law scholars thought that they could also be private property and their owners should pay 20% on their profits (Zarqa 1986).

These rulings are especially important after oil and natural gas has become drivers of the global economy. The Muslim world is rich in these resources and their reserves. As the respective countries can treat these mineral resources as state property from an Islamic point of view, as they were not developed before, they can either produce oil and gas using state companies or let international companies do the work which then have to pay taxes and royalties. As the production costs of oil in the Middle East is much lower than in other regions, the oil production creates economic rents. The rich revenues which flow to the state enable it to cover most of its expenditures without levying taxes on its nationals. While that seems to be advantageous for the citizens, it also has disadvantages. Economic rents are distributed according to a political and not an economic rationality, and support inefficient economic structures. The state regimes are not dependent on the citizens to levy taxes and the political participation of the citizens can be restricted (Beck 2009). Among the Muslim countries there are quite a lot which can be characterized as oil rentier states. This is a modern phenomenon, but the use of the revenues from oil and gas fields by the state is in accordance with Islamic law. The rentier states might therefore be seen as an exception, or as a specific form of an Islamic state revenue system which depends on geography and cannot be replicated in regions without these natural resources or in times when these resources have a lower economic value.

5. Secular Taxes in Islamic Tax Systems

In modern times the question arises if the state is allowed to introduce other taxes which are not mentioned in the Quran, the prophetic tradition and in the classical Islamic law, for example the income tax, corporate tax, value-added tax, inheritance tax, etc. In short, those taxes are called in this book chapter secular taxes, because they have no specific Islamic character. But, of course, in case that Islamic law scholars come to the conclusion that they are allowed, they can be a part of an Islamic tax system.

As taxes are limiting private property rights which are defended in Islam law, some scholars argue that additional taxes above those mentioned in the Quran, the prophetic tradition and or legitimated by the consensus of the early Islamic community are forbidden. These Islamic law scholars would therefore be in favor of a state which is constrained to essential tasks which can be financed by a narrow tax system. Other law scholars are of the opinion that additional taxes are allowed in case that the Islamic state needs more revenue for fulfilling necessary tasks which the traditional Islamic taxes cannot provide. For example, securing the subsistence level of the citizens is an approved task among scholars. But higher taxes in order to decrease the inequality of income and wealth is a controversial issue (Faridi 1983, 28).

With regard to the question whether direct taxes or indirect taxes should be used, Islamic economists think that the tax burden of indirect taxes, like a value-

added tax, hurts the poorer parts of the society and leads to a more unequal distribution of income and wealth. As exception, indirect taxes on luxury goods are more accepted. Some authors also see the problem that direct taxes only reach a part of the population in developing countries with weak tax institutions. Indirect taxes might therefore be necessary to tax the informal part of the economy and guarantee the necessary level of state revenues (Iqbal 1991, 111; Iqbal 1986, 230; Salama 1983, 112-113).

A further controversial issue is whether the taxes should be proportional or could also be progressive. The proponents of progressive tax rates among Islamic economists evaluate them as an appropriate tool to reach a more equal Islamic society. This opinion is not shared by all. With view on the proportional tax rates of the classical Islamic taxes, they reject progressive taxation. In addition to that, assuming that the rich in an Islamic society have acquired their income and wealth only through allowed activities, it would be unjust to burden them with disproportionate tax rates on their *ḥalāl* income and wealth (Chapra 1992, 297; Faridi 1992, 10-11, Salama 1983, 112).

The discussion shows that among Islamic economists there is a wide range of opinions about these secular taxes. Some would not allow them at all, some use them with low, proportional tax rates and others would use them with progressive tax rates to reach a more equal distribution of wealth and income.

6. Islamic Charitable Foundations (Waqf) and the Tax Base

Among Islamic economists there is a general appreciation of the waqfs, the Islamic charitable foundations, trusts or endowments. They recommend to strengthen the waqf system in order to achieve a variety of social goals. Murat Çizakça even sees the waqf as the primary instrument to provide an Islamic society with social services. Not a large inefficient state, but the private citizens should via this tool decide which services are provided and how they are provided (Çizakça 1998, 46-47).

The property and income of waqfs is tax-exempt which made them popular in the past, but also facilitates its existence in the present. The waqf system which Çizakça envisions has to be large in order to fulfill its assigned role. An evaluation of the past where waqfs owned considerable proportions of the cultivated land and of the urban real estate, shows that this is possible (Çizakça 1997, 5-6; Kahf 1992, 9).

The consequence of a large waqf sector is the reduction of the tax base. This might on the one hand, for some observers be a welcome constraint on the tendency of the state to increase its revenues and influence in society. For others it might be dangerous to reduce the capacity of the state and let rich donors decide which social policy is applied.

7. Conclusion

The study above shows that in the frame of Islamic economics and Islamic law a wide variety of Islamic tax systems are possible. Which of them is chosen

and realized is dependent on the preferences of the scholars, politicians and citizens. With regard to the Islamic law, there are scholars who defend a narrow tax system only allowing taxes and government revenues which can be based on the Quran, prophetic traditions, the consensus of the early Islamic community and precedents from the early days of Islam. Other scholars broaden the tax system considerably by using analogical reasoning (*qiyās*) being guided by the principles of Islam and taking the modern situation and challenges into consideration. Thus, there are several alternatives for an Islamic tax system.

- Proponents of a minimal state only providing for essential tasks would finance such a state via a minimalist definition of religious taxes. Social services would be provided mainly via waqfs, zakāt and ṣadaqa (voluntary donations).
- Proponents of a large social welfare state could finance it mainly via secular taxes. Zakāt, ṣadaqa and waqfs would, as voluntary contributions of the citizens complement the state efforts.
- A large social welfare state could also be financed by a combination of broadly defined religious taxes, like zakāt, and complementary secular taxes.
- Muslim countries rich in oil and natural gas resources have the possibility to develop large welfare states financed mainly by oil and gas rents without the necessity to tax their citizens.

Muslim states with considerable secular taxes and Muslim rentier states are existing in reality. For Islamic economists which aim at the Islamization of economy and society that cannot be satisfying. Depending on their preference for a minimal or a large state they might prefer models with less secular taxes, and an increased role for religious taxes.

This text covers mainly the positions of Islamic economists and law scholars, and of economic historians. It does not cover the legislation in the different Muslim countries or the recent political discussions about the state, its tasks and the tax system in those countries. It also did not include the specific positions of the Shī'a or the situation of the tax system in Iran. Further research in these areas should be conducted.

References

- Abū Yūsuf, Y. B. I. (1969). Kitāb al-Kharāj, translated and provided with an introduction and notes by Ben Shemesh, in: Ben Shemesh, A., *Taxation in Islam*, Vol. III, Brill and Luzac & Co. Ltd.
- Adiguzel, F. S., & Kuran, T. (2024). *Keeping while giving: The perpetuation of inequalities through private Islamic waqfs*. Economic Research Initiatives at Duke (ERID) Working Paper, (305). <http://dx.doi.org/10.2139/ssrn.3836060>
- Aghnides, N. P. (1916). *Mohammedan theories of finance*. New York: Columbia University, reprint 1969.
- Beck, M. (2009). Rente und Rentierstaat im Nahen Osten (Rent and rentier state in the Near East). In M. Beck, C. Harders; A. Jünemann, & S. Stetter (Eds.). *Der Nahe Osten im Umbruch: Zwischen Transformation und Autoritarismus* (pp. 25-49). Wiesbaden: VS Verlag für Sozialwissenschaften.
- Çizakça, M. (1997). Towards a comparative economic history of the waqf system. *Journal al-Sajarah*, 2(2).
- Çizakça, M. (1998). Awqaf in history and its implications for modern Islamic economies. *Islamic Economic Studies*, 6(1), 43-70.
- Faridi, F. R. (1983). A theory of fiscal policy in an Islamic state. In Z. Ahmed, M. Iqbal, & M. F. Khan (Eds.) *Fiscal policy and resource allocation in Islam* (pp. 27-45). Islamabad: Institute of Policy Studies & International Centre for Research in Islamic Economics.
- Faridi, F. R. (1992). Islamic criteria for the distribution of tax burden. *Journal of Objective Studies*, 4i, 1-13.
- Farschid, O. (2012). *Zakat in der Islamischen Ökonomik. Zur Normenbildung im Islam. (Zakat in Islamic economics. About the formation of norms in Islam)*, Würzburg: Ergon-Verlag.
- Iqbal, M. (1991). Financing economic development. In A. H. M. Sadeq, A. H. Pramanik, & N. M. bin Hj. N. Hassan. (Eds.). *Development and finance in Islam* (pp. 101-127). Kuala Lumpur: The Islamic University Press.
- Kahf, M. (1992). *Waqf and its sociopolitical aspects*. IRTI, Jeddah, Saudi Arabia.
- Kuran, T. (2016). Legal roots of authoritarian rule in the Middle East: Civic legacies of the Islamic waqf. *The American Journal of Comparative Law*, 64(2), 419-454.
- Kuran, T. (2020). Zakat: Islam's missed opportunity to limit predatory taxation. *Public Choice*, 182, 395-416. <https://doi.org/10.1007/s11127-019-00663-x> .
- Lokkegaard, F. (1950). *Islamic taxation in the classic period*. Copenhagen: Branner & Korch.

- May, S. (2013). Political piety: The politicization of zakat. *Middle East Critique*, 22(2), 149-164, <https://dx.doi.org/10.1080/19436149.2013.783536> .
- Mannan, M. A. (1986). *Islamic economics – theory and practice*. Cambridge: Hodder and Stoughton.
- Nasir, M. S. & Rahman, F. U. (2020). *Analysis of the recipients of zakat and the current situation*. 4th International Conference of Zakat Proceedings, 331-338. ISSN: 2655-6251.
- Oran, A. (1988). Fiscal policy in an Islamic state. *Journal of Islamic Banking & Finance*, 4, 7-56.
- Qaradawi, Y. (2000). *Fiqh al zakah: A comparative study of zakah, regulations and philosophy in the light of Quran and Sunnah*. Scientific Publ. Centre King Abdulaziz University.
- Salama, A. A. (1983). Fiscal policy of an Islamic state. In Z. Ahmed, M. Iqbal, & M. F. Khan (Eds.) *Fiscal policy and resource allocation in Islam* (pp. 27-45). Islamabad: Institute of Policy Studies & International Centre for Research in Islamic Economics.
- Zarqa, M. A. (1986). Islamic distributive schemes. In M. Iqbal (ed.) *Distributive justice and need fulfilment in an Islamic economy* (pp. 163-215). Leicester: The Islamic Foundation Press.

