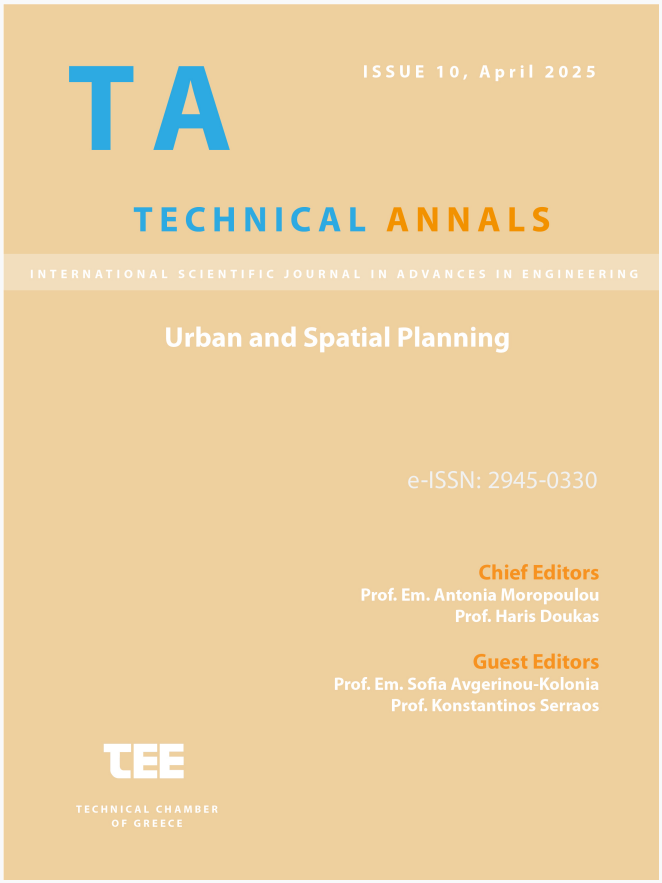
Technical Annals

Vol 1, No 10 (2025)

Technical Annals



The unique features of Greek cities as catalysts for implementing a polycentric city model for urban sustainability

Katerina Christoforaki

doi: 10.12681/ta.40730

To cite this article:

Christoforaki, K. (2025). The unique features of Greek cities as catalysts for implementing a polycentric city model for urban sustainability. *Technical Annals*, *1*(10). https://doi.org/10.12681/ta.40730

The unique features of Greek cities as catalysts for implementing a polycentric city model for urban sustainability

Katerina Christoforaki

National Technical University of Athens 42, Patision st., 10682 Athens, Greece
ka.christof@gmail.com

Abstract. Greek cities exhibit unique characteristics that can serve as catalysts for implementing the polycentric city model as a means to enhance urban sustainability. This paper explores how Greece's urban structure, historical development, and land-use patterns create both challenges and opportunities in adopting this model. While Greek non-rural cities, inherently possess mixed-use neighborhoods, which align with the core principles of polycentricity, persistent urban issues such as inefficient mobility networks, fragmented governance, and limited public participation hinder progress.

The study examines global case studies, particularly the 15-minute city model implemented in Paris, and assesses its applicability within the Greek context. Key factors, including mobility strategies, land-use policies, and citizen engagement, are analyzed to determine their feasibility in Greek central cities. Furthermore, the research highlights the importance of fostering local adaptation rather than direct replication of international models.

Findings indicate that while Greece has a comparative advantage in certain aspects of polycentric urbanism, targeted interventions are required to address existing urban shortcomings. These include strengthening sustainable mobility infrastructures, preserving the diversity of urban functions, and fostering public participation in planning processes. Ultimately, the study advocates for a strategic, context-specific approach to integrating polycentric principles into Greek urban environments, ensuring resilience, sustainability, and improved quality of life for residents.

Keywords: Polycentric city model, urban sustainability, Greek polycentric city

1 Introduction

In economic science, the term "comparative advantage" was first formulated by theorist David Ricardo in 1817 to describe the inherent, distinguishing feature of a system that makes it more efficient and gives it a competitive edge over other systems. This concept emerged at a time when economic theory began to recognize the natural environment as an integral part of the system - a finite and directly impacted component of economic activity. A system can be described as the sum of characteristics that we define as resources, which apart from the environment includes both economic and social variables. Similarly, in urban planning, a city is viewed as a system composed of

various characteristics, including the built environment, the natural environment, history, economy, social dynamics, and, crucially, its users. Based on this theoretical framework, urban planning can also assess the comparative advantage or superiority of one region over another in implementing a theoretical model.

Historically, Greece has been characterized by numerous particularities, especially concerning land ownership, public property, housing production, and rural land management. These features have largely constituted a comparative disadvantage. The challenges stemming from these issues, extensively documented in the literature over the past decades (see: M. Mantouvalou, 2023 [7], D. Karydis, 2008 [6] , G. Sarigiannis, 2000 [9]), have collectively contributed to problematic urban development, inadequate environmental protection, weak legislative enforcement, and a fragmented institutional framework. These persistent issues necessitate immediate intervention to enable Greek cities to withstand the growing pressures for sustainable and resilient urban environments, particularly in the face of climate change and the energy crisis.

Amidst this already challenging reality, the COVID-19 pandemic forced the world to slow down and reevaluate multiple aspects of daily life, including economic, social, and commercial activities. More importantly, within the scope of this study, the pandemic served as a turning point in redefining how urban users interact with the city. The rapid transformations imposed not only on economic and social sectors but also on urban daily life prompted major cities worldwide to reconsider their operational frameworks under these new conditions. Simultaneously, the increasing demand for action against climate change has intensified research into the optimal functional model for contemporary cities, reassessing daily mobility, communication networks, and transportation needs.

2 The Emergence of the Model

The polycentric city model has re-emerged in scientific and political discourse as a potential response to these challenges. Its contemporary iteration incorporates new technologies and a user-oriented approach to fostering greener, environmentally friendly urban spaces that help combat climate change. Given the urgent need to transition toward a more sustainable environment and a user-friendly urban structure aligned with the principles of sustainable development, a polycentric urban layout - with mixed-use zones and extensive connectivity - can create a new urban landscape tailored to 21st-century environmental requirements.

Cities worldwide, each with unique characteristics, are moving in this direction. Notable examples include Melbourne, Australia [1]; Ottawa, Canada [2]; Shanghai, China [3]; and Bogotá, Colombia [4]. In Europe, Barcelona, Milan, and Paris are a few of the cities that have also initiated similar projects. Paris specifically represents a particularly significant case study in promoting the polycentric "15-minute city" concept. Since 2019, under the leadership of Mayor Anne Hidalgo and urban planner Carlos Moreno - the concept’s primary proponent - the city has been rapidly redesigning its public spaces to prioritize sustainable mobility and environmentally friendly transportation. The implementation of this model in Paris has provided valuable insights into both the

successes and challenges of its application, which can serve as valuable input for strategy formation in other cities [5].

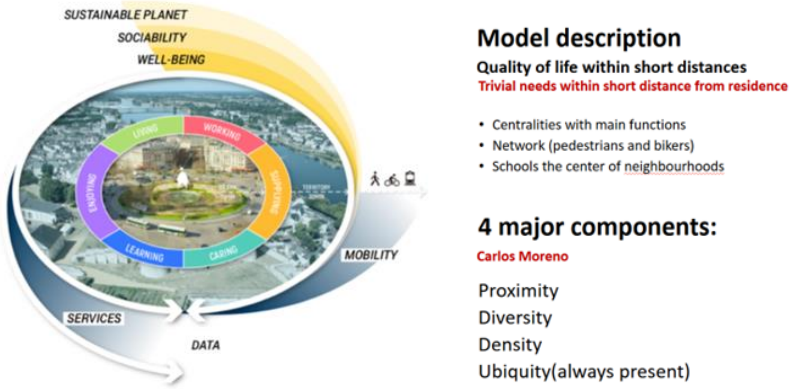


Fig. 1. Moreno's representation of the 15-minute city principles [8]

Moreno's strategy is structured around two key axes: Mobility and Services, aiming to achieve the triad of sustainability - social cohesion - well-being. His approach suggests that rather than focusing solely on eco-friendly transportation, efforts should be directed toward reducing the need for mobility altogether. This principle is operationalized by ensuring that essential daily needs can be met within short distances from residential areas, focusing on the concept of travel time. Moreno identifies six fundamental everyday needs that should be accessible within close proximity: residence, work, commerce, healthcare, education, and leisure, arguing that one's residence should be a within walking distance of less than 15 minutes from each of them.

As demonstrated by both empirical evidence and Moreno's own advocacy, the 15-minute city model - designed to enhance urban quality of life - must be adapted to the unique socio-economic, cultural, and spatial characteristics of each city [10]. The Parisian model, while a compelling prototype, cannot be directly replicated in every urban setting. Flexible and adaptive approaches are required to account for local particularities and priorities.

The fundamental principles of the model envision the creation of "walkable" cities that enable residents to meet their predefined daily needs within close proximity. To achieve this, the primary challenges that must be addressed include the development of safe routes and the concentration of land uses that accommodate essential functions such as education, commerce, employment, leisure, and (potentially) administration in a central and easily accessible location.

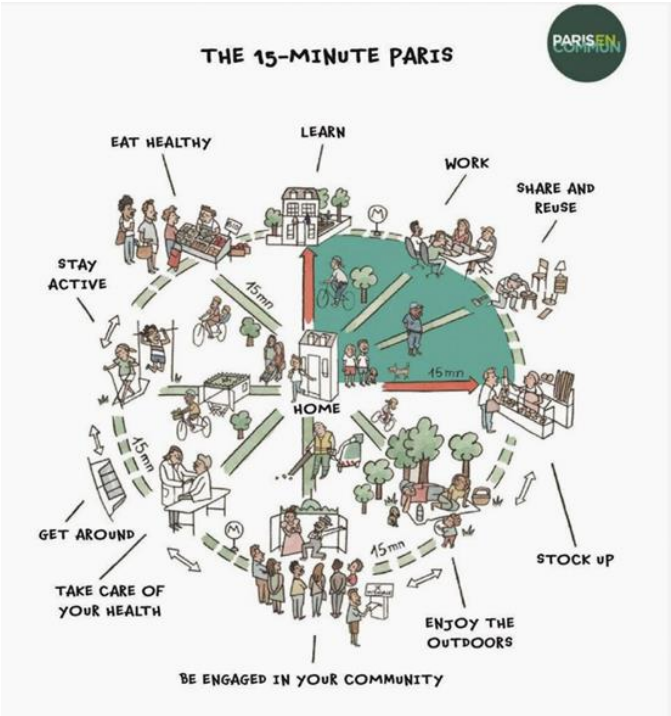


Fig. 2. Paris Strategy [11]

The common focal point and central axis of the strategy adopted by major European cities seeking to implement this model is the creation of centralities through the enhancement of multifunctionality and the encouragement of mixed land uses. In several cases, such as Paris, emerging new centers are proposed to be structured around educational institutions, as their spatial distribution has already taken into account both population density as well as the city's needs within a small radius. Attracting, establishing, or strengthening diverse land uses within local centers is a complex goal and a significant challenge for all cities. It requires the implementation of strategies with a strong social dimension to prevent gentrification and the creation of social inequalities. In this regard, the specific actions, objectives, and outcomes of the strategies followed by both Paris and other major cities have not yet been clearly documented. Specifically for Paris, certain individual strategies have been identified that aim to strengthen neighborhoods and engage citizens in the proposal development process. However, these strategies have not been explicitly linked to the broader 15-minute city framework.

Beyond meeting essential needs (services), mobility is the second key pillar of the strategy. The objective is to connect urban functions by creating safe routes to and from neighborhood centers, with a strong emphasis on promoting sustainable mobility principles. Taking Paris as an example once again, the traffic-related changes introduced during the pandemic - when car usage was already reduced - have been reinforced and now constitute the city's primary urban planning strategy.

On the other hand, the Parisian experience showed that partially implementing the strategy creates the possibility of misunderstanding the scope of the program. The actions taken need to be clearly related to each other in order to avoid fragmented application and poor results. Finally, it also showed that there needs to be clear communication of the objectives of the strategy. People's inclusion appears to be crucial throughout both the planning and implementation process [5].

3 The Greek Experience

Applying this experience to Greek cities necessitates an assessment of the model's core objectives and their feasibility in Athens. For the purposes of this paper the examination focuses on a typical suburb of Metropolitan Athens. This means that, similarities to the central area of Athens in terms of proximity, mixed uses and urban density are still present, however there are no special factors such as historical or touristic aspects that need to be taken into account.

3.1 Services

A central goal of the first strategic pillar is the establishment of multifunctional urban cores within small-scale neighborhoods. Greek cities inherently possess this small-scale, mixed-use characteristic, a byproduct of land development processes in the past century. During Greece's urban expansion, the absence of a coordinated city planning strategy allowed small landowners to develop their properties autonomously, leading to the mosaic of land uses and ownership seen today. This characteristic - considered an advantage in adopting the 15-minute city model - is a major challenge for many European cities designed under modernist planning principles that emphasize strict zoning. The core principles of Moreno's model - proximity, diversity, density, and ubiquity - are already partially fulfilled in Greek cities, offering them a competitive edge in integrating the 15-minute city strategy.

However, certain aspects require further investigation, such as the reinforcement of declining urban functions and the protection of existing land-use diversity from the pressures of tourism-driven monocultures, which are increasingly affecting both major cities and islands in Greece. Addressing this issue is essential for the country not only for implementing this strategy but also for broader social, environmental, and economic reasons.

3.2 Mobility

The second strategic axis, which focuses on connectivity and the creation of safe routes to local centers, is crucial for reducing travel time. Despite the seemingly straightforward and cost-effective implementation of sustainable mobility strategies, this remains a significant challenge in Greek cities due to limited public space, fragmented planning, and poor infrastructure maintenance. Establishing a comprehensive and safe pedestrian and cycling network requires a well-integrated plan rather than piecemeal interventions - something that is currently difficult in Greece, due to spatial constraints, planning inefficiencies, and -often- a lack of political commitment.

As a result, Greece - a country with an excellent climate for walking and non-motorized transportation for most of the year - fails to capitalize on this comparative advantage. A study on vehicle usage, conducted by the University of Thessaly with the supervision of prof. G. Koutedakis, revealed that 82% of surveyed drivers use their private cars for round-trip distances of less than four kilometers, while only 18% travel longer distances [12]. Round trips of under four kilometers fall within the influence radius of a neighborhood unit, and this percentage could be significantly reduced if a safe alternative route for non-motorized transportation were available.

4 …With a twist

Delving deeper into the need to reduce commuting, as emphasized by Carlos Moreno's core principles, one might expect that the mixed-use nature of Greek cities would naturally lead to decreased travel within major urban centers. However, this is not the case. Beyond Athens' already limited public transportation network compared to other European metropolises, car use remains a dominant aspect of daily life. According to Eurostat data from 2023, the car ownership rate in Greece was slightly above 0.5 vehicles per capita, while the average number of passengers per vehicle barely exceeded one person per car [13]. Despite a slight decline in car usage during the economic crisis (2007–2017), it gradually returned to pre-crisis levels after 2018 and surged even more during the COVID-19 pandemic, as people sought to avoid crowded public spaces. The trend has remained high despite the significant increase in fuel costs.

According to 2023 Eurostat data, 44% of car trips are related to commuting to and from work. When factoring in trips related to accompaniment - such as transporting children to activities - this figure approaches nearly half of all car trips.

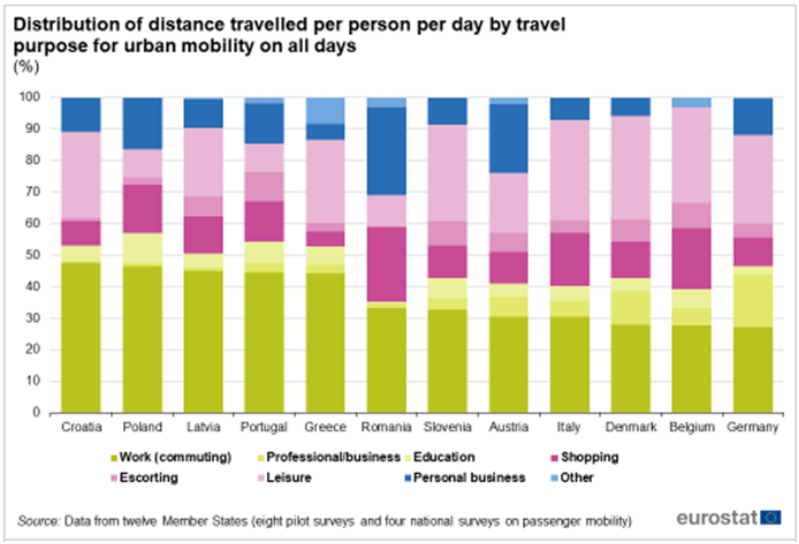


Fig. 3. Distribution of distance travelled per person per day by travel purpose for urban mobility [13]

Distribution of distance travelled per person per day by travel purpose for urban mobility on all days
(%)

	Work (commuting)	Professional/ business	Education	Shopping	Escorting	Leisure	Personal business
Belgium	27.7	5.7	5.9	19.4	8.1	30.2	0.0
Denmark	28.1	10.4	4.4	11.5	6.9	32.9	5.8
Germany	27.2	16.5	2.8	9.0	4.7	28.0	11.6
Greece	44.3	2.8	5.8	4.7	2.8	26.4	5.0
Croatia	47.4	0.5	5.0	7.9	0.9	27.3	10.8
Italy	30.5	5.1	4.7	16.6	4.1	32.0	7.0
Latvia	45.0	1.0	4.5	11.8	6.3	21.8	9.0
Netherlands	:	:	:	:	:	:	:
Austria	30.5	6.1	4.3	10.2	6.0	19.0	21.9
Poland	46.5	1.2	9.4	15.3	2.4	8.8	16.5
Portugal	44.6	2.9	6.8	12.7	9.3	9.0	12.8
Romania	33.4	1.5	0.4	23.4	0.7	9.6	27.8
Slovenia	32.7	3.5	6.5	10.2	7.7	30.7	8.6

Notes: (:) not available.
The shares of the travel purposes may not add up to 100% due to the small residual category "Other/unknown", not shown in the table.
Source: Data from twelve Member States (eight pilot surveys and four national surveys on passenger mobility)

eurostat

Fig. 4. Distribution of distance travelled per person per day by travel purpose for urban mobility [13]

The inability to introduce strong incentives to encourage the use of public transportation - whether due to the limited network, low reliability, or poor service quality - creates a persistent challenge in Greece when it comes to reducing private car usage. Addressing this issue requires long-term, consistent planning. While such planning is essential given the urgent need for more sustainable urban environments, it must also be accompanied by short- and medium-term solutions.

However, within the framework of the 15-minute city strategy, integrating workplaces into the set of essential services that should be available within close proximity to residents is entirely feasible. The COVID-19 pandemic demonstrated that a significant portion of the workforce can operate remotely. By establishing neighborhood-based remote work hubs, commuting by private car can be significantly reduced for those who can work without physical presence, while also making travel more efficient for those whose professions require them to be on-site. Both outcomes contribute to environmental protection and an improved quality of life, as studies have shown a direct link between commuting time and psychological well-being. Their research shows that individuals with longer commutes tend to report reduced levels of well-being [12].

Specifically, providing the option for remote work outside the home helps mitigate several risks that became evident during the pandemic, such as the transfer of work-related costs to employees, sedentary lifestyles, isolation, and procrastination. It also ensures access to well-equipped workspaces for those who lack suitable conditions at home. At the same time, it enables the creation of multifunctional neighborhood hubs that, beyond offering workspace, can also support complementary uses tailored to the specific needs of each community. The operation of these hubs can be funded through a combination of public and private sector investments, utilizing an appropriate reciprocity and exchange model between the two.

5 Plus: People Inclusion

As with all urban planning strategies, this approach requires strong public participation to ensure both effective design and broad acceptance. Meaningful engagement of stakeholders guarantees that interventions reflect the diverse needs, aspirations, and perspectives of local communities and residents, fostering a sense of ownership and inclusivity.

The experience of Paris has highlighted the significance of this factor. Despite the municipality's expertise in public consultation and urban policy communication, many aspects of the strategy were pre-determined - often inadequately communicated - and implemented through a top-down approach. As a result, the model did not receive the level of public support it might have otherwise garnered [5].

Moreover, the Parisian case demonstrated the crucial role of governance structures and the political framework in advancing transformative urban initiatives. Effective and coordinated communication and collaboration between municipal authorities, regional governments, and other administrative bodies are essential for balancing diverse interests, mobilizing resources, and overcoming bureaucratic hurdles.

Unfortunately, Greece has little positive experience to contribute in terms of public consultation and civic participation. It is common for such processes to be carried out only as a formality to meet regulatory requirements, without genuine efforts to engage with stakeholders. Even when users collectively attempt to participate by providing input, there is a strong likelihood that their contributions will not be seriously considered in the final planning outcome. This lack of meaningful engagement is further exacerbated by a weak culture of participation and public dialogue among users themselves. Compared to other European cities, resident communities in Greece often struggle to organize effectively and find appropriate channels to express their needs and demands.

6 Conclusions

As cities worldwide confront mounting challenges such as climate change, social inequality, and inefficient urban structures, adopting sustainable urban planning strategies becomes increasingly essential. The polycentric city model, particularly as exemplified by the 15-minute city concept, presents a viable framework for creating resilient and inclusive urban environments.

In the Greek context, the existing mixed-use nature of cities offers a strong foundation for polycentric urbanism. However, to fully realize the benefits of this model, several critical interventions are necessary. First, enhancing sustainable mobility infrastructure - such as expanding pedestrian pathways, cycling networks, and reliable public transportation—must be prioritized to reduce dependence on private vehicles. Second, urban policies should aim to protect land-use diversity, ensuring that local economies and social structures are not disrupted by tourism-driven gentrification. Third, a paradigm shift is needed in urban governance, fostering a culture of civic engagement and participatory planning to create more inclusive and community-driven urban transformations.

Furthermore, this study underscores the importance of flexibility in policy implementation. While international examples provide valuable insights, direct replication of models such as the Parisian 15-minute city may not be suitable for Greece without significant adaptations to local economic, cultural, and spatial realities. Instead, Greek cities should leverage their inherent characteristics - compact urban forms, vibrant neighborhood economies, and established land-use patterns -to develop tailored solutions that align with contemporary sustainability goals.

Ultimately, integrating polycentric principles into Greek urban planning requires a coordinated, long-term strategy that bridges the gap between policy vision and practical implementation. A holistic approach - encompassing improved mobility, strategic land-use planning, and active citizen participation - can enable Greek cities to transition toward more sustainable, efficient, and livable urban environments.

References

1. Plan for Victoria, Department of Transport and Planning https://www.planning.vic.gov.au/guides-and-resources/strategies-and-initiatives/20-minute-neighbourhoods
2. Engage Ottawa, https://engage.ottawa.ca/the-new-official-plan/news_feed/15-minute-neighbourhoods
3. Shanghai action guidance of 15-minute community life circle, https://ghzyj.sh.gov.cn/cmsres/3a/3a52297af92f43a29899e3d61e4c5cc2/36def90629a5427faec623ed7f2b4dbb.pdf
4. The Bogota Post, https://thebogotapost.com/going-local-15-minute-cities-is-bogota-one/51097/
5. Christoforaki, K. (2024) Towards a sustainable urban Future: The 15-minute city approach in Paris, France, *Sustainable Development, Culture, Traditions Journal*, https://sdct-journal.com/index.php/2015-10-18-22-23-19/2024-volume-2-a/532-towards-a-sustainable-urban-future-the-15-minute-city-approach-in-paris-france)
6. Karydis, D. (2008), *Τα επτά βιβλία της πολεοδομίας*, Papasotiriou
7. Mantouvalou, M. (2023), *Η παραγωγή του αστικού χώρου ως κοινωνικό και πολιτικό διακύβευμα,* Angelus Novus
8. Moreno, C. The 15 minutes-city: for a new chrono-urbanism! https://www.moreno-web.net/the-15-minutes-city-for-a-new-chrono-urbanism-pr-carlos-moreno/
9. Sariyannis, G. (2000), *Athens 1830-2000*, Symmetria,
10. Vasilopoulou, T. (2024), Η Αθήνα «πόλη των 15 λεπτών»; Ο Κάρλος Μορένο το πιστεύει, *Καθημερινή,* 9/2/2024 https://www.kathimerini.gr/society/562875292/i-athina-poli-ton-15-lepton-o-karlos-moreno-to-pisteyei/ (τελ. ανάκτηση 10/2024).
11. Resistire Project, https://resistire-project.eu/better-stories/paris-as-a-15-minute-city/
12. Athens – Macedonian News Agency, https://www.amna.gr/home/article/872296/To-82-ton-Ellinon-odigoun-gia-apostaseis-mikroteres-ton-4-chiliometron---Poies-einai-oi-sunepeies---Milaei-sto-APE-MPE-o-omotimos-kathigitis-G-Koutentakishttps://ec.europa.eu/eurostat/statistics-explained/index.php?title=Passenger_cars_in_the_EU
13. Eurostat, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Passenger_mobility_statistics

14. Euronews, https://www.euronews.com/next/2024/09/25/these-are-europes-longest-and-shortest-commutes-to-work-how-does-your-country-compare