

خطوط القوة



Lines of Power

The path of Al Boraq through, power, politics and progress
Research Abrar Asag-Gau 5015545

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Fig 1. Smallest link between the two continents Hayes, M. (2023, 17 october)

1. Introduction

As a child, I often sat around the table listening to relatives share their journeys between Morocco and Europe. Stories filled with exhaustion, tension, and quiet endurance. No one spoke of comfort, welcome, or dignity. Last summer, I found myself again in that same line. Moving slowly through a maze of metal fences under the burning sun. Around me stood elderly people leaning on canes, and a man without a leg waiting in silence in his wheelchair, exposed to the heat with nowhere to rest.

What struck me was not just the physical discomfort, but how routine it had become. How the space seemed designed to manage movement without care. And yet, the atmosphere wasn't hostile. I exchanged a few words with the Guardia Civil and even shared a laugh with the Moroccan border guards. The people were not the problem. The difficulty lay in the design, in the architecture itself. It functioned efficiently, perhaps even exactly as intended, but at the cost of basic comfort and humanity.

The objective of this research is to promote more human-centered infrastructure by critically analyzing a large-scale infrastructure project in Morocco, the country of my origin. The study focuses on various aspects of the urban domain, such as architecture, spatial planning, technological innovations, and environmental issues, to develop comprehensive, integrated solutions. Through this interdisciplinary approach, the project contributes to the creation of meaningful solutions for the placement of this tunnel in Morocco.

1.1 Context/Background

Connectivity has become the defining signature of our age. Like freedom or capitalism, it is a world-historical concept that transcends borders, fostering global integration and transformative change (Anholt, 2018). With rapid urbanization and advancing technology, millions of people connect to global networks daily (Anholt, 2018). The integration of physical and digital infrastructure now brings challenges such as energy consumption, urban density, and distribution efficiency (Palmisano, 2008). As cities grow and adapt, investment and growth increasingly gravitate toward regions with robust, smart infrastructure (Palmisano, 2008).

In this evolving landscape, Europe is seeking to strengthen its infrastructure and resource partnerships with Africa, particularly through the European Green Deal and in response to rising global competition (Damluji et al., 2024). The proposed Spain-Morocco tunnel, first envisioned in 1869 (SECEGSA, 2024), presents a significant opportunity to enhance connectivity between the two continents, connecting the two continents along the strait of Gibraltar. By addressing energy and logistical needs, this tunnel could further integrate Europe and Africa, fostering economic growth and political cooperation (الاقويطي, 2024).

Tangier, a historic port city at the crossroads of Europe and Africa, stands at the center of this project. Over the past few decades, the city has transformed from a modest port town into a major economic hub, attracting national and international investments. Tangier is now a focal point for regional development and global trade, making it a critical link in any infrastructure project aimed at connecting the two continents (CBRE, 2022).

This research takes the form of a design proposal for the final train stop in the city Tangier, the last station before entering Spain. It engages directly with the spatial and symbolic construction of a border within the city itself. Rather than treating the border as a fixed line of separation, the project explores how it might function as a space of connection, care, and inclusion. The aim is to investigate how border infrastructure can coexist with the principles of an inclusive urban environment.

1.2 Problem Statement

Despite Tangier's rapid growth and modernization, the benefits of this transformation have not been evenly distributed across all districts. Wealthier areas have reaped the rewards of large-scale infrastructural projects, while marginalized neighborhoods remain disconnected from essential services and opportunities (Wippel, 2018).

These socio-spatial divisions are further exacerbated by infrastructure initiatives that prioritize economic growth over local needs, widening the gap between different parts of the city (Wippel, 2018; Le Tellier, 2006). This is not only the case in the city of Tangier, multiple researches show that high-income neighborhoods benefit more from public transport investments, than low-income neighbourhoods (Heilmann, 2018; Calderón 2014)

Historical and political tensions between Spain and Morocco, coupled with Europe's focus on managing migration flows and addressing regional security concerns (Requena, 2019), further complicate the potential impact of the tunnel in Tangier. If these inequalities are not addressed, the tunnel risks reinforcing existing socio-economic divisions, both between Europe and Africa and within Tangier itself. Addressing these challenges require careful planning to ensure that such ambitious infrastructure projects foster inclusive growth.

Without equitable policies and a focus on local communities, these developments may exacerbate existing disparities, undermining the potential benefits of enhanced connectivity and regional integration (Haoyue, 2023). Leading to the question: How can infrastructure projects like the Tunnel be designed and implemented to address socio-spatial divisions and promote equitable development in Tangier?

1.3 Research questions

Main question:

How can infrastructure projects like the Tunnel be designed and implemented to address socio-spatial divisions and promote equitable development in Tangier?

The mainquestion is answered by a set of subquestions, looking into the history, connectivity, similarities with other projects and strategies.

Subquestions:

1. How has the historical development of Tangier as a port city influenced current infrastructural challenges and socio-spatial divisions?
2. What impact does improved connectivity, have on the socio-economic dynamics of cities?
3. How have similar infrastructure projects influenced the urban landscapes of cities, and what lessons can be drawn for the Tunnel?
4. What strategies can be implemented to ensure that the integration of the tunnel promotes inclusive growth and mitigates the risk of deepening socio-economic inequalities?

2. Theoretical Framework

The theoretical framework provides the academic basis for understanding how large-scale infrastructure projects shape urban space and social relations in general. It offers conceptual tools for analyzing how infrastructure is not only a physical or economic intervention, but also a political instrument that organizes movement, access, and exclusion. By drawing on theories such as dromology, technopolitics, and infrastructural boundaries, this framework allows for a critical reading of how design and planning decisions reproduce or challenge existing socio-spatial divisions within a city.

Dromology (Virilio)

French thinker Paul Virilio introduces the term dromology. The idea that speed is a key concept for understanding modern infrastructure (2006). Infrastructure accelerates traffic and information, but this accelerated mobility is never neutral. Virilio emphasizes that whoever controls speed has power. Infrastructure is more than a means of bridging distances; it is an instrument of power and control. It determines who can move, under what conditions, and who is excluded. According to Virilio, infrastructure thus functions as a form of concentrated power over movement, which can favor certain groups and exclude others. The promise of connection in mega-infrastructure projects raises questions about inequality. Careful consideration must be given to policies that reinforce existing hierarchies. Virilio's vision makes it clear that socio-spatial inequalities can be exacerbated when speed is prioritized without regard for who has access. Infrastructure can thus become a "weapon" in social and political struggles, rather than a connector.

In a city historically marked by uneven development by flows of people, goods, and capital, speed becomes a selective force. The mobility is not equally distributed: the Moroccan passport ranks 68th on the visa index list while the Spanish passport ranks third (VisaIndex, 2024). This disparity illustrates how speed is unequally available, depending on nationality, class, and legal status. Dromology thus offers a critical lens through which to examine how the promise of faster movement can obscure deeper patterns of control and exclusion in the urban landscape of Tangier.

Infrastructure as a border

Where Virilio points to control through speed, border studies show how infrastructure itself can become a border. Large cross-border projects physically connect regions, but can create new social divisions. Huub Dijstelbloem (2021) describes the European external borders as an example of extreme infrastructure. They have been formed into technical border systems that push inclusion and exclusion to the extreme and create exclusion zones in humanitarian and legal terms. Border infrastructure allows passage but also selects people and excludes others. This is also done in ways that override a country's rights and procedures. In zones of exclusion, a concept related to Agamben's state of exception, entire groups are rendered virtually powerless in the name of border security (2003). Infrastructure thus literally functions as a border. A physical structure forms a division between those who are allowed to pass and those who are not.

This critical view of infrastructure as a border is relevant to Tangier. Historically, Tangier has been a border city between Europe and Africa. Large-scale infrastructure projects over the years have often served both as a connection and as a barrier for different groups. A new tunnel can bring continents together, but it can also create the risk of zones of inclusion and exclusion within the city itself. Theories about infrastructure as a border provide a lens through which to analyze how infrastructure projects reinforce socio-spatial divisions.

Megaprojects and socio-spatial fragmentation

Related to the above concepts is the literature on the effects of mega-infrastructure projects on cities. These projects fundamentally redraw urban space. Research shows that mega-projects are associated with economic acceleration and increased investment, but also with social disruption. For example, Gellert & Lynch (2003) argue that mega-infrastructure initiatives may stimulate national growth and attract global capital flows, but at the same time lead to forced relocations of residents, fragmentation of the urban fabric, and ecological damage. The result is often that the benefits are unevenly distributed. Certain neighborhoods or groups benefit, while others suffer from displacement or new barriers within the city. These insights support Virilio's and Dijstelbloem's warnings that without inclusive planning, existing socioeconomic divisions will deepen. In Tangier, there is a real risk that the tunnel will centralize economic activities around hubs, creating sharp contrasts between developed centers and disadvantaged areas. Peripheral neighborhoods could thus become further marginalized. The concept of infrastructural violence refers to the damage caused by unequal access to infrastructure. This is a risk that this study explicitly seeks to address through proactive strategies.

Technopolitics of infrastructure

The construction and design of infrastructure are considered an inherently political process, which is where the term technopolitics is introduced. Technopolitics implies that technical systems are the result of political choices, values, and power relations (Dijstelbloem, 2021). Infrastructure is a manifestation of political decisions in material form. The route, entrances, and exits, which neighborhoods are connected or not, are the result of conscious choices that serve some interests and harm others. In the academic context, this means infrastructures are not a neutral objects, but a political actor networks. This implies that technology and politics are intertwined. A tunnel, for example, is a product of geopolitical visions, economic forces, and social interests. This research speaks of an infrastructural state (Dijstelbloem, 2021) in which government and technology together create social order.

It is important to note that every technical design choice for the tunnel takes a position on the distribution of accessibility and risks.

Infrastructure as compromise and mediation

In line with technopolitics is the idea of infrastructure as a social compromise. Rather than a purely top-down planned object, large-scale infrastructure is a negotiated result of conflicts of interest and cooperation between actors. The design reflects the concessions that have been made and the interests that have been prioritized. Importantly, this is not static. The integration and implementation of infrastructure is a continuous process of mediation. Inclusive integration requires a continuous process of coordination and adjustment rather than a decision point. This is in line with Latour's idea that technological objects only acquire their ultimate meaning and function in social practice (2005). The tunnel should therefore be seen as a platform for dialogue and adjustments. By approaching infrastructure as something that needs to be mediated between people, technology, and politics, it becomes possible to steer towards inclusive outcomes. The concept of mediation thus provides a framework for linking policy strategies to theoretical insights.

Kinopolitics and viapolitics

Two concepts that further theorize the relationship between mobility, infrastructure, and politics: kinopolitics and viapolitics. Kinopolitics is derived from the Greek kinesis for movement. The theory was developed by Thomas Nail (2019). It refers to a way of analyzing in which movement is central to politics and history. Borders and cities are understood as temporary outcomes of the flows of people, goods, and capital. The kinopolitical approach to Tangier's past, for example, looks at how colonial migration flows, trade routes, and population movements have shaped the city. This is discussed in the historical analysis. The emphasis is on the organization of flows through time. Tangier's role is thus analyzed in order to understand how current socio-spatial structures have emerged.

Viapolitics shifts the focus from movement itself to the routes and corridors along which movement takes place (Walters, 2015). It is about the politics of the road itself. Viapolitics answers the question of how infrastructure creates or conditions the possibility of mobility. It is also important how that infrastructure exercises political power. The spatial design of connections is central. The planned infrastructure in Morocco is a “via” that is explicitly politically charged. The thesis translates the insights from the kinopolitical historical analysis to this viapolitical domain. This results in a translation from historical flows to the design of future trajectories. This creates a complete picture. These perspectives emphasize once again that infrastructure must be understood in political-spatial terms in order to answer the central research question.

Infrastructure is not neutral, but rather a politically driven instrument that shapes access, movement, and power. The tunnel may link continents, but it also threatens to deepen existing socio-spatial divisions in the city Tangier. By drawing on theories of dromology, technopolitics, and viapolitics, this framework offers critical insights into how infrastructure can reinforce exclusion or, instead, promote urban development that is inclusive.

3. Methodology

This research adopts a multi-method approach to explore the socio-economic impact of the Tunnel project on Tangier. Each method contributes to a comprehensive understanding of how the tunnel will reshape Tangier’s urban fabric and socio-economic dynamics, ensuring the analysis is grounded in both historical context and practical realities.

The first method used is the Archival analysis. To understand Tangier’s historical context and social changes, archival analysis is conducted. This involves examining historical documents, maps, and policy records to trace the city’s transformation to its current state. The analysis provides valuable insights into the socio-spatial differentiation within the city.

The second method is the Fieldwork. On-site observations are critical for understanding the social structure and urban dynamics of Tangier. Since certain aspects of the city’s urban structure are not documented online, fieldwork plays a vital role in capturing these details firsthand. I have visited Tangier from 9 till 14 December 2024. As Morocco is my home country, I have visited the city before in the summer. The pictures used in this research however, all are taken on the visit in December 2024.

The mapping method is used to identify key intervention points by analyzing multiple layers of infrastructure data. This method compares the city’s scenarios before and after the tunnel to effectively visualize potential changes and effects. Mapping is a proven method for understanding the connections between social and spatial aspects. Urban anthropology and architecture are combined. Mapping becomes not only a representation, but also a participatory and interpretative tool. The method helps to reveal both visible and invisible urban dynamics that are important for the integration of the tunnel in Tangier (Genz, Drohan, 2018).

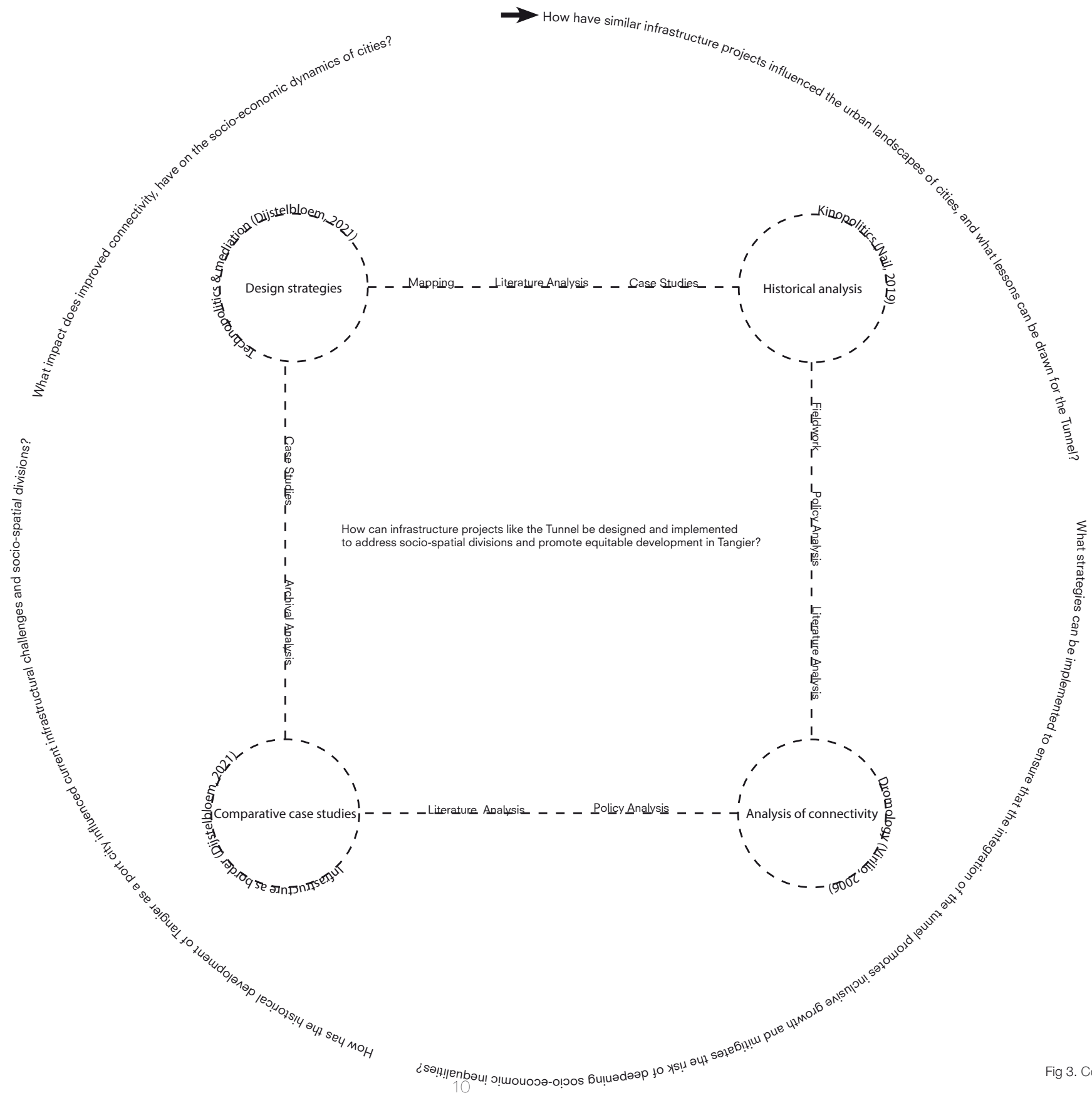
The research also makes use of Case studies. For answering the third sub question: How have similar infrastructure projects influenced the urban landscapes of cities, and what lessons can be drawn for the Tunnel?, the effect of multiple Mega Projects on a cities Urban fabric have been analyzed. The Mega project The Channel Tunnel (England, France), The Øresund Bridge (Sweden, Denmark), The Marmaray Project & The Eurasia Tunnel (Turkey) and The Hong-Kong-Zhuhai-Macau Bridge (China) serve as an example on how the citie could change socially and how the flows will change the city.

The research also makes use of a Policy analysis. Policy documents related to urban planning and infrastructure development are reviewed to assess how they shape the socio-economic outcomes of connectivity projects in the city of Tangier.

Conceptual Diagram

The diagram shows the four main research steps. The research begins with a historical analysis of Tangier, approached from the perspective of cinematic politics. The second step involves the analysis of connectivity trends, informed by Virilio’s dromology. Here, the concept of speed/power serves as a lens to interpret the impact of new connections on socio-economic dynamics. The third step compares case studies of megaprojects, focusing on the concept of infrastructure as a boundary. This theoretical lens helps to distill from the cases how large-scale infrastructure sometimes operates as a dividing line between inclusion and exclusion.

The research concludes with the formulation of design strategies for tunnel integration. This is linked to insights from the technopolitics and mediation approach. The emphasis is on the political mediation of infrastructure in order to arrive at inclusive solutions. The arrows in the diagram illustrate the relationship between each step and the relevant theoretical framework. To answer the main question, a combination of empirical analysis and theoretical reflection has been chosen.



4. Research

The research investigates how the historical, infrastructural, and socio-political evolution of Tangier has shaped the city's current urban challenges. The first chapter begins with a historical analysis to examine how Tangier's past continues to influence the contemporary urban landscape.

4.1 Historical analysis

The first question posed in this research is: How has the historical development of Tangier as a port city influenced current infrastructural challenges and socio-spatial divisions? The historical analysis conducted in this following chapter lays the foundation for understanding the dynamics of the city and its urban landscape, and identifying patterns and trends.

4.1.1 Late History

The city of Tangier is built on a chalky limestone hill (Ionesco, 1967) and has been a significant trading post since the middle of the first millennium BC (El Idrissi, 2012). Over time, various dynasties conquered the city, each leaving a lasting mark on its cultural and architectural heritage. During the early to mid-20th century, Tangier was periodically under the collective administration of several countries, attracting many Western settlers (Hannoum, 2019).

As noted in an article from a Dutch newspaper *Ons Land* dated 1933, the city's international administration established Tangier as a hub of political and artistic activity (De Graeve, 2023). This reputation peaked in the 1950s and 60s when the city became a magnet for artists and writers from Europe and the United States (Hannoum, 2019). However, socio-spatial divisions were already evident during this period, stemming from the economic disparities between the local Tangier population and Western settlers (Hannoum, 2019). Tangier's international status fostered a unique cultural blend, still evident in its architecture today. At the same time, it laid the groundwork for uneven infrastructural development, a topic that will be explored further in this study. This historical context is essential for understanding the present-day challenges related to urban planning and social equity within the city.

Lines of power



Fig 4. Entrance Roman Necropolis Own picture (2024)



Fig 5. European architecture with the city. Own picture (2024)



Fig 6. Dutch newspaper *Ons Land* dated 1933 (De Graeve, 2023)

In 1956, Morocco gained its independence, and by 1962, Tangier became a summer residence for the Moroccan royal family . Morocco's independence marked a significant shift in the country's demographics and cultural landscape. With the departure of a large portion of the former European settlers, space was cleared for the reintegration and empowerment of the Arabic-speaking population that moved to tangier from what was once part of French Morocco (Knowledge networks, n.d.). However, Tangiers population was part of northern Rif region, that had been under Spanish colonial rule. The Rif is predominantly inhabited by the Amazigh (Berber) people, who have their own distinct language and cultural identity (Sadiqi, 1997). As King Hassan II pursued the vision of a unified Arabic state, the Amazigh population and their cultural autonomy were perceived as a challenge to this national agenda. This led to periods of oppression and marginalization of the Amazigh people. In a notable shift, however, the king committed in 1994to the inclusion of

Tamazight, the Amazigh language, in Moroccan schools, marking an important step toward cultural recognition and integration (Carrera, 2023).

4.1.2 Political, Diplomatic, and Economic transformations (1990s to present)

In the last 30 years, Tangier has seen significant political, diplomatic, and economic developments that have shaped it into a strategic port city. In 1999, King Mohammed VI ascended the throne, marking a new era of modernization for Morocco (Abouzzohour, 2020). His reign emphasized international diplomacy, urban renewal, and economic development. In 2011, Morocco initiated regionalization reforms, granting more autonomy to regions like Tangier-Tetouan-Al Hoceima to decentralize power and promote local governance (Embassy of the Kingdom of Morocco, n.d.). The Arab Spring further pushed for constitutional reforms, allowing for more democratic participation. By 2020, Tangier had become a focal point in Morocco's foreign relations.



Fig 7. Tangiers coastline Own picture (2024)
14

Economically, Tangier has undergone significant infrastructural transformations, evolving from a modest town to a global logistics and industrial hub. In 2007, the Tangier-Med Port project was realized, becoming Africa's largest port and logistics hub. By 2019, the port expanded further, gaining the status of a global maritime trade center. Large international companies, such as Renault, established major production plants in the city, contributing to its industrial growth (CBRE, 2022).

Despite industrialization, Tangier remains a popular tourist destination due to its cosmopolitan history, beaches, and medina. Several urban renewal projects, such as the Marina Bay project and the new railway station opened in 2018, have modernized the city. The railway station connects Tangier to Casablanca via a high-speed rail network (TGV) , improving accessibility and connectivity (Wippel, 2023).

4.1.3 Social and environmental challenges

Tangier's historical role as a significant port city has deeply influenced its present-day urban challenges, particularly in terms of socio-spatial fragmentation. The city's development has prioritized creating globally connected infrastructure at the expense of local integration. For instance, large-scale projects such as the Tangier Med port and associated special economic zones have created isolated hubs that are more closely linked to international markets than to Tangier's surrounding regions (Wippel, 2019). These projects, while boosting Tangier's global connectivity, have contributed to territorial fragmentation by physically fencing off large portions of the city, including previously accessible public spaces(Planel, 2009).



Fig 8. The operation of El Boraq at rush hour Own picture (2024)
15



Fig 9. Community's own market Own picture (2024)

The closure of the inner-city port and the relocation of industrial facilities to the periphery have worsened this divide. Workers who once had easy access to jobs in the city center now face long commutes to industrial zones, often under deteriorating traffic conditions. In some cases, workers have lost their jobs altogether due to the shift toward more automated and specialized industries, which require a highly skilled workforce that is often sourced from other parts of Morocco rather than locally trained (Barthel & Planel, 2010). Agricultural areas have been expanded to accommodate these projects, further displacing local communities. These changes reflect a pattern where Tangier's port development has favored global economic integration over addressing the needs of its local population, resulting in increased socio-economic inequalities and spatial divisions within the city (Wippel, 2018).

4.1.4 History of the connection along the Strait of Gibraltar

Between six and nine million years ago, tectonic movements caused the creation of the Gibraltar Arch, which separated the Mediter-

anean Sea from the Atlantic Ocean. Ultimately, Atlantic waters broke through this barrier and the present-day Strait of Gibraltar formed (SECEGSA, 2024).

The idea of connecting the two continents dates back to 1869. The French engineer Charles de Villedeuil was inspired by the opening of the Suez Canal, and proposed an underwater tunnel under the Strait. Several proposals followed over the decades, but it was not until 16 June 1979 that King Juan Carlos I of Spain and King Hassan II of Morocco signed the Joint Declaration of Fez. Established in this was the terms of reference studies for a permanent link to promote a lasting relations between Africa and Europe (SECEGSA, 2024).

Building on this commitment, Spain and Morocco signed a scientific and technical cooperation agreement on 8 November 1979. This led to the creation of two state institutions in 1981: SECEGSA in Spain and SNED in Morocco, charged with carrying out feasibility studies for the project (SECEGSA, 2024). Despite these efforts, the project has encountered many obstacles. The shortest proposed route of 14 kilometres is problematic due to the extreme depth of the strait in that area and the presence of exceptionally hard rock. The region's location near the boundary of the Eurasian and African tectonic plates poses seismic risks, further complicating construction (Perucho et al., 2015).

Political factors have also significantly slowed progress. Tensions between Spain and Morocco, particularly over the Western Sahara conflict, have disrupted cooperation in recent years (WalawPress, 2024). In spring 2022, however, Spain changed its stance on Western Sahara by supporting Morocco, reviving hopes of realising the tunnel. According to Al Jazeera, the agreement to resume feasibility studies was signed in 2022 (2024). These studies began in 2024 and should be completed by 2026. Both countries aim to start construction in 2026, with the goal of completion before the 2030 FIFA World Cup, jointly organised by Spain, Morocco and Portugal. The maximum completion date has been set at 2045 (Al Jazeera, 2024).

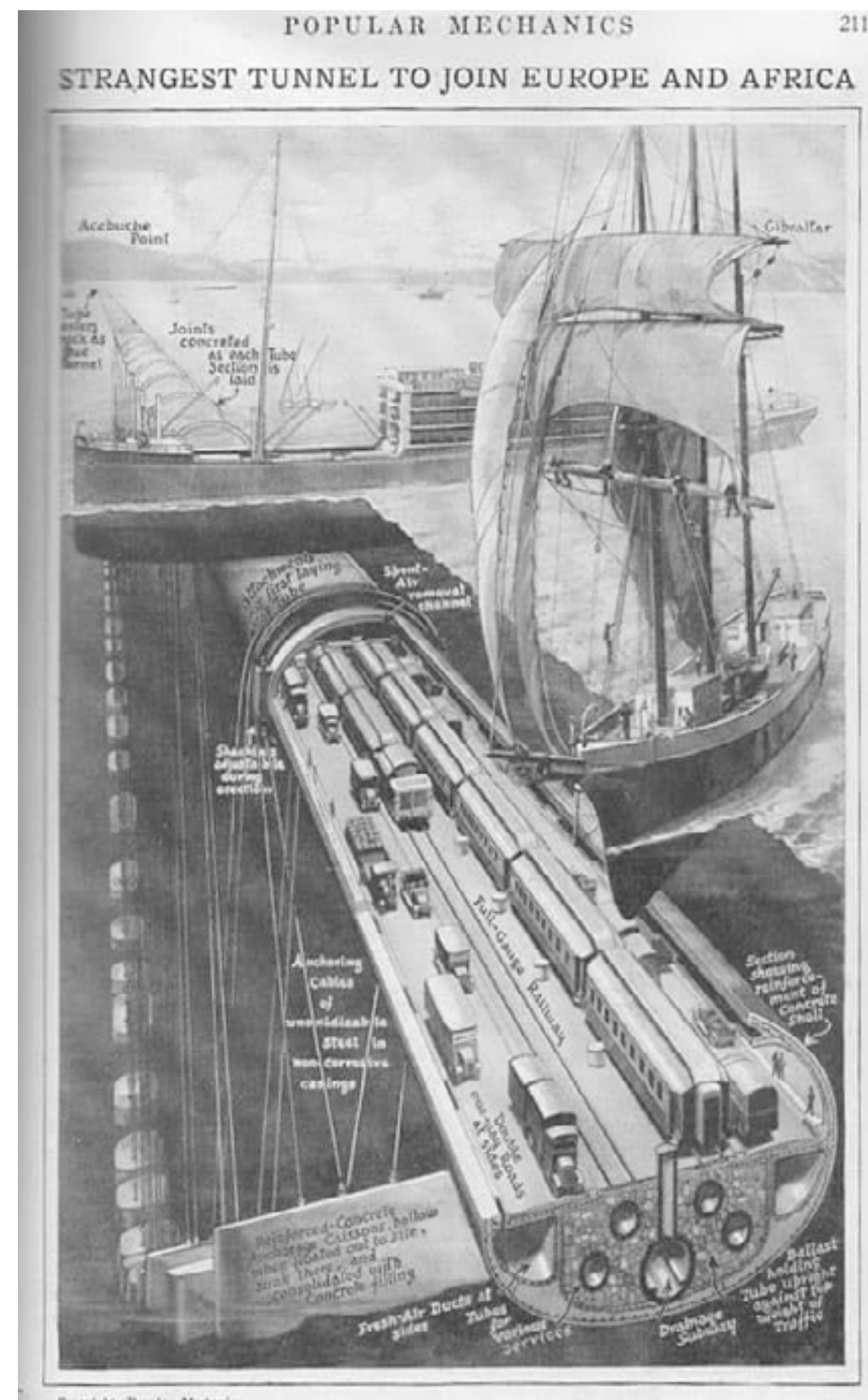


Fig 10. The Early stages of envisioning the tunnel ("Strangest Tunnel To Join Europe And Africa",

4.2 Connectivity

What impact does improved connectivity have on the socio-economic dynamics of cities?

Connectivity is as stated in the introduction the defining signature of our age. Improved connectivity is a key driver of major global trends (PMI, 2022). Infrastructure projects not only change the urban fabric spatially, but also in its socio-economic, environmental and cultural dimensions, shaping access to resources, mobility patterns and the way communities interact and evolve (Haoyue, 2023). The Oxford Dictionary defines connection as: “the state of being connected or the degree to which two things are connected” (“Connectivity”, z.d.). The top 5 megatrends caused by connectivity are examined in terms of their impact on the cities in the PWC report (2016). The report focuses on the effect that

these megatrends will have on defense and security, aligning with Virilio’s (2006) concept of the interplay between technology, speed, and urban vulnerability.

This chapter first investigates the trends on a global scale, then progressively focus on trends at the country and city level. This is to understand how these trends can be effectively translated into workable planning strategies. The five trends identified are Demographic shifts, Accelerating Urbanization, Climate Change and Resource scarcity, Rise of technology and Shift in global economic power.



Fig 11 Children playing along the edge of a slope Own picture (2024)



Fig 12 Entrance of the Old Medina Own picture (2024)



Demographic shifts

Demographic shifts

Connectivity projects have a significant impact on migration flows. Tangier's strategic geographic location at the northern tip of Morocco has long made it a hub for migration as is discussed in the first chapter. The PWC report (2016) highlights the challenges of demographic shifts, including competition for resources and the destabilizing potential of youth populations. Similarly, the National Intelligence Council (2012) points to urbanization and increased migration as defining trends in demographic change.

These patterns are already evident in Tangier. The city experiences seasonal population surges, as approximately 40% of Morocco's northern population lives abroad and many return during the summer months. Following independence in 1965, migration from the Rif region was actively encouraged. This was largely due to the area's reputation for political opposition and its limited economic stability (Hannoum, 2019). Data indicates that Tangier's population nearly doubles during this period based solely on boat arrivals (OPE, 2024). This demographic flux places immense pressure on local resources, driving up the cost of living. For instance, food and transportation expenses in Tangier significantly exceed the national average (HCP, 2024). Improved connectivity, such as a direct link to Europe via the proposed tunnel, could amplify these trends by attracting more migrants, both legal and irregular, further intensifying resource competition and urban pressures.

To better understand the potential impact of the proposed tunnel on Tangier, this research looks into a comparable project: the Channel Tunnel connecting the UK and France. Multiple news outlets often draw parallels between these two projects (El Yazeera, 2023). While the historical context of Franco-English relations differs from Europe-Africa relations, the migration and settlement dynamics around the Channel Tunnel offer valuable insights.

One notable example is the emergence of the "Jungle" in Calais, a settlement formed by migrants hoping to cross into the UK. Although

dismantled in 2016, the Jungle highlights how connectivity projects can attract migration to border cities, creating challenges in resource allocation, and public services (Sanyal, 2020). In Calais, migrants were unable to cross into the UK because they were not classified as being in immediate danger. In Tangier, a city that has long been a migration hub due to its proximity to Europe, similar patterns could emerge, potentially leading to informal settlements around the tunnel's infrastructure.

Unlike Calais, however, Tangier's position as a transit city for African migrants heading to Europe and its internal role as a destination for Moroccan migrants from rural areas give it a unique demographic profile (IOM, 2017). Tangier already attracts more legal migrants than irregular ones annually, partly due to Morocco's migration policies. Under Morocco's 2003 migration law, crossing borders without proper documentation is classified as a criminal offense. Meanwhile, the Universal Declaration of Human Rights (1948) guarantees freedom of movement as a human right, creating tension between individual freedoms and state-imposed restrictions (Hannoum, 2019). These existing dynamics underscore the need for careful planning to mitigate the potential social challenges posed by increased migration due to the tunnel.

Connectivity enhances trade, investment, and tourism opportunities. But it also creates new challenges related to resource allocation, infrastructure demands, and socio-economic inequality. This will be discussed in the paragraph Accelerated Urbanization.

The Channel Tunnel's operational models, such as the Eurostar and Le Shuttle services, provide useful lessons for the proposed Tangier-Europe tunnel. For instance, Eurostar operates fourteen times a day, focusing on passenger transport between Paris- London , while Le Shuttle runs 53 times a day, emphasizing efficiency in movement (Le Shuttle, Eurostar, 2024). The frequency and type of services offered by the Tangier tunnel will have

Folkstone

Calais

Brexit

Le shuttle

Eurostar



Fig 13 Overview changes in network eurotunnel based on information on eurostarwebsite (Maps From maobox, own work)

year calculation

Legal migration

Country of Nationality	Number	% of Total
African countries	29650	38,1
of which Algeria	10424	13,4
Senegal	2889	3,7
Mauritania	1956	2,5
European countries	31483	40,5
of which France	22683	29,2
Italy	1595	2,1
Turkey	1524	2
Other countries	16665	21,4
of which US	1648	2,1
China	1319	1,7
Total	77798	100

Refugees

Country of Nationality	Number	% of Total
Syria	5,399	30%
Guinea	2,405	14%
Senegal	1,956	11%
Côte d'Ivoire	1,484	8%
CAR	1,223	7%
Sudan	1,066	6%
Yemen	551	3%
Cameroon	541	3%
DRC	340	2%
South Sudan	251	1%
Palestine	130	1%
Chad	124	1%
Others	2 315	13%
TOTAL:	17 786	100%

year calculation

Summer calculation

Moroccan diaspora

Region/Country	Number	Emigrants % of All
Europe 28 + Switzerland + Norway	2,436,957	87%
- France	881,311	31%
- Spain	716,679	25%
- Italy	347,048	12%
- Belgium	188,336	7%
- Netherlands	154,885	5%
- Germany	88,236	3%
- UK	21,772	1%
North America	124,557	4%
- USA	65,782	2%
- Canada	58,775	2%
Arab Countries	92	3%
- Gulf Countries	47	2%
-- Saudi Arabia	20	1%
-- UAE	14	
- Other Arab Countries	45	2%
-- Libya	18,839	1%
Other Countries	158	6%
- Israel	136,95	5%
- Australia	1,567	
Total Emigrants	2,812,000	100%

Morocco-Born Migrants Abroad 2.8 million



1.710.131 Passengers and 409.055 vehicles
Tanger Med-Algeciras 46,3 % 718.916 Persons _ 192.730 vehiceles
Tanger ville-Tarifa 10,4 % 258.809 Persons _ 42.485 vehiceles
total 977.725 Persons _ 235.215 vehiceles

Fig 14: Overview migration in and to morocco (Legal migration & moroccan migration (De Bel-Air, F; 2016) refugee numbers (International Organization for Migration (IOM), (2023).) Boat arrivals (OPE,2024) , own work)

significant implications for the local economy. A high-frequency model, for example, could prioritize trade and economic integration with Europe but may also strain Tangier's infrastructure and public services if population inflows increase rapidly.

Virilio's framework highlights the importance of integrating connectivity projects with local transportation networks. For example, the Channel Tunnel terminals in Folkstone and Calais are located at the edges of these cities, with direct access to highways and other transport services. Similarly, the proposed tunnel must ensure seamless connections to Tangier's existing infrastructure to optimize functionality and minimize disruption. However, Tangier's existing urban pressures—such as rising housing costs and overcrowded public services—pose challenges to such integration(HCP, 2024).

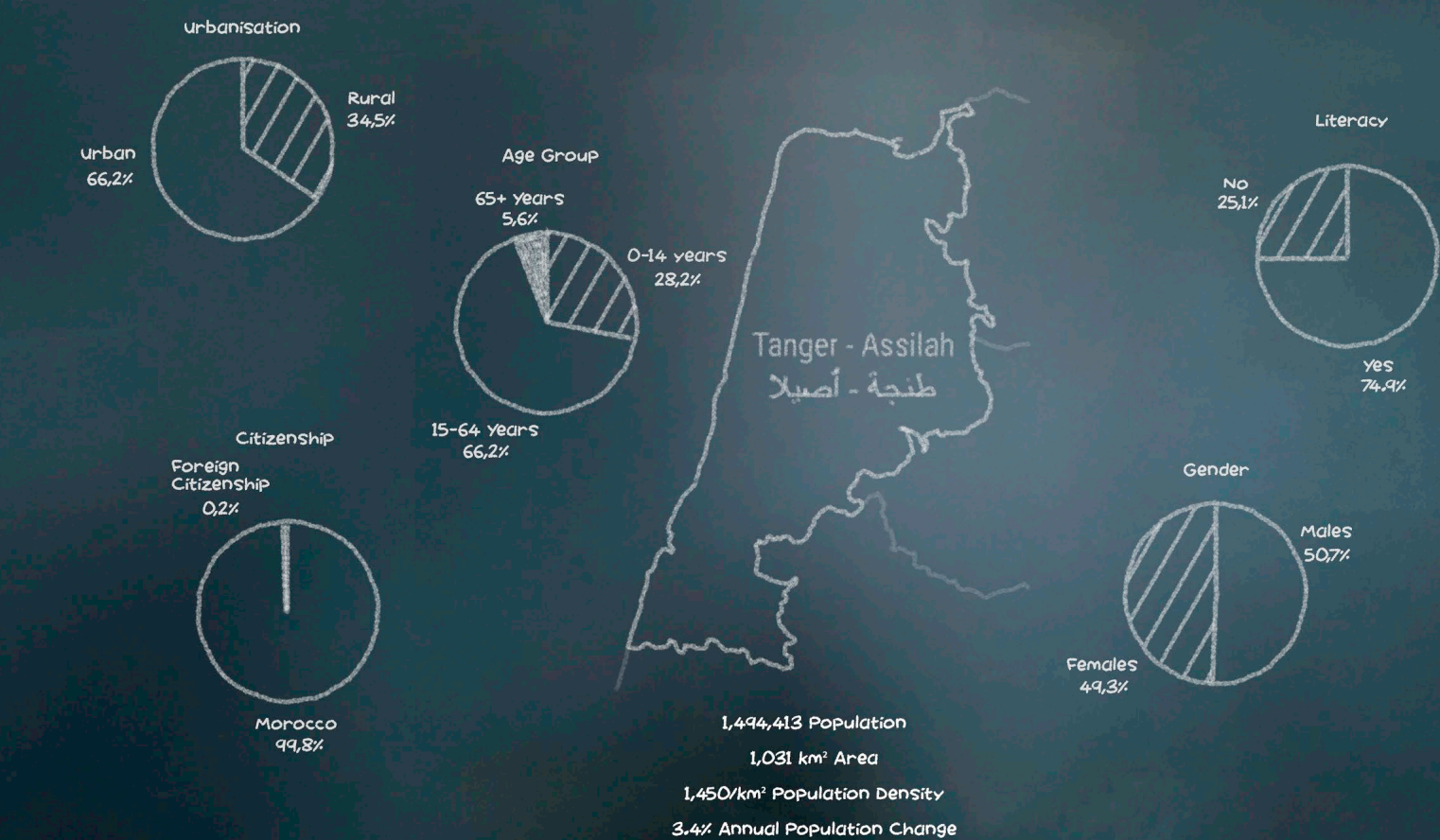
Connectivity projects often trigger migration-driven settlement patterns, which can significantly influence the socio-economic dynamics of cities (National Intelligence Council, 2012). In Tangier, migration has long shaped the city's character. Its geographic position has historically attracted African migrants, while Moroccans from rural areas have moved to the city in search of better opportunities (IOM, 2017). Improved connectivity is likely to accelerate these trends, potentially leading to the formation of new settlements around the tunnel infrastructure.

The socio-economic implications of such settlement patterns are multifaceted. On one hand, increased migration can provide a labor force to support the city's growing industries and infrastructure projects. On the other hand, it can strain housing, education, and healthcare services, exacerbating inequality and social tensions (National Intelligence Council, 2012). The experience of Calais demonstrates how migration and settlement dynamics can impact the functionality of connectivity projects. For example, the presence of informal settlements near the Channel Tunnel created logistical and security challenges, highlighting the need for proactive urban planning in Tangier.

Fig 15 Comparison affordability Tangier-Casablanca (HCP 2024)



Fig 16 Demography Tangier-Assilah (HCP 2024)





Accelerating urbanization

Accelerated urbanisation

Accelerated urbanization is a global trend and an integral part of development worldwide (PWC, 2016). This chapter draws on theoretical frameworks that link economic openness and government efficiency to urbanization. These frameworks argue that open trade promotes urban population growth and encourages regional migration (Chen & Paudel, 2021).

Implications of urbanization

Analysts have suggested that the rapid acceleration of urbanization may make cities as powerful as national governments because of their size and economic influence. However, this growth will also require mega-projects to build infrastructure, support new trade flows and meet education, health, security, and employment needs (PWC, 2016). Urbanization is closely linked to economic activity, as urban centers typically account for the largest share of a country's GDP (Liddle, 2017). By comparing national GDP with urban contributions, urbanization trends can be understood. In Tangier-Assilah, urbanization is evident through significant demographic and economic changes. By 2024, Tangier reached 1.4 million inhabitants and an estimated GDP per capita of €8.8 million. This makes it the 10th most populous city in Africa and eighth in terms of GDP per capita (Harvard Growth Lab, n.d.). Accelerated urbanization in Tangier has been a trend for years.

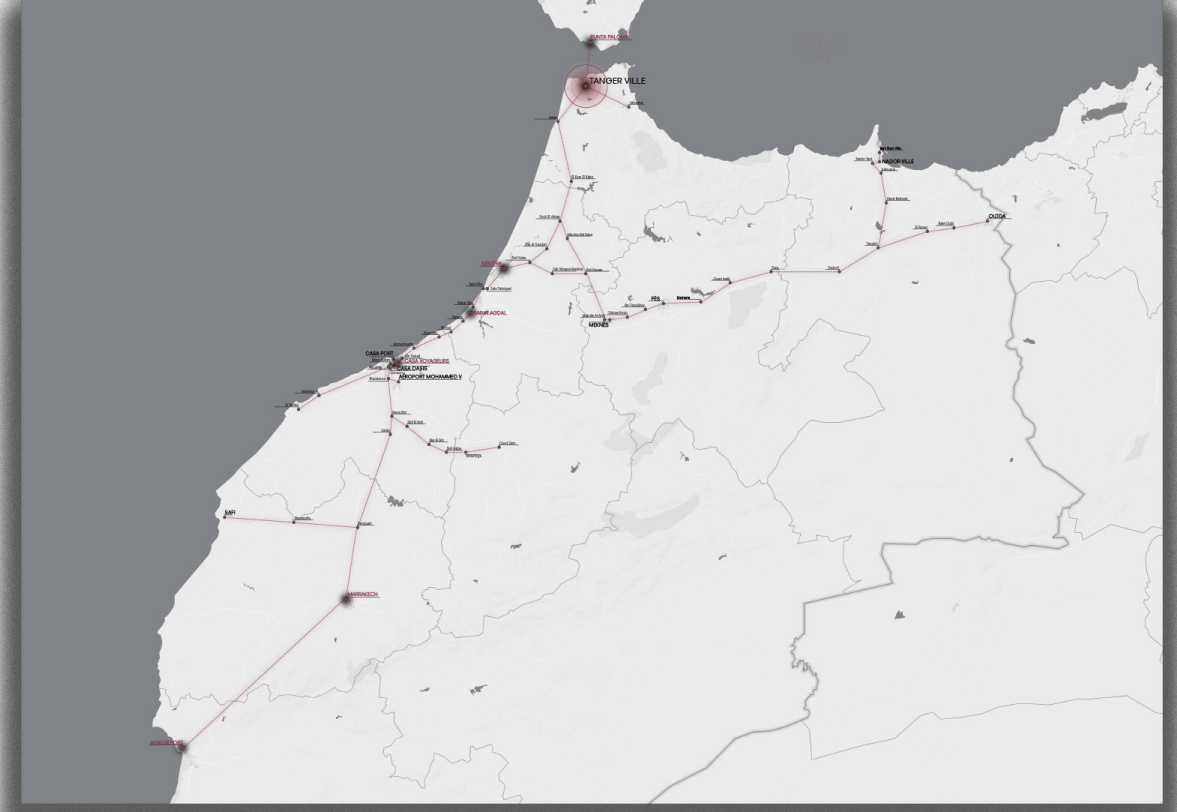
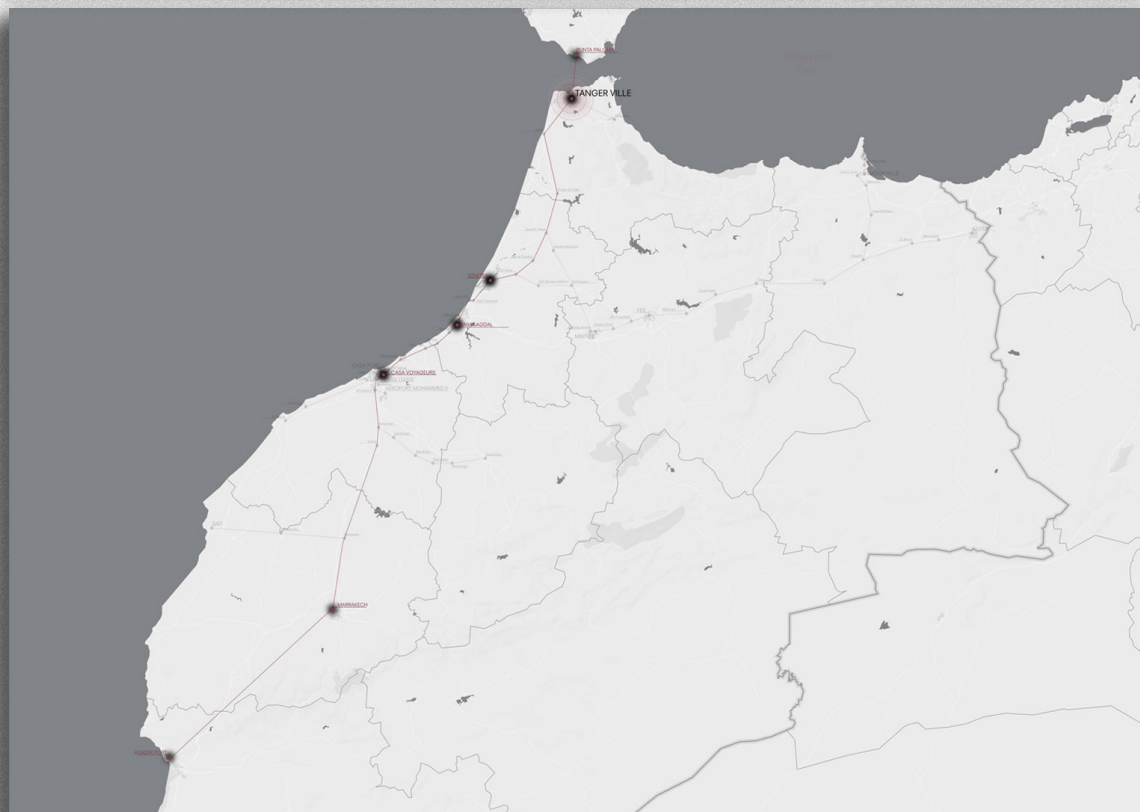
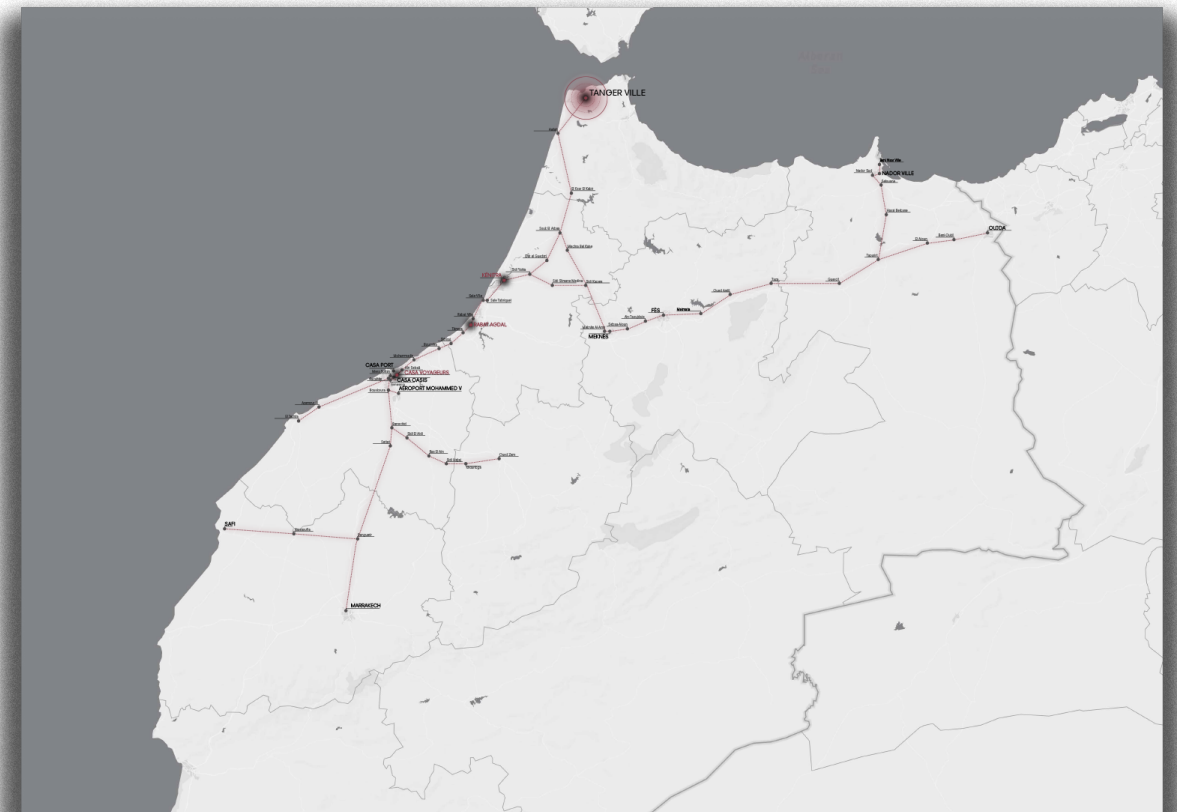
Between 1960 and today, Morocco's urban population has grown from 29.1% to 65.1%. The first urban development strategies were outlined in the Moroccan Development Plan of 1965-67, which focused on challenges such as expanding informal settlements (bidonvilles) and addressing urban poverty (Johnson, 1972). High unemployment and socio-economic inequality were persistent problems. After independence, Morocco suffered from overcrowding, inadequate housing, and inadequate urban amenities, due to centralized systems of governance inherited from French colonial rule. In 1968, the government began to address these problems through new housing and urban planning policies (Johnson, 1972).

The Loi-Cadre introduced a three-level planning system - regional plans, master plans and land-use plans - with the aim of eradicating the bidonvilles within 30 years. However, challenges arose due to outdated colonial systems, limited resources, and dependence on international planners (Johnson, 1972). Article 3 of the 1993 Dahir No 1-93-51 delegated urban development responsibilities to regional agencies, including the Tangier Urban Agency (Agence urbaine de Tangier, n.d.).

Tangier has witnessed major infrastructure projects as part of its urban transformation. One important project was the relocation of the railway station from the coastline in 2003. In 2015, the station was further improved and in 2018, the city became part of Morocco's network of high-speed trains, connecting Tangier to Casablanca in just two hours. This network is Africa's first high-speed line and world-wide the third fastest. This transport infrastructure has strengthened Tangier's role as an international hub by combining port activities with efficient railway networks. This strategy has attracted large companies to Tangier (CBRE, 2022). Future plans include extending the rail network to Agadir in southern Morocco and connecting Tangier to Tétouan in the east (طنجة 24, 2024).

The most important infrastructure project remains Tangier Med, the new port opened in 2007. This was followed by the establishment of an industrial platform in 2009 and passenger operations in 2010 (Tangier Med Special Agency, 2023). Today, Tangier Med handles 20% of global logistics activities, making it a hub for international companies (CBRE, 2022). Sustainability is a key focus, giving the port a competitive advantage over neighboring facilities (Tangier Med Special Agency, 2023). For instance, Danish logistics giant Maersk recently moved its operations from Algeciras to Tangier Med (Pedraza, 2025). Port development has also enabled tourism projects along Tangier's coastline, including Tanja Marina Bay (Sanchez, 2021).

Urban development has led to innovative infrastructure projects, such as a proposed cable car system linking tourist sites in the city. There is still speculation about other



projects, such as a tram network (طنجة 24, 2024), however the company that outsources these infrastructure project said that current plans only focus on bus rapid transit systems (see annex). A map of proposed transit lines shows two key areas with potential for significant development.

Housing trends in Tangier-Assilah show major differences between urban and rural areas. Urban households comprise an average of 3.5 members, compared to 4.2 members in rural areas. Most residents live in traditional Moroccan houses: 82.8% of rural residents own their own house, compared to 47.6% in urban areas. Differences in infrastructure are also evident. While 98.1% of urban households have access to running water, this figure drops to 73.2% in rural areas. Almost all urban houses are connected to public sewerage, compared to only 19.2% of rural houses. Also, 99% of urban homes have electricity-

ty, compared to 93.7% of rural homes (HCP, 2024). Social and economic roles differ significantly by gender. Men are mostly business owners, while women are mostly salaried. Of those employed, 74.6% are employed, compared with only 29.8% of women, reflecting broader socio-economic patterns in urban and rural areas (HCP, 2024)

Morocco’s urban development policy aims at bridging infrastructure gaps, promoting sustainable urbanization and improving living conditions. However, as the OECD notes, these efforts often lack coherence, limiting their overall impact. To promote equitable growth in the future, it is crucial that policies are aligned and address the diverse needs of both urban and rural populations (2024).



Fig 21 Percentage comparison acces to services Rural & uRban HCP 2024 own work)

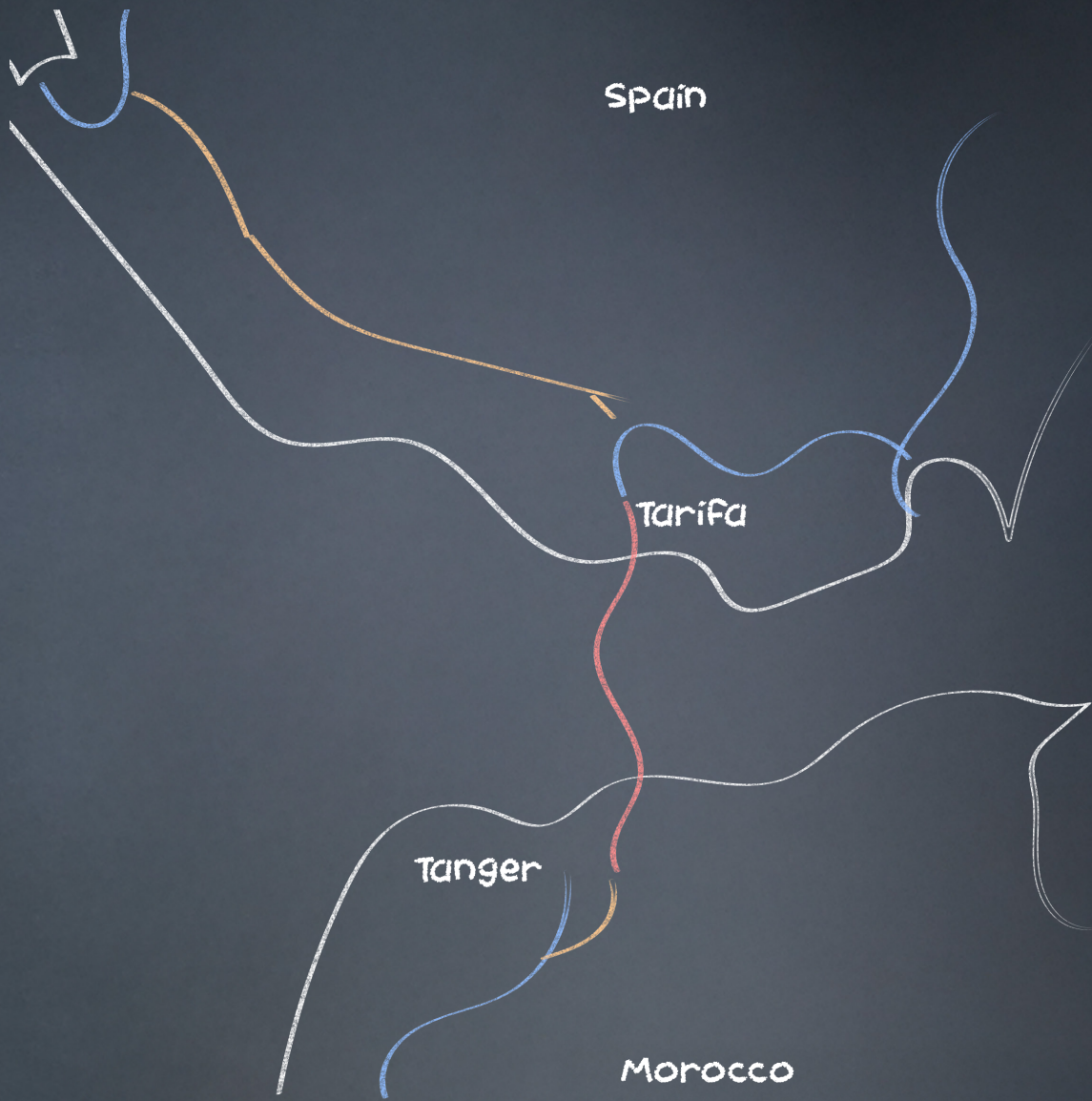
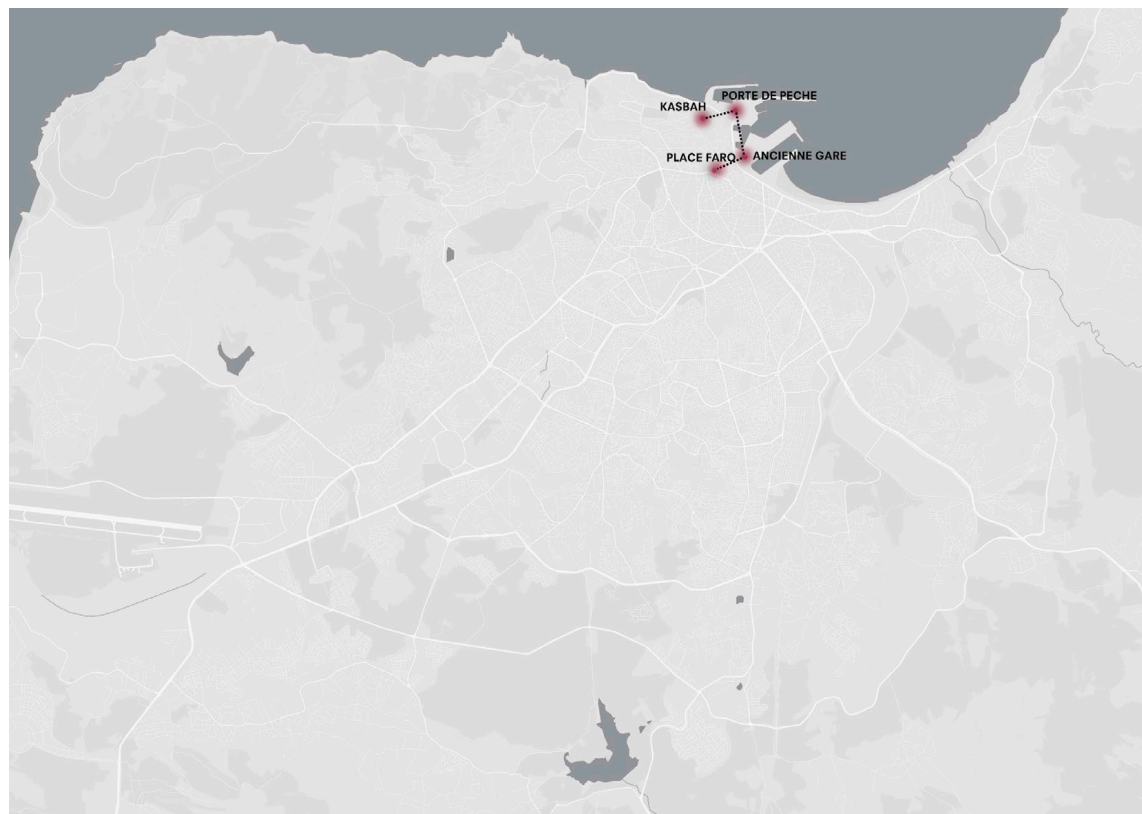


Fig 22 Envisioned connection of the tunnel, as documents of SECEGSA 2024 own work)





Rise of technology

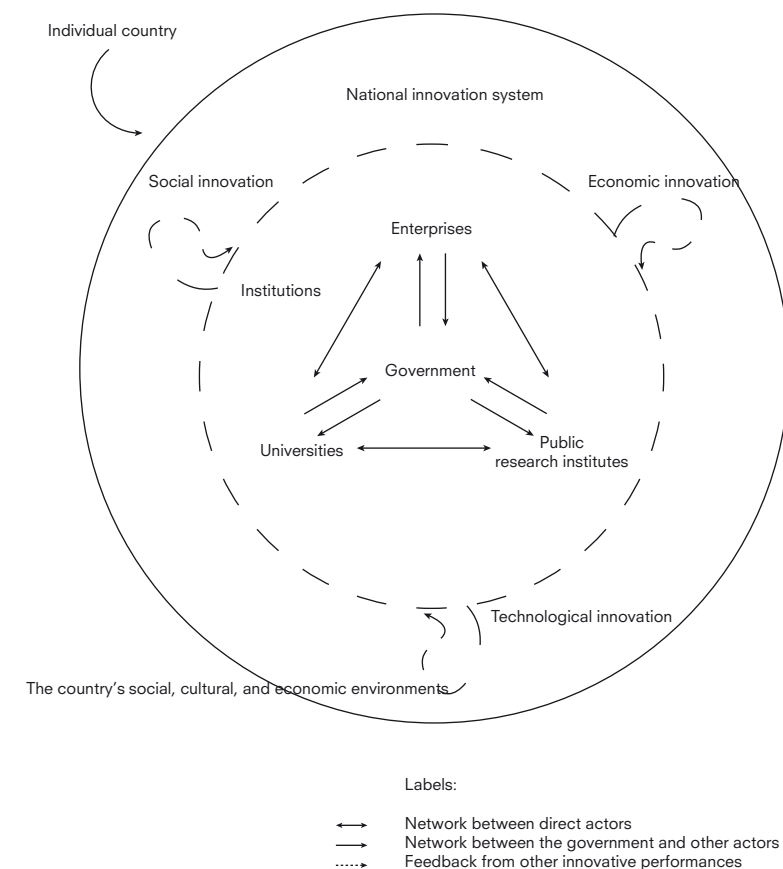
Rise of Technology

The rise of technology offers opportunities for transformation but also brings challenges that need to be critically evaluated. The 2016 PWC report highlights security as a primary concern but also portrays technology as a crucial driver of progress. This chapter examines Morocco's technological development, focusing on innovation and the ambition to transform Tangier into a smart city.

Morocco's transition from a low-cost economy to a diversified, innovation-driven model is supported by policies such as the National Innovation Strategy introduced in the late 1990s (Hamidi, 2013). Innovation is the

foundation for creating competitive advantages. However, achieving innovation requires constant interaction between technology firms and the government to create market opportunities (Boyer and Didier, 1998). This dynamic process is determined by public policy (Haddad, 2010). Within the National Innovation System (NIS), key factors such as enterprises, universities, research institutes, and governments play critical roles. While various frameworks for NIS exist, the Moroccan model emphasizes simplifying the process by focusing on these actors, with the government enabling innovative activities.

Framework of a national innovation system.



To implement these policies, different agencies were created. However, the lack of coherence between these agencies, a recurring issue in Moroccan policy implementation, hindered the system's success (Hamidi, 2013). The original NIS saw minimal engagement from its starting point till 2008, with only four meetings held throughout the project due to a lack of government interest. In 2009, the NIS was redefined into Moroccan Innovation Strategies (MIS), which, while introducing new agencies, proved to be more successful (Hamidi, 2013).

Despite advancements, challenges persist. Morocco invests only 0.8% of its GDP in R&D (Research & Development), significantly less than the OECD average of 2.3% (Jabri, 2022). Universities lead patent applications, but the lack of commercialization limits the broader economic impact. Cultural and operational gaps between academia and industry also hinder effective technology transfer, with universities prioritizing theoretical research while industries focus on market-ready solutions (Jabri, 2022). Morocco's broadband infrastructure, although improved, faces challenges with gaps in rural coverage and underdeveloped 3G and 4G networks, further highlighting a need for infrastructure investment to support the digital transition (Gelvanovska et al., 2014)

In 2024, Morocco launched a new policy called Digital Morocco 2030 (Ministry of Digital Transition and Administrative Reform). This policy envisages widespread growth in technology across all sectors, with a focus on making services accessible to all sections of the population. However, the report does not specify how this vision will be achieved. Growth targets have been set, but the means of implementation remain vague. For example, Morocco still ranked at international level in 2022 ,114th for internet connectivity on worldwide scale (. In the report, connection to 5G networks is mentioned, but this requires collaboration with networks which, currently, are not yet sufficiently developed for 3G networks (Gelvanovska et al., 2014)

Tangier's technological progress began with the inauguration of Tangier Med, which required advanced systems to address logistical needs. Initiatives such as Tangier Tech City and agricultural technology cooperation with China in Khouribga aim to modernize agriculture and position Morocco as a leader in sustainable innovation (Zreik, 2024). The Med Port of Tangier has emerged as a flagship project, integrating renewable energy systems, sustainable mobility, and energy-efficient technologies to meet global decarbonization targets.

Tangier Med is leading the way in introducing renewable energy, with projects such as a 13 MW floating solar park, solar panels, and integration of wind power (Kharoufi, 2024). Sustainable mobility initiatives include the switch to electric service vehicles and the development of hydrogen infrastructure. These measures have significantly reduced energy consumption, such as a 55% reduction in public lighting energy use (Kharoufi, 2024). However, high capital costs and reliance on international partnerships for funding remain

critical challenges. Tangier Med's efforts to become a sustainable logistics hub showcase Morocco's potential. However, its reliance on international cooperation and lack of local expertise poses risks (Kharoufi, 2024).



Fig 28 INWI, the King's network provider Own picture (2024)



Fig 29 Integration of network by design, palmtree Own picture (2024)



Climate Change and Resource scarcity

Climate change & Resource scarcity

Europe is the most rapid warming continent, with temperatures rising twice as fast as the global average (European Commission, 2024). As a result, extreme heat, drought, forest fires and floods are expected to worsen on the continent, even in the most optimistic global warming scenarios. The EEA has identified five clusters in which action is needed: ecosystems, food, health, infrastructure and economy and finance (European Environment Agency, 2024). To become climate-neutral and have a chance of meeting the set targets for 2050, the EU has agreed on targets and legislation to reduce emissions by 55% by 2030 (European Commission, 2023).

This European climate law is included in the European Green Deal presented in 2019. This deal aims to transform the EU into a fair prosperous society with economic growth. The deal states that 'the EU will strengthen its commitment to Africa for the broader deployment and trade of sustainable and clean energy' (European Commission, 2019).

This is where different energy terms come into play. The global energy demand shift is linked to geopolitics. As global energy demands are expected to grow by 50%, this is due to the growth of developing countries (Goldthau et al., 2020), 70% of energy demand will be in 2040 of non-OECD countries (EIA, 2019). Now for the geopolitics the research distinguishes the Global North, from the Global South from the Fossil Fuel Exporters. The demand of the Global North (OECD Countries and China) will stagnate, while the Global South (Latin America, Sub-Saharan Africa, India, and South-East Asia) is the reason for this growth in demand. As the Fossil Fuel Exporters (the Middle East and North Africa, Russia, Central Asia and the Caspian Region) will not be able to catch up with the demand, the global south is expected to meet their short-term demand with fossil fuels but move towards sustainable energy over time (Scholten & Zuckerman, 2023).

Morocco is part of North Africa but finds more with the Global-South looking in the energy demands that make the distinction between the world parts. Having the characterlike of a developing country, the energy demand also grows. In November 2023 Morocco signed a memorandum of understanding with European countries to sell power across borders. Now the real problem lies with the fact that the sustainable energy sources that have developed over the past decades are only able to cover 19.5 percent of the national demand (Josephs, 2023). The Energy transition minister states that, the agreements are signed because of the "Historic Opportunity" to integrate with the European markets. Thereby trying to "position itself as an industrial hub for investments for exports of green industrial products" (Josephs, 2023).

The question that then arises is what are these sustainable energy sources and how does this further impact on the population? Morocco is home to the vast Noor-Ouarzazate Solar Complex being world's largest concentrated solar power plant, financed by OECD Countries (Global Data, 2023). These projects of course create jobs, but it is argued that laying that many solar panels in the Sahara only raise local temperatures, only further accelerating warming and climate change (Smith & Lu, 2021). Meaning that there are only that an x amount farms that can be built, thus seeking other alternatives of sustainable energy. Morocco then also installed Africa's biggest wind farm. And is already installing the 3,500MW onshore wind power project Xlinks Morocco-UK Wind Project (Global Data, 2023).

For now, the research only concluded that generating and installing sustainable energy in Morocco is poorly divided, and investment by the EU result in power of the sources by the EU. The next point is then how will the climate change Morocco, on a non-energy scale for Tangier.

Fig 30: wind energy and Solar energy map of Morocco (Brand and Zingerle, 2011)

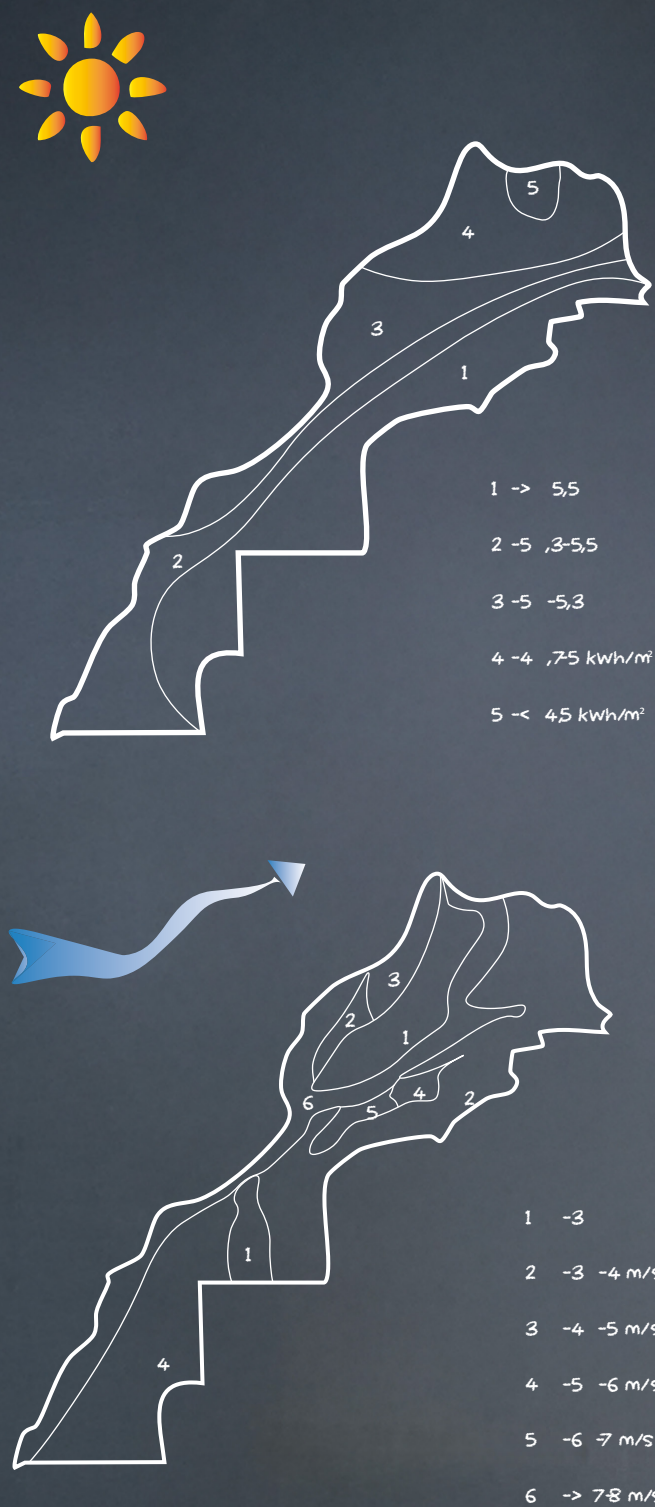
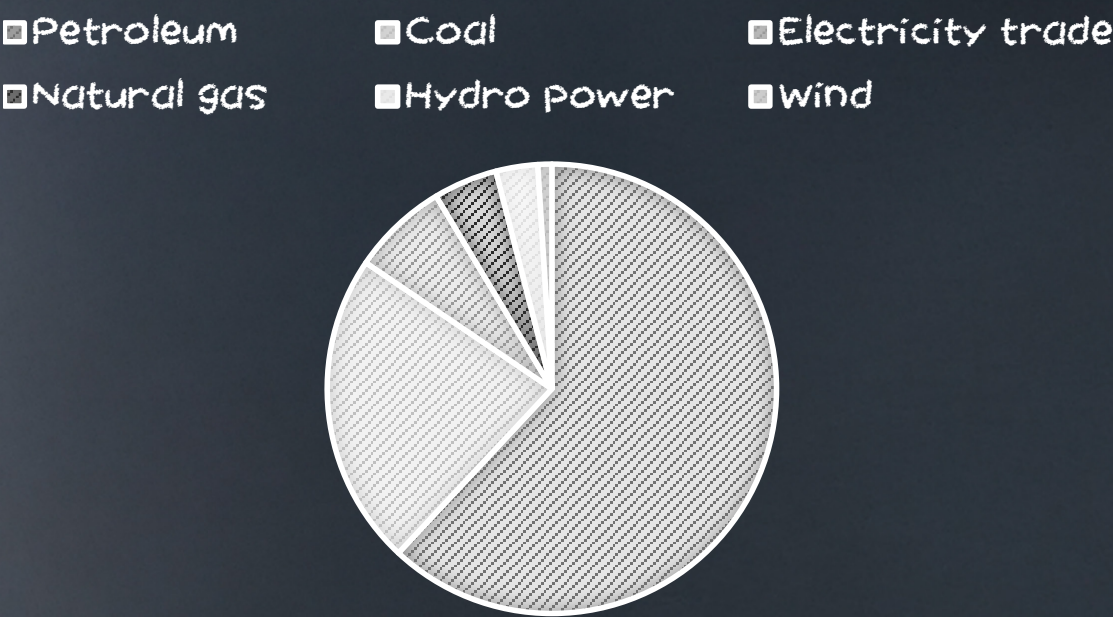


Fig 31: Energy consumption distribution in Morocco (Brand and Zingerle, 2011)



Tangier Bay is one of the most at risk areas on the Tangier, Tetouan, Assilah coast (Agharroud et al., 2023). The coastal risk zone encompasses the urbanized regions, including Tangier's port, which hosts numerous economic enterprises with significant investments and provides employment. Another hotspot of coastal risk is in the industrial area south of Tangier, which already experiences regular continental flooding due to its low elevation and urbanization density. According to earlier studies, 24% of the Bay is at risk of flooding at 11-meter flood levels, while shoreline erosion could affect 45% of beaches by 2100 (Snoussi et al., 2009). As the region faces these challenges, integrating sustainable adaptation strategies into coastal management is critical to address the combined impacts of climate change.

Socio-economic inequalities in Tangier, including disparities in education, public services and employment between urban and rural areas, contribute to coastal risks. Rural areas around Tangier, characterised by high levels of poverty and illiteracy, are therefore not even well aware of risks (Haut-Commissariat au Plan, 2018). Ivcevic et al (2021) stress that risk awareness is crucial for predicting preventive behaviour and self-protection against natural hazards. Poor socio-economic conditions can increase vulnerability, even in low-risk areas, due to limited coping capabilities. Bridging the communication gap between multiple disciplines is crucial to addressing these challenges and ensuring integration of socio-economic considerations into the coastal plans.



Fig 32 Coastal risk (Data Agharroud et al., 2023 & Picture Google Earth 2024)

In a report by the Ministry of spatial planning, urban planning, housing, and city policy (director of urban planning) on durable urbanism the essence of behavioural change within the population is again highlighted. However, this ministry also highlights the essence of protecting the existing green and blue corridors from ongoing urbanization. One of the points highlights the essence of waste: "almost all industries discharge their wastewater into the open sea without any treatment, while only 5% of towns have wastewater treatment plants." Tangier opened his first wastewater treatment in 2015 (APDN, 2024). This plant can provide 20% of the capacity needed for the city (Tempest, 2020). The total area of green spaces has expanded to 283 hectares after the implementation of the plant, but their distribution across districts stays uneven. Despite efforts to improve maintenance, parks and green areas in certain districts are in poor condition. Contributing factors include limited public awareness and appreciation for green spaces, leading to inadequate cleanliness levels, as well as insufficient staff to effectively manage and keep these landscapes (APDN, 2024). The importance of maintenance and behavioural change again is highlighted in this report.

Now critical climate related issues and policy directions have been named in this chapter, a comprehensive design solution will be constituted. Actionable and site-specific strategies with measurable outcomes will align the discussion with the goals of addressing climate change through design.

One of the first outcomes is the absence of sustainable energy systems within communities. Building a whole wind farm within a community is, of course, impossible, but placing solar panels seems possible and sustainable. However, laws and regulations make this almost impossible.

Administrative burden, excessive costs and lack of public awareness discourage people from undertaking small-scale renewable energy projects, despite the potential benefits. These complex regulations create barriers to achieving community-based renewable

energy solutions.

From my observations, the implementation of the tunnel should prioritize preserving the city's blue and green spaces, ensuring that these vital areas are still unaffected. But it is at least as important to educate the population about climate challenges, highlighting how specific parts of the city may be affected. Additionally, raising awareness about energy consumption and sustainable supply is crucial. To address traffic concerns near the station, efforts should focus on reducing vehicle congestion by creating convenient links for pedestrians and cyclists.

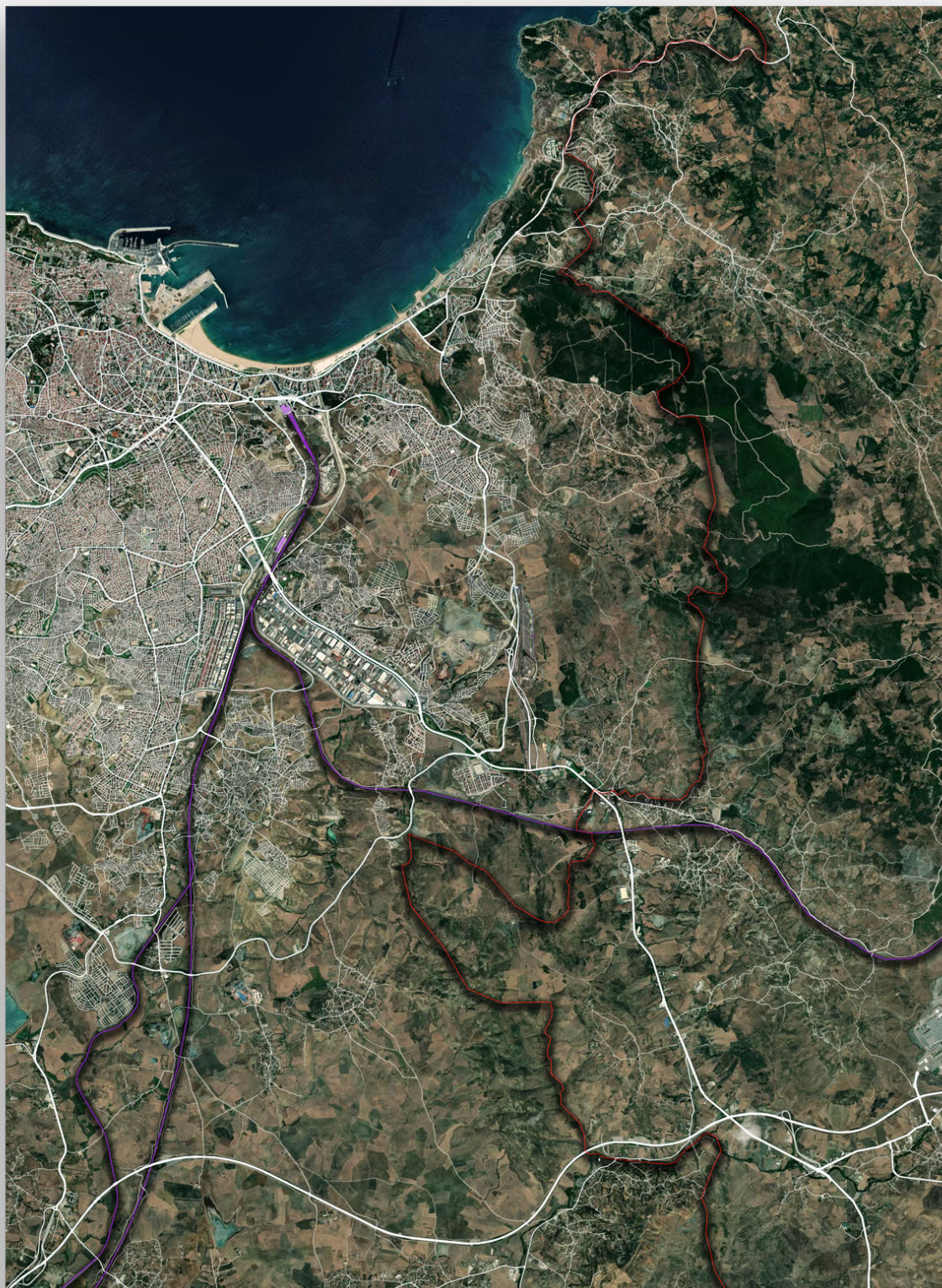


Fig 33. Existing train connection purple, Prefecture Tangier-Assilah red (Own work & Picture Google Earth 2024)

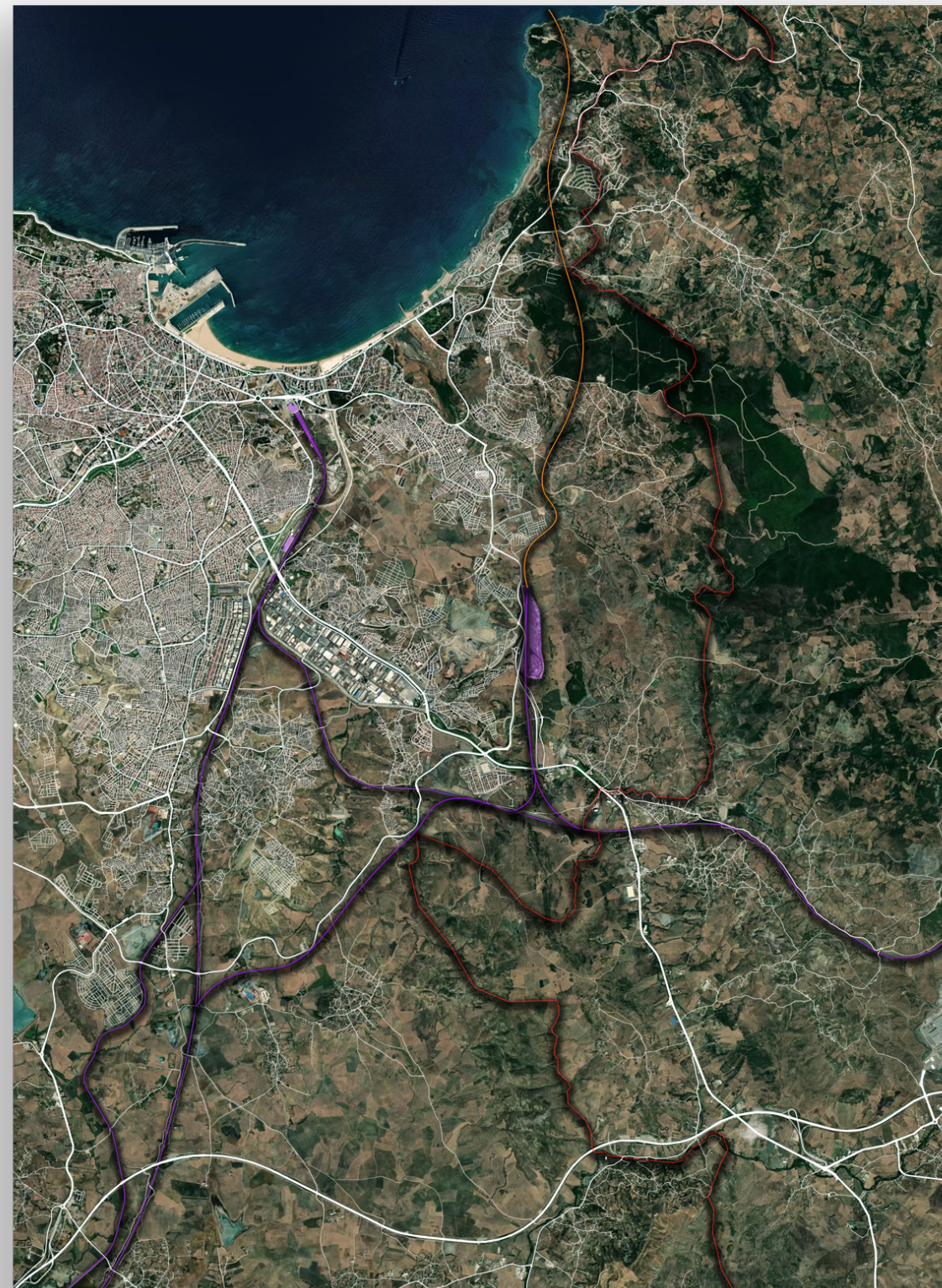


Fig 34. Train connection purple, Prefecture Tangier-Assilah red, Tunnel orange (Own work & Picture Google Earth 2024)



Shift in global
economic power

Shift in Global Economic Power

In colonial history, Western powers asserted dominance despite being outnumbered by local populations, primarily due to superior mobility (Virilio, 2006). Western economic dominance, however, is now history, and there is a shift that is rebalancing the global economy (PWC, 2016). According to Virilio, speed became a survival strategy and a tool of power. Now, that same speed that Western powers used is being surpassed by the BRIC countries, realigning global economic and business activities and transforming them from production to consumption-oriented economies (PWC, 2016). Additionally, China is expanding its economic presence in the global market by increasing investments in Africa and the North Sea.

Let's start by looking into how the city will be influenced by the change in global power. In the JLL report titled Uncovering Potential in Reshoring EMEA, the challenges of logistics over the last couple of years are coupled with upcoming trends (2022). The war in Ukraine, COVID-19, and Brexit have led to supply chain delays, pushing companies to reshore. BCI Global shows that 60% of global U.S. and European companies are planning to reshore primarily to Romania, Turkey, and Morocco, resulting in rising demand along the Blue and Black Sea Banana (2022).



Fig 35 Mega Project envisioned all over the world. (Google & Own work)

The CBRE report looks at the global increase in e-commerce sales and examines the influence of logistical costs on the profit margins of companies. Forty-five to seventy-five percent of logistics costs are transportation costs. “It takes roughly an 8% increase in fixed costs to equal the impact of just a 1% increase in transportation costs.” As a result, companies locate distribution infrastructure as close to ports as possible. The biggest success of the Tangier port is attributed to its link with its train network. However, the report also mentions that its biggest import and export partners are Western powers (CBRE, 2022). With the shift in global powers, this might not be the most brilliant strategy.

Morocco’s position in Africa can be compared with Mexico’s position in North America. The report Localized Global Economies on the Northern Borderlands of Mexico and Morocco argues that Morocco is in the early stages of development that Mexico has already undertaken. This is primarily due to the country’s lack of development in education and health services. However, Tangier scores lower in poverty rates, showing that wealth is better distributed within the region (Requena et al., 2019).

So how will this trend influence Tangier as a future city? The research has established that whoever controls access to infrastructure holds power. But will Morocco control the power over this tunnel?

Conclusion:

The research finds that improved connectivity significantly influences the socio-economic dynamics of cities by changing migration patterns, the allocation of resources and economic activities. In Tangier, it is expected that improved connections, such as the proposed tunnel to Europe, will reinforce existing demographic trends. Historically, Tangier has been a migration hub, with seasonal population growth and the attraction of both legal and illegal migrants. Increased accessibility may lead to a greater influx of migrants, increasing competition for housing, public services and employment.

Economic integration is another important effect. Connectivity facilitates trade, investment and tourism and can strengthen Tangier’s role as a logistics hub. The Channel Tunnel serves as a reference and shows how infrastructure projects prioritise economic efficiency, but can also reinforce economic centralisation. For Tangier, better connections can be beneficial for sectors such as logistics and manufacturing, but they can also increase socio-economic inequality if the economic benefits remain concentrated in certain sectors or regions.

Accelerate urbanisation trends with better connections. As seen in the development of Tangiers, large infrastructure projects such as the relocation of the railway line and the Tangiers Med port have attracted businesses and increased urban density. These projects have, at the same time, led to rising housing costs and overstretched public services. The experience of Calais points to the risk of informal settlements forming around large infrastructure projects as a result of urban pressure caused by migration.

It also shapes environmental and infrastructure challenges. The integration of new transport networks with existing urban infrastructure requires careful planning to avoid congestion and overload. The operational model of the Channel Tunnel emphasises the importance of transport frequency and accessibility, which will be crucial in determining how Tangier adapts to increased mobility requirements

Although improved connectivity offers economic opportunities, it also brings challenges in the areas of migration, urban pressure and social inequality. Without strategic urban planning and policy coordination, the benefits of connectivity can be unequally distributed, further increasing existing socio-economic differences.

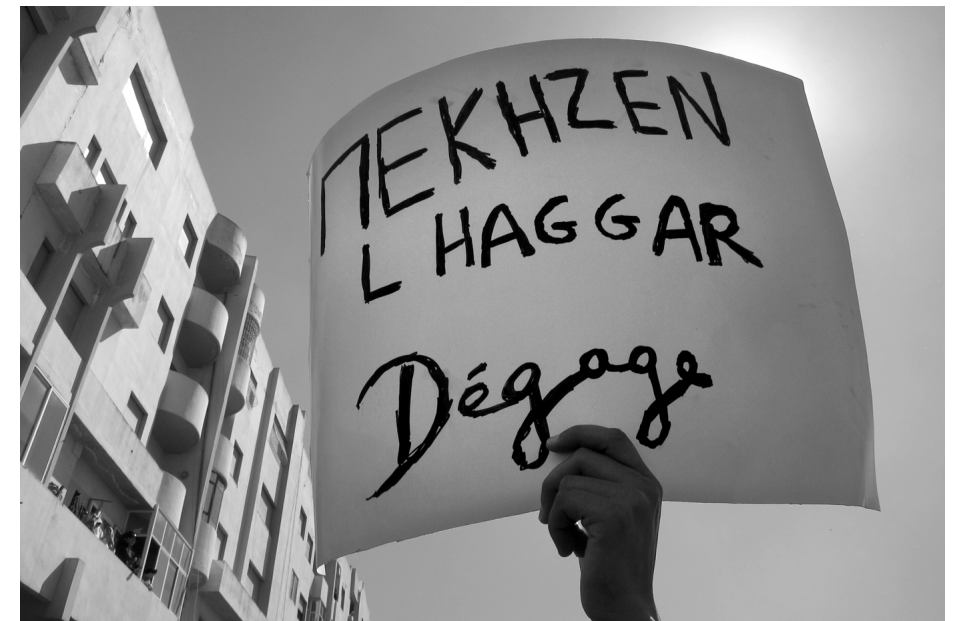
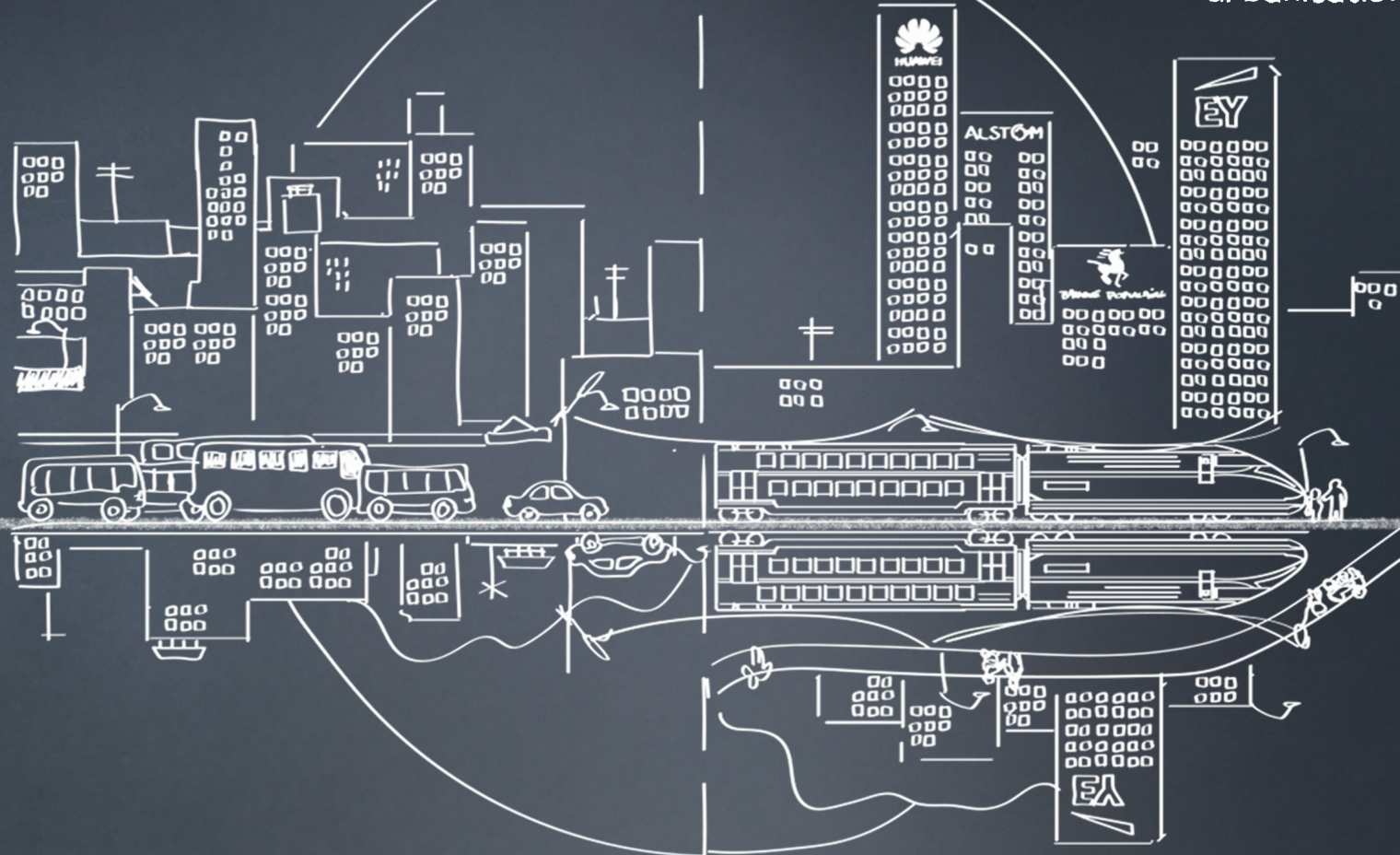


Fig 36 Arab spring in Morocco “Makhzen, Hagggar, Get Out!” (Hannoum, 2019)

2030-2040 SCENARIO'S

All trends, but no
connection

All trends,
connection,
Economy based
urbanisation



All trends,
connection,
Failed outcome

All trends,
connection,
Human based
urbanisation

4.3 Infrastructures

Analysing infrastructure projects that resemble the tunnel project, allows us to anticipate the Urban transformation of Tangier. In this chapter, 4 different mega infrastructure projects will be investigated that have transformed cities, to answer the sub question: How have similar infrastructure projects influenced the urban landscapes of cities, and what lessons can be drawn for the Tunnel?

To understand what the research is looking for in the case studies it is important to understand that Mega-infrastructure projects don't just facilitate connection but also change the fundamentals of urban landscapes. Mega projects in general accelerate economic development of countries, attract global capital, and therefore lead to rapid spatial transformations. The challenges have been mentioned before and include displacement, socio spatial fragmentation, and environmental consequences (Gellert & Lynch 2003).

There is no other project that has exactly the same function and challenges as the proposed tunnel between Spain and Morocco. Nevertheless, the selected case studies each reflect a specific dimension that is relevant to this project. The Channel Tunnel has been included because of its functional similarity as a cross-border underground link between two sovereign states; it is also frequently referred to in media discussions about the new tunnel. The Øresund Bridge was selected because of its relevance to socio-economic inequalities, as it connects two countries with existing class inequalities – an issue that is also central to the context of Spain and Morocco. The Marmaray project and the Eurasia tunnel in Turkey provide insight into the effects of transcontinental infrastructure, particularly how such connections reshape urban space and regional integration. Finally, the Hong Kong-Zhuhai-Macau Bridge was chosen for its advanced border management infrastructure, including customs, security, and surveillance facilities, which directly relate to the technological and infrastructural theories employed in this study.

The Channel Tunnel (England, France)

The Channel Tunnel opened in 1994 and was expected to stimulate regional economic development and promote cross-border integration between Kent (UK) and Nord-Pas-de-Calais (France) (Thomas, O'Donoghue, 2013). The research has shown that the benefits were uneven on the urban landscape of Folkestone and Calais.

In Folkestone the Channel Tunnel terminal in Cheriton became an important transport hub, but the economic benefits were limited. Due to its poor transport links with the rest of the country, it has restricted Kent's ability to attract employment. Folkestone did not experience any major urban renewal, while Ashford did (Thomas, 2006). The city did not experience significant growth in tourism or investments because the economic activity of the tunnel was concentrated in London.

Calais held its importance as a maritime hub after the placement of the tunnel. With the port adapting to competition from the tunnel and maintaining traffic it experienced economical loss. The development of Coquelles led to urban growth, particularly the shopping complex Cité Europe (Thomas, O'Donoghue, 2013). The regional economic benefits were limited, and Calais did not develop into an integrated labour market with Kent as was imagined. Language differences and the lack of commuting maintained the Channel as a barrier.

Instead of transforming medium-sized urban centres, the tunnel reinforced economic centralization to the benefit of London and Lille.



Fig 28 Connection The Channel Tunnel (England, France)



Fig 29 Connection The Øresund Bridge (Sweden, Denmark))

The Øresund Bridge (Sweden, Denmark)

The Øresund Bridge opened in 2000. It has influenced the urban landscapes of Copenhagen and Malmö by reducing the travel time and fostering regional connectivity. The expected functional integration between Denmark and Sweden has progressed slower than policymakers and urban planners had anticipated (Ejermo et al. 2021).

Copenhagen has benefited from improved accessibility by the tunnel. The Mega project reinforces the cities position as a dominant urban centre in the region, especially due to the laying of its airport (OECD, 2003). By investing in its metro and railway links, it has enhanced its attractiveness for businesses. The bridge was expected to create a more balanced urban region, but Copenhagen became the primary economic hub (Ejermo et al. 2021).

Malmö has experienced urban development due to increased migration from Denmark. This is driven by lower housing costs in Sweden. The bridge has not fully integrated into the labour markets of the two cities. High tolls, differences in taxation, legal systems, and social policies are in the way of economic and social integration of these two cities (Örestat, 2020).

Øresund Bridge has enhanced connectivity and altered mobility patterns, it has not yet led to the seamless integration of Copenhagen and Malmö as a single urban region.

The Marmaray Project & The Eurasia Tunnel (Turkey)

The Marmaray Project is a large-scale transportation infrastructure initiative in Istanbul, Turkey. The Eurasia Tunnel is the only highway tunnel that connects two continents and leads to increased cross-continental mobility in the city (Cürebal et al. 2011).

The European side is the historical and economic centre of Istanbul. The placement of the tunnel has strengthened the city's role as commercial and business centre. Most of the trade and industry is already located here. The rail connection and highway has allowed access for workers and companies by rail leading to reduced traffic congestion, especially on the Bosphorus bridges (González et al. 2023).

The Asian side is traditionally more residential. The tunnel has contributed to urban expansion and shifts in faster traffic here. Improved access to the railway has made living in this side more attractive for people working in the European business districts (Cürebal et al. 2011). Migration to the Asian side has therefore increased. But also due to lower housing costs and better connections.

Despite this improved accessibility, economic activity remains concentrated on the European side. Thereby reinforcing the spatial divide between Istanbul's residential and business districts.

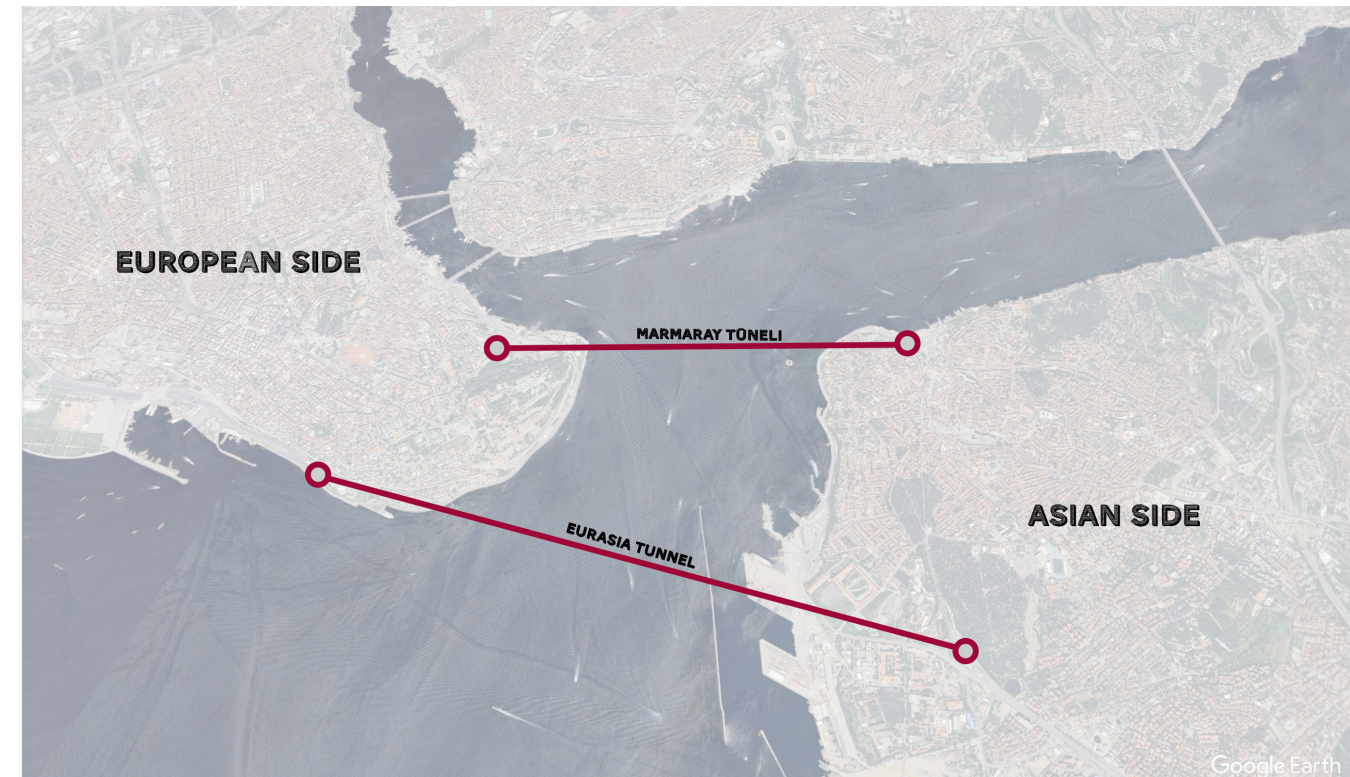


Fig 30 Connection The Marmaray Project & The Eurasia Tunnel (Turkey)



Fig 31 Connection The HongKong-Zhuhai-Macau Bridge (China)

The HongKong-Zhuhai-Macau Bridge (China)

The Hong Kong-Zhuhai-Macau Bridge (HZMB) is a direct road link between Hong Kong, Zhuhai and Macau. Its construction has changed the spatial and economic dynamics of urban areas in the Pearl River Delta. The bridge has shortened travel distances, facilitated economic interactions and influenced the urban development of these cities (Zhang, 2022).

Hong Kong’s role as an important financial and logistical centre in the region has been strengthened by this mega project. The connectivity with Zhuhai and Macau has increased Hong Kong’s economic reach and strengthened its influence in construction, finance, transport, storage and communication. However, the expected increase in cross-border travel and trade is held back by existing institutional and regulatory barriers (Zhang, 2022).

Zhuhai was a less industrialized city before the construction compared to Shenzhen and Guangzhou. The city is changing gradually from a more peripheral urban centre to a strategic gateway for trade and logistics due to the construction of the connection. The bridge has also stimulated the growth of tourism and improved the outlook for foreign investments. Unfortunately, full economic integration remains a challenge (Zhang, 2022).

Macau is dependent on the gambling industry and tourism. The improved connection is diversifying the economy. However, the bridge has not yet radically changed its urban structure or economic base, as the service sector still dominates (Zhang, 2022).

Legal systems, business regulations and customs procedures continue to stand in the way of economic cooperation. The transport advantages are clear, but a more uniform policy framework is needed to fully utilize the bridge’s potential for urban transformation (Zhang, 2022).

Conclusion:

The research shows that Mega-infrastructure projects reshape urban landscapes by altering economic dynamics, mobility, and spatial development. The Channel Tunnel and Øresund Bridge reinforced economic centralization, They have benefiting dominant cities while limiting regional integration. The Marmaray Project and HZMB improved connectivity but did not fully balance economic activity across regions due to regulatory and structural constraints. These cases show that while such projects enhance accessibility there is a need for additional policies to have equitable urban transformation.

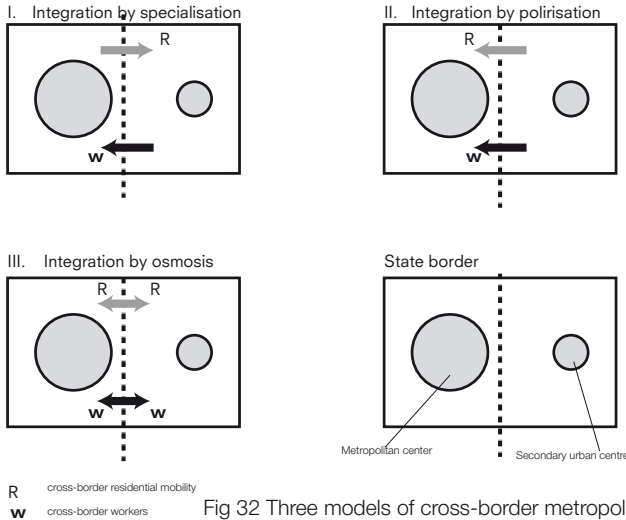


Fig 32 Three models of cross-border metropolitan integration (Sohn 2010)

4.4 Implementation

In the thesis, the historical development of infrastructure, the role of connectivity within global trends, and explored comparative insights from similar mega-projects are addressed. Effectively translating these insights into strategies that can be spatially integrated requires a deeper understanding of the underlying techno-political dynamics. The integration of large-scale infrastructure at international borders is a profound political act that shapes flows of people, goods, and capital, and often reproduces or exacerbates existing socioeconomic divisions as discussed in earlier chapters. Here, the concept of technopolitics, how technological systems are embedded in political choices and power structures, provides a lens for inquiry. Therefore, this chapter begins with the technopolitics of borders to explore how infrastructure can lead to connection (Dijstelbloem 2021, 2022). In this way, it becomes possible to identify spatial strategies that promote inclusivity. The spatial translation of these insights forms the basis for the design proposals developed in the following paragraphs.

Infrastructure projects at the border are never neutral. Social value and power dynamics form the interventions that reflect politics. First, the theoretical approach to border infrastructure is discussed in order to filter out policy strategies that answer the main question of this chapter. What strategies can be implemented to ensure that the integration of the tunnel promotes inclusive growth and mitigates the risk of deepening socio-economic inequalities? This involves looking at how the terms Technopolitics, mediation, and peromorph politics (Dijstelbloem, 2021) lead to inclusive objectives. The main goal here is to understand the extent to which borders can build bridges. Whereas the text so far has focused mainly on ‘Kinopolitics’ the historical organization of flows (Nail, 2019), the research attempt to translate this into ‘Viapolitics’ the spatial paths and routes (Walters, 2015).

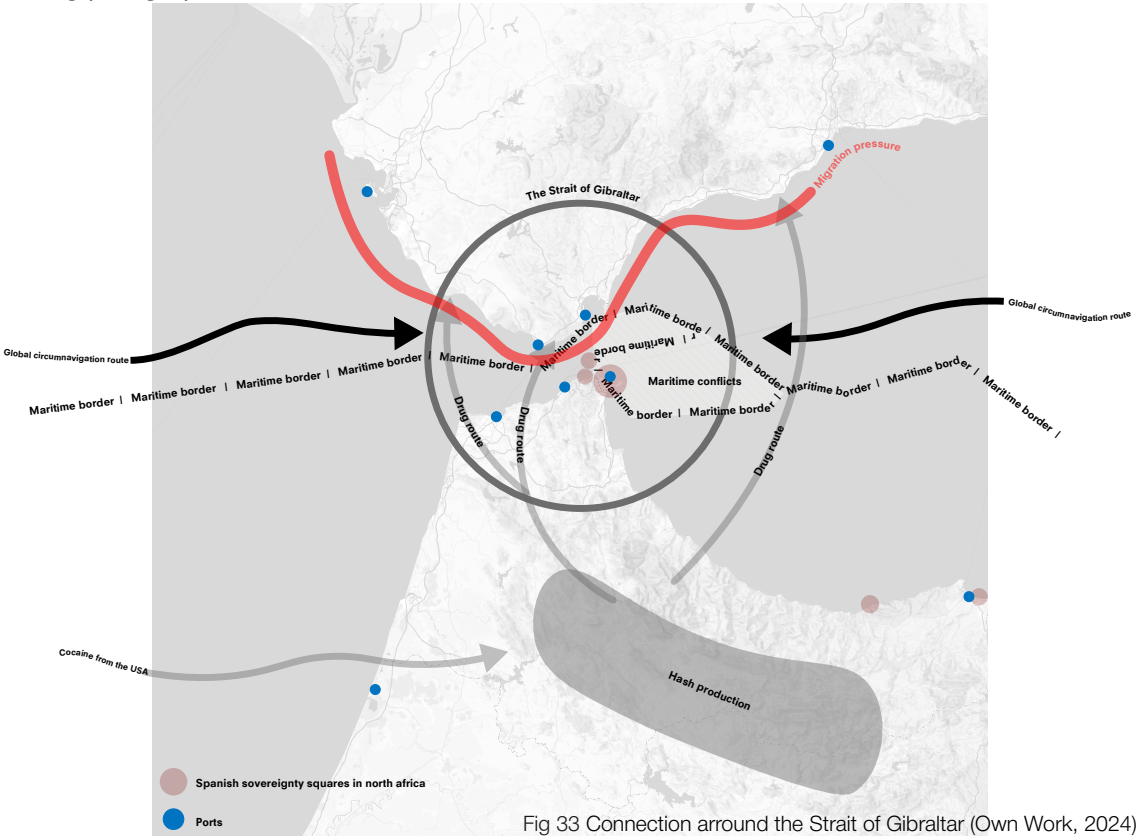


Fig 33 Connection around the Strait of Gibraltar (Own Work, 2024)

4.4.1 Technopolitics

Large infrastructure projects are the spatial translations of Technopolitics, how technology and politics come together. Infrastructure projects at borders are a combination of the technology that moves people and goods and the political instrument that structurally shapes the relationships between regions and countries (Dijstelbloem, 2021). According to Dijstelbloem, borders are networks of technology through which political ideas travel. Similar to Virgilio's ideas, infrastructure is seen as a link between societies and states. It can be a place of exclusion as well as cooperation. A means of power that rests on politics, resulting in distribution. Infrastructure regulates circulation and acts as a selection mechanism. This can create an unfair distribution of "life chances and expectations" in a society (M'charek et al. 2014).

Border infrastructure also plays a direct role in mediation. Mediation is the way in which human and non-human actors interact and influence each other (Latour, 1994). According to Latour's study on technical mediation, new hybrid entities between humans and technology arise here. Technology is an active player in this, directly influencing human actions and possibilities. Mediation gives border infrastructure a social dimension, which makes technopolitics spatial (Dijstelbloem, 2021). Border infrastructure where mediation takes place is an active stream for economic opportunities, cultural exchanges, and political ideas. Infrastructure as a border creates "ambiguous operating spaces" where multiple factors (security and freedom, mobility and control) interact dynamically. This is a space of compromise between different objectives: national security versus access for the local community, profit versus public good, fast transit versus fair access (Longo, 2017). A technopolitical approach requires that these compromises be managed transparently and fairly.

The theory in the book *Borders as Infrastructures* by Dijstelbloem uses the concept of peramorphic politics to describe the role of the tunnel at the border. Peras (border) as the morphology of politics (2021). The design of the infrastructure would thus be a connecting, open form rather than a wall. The infrastructure of a tunnel between Morocco and Spain is a political choice that already expresses itself as integration rather than separation. However, this does not automatically lead to inclusive results; integration and management of access are of the utmost importance. The border can take on a different form if it is shaped by the natural border of the Strait of Gibraltar, the physical borders in Melilla and Ceuta. But whether this happens in an inclusive way depends on the policy that is pursued afterwards.

In Melilla, the flow of pedestrians on both sides is shown below. It is clear that the infrastructure here has anything but the intention of playing a connecting role. The number of queues in that form is indicated by figures. Little to no consideration has been given to climate-related aspects for people, and a clear linear flow is visible. The main purpose of this border is to exclude, control, and secure. The use of revolving doors at each passageway is striking.



Fig 34 Entrance Morocco through the border of Melilla/Bni Ensar (Satellite, Google maps 2025) (Own work, 2025)



Fig 35 Exit Morocco through the border of Melilla/Bni Ensar (Satellite, Google maps 2025) (Own work, 2025)

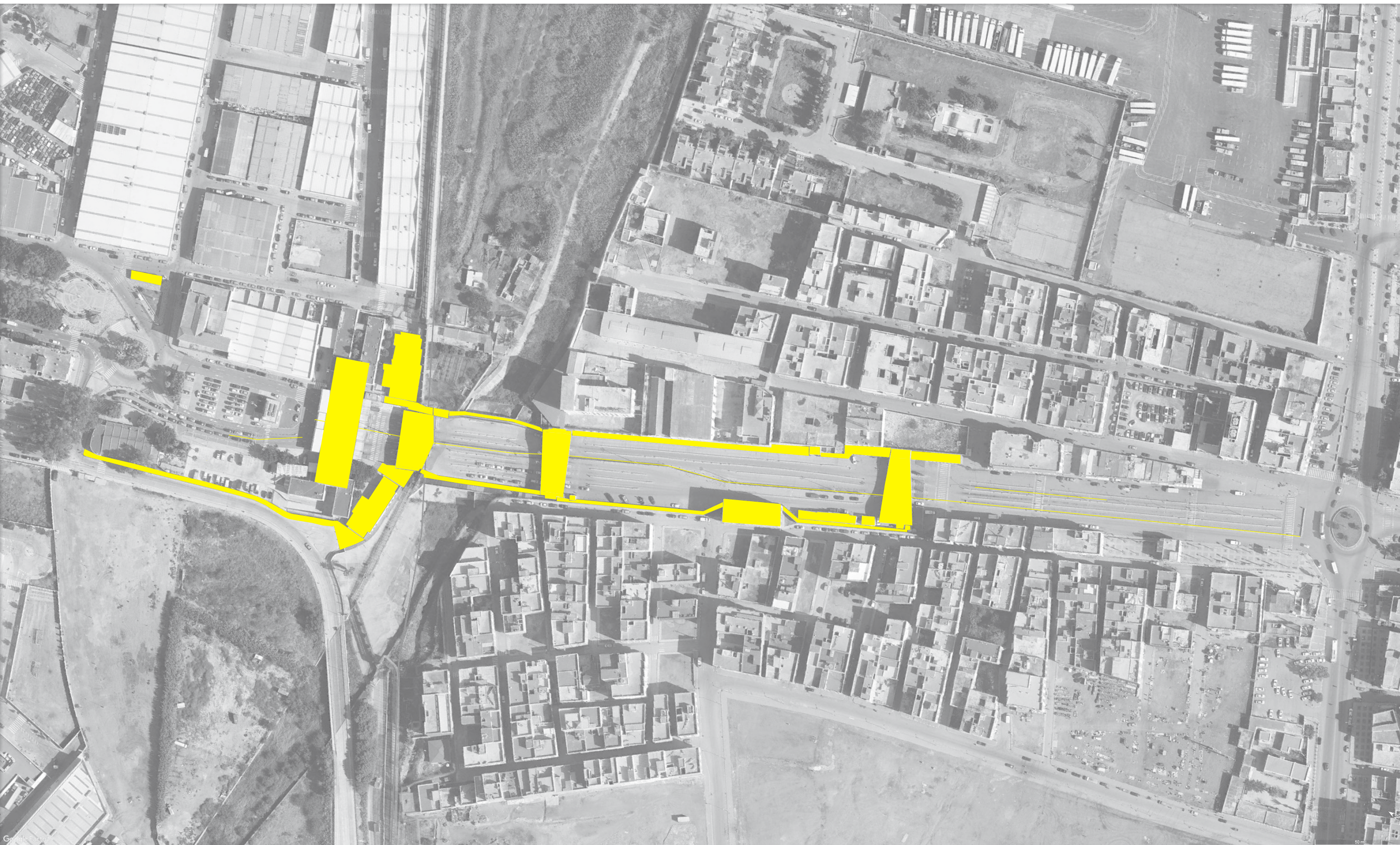


Fig 36 Infrastructure of the border of Melilla/Bni Ensar (Satellite, Google maps 2025) (Own work, 2025)

4.4.2 Spatial strategies

An important insight from the borders-as-infrastructure framework is that projects connect multiple spatial scales (2021). Mega infrastructure projects connect locations and communities with larger regional, national, or even transnational networks (Hein, 2016). Opting for an inclusive spatial strategy as described in the book means designing these connections in such a way that peripheral areas and disadvantaged neighborhoods are not overlooked (Dijstelbloem, 2021). In this case, the infrastructure is designed in such a way that the flow through the tunnel is connected to local public transport, the rural hinterland, or minority communities on both sides of the border. The high-speed line running through the tunnel can distribute stops or connecting services that lead to new economic opportunities for the various communities. Connecting to a road link can help parallel investments in local road improvements, bike paths, or bus routes for residents in poorer areas to reach the main corridor and benefit from improved mobility. By expanding the network in this way, the infrastructure avoids becoming an exclusive route and supports connectivity for a broader population (Graham & Marvin, 2001).

Border infrastructure often leads to new logistics hubs, commercial centers, or urban development at border crossings. Without an active focus on inclusion, history has shown that these become enclaves of elite investment (Graham & Marvin, 2001). Hein’s work examines port cities and, similar to Graham & Marvin, highlights the importance of including social and cultural capital in cities (Jansen & Hein, 2023). Shopping areas or logistics parks that do not integrate with the surrounding community are being built, as can be seen in Tangier and the rest of Morocco. The TGV stations contribute to this. The overview below clearly shows that the majority of the final design is used by large multinationals, whereas the initial design still left room for socio-cultural interests.

To prevent this, inclusive urban planning principles can be applied at the interface between boundaries. Christophe Sohn’s work, *Modeling Cross-Border Integration: The Role of Borders as a Resource*, discusses several methods (2014). One of the methods discussed is the creation of a zoning plan for mixed-income housing, so that low-income residents are not pushed out by rising land prices near infrastructure. It can also involve designing public spaces, markets, or cultural centers near borders. These invite communities on both sides to mix and benefit from increased pedestrian traffic. The ultimate goal is to promote integration, not gentrification. The physical presence of infrastructure should bind the urban fabric across the border. This creates cross-border common space.

At the same time, spatial implementation must also address historical spatial inequalities (Hein et al. 2021). As concluded in the previous section, borders often coincide with stark contrasts in development. The integration of mega-infrastructure is an opportunity to correct some of these imbalances. Giving priority to historically isolated or underserved neighborhoods creates balance in equality. Connection as a backbone allows secondary infrastructure to branch out and reach marginalized regions. This is in line with the idea that infrastructure can reinforce or overcome existing geography of inequality. A spatial plan for inclusive growth would explicitly focus on the latter: infrastructure as a lever to bridge previously disconnected economic zones. The spatial strategy as peramorphic policy, or the active reshaping of the border landscape in line with a political commitment to inclusion (Dijstelbloem, 2021).

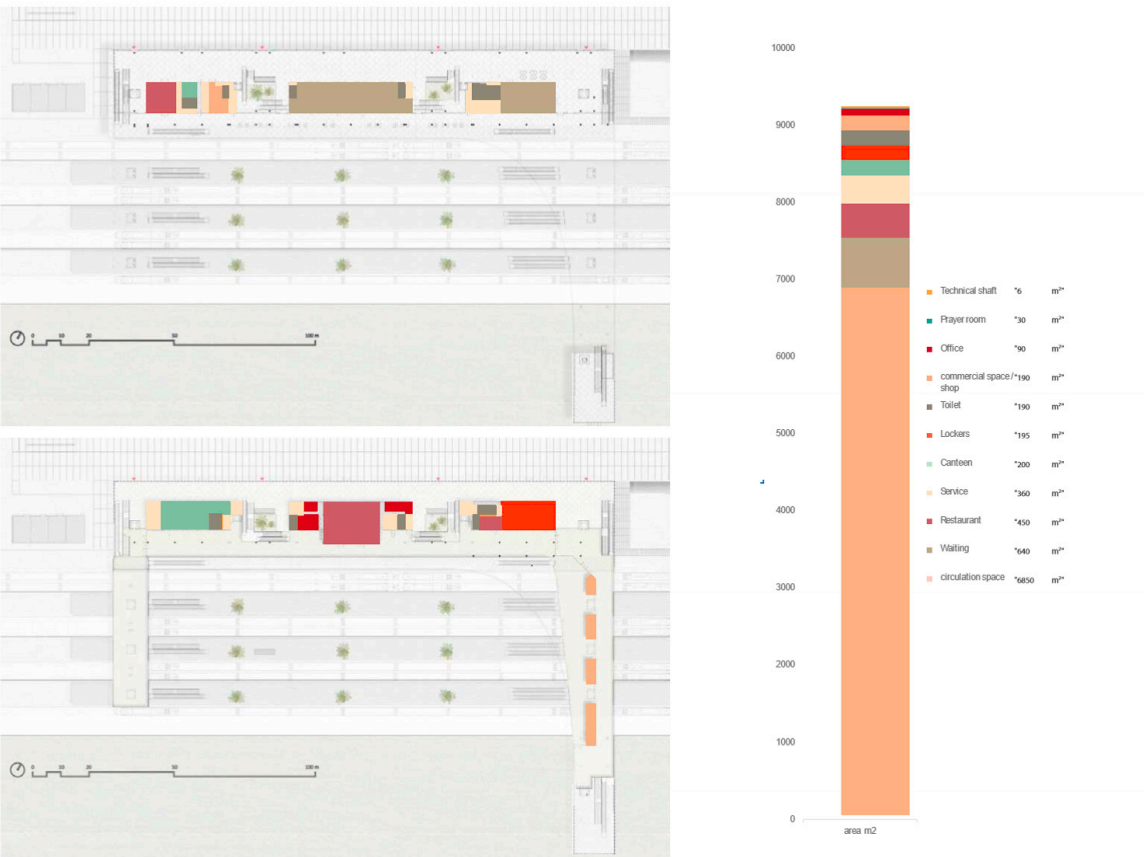


Fig 37 Knitra trainstation envisioned functions (Archdaily, 2025) (Own work, 2025)



Fig 38 Tangier City trainstation envisioned functions (Archdaily, 2025) (Own work, 2025)

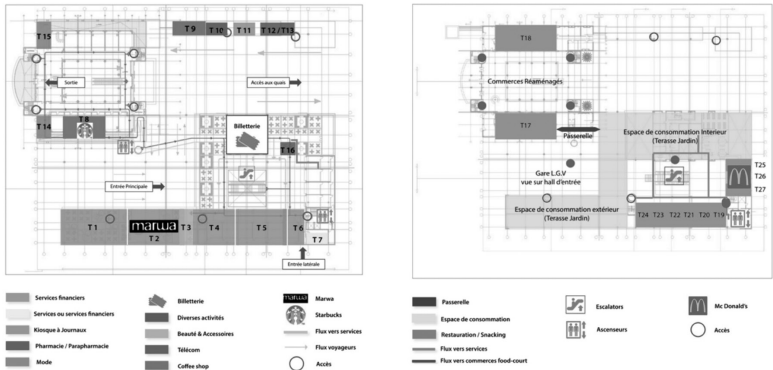
Analyse TGV Stations

We analyse the existing TGV stations, that will be connected to the infrastructure project. The spatial distribution of functions within the station floorplans reveals how circulation and commercial programming shape passenger flow. Functional zoning diagrams indicate that circulation space occupies the largest share of the total area across all three stations. In comparing the stations, Tanger Ville allocates a significant amount of space to fashion retail, reflecting a commercial orientation toward shopping. In contrast, Casa Voyageurs and Gare LGV Kénitra dedicate a larger proportion of their commercial space to food and beverage services, suggesting a greater emphasis on short-term consumption and passenger amenities.

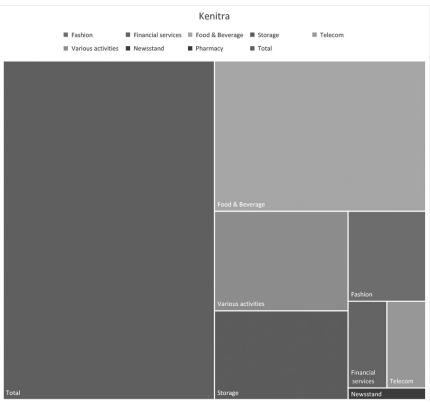
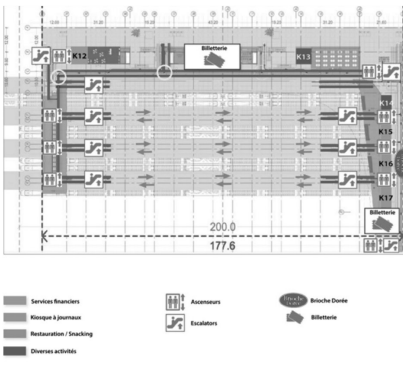
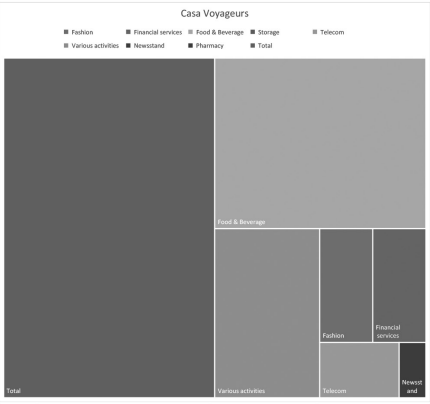
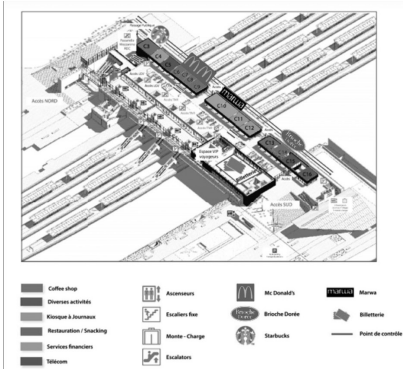
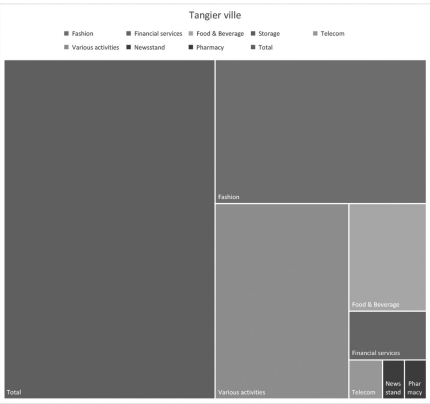
Functions comparison

Functions	Casa Voyageurs	Gare LGV Kénitra	Tanger Ville
Fashion	135 m ²	193 m ²	1322 m ²
Financial services	135 m ²	93 m ²	164 m ²
Food & Beverage	805 m ²	878 m ²	362 m ²
Storage		328 m ²	
Telecom	98 m ²	93 m ²	57 m ²
Various activities	397 m ²	368 m ²	1136 m ²
Newsstand	33 m ²	25 m ²	37 m ²
Pharmacy			37 m ²
Total	1603 m ²	1978 m ²	3115 m ²

Functions within floorplan



Functions as a diagram



The spatial strategy must also take accessibility and affordability into account in its design. An inclusive design ensures that working-class commuters and other travelers with modest means can use the crossing. Designing a multimodal corridor that is suitable for different types of users prevents the project from privileging one group of travelers over others. These spatial decisions are inherently technological: seemingly technical choices reflect values about who is encouraged to cross and who is excluded (Dijstelbloem, 2021). Therefore, integration with inclusive spatial features is a direct strategy to reduce socioeconomic inequality in cross-border mobility (Hein et al. 2021).

4.4.3 Policy and governance

It is important to develop fair economic policies when implementing mega infrastructure projects (OECD, 2015). This includes tariff policies that take into account the different means of users and offer reduced tariffs for local residents. International guidelines for inclusive infrastructure also emphasize that affordability of tariffs for vulnerable groups is crucial for equal access. Any revenue generated by the project can be reinvested in local community projects or public services on both sides (Global Infrastructure Hub. (n.d.). Diagram x shows the link between government policy and the use of private sector innovations to enhance inclusivity through infrastructure (OECD, 2015). In this way, communities that do not directly use the infrastructure can indirectly benefit from better facilities.

Inclusive growth also means that jobs and business opportunities do not all go to outsiders or established companies. Governments can implement local recruitment requirements for the construction and operation of the tunnel to ensure that population groups in the border region receive a fair share of employment (OECD 2015). Inequalities arise when expats with European salaries move to Morocco. Not only from abroad, but also from larger cities, as discussed in previous chapters. Skills training programs can be set up to prepare local workers for new jobs in logistics, maintenance, customs clearance, tourism, and other infrastructure-related sectors.

Proactive social policy is needed to address any negative side effects that could exacerbate inequality. Large infrastructure projects can lead to spikes in property values, shifts in the labor market, or environmental changes that disproportionately affect vulnerable groups. Governments need to anticipate this. Education and cultural exchange programs could be set up to strengthen cross-border social cohesion, so that increased interaction leads to greater understanding rather than social friction. Creating “soft connectivity” in the form of people-to-people contact and culture sharing across sectors is needed (OECD 2015). The broader point is that inclusive growth is not automatic; it requires a series of policy measures that are deliberately designed to distribute the benefits widely and mitigate any disadvantages. By integrating infrastructure projects that prioritize equality, the reproduction of socioeconomic inequalities can be prevented (Dijstelbloem, 2021).

4.4.4 Design and process

The strategies outlined above indicate that inclusive integration of the tunnel is not a one-time decision, but a continuous process of mediation. In Dijstelbloem’s terminology, infrastructure is shown as an “infrastructural compromise,” a mediated outcome that balances different demands and values (Dijstelbloem, 2021). Achieving inclusive growth means constantly negotiating between competing forces: economic vs. social goals, national vs. local interests, safety vs. openness. A practical approach is to build participation mechanisms into planning and use. Participation of diverse stakeholders is crucial to making infrastructure projects more equitable and effective. Laterza et al. (2023) show that involving local communities and civil society organizations helps reconcile conflicting interests. This participatory element acts as a social mediator that keeps policymakers aware of reality (OECD 2015). It also gives communities a voice in how border infrastructure affects their lives, which in itself is a step towards inclusive governance. Dijstelbloem concludes that Europe has come to function as an “extreme infrastruc-

ture” where border controls push inclusion and exclusion to the extreme and effectively create zones of exception (2021). The tragic consequences of exclusionary border policies underscore what happens when infrastructure is guided by a politics of division. The mediation process, discussed earlier in this section, consciously opposes such extremes. Every decision must be examined through the prism of “does this broaden or narrow inclusion?” By institutionalizing this question in the design, the project can ensure social justice. To maintain inclusive growth, stories and consensus-building are needed that emphasize common interests across borders. By publicly presenting a tunnel as a joint asset and a symbol of a shared future, you actively build a community of destiny across borders (Sohn 2014; Brunet-Jailly 2005). This process helps to reduce historical mistrust through practical cooperation and the institutionalization of shared interests (Perkmann 2003). Infrastructures function not only physically, but also symbolically, and can replace existing boundaries with narratives of shared success (Amilhat Szary & Giraut 2015).

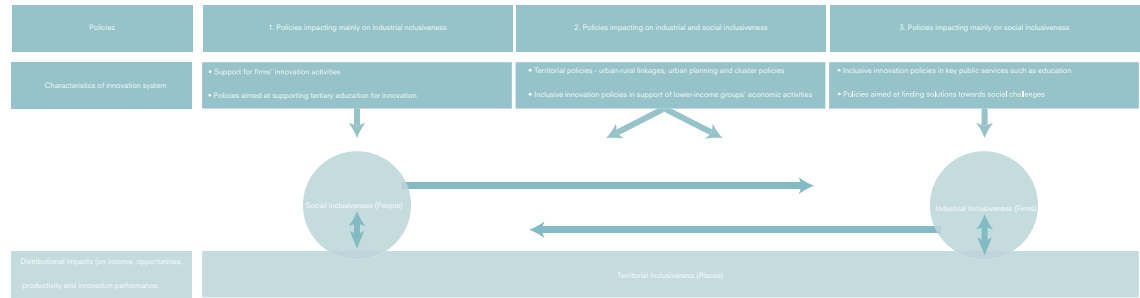
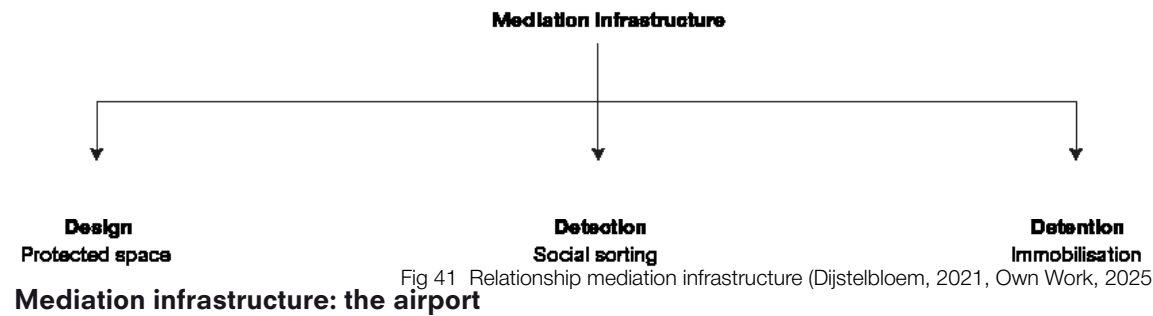


Fig 40 Enhancing the inclusivity of infrastructure by linking government policy to private sectors (OECD 2015) Lines of power 68



For the implementation of the tunnel in Tanger, the most comparable type of infrastructure with a border function is an airport. Airports also form a hub in cross-border border regimes. Airports are the embodiment of mobility management, security control, and infrastructure design. Jan Benthem says about the design: designed to be in constant change while concealing their technological complexity from travelers. The buildings have four main functions: they connect local locations with global networks, organize forms of selection among travelers, mediate between visibility and invisibility, and remain mobile and adaptable themselves. They are both logistical transit spaces and places of surveillance, control, and exclusion (Dijstelbloem, 2021). Three intertwined mediations determine the structure of the airport: design, detection, and detention. These are not isolated functions but dynamically overlap, shaped by the technologies and compromises that manage movement, security, and exclusion.

4.4.4.1 Design

The design of airports promotes efficient circulation. Victor Gruen’s vision led to the airport that is often seen in large metropolises: the airport as a shopping center (Gruen, 1964). This vision reflects a controlled, climate-controlled, enclosed space that guarantees comfort and predictability. It strikes a balance between the fast movement required by airlines and the slower, consumerist rhythm desired in shopping areas. Circulation is choreographed to create an atmosphere of calm and seamless flow. Intensive surveillance and control mechanisms are hidden beneath an aesthetic of relaxed movement. This architecture echoes Peter Sloterdijk’s concept of “spheres,” where life is isolated from external uncertainties (Sloterdijk, 2011).

4.4.4.2 Detection

In addition to openness, airports are also concerned with detection: classifying travelers through surveillance technologies and risk assessments. Security regimes such as the Schengen Information System (SIS), the Visa Information System (VIS), biometric screening, and algorithmic risk profiling contribute to a continuous process of “social sorting” (Latour, 1996).

Detection does not simply produce binaries of inclusion and exclusion, but compiles complex mosaics of traveler profiles (Amoore, 2013). Travelers are not insiders or outsiders, but are filtered through layers of possibility and suspicion. In this way, detection transforms airports into laboratories of preventive governance. Movement is determined not only by identity but also by predicted behavior. Surveillance is aestheticized and spatialized, contributing to a “politics of possibilities.” Potential threats are detected before events take place (Green, 2010). The gap is widening with the implementation of ETIAS for many EU countries. This means that stamps are no longer required when crossing borders, and digitization is leading to greater demand for filtering through layers.

4.4.4.3 Detention

Illegal migrants who are denied the right of entry or residence are held in detention centers within the border infrastructure. These are spaces that are legally and physically separated from the normal order. These detention centers are an example of what Giorgio Agamben calls “states of exception,” where migrants fall outside the full protection of the law (Agamben, 2005). The conditions in these centers often exceed the severity of criminal detention, despite the fact that migrants have

not committed any criminal offenses. While the kinetic elite pass through effortlessly, others are immobilized and made invisible.

4.4.4.4 Mobility

Airports are patchworks of infrastructural compromises. Choices are made between conflicting demands: speed versus security, openness versus control, service versus surveillance. These are mainly choices between government security mandates, the interests of commercial airlines, consumer comfort, and humanitarian considerations. Technologies such as revolving doors are literal and symbolic compromises. They simultaneously regulate air pressure, pedestrian flows, and security needs.

The configuration creates interstructures, which are hybrid spaces where different forms of boundaries intersect without a single organizing logic. Airports enable global circulation while managing, filtering, and often excluding under invisible regimes (Dijstelbloem, 2021).

4.4.5 Conclusion

Infrastructure makes political decisions about who gets connected and how. Infrastructure is equivalent to political action. Infrastructure can be used to connect marginalized areas. This can be achieved through policy measures and administrative reforms. Economic benefits can be distributed to protect vulnerable groups. This leads to active inclusion in economic and social networks. This project deals with peramorphic politics, which actively changes the form and function of the border. Infrastructure can be used as a mediator to create connections. This requires continuous management of tensions between mobility and exclusion. In this way, the border is not experienced as a division, but as a binding space between communities, and the border is transformed into a shared center of opportunities. This requires adaptive policy and cooperative governance, leading to inclusive growth and requiring ongoing commitment. Vigilance and community involvement are essential. With these strategies, the project becomes a driver of inclusive development and creates infrastructure that not only transports but also promotes equality.

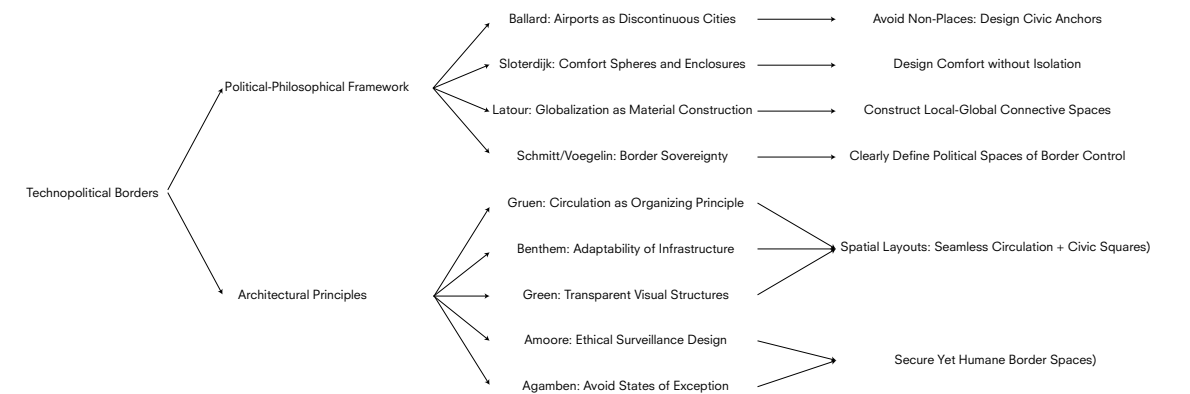


Fig 42 Relationship theories Borderinfrastructure (Own Work, 2025)

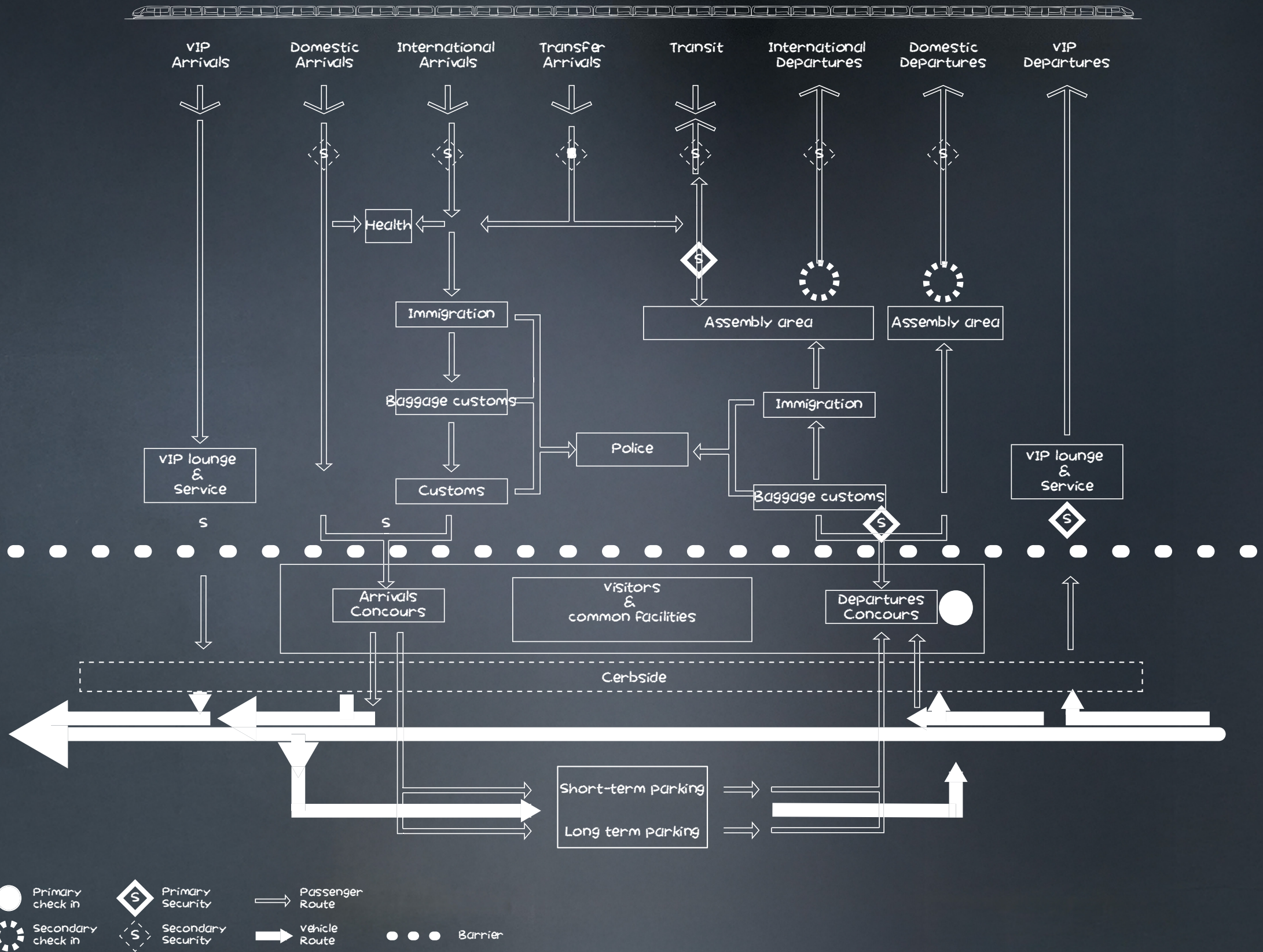


Fig 43 Diagram showing both passenger and vehicular Flow patterns For a international plus domestic trainstation based on Metric handbook,

5. Conclusion

The study reveals that infrastructure can be both a connecting and a dividing force. Historical analysis showed how Tangier's development as a border and port city went hand in hand with uneven growth. Previous infrastructure investments concentrated benefits in specific enclaves, while other areas lagged behind. Looking at comparable megaprojects teaches us that physical connectivity alone does not automatically lead to regional equality. Without additional measures, projects can centralize economic activity in already strong core cities, while surrounding regions or vulnerable groups see little benefit and sometimes even experience new disadvantages. This emphasizes that a tunnel such as the Tangier-Europe connection risks exacerbating socioeconomic inequalities if there are no targeted policies to prevent this.

Answer to the main question:

How can infrastructure projects such as the Tunnel be designed and implemented in such a way that they address socio-spatial divisions and promote equal development?

Technocratic planning alone is not enough. A people-centered, inclusive approach is essential. Inclusive strategies must be integrated into the tunnel project from the outset. Several angles have been identified:

1. The plans must take into account Tangier's local context and historically developed vulnerabilities. In this way, the infrastructure will build bridges between separate parts of the city and not create new barriers.
2. Accompanying measures must be introduced to spread the benefits widely. Affordable fares and access for local residents, investment in surrounding neighborhoods, and programs that stimulate local employment during construction and operation have been discussed.

3. Participation and co-creation are of paramount importance. The involvement of local communities and stakeholders in the planning process can help embed the tunnel as a shared public good. Policymakers should view the project as part of a broader social policy. Measures in the areas of education and urban mobility are needed to translate improved physical connectivity into equal opportunities for the population.

The bottom line is that the tunnel can become an inclusive infrastructure project if its design and implementation are explicitly aimed at bridging gaps, both literal and figurative. Only by linking technical innovation to social integration and equitable policies will the new connection serve as a link for equal urban development in Tangier.

6. Discussion

The study is partly based on hypothetical scenarios and analogies with existing projects. This means that conclusions about impact and effectiveness are speculative in nature; it is uncertain how local actors in Tangier will actually respond and to what extent predicted patterns will manifest themselves. In addition, there is a more limited empirical basis: due to time and scale constraints, it was not possible to conduct extensive fieldwork among the local population of Tangier. The research relies mainly on secondary sources, policy documents, and literature. Direct input from residents who may have different priorities or concerns than those assumed in the literature is lacking. There is also a clear confirmation bias in the case study selection. The case studies examined are largely Western projects documented in the literature. Less attention has been paid to African or specifically Moroccan infrastructure projects, which means that contextual differences may be underrepresented.

In addition, certain assumptions have been made in the analysis that color the results. For example, it has been assumed that economic developments in Tangier will largely follow global trends and previous cases, and that policy measures as recommended are implementable and effective. In practice, political feasibility and administrative capacity may limit these assumptions. Furthermore, it is assumed that inclusive design and participation are possible within the given decision-making structures. The analysis of history clearly shows that this is not always possible in Moroccan politics. If local stakeholders are not given a say, many of the recommendations lose their basis. The research results should therefore be seen as a conceptual framework.

The thesis also has methodological limitations. The multi-method approach provided rich insights, but each component had its own limitations in terms of depth. So the historical analysis had to summarize an enormous period, which meant a loss of nuance. The case studies are informative, but the policy analysis remained theoretical. The validity and generalizability of the conclusions are therefore points for attention. The situation in Tangier is unique and complex, and the findings cannot be applied one-to-one elsewhere, as all the literature already indicated. Eventhough it is not perfect, the approach used offers a transferable framework for similar cases.

5. Reflection

My project is situated in the city of Tangier, Morocco. The research mainly focuses on how infrastructure projects affect the spatial and socio-economic structure of cities. For the project I investigate the impact of the tunnel, that is envisioned between Spain and Morocco, and the structure of the city. The central question is how large-scale infrastructure projects can contribute to reducing socio-economic inequality in border areas. Within this I am designing a new station in the city of Tangier as the important link and first stop in Morocco for the High-speed train network between the two continents. For the research I have analyzed the relationship between infrastructure and spatial justice with a focus on postcolonial urban contests and cross-border cooperation.

The design functions as both public space and a Train station/mobility hub. I tried to emphasize social interaction, the accessibility and cultural representation. The design is focused on developing an infrastructure that goes beyond economic efficiency at the core of interaction.

The process had a series of repetitions and reorientations. At the p2 the theoretical framework was not included in the design strategy, which led to critical feedback from my mentors. That feedback was essential: it helped me make the spatial and social dimensions of the design stronger. Based on this input, I worked on a new concept in which public use, social inclusion and urban connections are central, the design is based on slowing the traffic down.

The translation of research into design took more time than anticipated. This was due to the abstraction of the subject and the challenge of making social-spatial ambitions spatially tangible. In the coming weeks, I will focus on further detailing the design. Including the maquette.

1. What is the relation between your graduation project topic, your master track (A, U, BT, LA, MBE), and your master program (MSc AUBS)?

The connection between my topic and the studio lies in envisioning future cities shaped by current trends. The studio emphasized the profound impact of infrastructure on urban development, specifically piquing my interest in the Strait of Gibraltar Tunnel. Recognizing that such infrastructure projects intersect with politics, economics, and social studies, I believe architectural solutions must consider these broader contexts as is asked for in this Master.

2. How did your research influence your design/recommendations and how did the design/recommendations influence your research?

My research directly influenced my design by providing a focus on the human scale and experience. The design focused on inclusion, however instead of focusing on including the outside world, the existing structures and experiences are used as the foundation of the design. Through literature review and analysis of similar projects, I better understood how infrastructure can mitigate or reduce spatial inequality. My design therefore not only focuses on functional aspects of the train station but rather on social connections, accessibility and making it part of the urban context.

The design process also influenced my research. While designing questions like how do you program public space around a station that forms a border, and what is the role of the different identities and interests of the travelers but also of the stakeholders of my project? This forced me to sharpen my research and investigate practical examples, interviews and spatial scenarios of projects that combine the Arab with the western world.

3. How do you assess the value of your way of working (your approach, your used methods, used methodology)?

Looking back, I believe that the methodology I used offered depth in understanding the socio-spatial problems related to my topic but lacked direct applicability when it came to developing the design. The research questions I initially posed were highly analytical and conceptual, which helped frame the complexity of the border context, but did not sufficiently steer the design process toward clear spatial strategies. As a result, the early stages of the design relied heavily on precedent comparison and analogies with other projects, rather than a structured, research-driven methodology.

This made the process time-consuming, especially since similar case studies were virtually non-existent. I had to depend on multiple things from border theory, mega-infrastructure projects, Moroccan TGV stations, and inclusive design principles. While also looking into the fieldwork to understand the urban context of Tangier. The lack of direct references forced me to rely on my own design vision to interpret how two worlds, Europe and Africa, north and south, global and local, could meet within one infrastructural project.

While this made the process challenging, it also deepened the reflection on the meaning and purpose of my work. The methodology required constant integration between abstract thinking and tangible design output, which did not always happen smoothly. Yet, I believe that this very tension helped me to critically assess each design decision in relation to the broader social issues I aimed to address. Ultimately, the approach helped me find a balance between theoretical abstraction and spatial materialization, even though that balance was often difficult to maintain.

4. How do you assess the academic and societal value, scope and implication of your graduation project, including ethical aspects?

First, there are of course cross continental multiple mega infrastructure projects envisioned that will experience the same problems. But I think my research also addresses some of the problems or inequalities that can even be found in just a train station. In Morocco the TGV stations are not inclusive. The process of being able to travel is exclusive in Morocco. Train stations and airports are designed to accommodate the needs of a certain population. Doing this within the city then also does too little for the livability and social structure of cities. My project contributes academically to the broader debate on the role of infrastructure in socio-spatial transformations. By approaching cross-border infrastructure as a social and political phenomenon, the project moves away from technical or economic logic to a spatially inclusive approach. I hope it offers an integration of infrastructure urban and social structures.

The social value lies in the way the project takes local social structures seriously within a mega-project with geopolitical impact. Instead of reducing Tangier to a functional gateway to Africa, the project proposes to position the city as the active actor and cultural carrier within the border narrative. In this sense, the station's design acts not only as a link between continents, but also as a space for social justice, encounter and urban integration. It is where the tunnel project kind of becomes a bridge. Not only between cultures, but maybe more important for the city between the neighborhoods and existing communities.

In terms of scope, the project can be used as a reference for others project even in Tangier. The current infrastructural interventions threaten to dominate over local interests to be seen at the coastline. The methodology and design strategies can be translated to other contexts where there is tension between global policy and local life.

For me it was essential to remain critical of the risks of gentrification, symbolic violence and exclusion. I have tried to investigate the role of infrastructure as a possible instrument of equality. For the design this meant inclusiveness by focusing on shared public space, access for informal economies and local cultural representation.

5. How do you assess the value of the transferability of your project results? For the design solutions I have focused on the culture of buildings from the region. The methodologies of the history of building in Morocco formed the starting point of many of the solutions. The climate and natural position of the plot has already become part of the design in combination with the research on global trends. The design tries to directly translate the theoretical framework of Claude Parent on the Oblique on the surroundings of the plot. Because the project is strongly embedded in the specific context of Tangier. Its postcolonial history, social stratification and geographical position as a border city are crucial to some of the design principles. Therefore, I think the final design is not applicable in any other urban or cultural setting. Its form and program are specifically tailored to local needs the patterns of use and symbolism.

At the same time, in case the political tensions lay down and Spain and Morocco create another connection between for instance Tangier and Ceuta, some of methods on which the design is based are transferable to this. But I also think that the ideas on spatial justice, integrating the local narratives within Moroccan infrastructure projects and the border terminology can also be included in the other TGV stations.

What choices in my process determined the direction of my project? A crucial choice was to start not from a formal or technical approach to infrastructure, but rather from a social-spatial perspective. My mentor stressed that spatial experience is more important than the functional design of a station. As the functions needed within a station are the same everywhere. This shifted the focus from “how do you design a station?”

to “how does a station facilitate the wanted social structure and inclusion in a border city and station? The decision to treat design and research equally also influenced the process: design became not an illustration of the research. But the position changed from P2, and I started to move between the two. These choices determined not only the direction of my project, but also the direction of my research.

What is the most important methodology for design?

The most influential methodology in my design process was fieldwork. While I was already familiar with many spatial and cultural practices of Moroccans, it was only through direct experience in Tangier that I could understand how these practices manifest spatially. Fieldwork allowed me to observe, absorb, and translate these insights into my design decisions. For example, visiting the Tangier City Mall revealed the importance of natural ventilation and window placement in public buildings (it was absent). Walking through the city streets, I noticed how large stretches of cast-in-place concrete pavement were filled with visible footsteps.

Conversations with taxi drivers and observations of nearly empty parks highlighted a key spatial lesson: green space alone is not sufficient. Public space only becomes meaningful when activated by surrounding functions and everyday routines. Equally revealing were the informal market areas, where I realized that flexibility in spatial layout can enable social and economic inclusion. This connects to a broader insight: in such urban environments, function often follows form, not the reverse. Religious practice also emerged as a crucial spatial factor. Around prayer times, the city's flows and rhythms shift, and public space is temporarily redefined. In areas where mosques are absent, people adapt their surroundings and create provisional spaces for prayer. Therefore, I started thinking of infrastructure not only in terms of permanence, but in terms of adaptability, rhythm, and collective rituals.

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