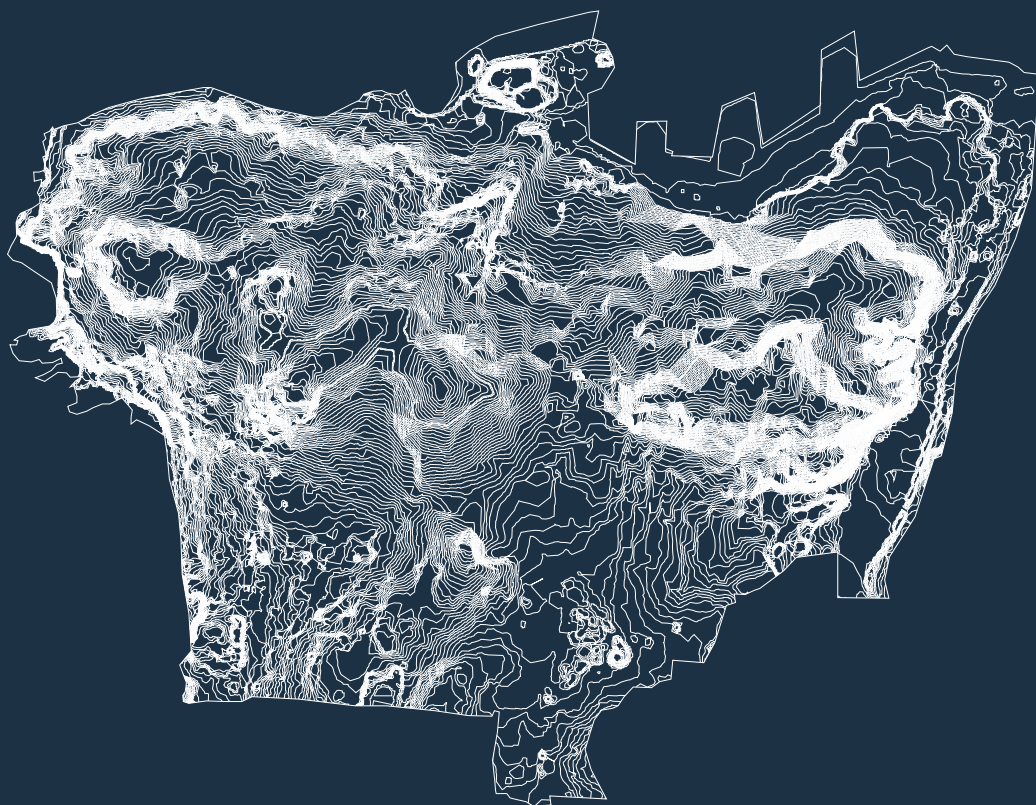




RESEARCH PLAN

Beirut Studio
The Cornucobay



complex studio

2021

COMPLEX PROJECTS

Beirut studio

AR3CP100

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INTRODUCTION

01

1.1 INTRODUCTION

1.1.1 Research Interest

The research interest is the change in Beirut's urban diversity. Lebanon has seen many changes in all dimensions throughout recent history. The remains of French influence, the war, the economic recovery, and downfall have all taken place in the last 50 years. Perhaps the most extensive example of this change is visible in the capital city of Beirut itself. All of the country's macro-events had an effect on the urban fabric of Beirut. In this thesis, we seek to entangle the changes that lead to Beirut's current form. In order to do this, we mapped key routes in the city center, counting for areas of high diversity.

1.1.2 Introduction to location

Beirut is a complex, densely built city along the Lebanese Mediterranean sea. Its hilly environment, tall skyscrapers, and curved roads give it a hard to grasp urban fabric. The city has formed over time from a small village near the sea to spanning the entire lower terrain near the sea. While this surface is far from flat, it is relatively favourable compared to the rough mountain lands that span across the Lebanese coast.

While the city has been known since Roman times, it only extensively started to increase in size during and after the French mandate of the early 20th century. This caused various French architectures to spread along with the city, both modern and traditional. These happened organically among the Islamic and Christian neighbourhoods. These parts were separated during the war, partly destroyed after, and rebuilt by foreign investors, this left the city without a recognizable urban hierarchy

For the P0.5 we analysed Beirut on six different scales; Mediterranean, Lebanon, Greater Beirut Area, Beirut city, wider port area and the explosion area. Lebanon is populated by 6,8 million inhabitants, of which 25% are refugees, mostly Palestinian and Syrian.

Lebanon is often referred to as the gateway to the Middle-east, since it's geographically a very important trading connection. Because of this connection and because of the French Mandate period of 1922 till 1943, Lebanon is influenced by European culture. The French influence is also very visible in architecture.

After the French Mandate alternating periods of political stability and turmoil took place. With 18 official religious groupings in Lebanon, the religious balance is a very sensitive political issue. This triggered the Lebanese Civil War, which started in 1975 and lasted until 1990. The country was left scarred, and Beirut a fragmented city.

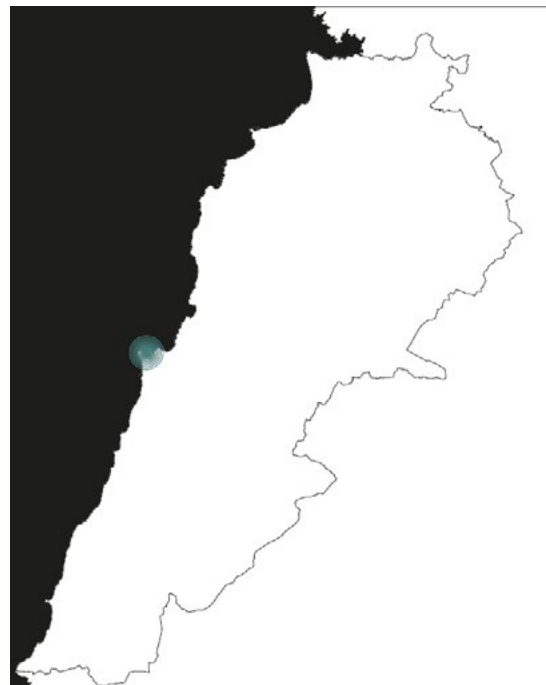


Figure 1.1: Explosion site on country scale
(The Cornucobay Group, 2021)

The central district was destroyed and inhabitants were displaced. Solidere, a joint-stock company, became responsible for reconstructing the city centre. The approach they took led to gentrification of the area and to a poly-centric Beirut. Once, Beirut was divided by the demarcation line, but now also by privatization of space and resources. Current issues in Lebanon involve political corruption, economic crisis and lack of resources but also inadequate infrastructure and most recently the port explosion in Beirut.

This port is the largest port of Lebanon and accounts for 75% of Lebanon's import. Due to corruption and mismanagement this disaster wasn't prevented. Officials we're made aware of the 2,750 ton of unsafely stored ammonium nitrate in 2014 already, but no action was taken.



Figure 1.2: Explosion site on city scale (The Cornucobay Group, 2021)

1.2 URBAN DIVERSITY IN BEIRUT

1.2.1 History

Beirut is known for hosting numerous civilizations and influences, enriching its history. Beirut has been inhabited for over five thousand years, making it one of the oldest cities in the world. The origin of Beirut's settlement lies in maritime practice. The most prominent and strongest ages, as a port city, were the Phoenician and Roman times. During these periods, the port was their main asset. Some archaeological sites, from the Phoenician and Roman periods, are still present and openly visible in Beirut's urban fabric.

For our studio research, we mainly focused on Beirut's history of the past hundred years. Starting from the end of the Ottoman empire, to the moment of the August blast. This timeline presents a sequence of historical changes in the city, both physically and socially, and clarifies the familiarity of the city with destruction and reconstruction.

In the late Ottoman period, Beirut was the port of the Levant, making it an important center of commerce and trade. In this period the natural coastline was extended with land reclaimed quays to facilitate the enlarging trade practices. During these periods numerous outburst of conflict would occur with European fleet, regularly destroying the urban fabric which was anchored around the port. Some of these reconstructions are visible in the map, where ancient urban patterns are replaced with geometric structures. The rise of Beirut as port city participated in the diversification of its population. It is also during the Ottoman period that foreigners mainly from France, Germany, Britain and United states settled in Beirut – often through Christian missions.

The industrialization of Beirut resumed under the French mandate. The port continued to be extended and was further supported by the introduction of the tram rails. In the urban development the French implemented clear distribution of zoning and furnished

the city with colonial architecture and recognizable French urban morphologies. One example is the Place de l'Etoile, to the west of Martyr square. Together with Martyr square, it continued to function as the centre of Beirut. However, the imposition of the Baroque urban form Place de l'Etoile wasn't successfully finished as planned, due to archaeological sites and landmarks in its proximity.

It wasn't until the post-independence era that Beirut underwent a tremendous population increase. Important international migration flows radically shifted the demographics of Beirut. In the rise of tourism and the Palestinian refugee influx due to the establishment of the state of Israel, the spatial and social complexity of Beirut progressed. A few years before independence, in 1936 the French requested from citizens to "declare allegiance to one of the (religious) affiliations in order to be legally recognized as a citizen" (Martinez-Garrido 2008: 1). This manifested in strategically clustering and positioning of communities in the urban fabric, dividing the city. Simultaneously, we see an architectural exploration of post-colonial architecture.

The socio-spatial organization based on sectarianism is not new in Beirut. For instance, Ottoman established mosques in the city centre which resulted in mainly Muslim inhabitants in this area. Whereas the French were much more interested in maritime control which happened mainly on the east side of the city centre, making this area more Christian. That division between east and west met at the Martyr square, which progressed into the demarcation line during the civil war. Most of the destruction during this time was at the city centre, displacing many of its residents to the suburbs which created misery belts and physically expanded the city. After the civil war, the city centre as it was known, did not exist anymore. The city became centre-less.

Today the city centre is still not fully recovered from the civil war. Solidere is responsible for the reconstruction of the

central district and the re-establishment of an attractive, commercial core for the city. The Solidere masterplan is criticized for its neoliberal approach which continues the gentrification of Beirut. Hence, the historically displaced residents of the city centre, were never able to return.

In this brief summary of the hundred year timeline, today's urban fabric can be clarified. With the historical socio-spatial development and a familiarity with informal settlements, cultural segregation and diverse densification, we understand the urban structure. Today the city seems to have scarcity in centralized public spaces and a commercial core. Seemingly, Beirut much more resembles a polycentric city rather than a monocentric city. However, polycentricism implies that there are multiple centers facilitating the surrounding neighbourhoods. Whereas in Beirut, where commerce is not zoned into cores, polycentricism is not the

ideal description. This gives an interesting spatial experience and movement of people in the city, where way-finding is much more based on 'accidental moments' rather than centralized city cores and landmarks.

Mapping the diversity of urban activities is extremely relevant in the case of Beirut. A city of which the urban structure is not evident at first sight and becomes even more complex when historically evaluating it. Mapping urban diversity aids in exploring urban patterns and relations in Beirut – a largely unplanned city which isn't monocentric nor polycentric – to be able to conceptually formulate its composition. This analysis gives us deeper insights into the socio-spatial implications of historical events like cultural pluralism, sectarianism, civil war and gentrification.



Figure 1.3 Martyr square in 1960s, retrieved from <https://oldbeirut.com/page/72>

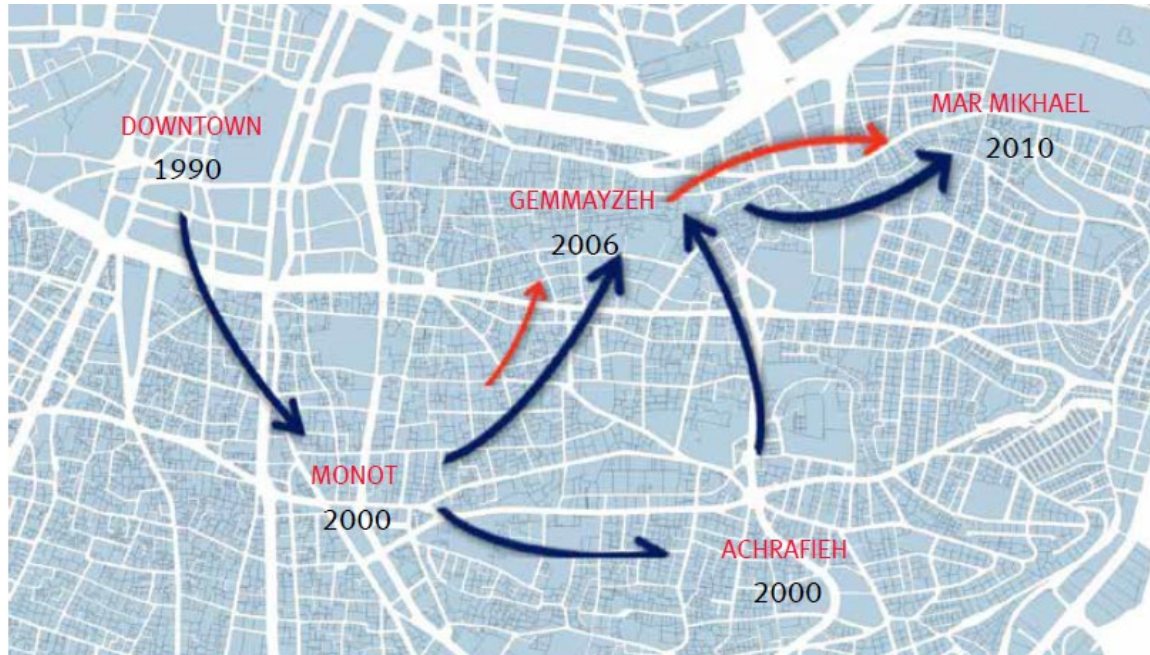


Figure 1.4: historical areas under different stages of gentrification (Germal and Hrycaj, 2015)

1.2.2. Choice of areas

Three axes are chosen as research areas for their representative historical evolving pattern and the availability of Google street view. These axes go through historical neighbourhoods, neighbourhoods that were fully reconstructed after the civil war, and neighbourhoods under different stages of gentrification.

The west axis is a representative of gentrified area. It goes through the downtown area, which is fully reconstructed by Solidere, a private developer, after the civil war. The downtown has been seen as an exclusive enclave for wealthy residents. (Calame et al., 2012) The whole axis goes through the downtown area and high-end neighbourhoods on the north coastline, and ends at the campus of AUB.

The south axis lies on areas that were fully reconstructed after the civil war. It starts from the south of the downtown area, going through the margin of Monot neighbourhood, Ras El-Nabaa neighbourhood, and ends at Horsh Beirut, the largest urban park in Beirut. Monot

is the starting point of Beirut's cycle of gentrification, and it is now a quiet residential neighbourhood with high-end commerce. Ras El-Nabaa was reconstructed as a residential area for working-class after the civil war, and are now becoming a mix-class residential area (Saab, 2006)

The east axis goes through historical areas under different stages of gentrification, including Gammayzeh, Rmeil, Mar Mikheal, and Khodr. The west part of this axis represent gentrification area in stage 3, while the east part of the axis represent gentrification are in stage 2 and 1. (Germal and Hrycaj, 2015) (figure1.4)

1.3 METHODS

1.3.1 Defining urban diversity

For this research the 'urban diversity' method is used. This method is based on the research and article by Birchall (2020). For this research the definition of 'Superdiversity' by Vertovec (2007) is used. Birchall describes Vertovec's indication of how 'the increase in global migration leads to 'Diversification of Diversity', which

introduces more social variables within demographics, therefore, addressing diversity just as ethnicity, religion and race is no longer appropriate. [...] He consequently coins as 'Superdiversity' to describe new levels of heterogeneity in British society.'

To comprehend 'Superdiversity' on the scale of architecture and the built environment Birchall introduces urban diversity heatmapping to 'create a visual narrative of the existing spatial diversity and enable the user to generate a framework for design through highlight key areas for development and design potentials'.

For our research we will be using the same method to apply on the urban diversity of Beirut.

1.3.2 The record

The record of the research consists of three websites with maps and one report, specifically for housing. Since not all roads are visible in Google Street View, we've also used the information on Mappilary.com and Openstreetmap.org. For housing not all information was accessible through these maps, so Airbnb.com and a report about heritage mapping was an added information source (NAHNOO, 2020).

1.3.3 System of classification

In order to map the urban diversity thoroughly the distinction between five layers, all crucially relevant to a functioning city, has been made. These layers should also be historically relevant in the context for a specific city. For Beirut we made the following classification system: education, public space, infrastructure, commerce and housing. These five layers have diversity sub-layers, which are explained in the following chapters. In order to redo this research for Beirut or another city, five or more layers with the most relevant functions of the city should be mapped. Ideally, all layers have approximately the same 'weight' and amount of sub-layers.

1.3.4 Granularity

The granularity of the mapped object is defined by function. For education, culture, and commerce, the granularity range from shop units to building complex. For housing and working, the granularity range from building to the building complex. For infrastructure, the granularity range from element to area.

1.3.5 Indexing

Buildings and infrastructure elements that influence the urban activities on the three selected roads will be mapped. For the infrastructure layer, the mapped object are elements on the street. For educational commercial, living and cultural activities, the main mapped objects are buildings along the road.

The influence radius of the mapped objects will also be considered. Larger complexes that are not along the road but will influence the urban activities on the road are also mapped, such as universities and schools in the education layer.

The grid is set as an interval of 100m and is following the path of the street. The number of types of activities will be counted in each unit, and be visualized by colour. The diversity level of each unit is evaluated by the number of type of activities, and ranges from 0-12.

1.3.6 Validation

According to the study of the cycle of gentrification in Beirut, the urban diversity changes along with the gentrification stage of a neighbourhood. In stage 1, leisure and creative activities added diversity to the original neighbourhoods, In stage 2, urban activity is influenced by the boom of night-life. In stage 3, the arrival of high-end housing and leisure industries evict the creative class and original residents, resulting in the reduction of urban diversity.

1.3.7 Application

The result of the heatmap collectively shows how different patterns of historical evolution influence urban diversity. The contribution of each layer as well as the reason behind it will be analysed individually. The collective map and individual map of each layer will be used to validate and complement our research. The analysis process will lead each of us to answer the individual research question, and be applied in the individual architectural projects in the design stage.

1.4 RESULTS

1.4.1 Description

The combined data gives quite complex patterns of density. In order to make a clear analysis we subdivide the resulting data in three categories: low density (1,2,3,4), medium density (5,6,7,8) and high density (9,10,11,12).

The simplified graph (figure 1.6) shows clear zones of high or low density throughout the axes.

We clearly see (figure 1.7) that in John Kennedy - Omar Daouk - Waygand there's a prevailing low urban activity density. Except for a few separate isolated incidents and the end of the axis showing a medium density.

Gouraud - Armenia (figure 1.8) seems to be the opposite where the major tendency is a high density of urban activity, interrupted by a zone of medium density between the west side of Armenia and Gouraud.

The south half of the axis Bechara el Khoury (figure 1.9) has a medium to high density. In the North half, close to the old centre of Beirut, densities are low, and medium on the intersection with Gouraud.

The axes meet in Martyr square where density is also low.



Figure 1.5: Urban heatmap Diagram Beirut (The Cornucobay Group, 2021).



Figure 1.6: Simplified urban heatmap Diagram Beirut (The Cornucobay Group, 2021)

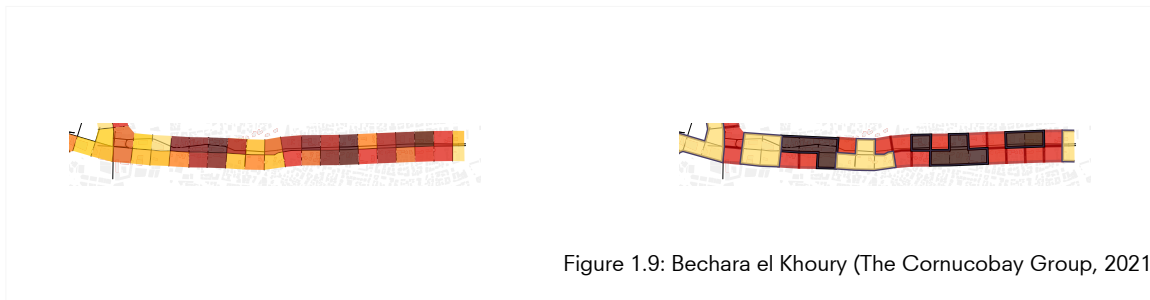
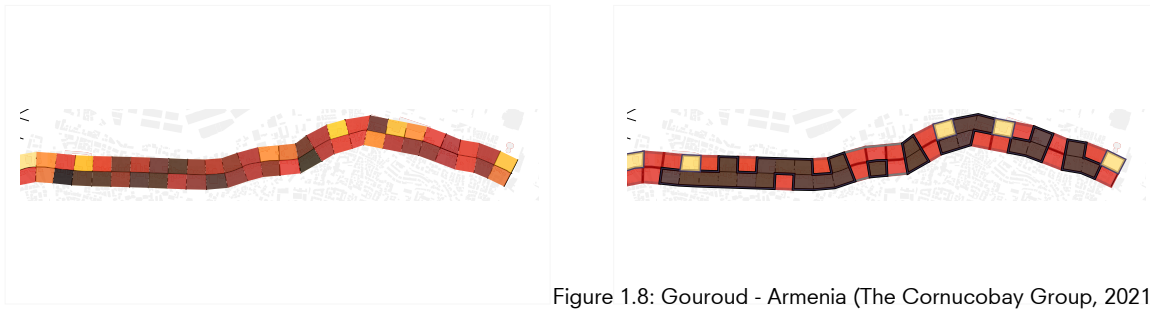
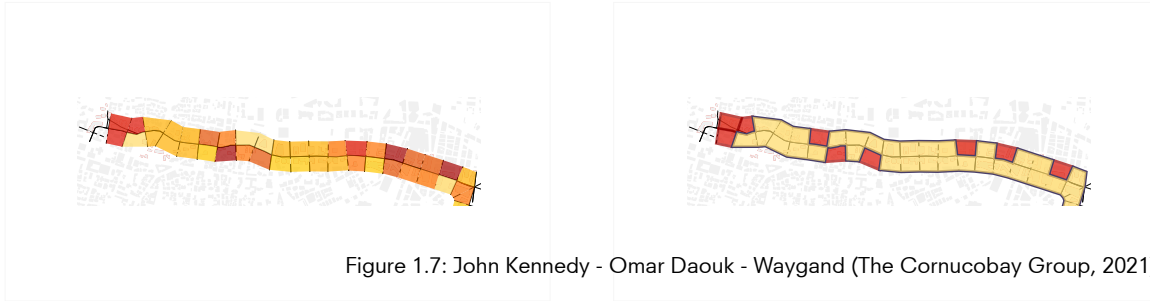
1.4.2 Validation

From studio research we find different typologies and urban fabric in each of the axes, which can be explained from a historical perspective. Buildings throughout different areas have increasing dimensions.

Armenia And Gouraud reflect the old rural landscaped neighbourhoods with their old Ottoman villas. Filled in with French Mandate apartment buildings and some small scale 60s-70s apartment blocks. Bechara el Khoury consists of larger scale sixties and seventies urban concrete apartment flats.

The centre of our study marks the former city wall, now Martyrs square, an area severely damaged and demolished through and after the civil war ending in '92. Waygand is part

of this same urban redevelopment of the nineties and has seen some major rebuilding. In (figure 1.7) we can see an urban tissue with larger building grain than in the other axis. Along Kennedy and Daouk the density is lowest, there's distance between buildings. In Kennedy the street is quite one sided in some places, where the street faces many gardens and education campuses dating before 1900. The area matured through gentrification stages. The axis used to go through the most developed and active area in the sixties boom. And after the interruption of the civil war, got rebuild as an area for the wealthy investors and luxury commerce. The diversity decreased.



In Armenia (figure 1.8) the building grain is the finest. Buildings are close together, north-south interrupting streets are quite narrow, which all leads to a high density. In the west of Gouraud high-end commercial activities, hotels and high-end residential buildings are taking over (stage 3 gentrification), diversity goes down. Where Gouraud and Armenia meet gentrification is at stage 2, highest diversity because of bars, shops and culture. The east part of Armenia is in stage 1, a medium density reflects the variation in activities of life in common residential areas.

Bechara el Khoury (figure 1.9) has a medium grain size urban fabric. Some areas with medium density occur with buildings along both sides of the axis. However some interruptions in the urban fabric occur explaining the low density of urban activities. Monot has been developing

through the gentrification cycles the past two decades, and is now one of the (stage 2) vibrant clubbing areas. Although, we see some density in urban activity, it is less than expected. This could partly be explained by the knowledge that many of the urban activities here happen off the main road, and are thus not counted. The northern part of the axis adjacent to Martyr square and the government zone has not been completely rebuilt since the civil war ended. Many plots are still empty, while others are still getting built, therefore not adding to urban diversity.

Although a bigger grain size might indicate higher density, the opposite seems to be true for density of urban activities. The smaller the grain size, the more different functions can coexist, the higher diversity becomes.

1.5 CONCLUSION

1.5.1 Process

We have done a diversity mapping of Beirut, based on a considerably laid out grid, and pre-existing mapping methods. The axes were chosen based on representativeness and availability of data. The data they provide were validated and taught us individual lessons and lessons about the urban fabric. Gentrification cycles influence the diversity found along the different axes. The visualisations have been analysed further and provide us some insights in the differences between the axes. We can relate this data to historical developments and ongoing urban transition.

1.5.2 Expectation

We expected the west axis to have less diversity, since this area is quite mono-functional with the university area along John Kennedy road, and the Solidere developments along Omar Daouk and Waygand. We expected to find an empty centre around Martyr square, since the area was not rebuilt and is uninhabited. As expected Gouraud and Armenia show a high density of urban activity, which corresponds with studio research proving this area to be among the most vibrant and diverse in Beirut. The southern axis did hold surprises. We might expect more diversity in the northern part along Monot, and less diversity in the southern parts. The prove that some assumptions are incorrect provides us more insight and understanding of these parts of Beirut.

1.5.3 Evaluation

In order to keep the research feasible we used some simplified methods to measure density. The grain size of 100x100 was chosen to span a large area. A more detailed approach might be possible when dealing with smaller areas, or when there's more time for the research. We divided urban activities among five topics, that have different weights, due to the scale

of buildings and the number of sub-layers. Only one of these categories looks at the streets themselves, and therefore the topic of infrastructure has more weight with 7 sub-layers, against 2 or 3 in other categories. There can be discussion as to what provides the right balance and results for a clearer image of urban activity. Density has been expressed in activities in approximately 100x100m total area. A simplification was necessary for this particular study. With a script to make more accurate calculations more complexity and precision might be added.

So far we have succeeded to provide some insights with our research, especially when combined with other research. And the findings are replicable and usable for those familiar with the city being studied. It's therefore a development tool in the hands of researchers and designers, and must be used wisely for its strengths and weaknesses.

1.5.4 Use

We can use our insights in the redevelopment of the port and rethinking of Rmeil, Mar Mikhael, Khodr, and Karantina. To find what each of these areas brings to Beirut in terms of urban activity. We can judge its state of gentrification, and its grain size to better implement designs to the situation on site.

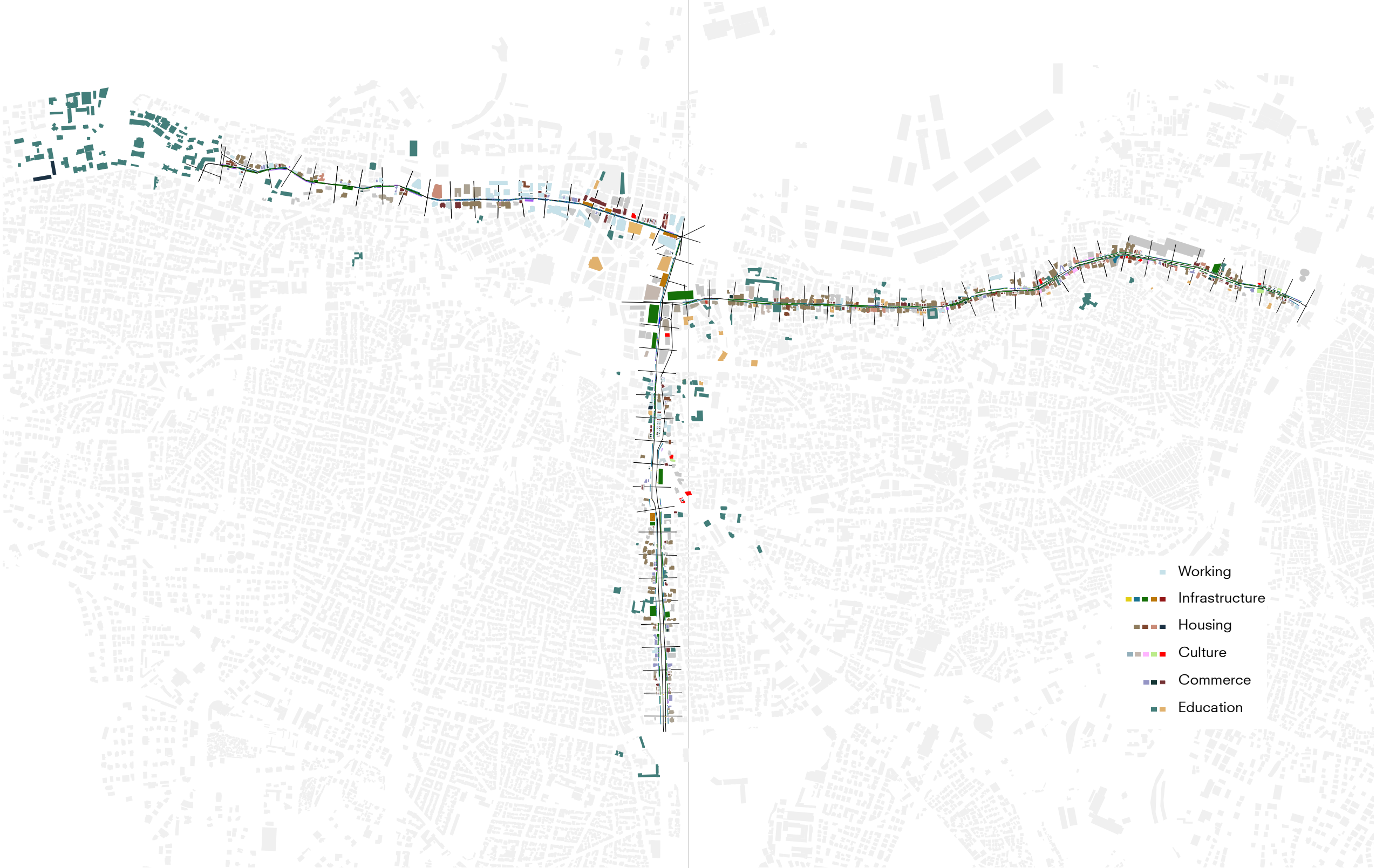


Figure 1.10: Urban Diversity map (The Cornucobay Group, 2021).

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INFRASTRUCTURE

LÛTE BIESHEUVEL

02

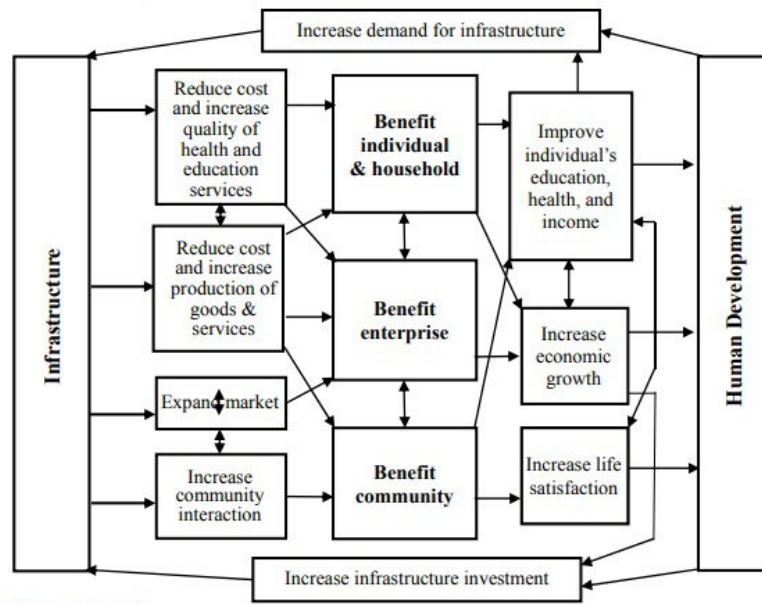


Figure 2.1: A dialectic model of infrastructure and human development (Sapkota, 2014).

2 Infrastructure

2.1 Introduction to infrastructure

In the Oxford dictionary 'infrastructure' is described as the following:

'The basic physical and organizational structures and facilities needed for the operation of a society or enterprise.'

Infrastructure is a broad term, and includes a wide range of projects. Some are related to transport of people and cargo, like roads, bridges, railways, subways, airports and ports. Some projects are related to other services, like water treatment plants, oil and gas pipelines, telephone networks or power plants (Bourguignon & Pleskovic, 2005). A lack of access to good infrastructural services makes fulfilment of basic human needs extremely difficult, since it's a prime necessity. Having good access to different infrastructural services, like transportation, water and energy, directly benefits a country and its people (World Bank, 1994). In figure 2.1 the relation between infrastructure and human development is shown (Sapkota, 2014).

The author implies that the many positive consequences of qualitative infrastructure benefits a variety of stakeholders, which leads to economic growth, improved education, health and income conditions, as well as increased life satisfaction. For the analysis in Beirut the main focus is on transport related infrastructure. Although, also other forms of poor infrastructure trouble the city: water shortages and electricity black-outs are known problems to the inhabitants of Beirut, creating precarious situations. However, the congested infrastructure and the transportation crisis currently happening, creates a clear-cut, defined research topic and problem statement.

This transportation crisis is mainly caused by the use of passenger cars: 80% of the trips in the Greater Beirut Area are executed by passengers cars. Public transport is limited to the use of buses, less than 2% of the trips, or taxi services, which accounts for the other 18% (Samaha & Mohtar, 2020). This results in a congested, polluted city with traffic problems, where traveling by yourself, by car, is the standard means of transport.

2.2 Relevance

Research into transport is relevant since researchers have claimed that good transport infrastructure has a bigger impact on economic growth, productivity and poverty reduction than any other form of infrastructure (Sakamoto et al., 2010). Also, road transportation is by far the biggest greenhouse gas emitter, and it's the main cause of air pollution in cities, which directly effects mortality rates (WHO). Researching and possibly intervening in the transport situation will have a significant impact on Beirut.

2.3 Research questions

This leads to the following research questions:

What would the impact of an improved public transport system be on the social, sustainable and economic development of Beirut?

How will improved public transport impact the reconstruction of Beirut?

What form of transport is the best protagonist for this change?

To see how infrastructure currently behaves and influences the use of the streets of Beirut, the following question will also be answered:

How does infrastructure affect the urban diversity in Beirut?

How would an added form of infrastructure change the urban diversity?

How can this urban diversity map inform my design?

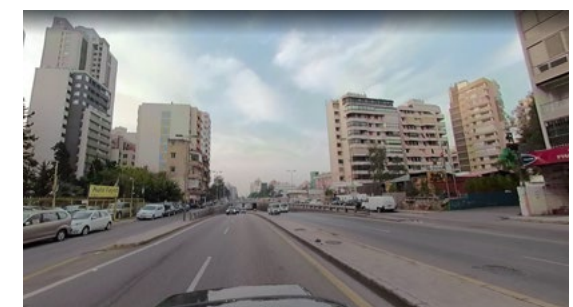
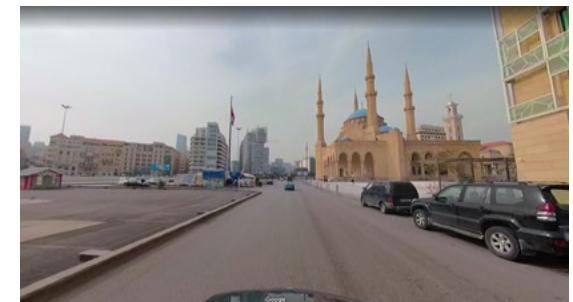
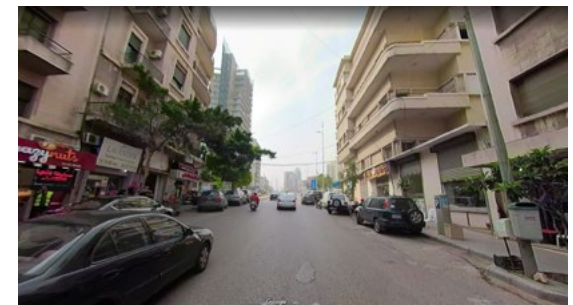


Figure 2.2: Analyzed streets in Beirut, Google maps

2.4 Research framework

The main research questions involve three different scopes. It touches upon social studies, when researching the social effects of (adding) public transport. Geurs, Boon and van Wee (2009) define social effects on traffic as *'changes in state that occur as a result of the movement and / or (potential) presence of vehicles on a piece of infrastructure (or the pure presence of infrastructure), which have a positive or negative influence on the community needs, community groups, social categories and individuals who are satisfied in certain destinations.'*

I will be using this definition but limit it to the influence of a public transport system, instead of multiple transport infrastructures.

The second scope is within the realm of sustainable development. Sustainable transport is related to the Sustainable Development Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable. At the United Nations Conference on Sustainable Development in 2012 the world leaders established that transport and mobility are central to sustainable development and it will play a significant role in achieving the Paris Agreement. The definition of sustainable transportation development can be derived from the Brundtland Commission's (1987) definition, which is globally used to define sustainable development. Based on Richardson this would read: *'sustainable transportation is the ability to meet today's transportation needs without compromising the ability of future generations to meet their transportation needs'*, with the following five indicators: safety, congestion, fuel consumption, vehicle emissions, and access (Richardson, 2005).

The last subject is economic development. Economic prosperity should grow in a sustainable and equal manner. According to Barbier (1987) sustainable economic development should meet the following criteria, shortened:

- It is indistinguishable from the total development of society and cannot effectively be analysed separately;
- To provide for adequate physical and social well-being and security against becoming poorer;
- Its associated with ensuring the long-term ecological, social, and cultural, potential for supporting economic activity and structural change;
- Quantitative and qualitative dimensions are mutually reinforcing and inseparable, and can't be captured by the concept of direct and measurable economic gain.

2.5 Methods and methodology

I will use historical, descriptive and case study methods to carry out my research.

The historical approach contains literature research and collecting data, which will help me understand the country, history, theories and impact of my topic.

The descriptive research includes executing interviews and doing visual research with Google street view. While the historical research provides me with objective data, this research will provide me with subjective data, allowing me to view the topic with observational knowledge.

Part of this is the correlational research method, in this case the urban diversity mapping, on which I will elaborate in paragraph 2.6.

The last methods is conducting case studies. I will research existing infrastructural and transportation projects to compare, analyse and learn lessons about their impact within the three areas of my research framework.

These methods together will form a thorough research into my topic. This helps to create an image of Beirut's current and possible future transport situation, the implications and possibilities.

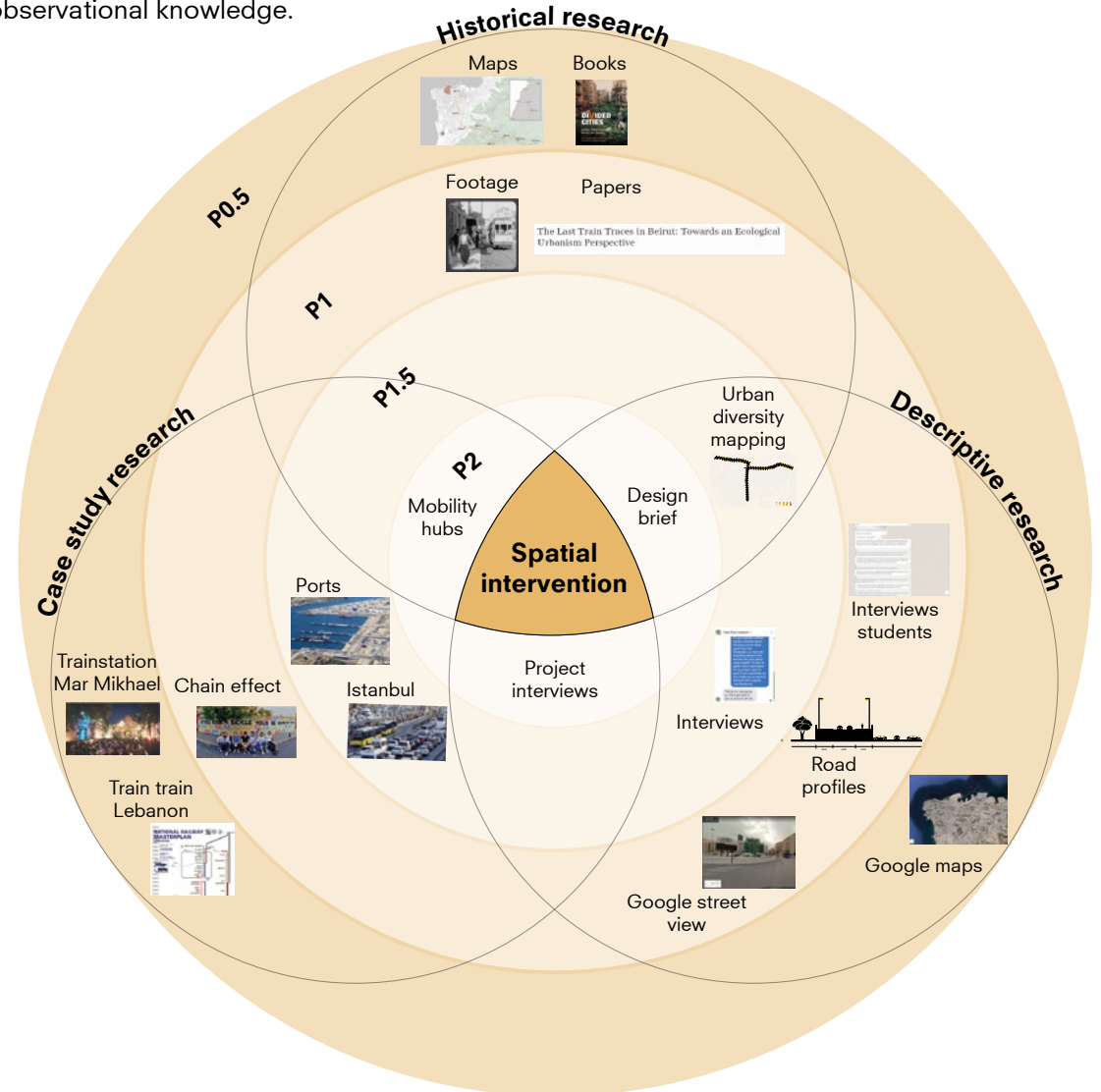


Figure 2.3: Methodology diagram (Biesheuvel, 2021)

2.6 Urban diversity mapping

The mapping of the selected streets is focused on road infrastructure and additional features. These features are chosen due to their ability to change urban diversity in a specific area.

These features, which form the sub-layers, are the following:

- a) Sidewalk that exceeds a width of one meter;
- b) The possibility to park a car;
- c) Seating elements;
- d) Lighting elements;
- e) Cooling or shading elements (such as trees or fountains);
- f) Squares;
- g) Bus stops

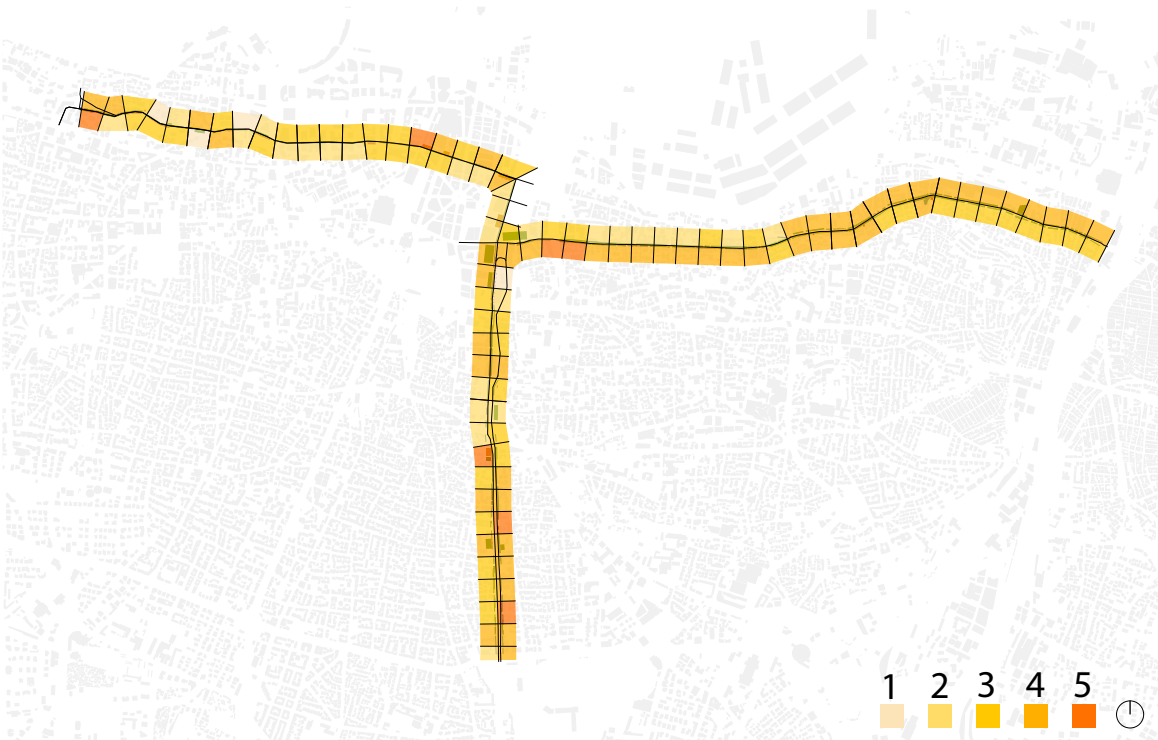


Figure 2.4: Infrastructure urban diversity heatmap (Biesheuvel, 2021).

These features are either chosen for the ability to create a meeting and social outdoor space (wide sidewalks, squares), because of the additional comfort they bring to the outdoor space (seating, lighting and shading elements), or because of the increased accessibility they offer (bus stops and parking places). Mapping and zooming in on a very detailed level teaches us how Beirutis behave and use their public space.

2.7 Relevance

Mapping infrastructure in this diversity map is equally important as mapping the buildings around it. It gives insight in how people use the streets and the opportunities to diversify city life, offered by infrastructure in the city. Whereas in Mediterranean countries ‘streetlife’ is often an important way of meeting and talking to neighbours, in Beirut there is less chance to do so. This is largely due to the current infrastructure, and the sub-layers I’ve mapped. This affects the urban diversity, and is therefore of great relevance.

2.8 Results and validation

Figure 2.4 depicts the urban diversity heatmap for the layer infrastructure. The infrastructure heatmap behaves differently than the overall heatmap. On the south axis most urban diversity regarding infrastructure can be found (average of 3.472 sub-layers per square). This axis is a primary road that holds many different features, like regularly placed lights, lots of parking spaces and a semi-consistent sidewalk (fig. 2.5).

The east axis shows a lot of urban diversity in the overall heatmap, but is not the most diverse for infrastructure (average of 3.462 sub-layers per square). Historically, this axis was important and diverse, but it’s not a primary road anymore, altering the diversity of its infrastructural layers (fig. 2.7).

The west axis shows least urban diversity. However, part of it shows a very unique infrastructure pattern for Beirut. Between figure 2.6 and 2.7 there’s a remarkable difference. Figure 2.7 is a classic example of a secondary road in Beirut, parking on both sides of the roads, sidewalks that are sometimes interrupted and irregular placed trees and street lights. Bus stops, squares and sitting elements are not to be found.

Figure 2.6 shows an entirely different version of a secondary road in Beirut. This road is accompanied by a consistent sidewalk with trees and street lights, without parking space. Even squares and sitting opportunities are present. Although it leads to a less diverse heatmap, the character of this street is very different than most roads. This observation can be validated when it’s related to the city planning of Solidere. Right at the edge of the area they have reconstructed, this new road pattern starts. Solideres reconstruction choices have let to gentrification of the area, and this road can be seen as an example of a gentrified road. From an European point of view, this road might look normally built up. However, for Beirut it is a rare exception.

2 Infrastructure



Figure 2.5: Zoomed-in south axis urban diversity (Biesheuvel, 2021).

2.9 Inform the design

Arguably, this axis is the place where another form of infrastructure could be added to increase the diversity and seize the opportunity of this atypical road. Especially if this information is combined with the road profiles made for P1 (fig. 2.8), which showed a lot of designated parking spaces and wide sidewalks in the Solidere area. This means that in the near future parking alongside the road is unnecessary, leaving potential space for other means of transport. The wide sidewalks give opportunity to safely and comfortably walk to a destination. An addition that would fit the urban diversity and road profile of the area are bicycle paths. This will increase the liveability and mobility of the area even more, while connecting soft modes of transportation to the port of Beirut and the transit station I'm planning to design there. Another addition could be a designated BRT (bus rapid transit) lane, to make the use of public transport more attractive for Beirutis.

2.10 Conclusion

In terms of 'weight' infrastructure is a big informant for the overall urban diversity heatmap, but it also shows interesting differences when looked at it separately. Especially the gentrified area of Solidere shows irregular infrastructure compared to the rest of the city. With the waterfront group strategy we're currently designing, I was looking for places to introduce other forms of transport. This urban diversity map informed me where and what to introduce (fig. 2.9), and how it can be connected to other parts of the city and improve mobility in Beirut.

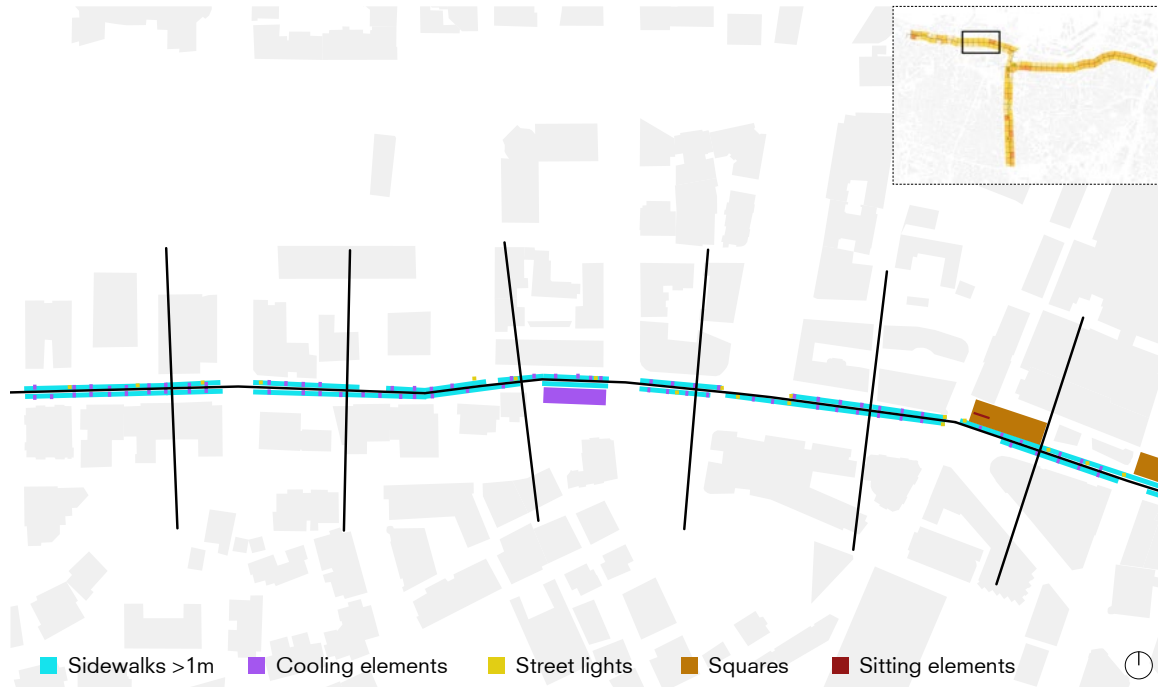


Figure 2.6: Zoomed-in west axis urban diversity (Biesheuvel, 2021).



Figure 2.7: Zoomed-in east axis urban diversity (Biesheuvel, 2021).

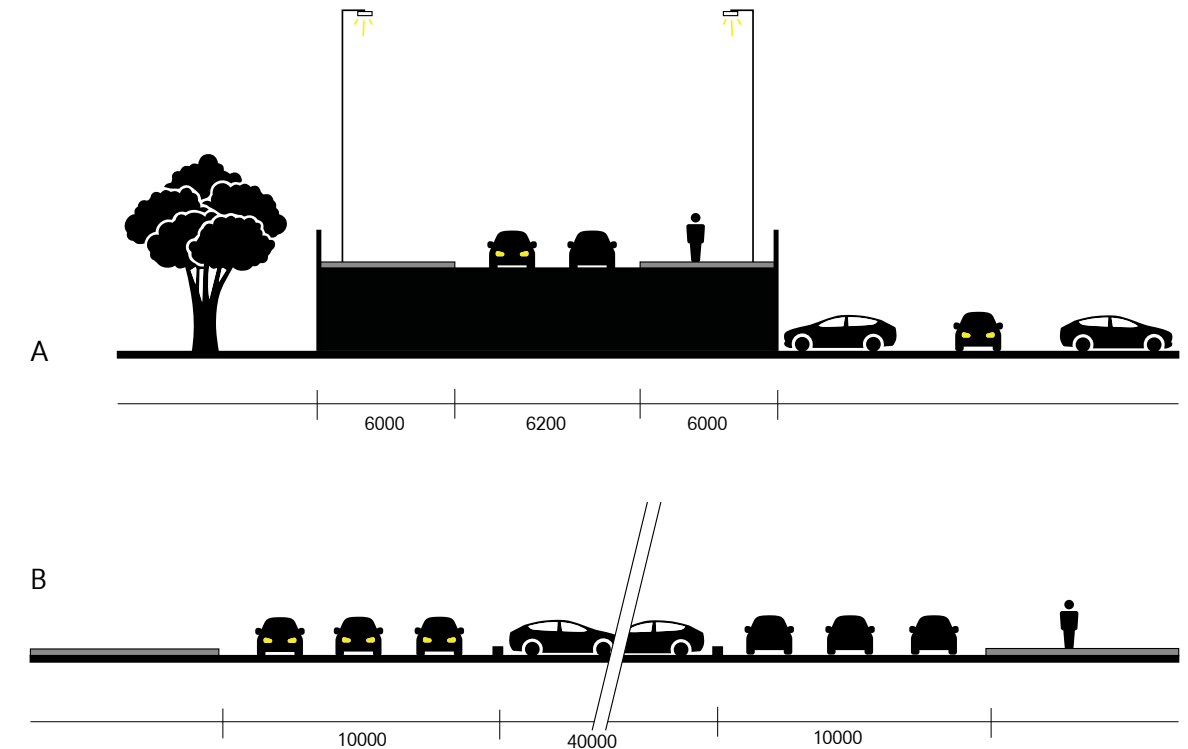


Figure 2.8: Road profiles Solidere area (Biesheuvel, 2021).



Figure 2.9: Possible added infrastructure activities at west axis, informed by map (Biesheuvel, 2021).

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HOUSING

WAN HUANG

03

3.1 INTRODUCTION

3.1.1 Housing on the global scale

By 2050, two out of every three people are likely to be living in cities or other urban centers, according to a UN report. The report also predicts that by 2030, there will be 43 megacities with more than 10 million inhabitants in each, and most of them are in developing countries. However, it is estimated that around 40% of the population of fast-growing cities in developing countries is dwelling in informal settlements without basic municipal services. (UN, 2018) How can future cities provide sustainable, liveable, and affordable living environments, and how can the constructed urban area be reshaped to accommodate the increasing and widespread changing population, have become a widely discussed challenge.

Under this circumstance, CLC Liveability Framework is proposed by Singapore's Centre for Liveable Cities (CLC), which offered a referable solution to improve liveability for cities with high density. The framework defines a liveable and sustainable city as a city that fulfills "high quality of life", "competitive economy", and "sustainable environment". (Khoo, 2012) (figure 3.1) Housing as an important role should also support and facilitate a city's liveability in these three aspects.

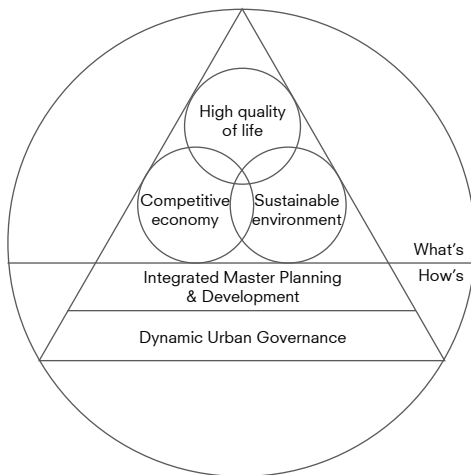


Figure 3.1: CLC Liveability Framework (Source: Hee, 2015)

Diverse ways of dwelling had emerged under the socio-demographic change the goal of liveability, such as sharing flats, multi-generational dwelling, mini-apartments, new cooperative housing, etc. Considering age, sex, lifestyle, social class, and background, trends of future housing are evolving towards individuality and pluralistic. Multifunctional housing concepts for different social groups seem to be the most sensible common goal for future housing. Flexibility therefore is becoming an important criterion. Communal form of living also provides a sound basis for integrating environmental measures at community scale. Economic, social, and ecological parameters need to be taken into account in drawing up forward-looking housing concepts. (Jonuschat, 2012)

3.1.2 Problem statement

The problem statement will be elaborate by 2 scales, housing in Beirut and housing in reconstruction neighbourhoods.

a. Housing in Beirut

The study of housing in Beirut involves both housing provision and other essential factors related to living condition.

- Housing Provision

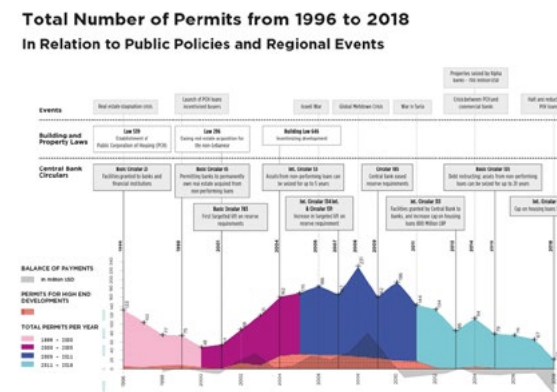


Figure 3.2: Total number of permits from 1996 to 2018 (Beirut Urban Lab, 2021)

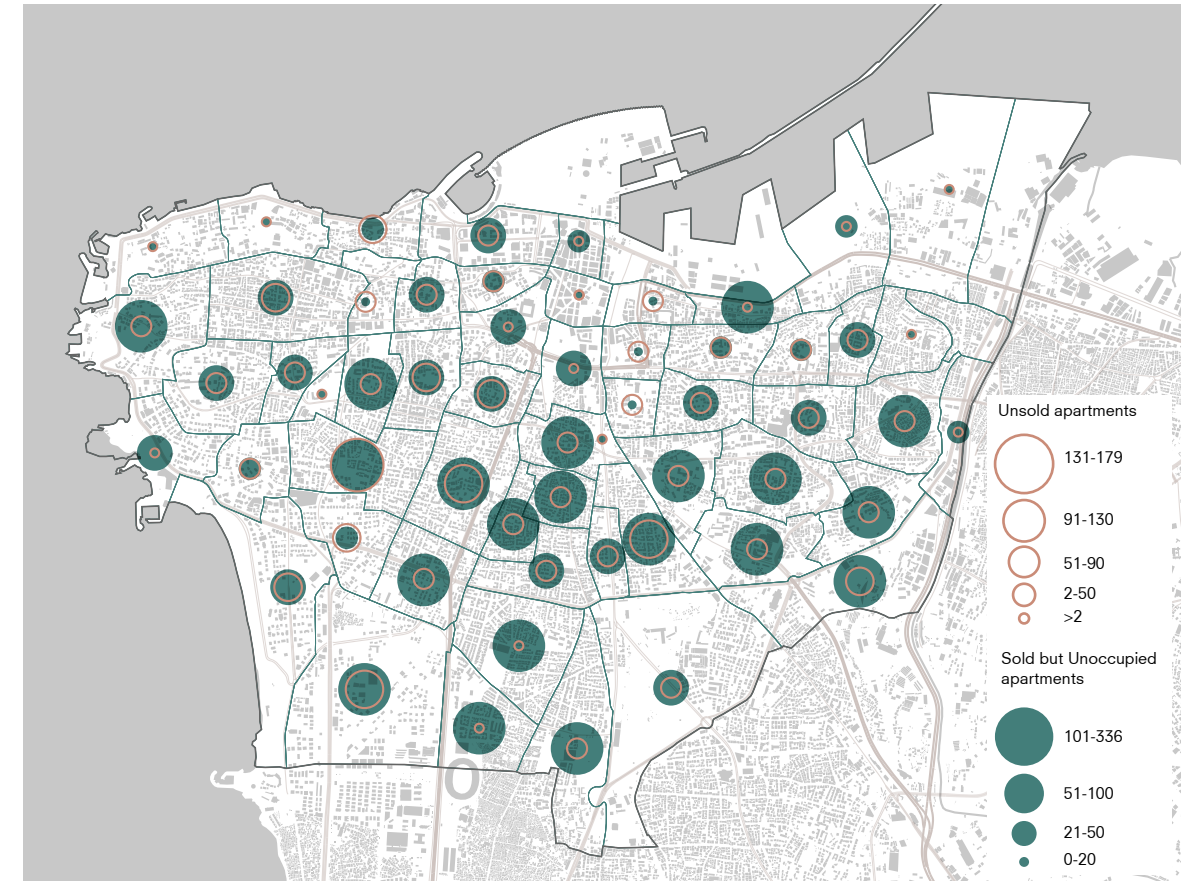


Figure 3.3: Vacancy map (Huang, 2021)

Housing provision in Beirut is dominated by private developers. The public sector in Lebanon lags behind in its responsibility to set and implement affordable housing strategies and production, resulting shortage of affordable housing units has been a long-standing urban issue for the past 20 years.

In the meantime, the "ghost" luxury residential tower is becoming Beirut's new urbanscape. After the civil war, a property-led redevelopment was implemented and leading to the construction boom (figure 3.2) (Beirut Urban Lab, 2021). Large groups of well-off Lebanese diaspora invested in housing properties in their homeland. Targeting these groups, apartments larger than 200 sqm were largely built. (Marot, 2018) The neglect of local demand in housing market resulted in a high proportion of vacant units in new housing projects, which include both unsold apartments and

sold-but-unoccupied apartments. (figure 3.3) (Beirut Urban Lab, 2021) Nowadays, Beirut is having a vacancy rate of approximately 25% in apartments built after 1996, while 7% is considered to be a healthy vacancy rate (Sewell, 2019).

The unaffordable housing products drives a vast majority of middle to low-income people from the central area to suburb, exacerbating citizen's inaccessibility to public facilities, job opportunities, and social networks in the city center. (figure 3.4) It is also resulting in mass loss of high-educated youth, which is a waste of demographic dividend from which Lebanon should currently be benefiting. (Chaaban & Khoury, 2016) For future development, small-scale apartments which are more affordable for starters are highly demanded. Policies and financial support for related housing products are already under wide discussion.

- Essential Factors Related to Living Condition

Besides housing itself, essential factors that are closely related to liveability are also subpar, such as the electricity supply, water supply, and open space accessibility. Electricity cuts off for 3 hours each day, and 90% of the family in Beirut is suffering from poor water quality and intermittent supply. Most of the open space in neighbourhood scale is privately occupied. (RELIEF Centre & UN-Habitat Lebanon, 2020) (figure 3.5) These all add to the substandard living conditions.

b. Housing in Reconstruction Neighbourhoods

The reconstruction neighbourhoods that were damaged in the Explosion are the city's historical area, including Mar Mikheal, Gemmayze, Rmeil, and Karantina. These neighbourhoods are mainly accommodating low to middle-income families. (figure 3.6)

(Beirut Urban Lab, 2021) In the damaged and need assessment by the World Bank group, housing is the most damaged sector in these neighbourhoods.

- Historical Housing

A large proportion of residents in historical neighbourhoods are old tenants benefitting from the rent control law, whose dwellings are mostly constructed before 1970. Statistic shows that dwellings constructed before 1970 take up to 60% of the total dwellings in Beirut. (CAS, ILO, EU, 2020) Historical buildings work as an important part of affordable housing stock, especially in the historical area. However, 80% of the historical buildings are not in good condition (Hamze and Hammoud, 2018) (figure 3.7), and are gradually being abandoned due to the high maintenance fee (NAHNOO, 2020). The disuse of historical residential buildings exacerbates the shortage of affordable housing.

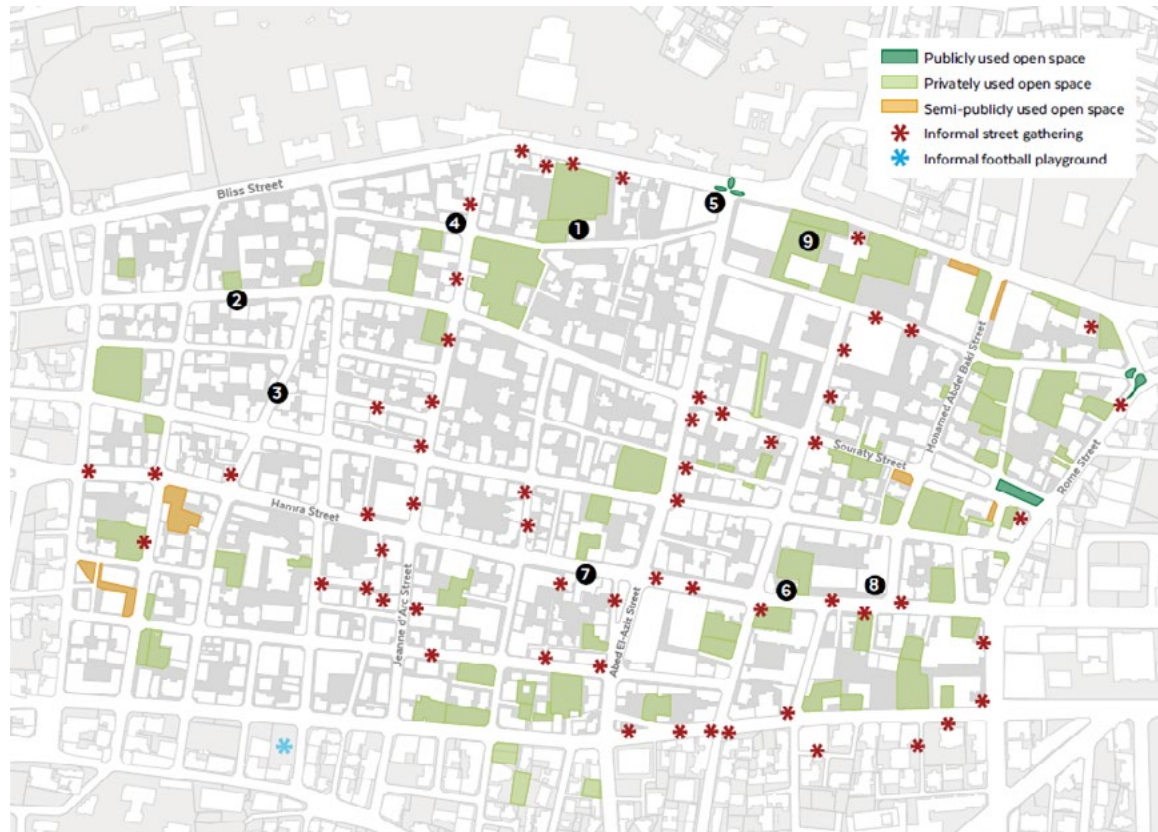


Figure 3.5: Open spaces in Hamra community (RELIEF Centre & UN-Habitat Lebanon, 2020)

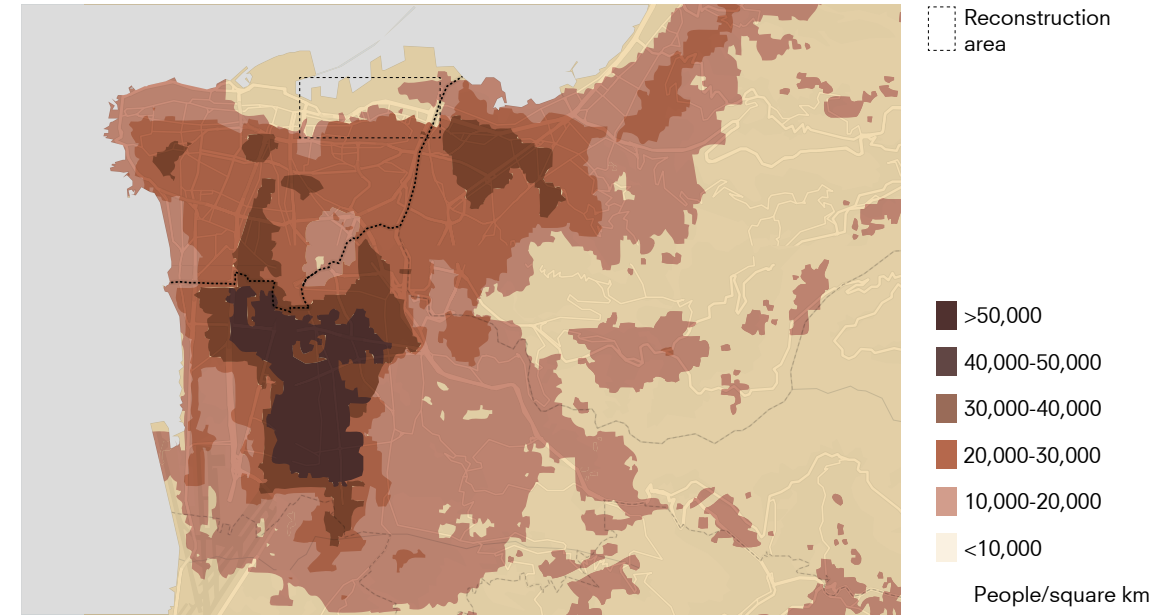


Figure 3.4: Population density (Huang, 2021)

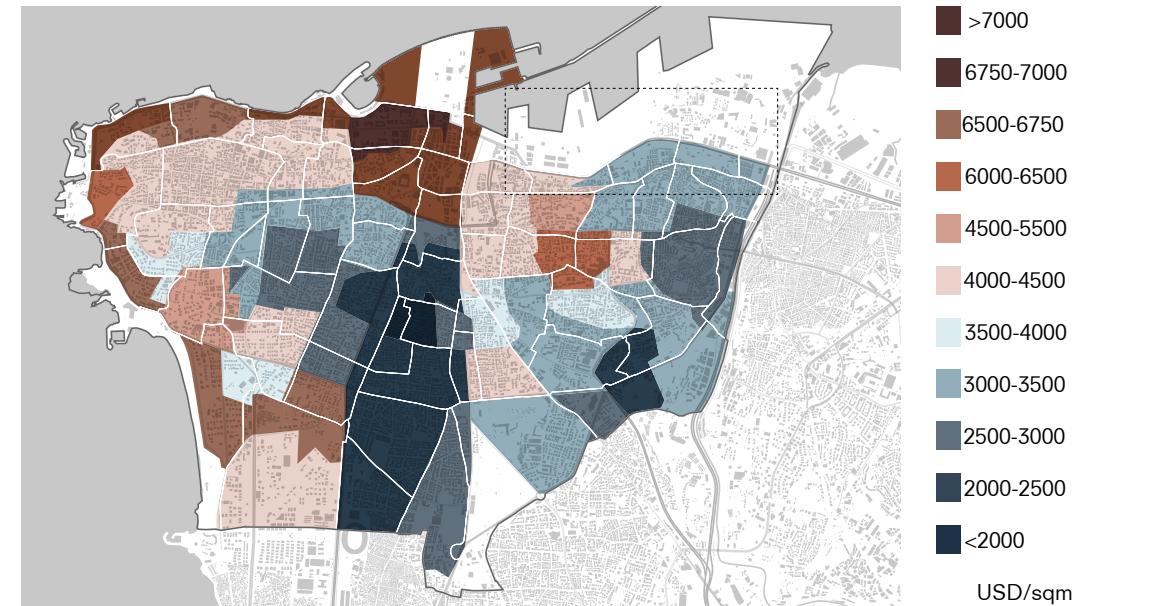


Figure 3.6: Real estate value (Huang, 2021)



Figure 3.7: Abandoned housing in Mar Mikhael (NAHNOO, 2020)

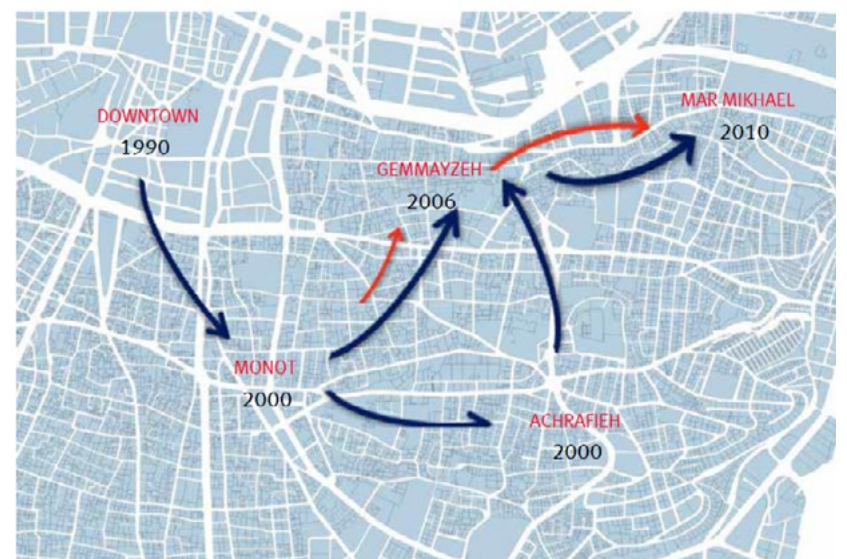


Figure 3.8: Gentrification cycle in Beirut (Gerbal & Hrycaj, N, 2016)

- New Housing Projects

As the “gentrification circle” which is mentioned in 1.3, the damaged area include historical neighbourhoods in different gentrification stage. In the past 10 years, new housing developments were designed almost exclusively for wealthy populations, particularly the Lebanese diaspora as mentioned. The developments of new residential projects are boosting gentrification, destroying the urban fabric as well as socio-economic diversity. The original socio-culture diverse and inclusive neighbourhoods are at the risk of being transferred into exclusive residential areas with high-end leisure industries, which is adverse to the area’s long-term social and economic development. (Gerbal & Hrycaj, N, 2016) (figure 3.8,3.9)

c. Summary of Problem Statement

The problem of housing sectors and living environment in Beirut can be summarized as

follow:

- Supply-demand disconnection: large apartments targeting well-off Lebanese diaspora are largely constructed in the past 20 years, while small apartment which is affordable for starters were long-standingly neglected.

- Basic infrastructure insufficiency: Essential municipal services for living such as water and electricity supply is insufficient and unstable.

- Public community space deficiency: Open spaces in community scale are mostly privately occupied.

- Current housing is boosting gentrification: New housing projects in historical areas are boosting gentrification, destroying the urban fabric and socio-economic diversity.

- Abandoned housing heritage: Existing historical housing are not in good condition and are gradually been abandoned

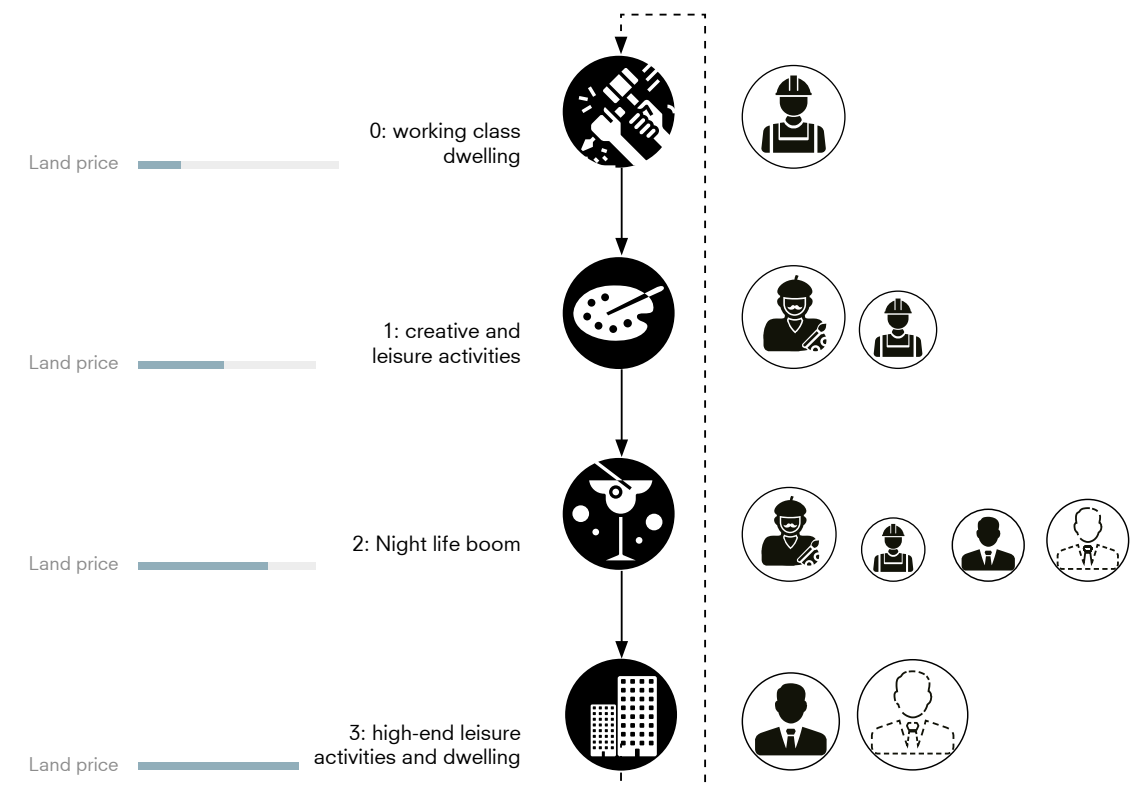


Figure 3.9: Diagram of land price, actors, activities in different stages of gentrification in Beirut (Huang, 2021)

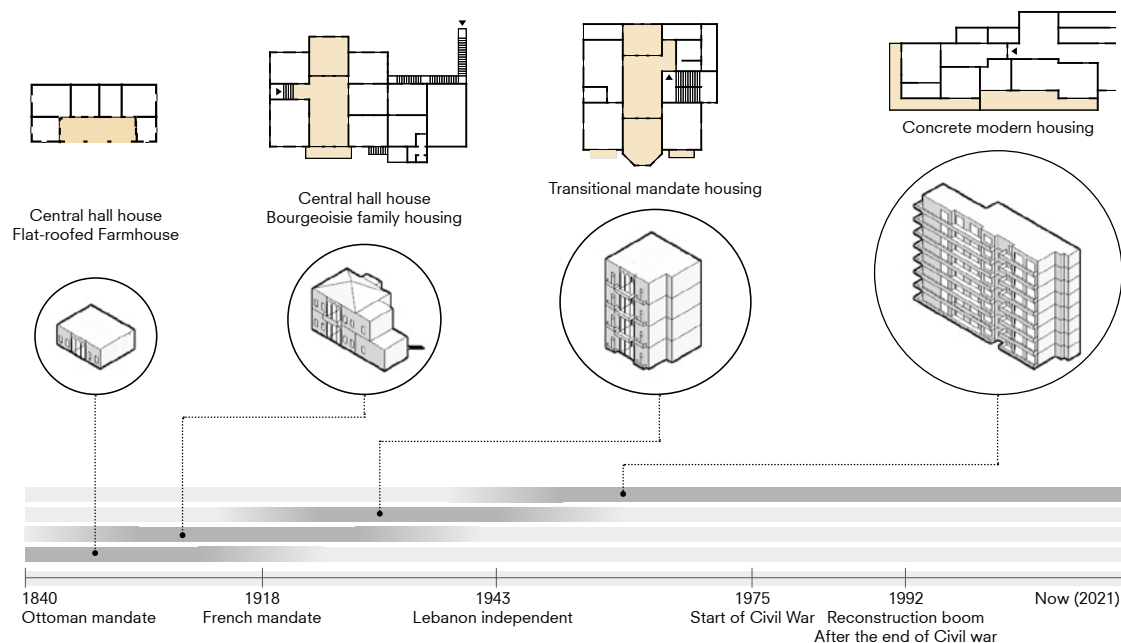
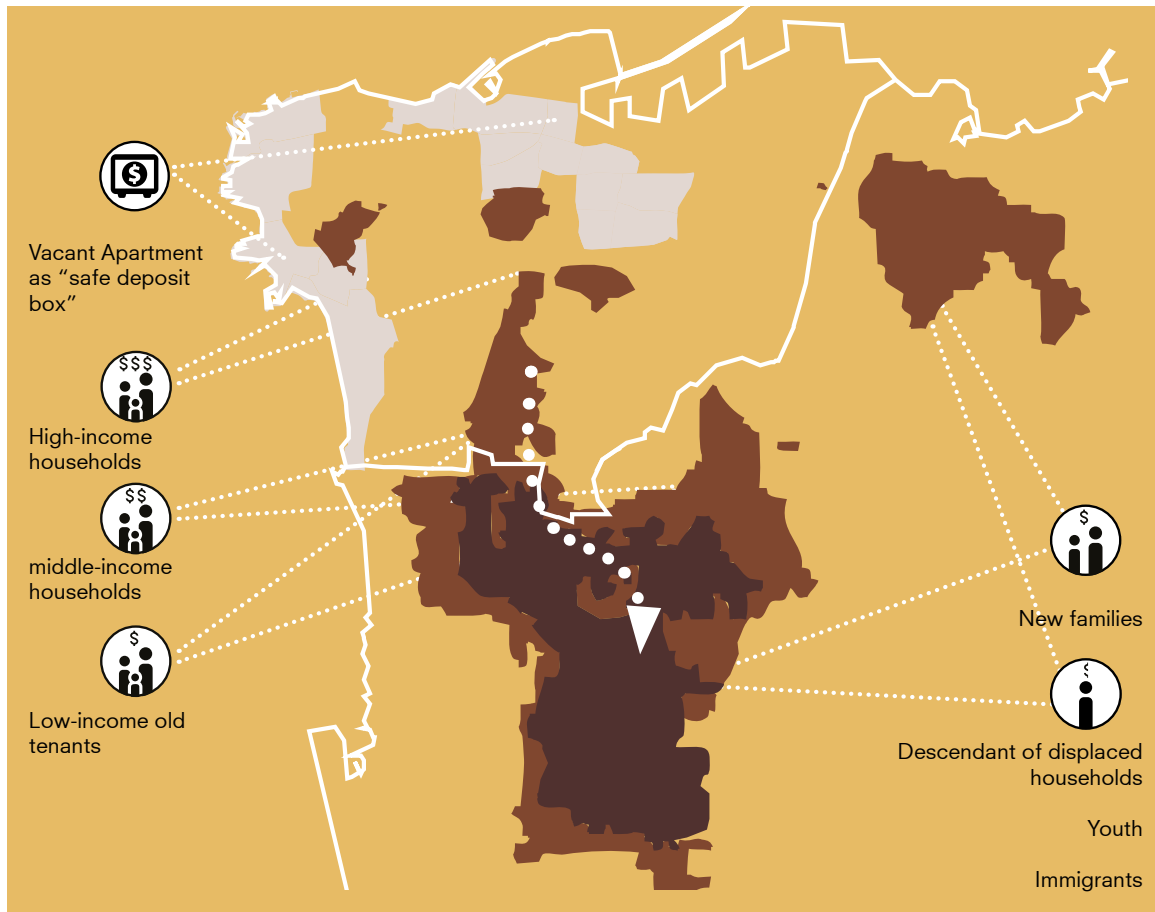


Figure 3.10: Research outcome of document review and typology study (Huang, 2021)

3.1.3 Research question

Based on the problem statement, I proposed the following research question:

How can housing be built back in Beirut and what role can it play in the reconstruction and urban revitalization process?

This research question will be broken down into the following sub-questions:

- How will understanding the urban fabric and urban diversity inform the design strategy of housing projects in the historical area?
- What kind of new model of housing can be applied in Beirut's context to support its future economic and environmental development, and be acceptable by local residents?
- How can the insufficiency of basic municipal service and open space be supplement in a new housing project, to improve the life quality of local residents?

3.2 RESEARCH FRAMEWORK

The whole research is carried out by 4 stages towards the design brief: understanding research, descriptive research, explanatory research, and potential research. The research process involves both group work and individual work. The study content, key notion and concept, chosen methods, and reasoning behind the methods of each stage will be elaborated as follows.

3.2.1 Understanding Research

Group work

Key notion and concepts: ethnography, qualitative research, data collection and interpretation

To understand the research context, we collect information in all dimensions, including culture, policy, economy, demography, history, and different urban

layers, and collectively interpret the data into a catalogue of maps by scale, ranging from the Mediterranean sea scale to the Beirut port. The studied data includes historical documents, photography, official reports, existing database, and Google map. By organizing and interpreting these data, the study becomes readable and sharable. The holistic study gave us an overall picture of the research context.

3.2.2 Descriptive Research

Individual work

Key notion and concepts: historical-interpretive research, typology and morphology study, material culture, correlational research

The research in this stage focus on the housing topic, aiming towards problem statement. Descriptive research is conducted to identify the current problem and urgent need of the housing sector. The study is divided into two scales which focusing on different aspects: the scale of Beirut and the scale of the reconstruction area.

In the scale of Beirut, study is carried out by asking the following question and fine correlation of the existing data to answer the question:

- WHAT: What houses do people live in? What houses do the market provide? What house do people need?
- WHERE: Where do different people live?
- HOW: How do different people live?

The used method includes historical document review, housing market statistic review, living condition statistic review, housing typology study, material culture study, morphology study, and demographic analysis of neighbourhoods. By analysing the data and finding relation between them, the current supply-demand disconnection and living condition of different social groups was revealed. (figure 3.10)

The reconstruction area is one of the historical areas in Beirut. Therefore, in the scale of reconstruction area, the research focus on both the current situation of historical housing and the urban impact of new housing projects. Literature review of gentrification offers foundation and direction of the research, and morphology study, statistic review is used to further understand the two focusing aspects of the context.

3.2.3 Explanatory Research

Group work

Key notion and concepts: mapping diversity, quantitative research

At this stage, in-depth study of the fact from descriptive research was conducted by mapping urban diversity, aiming at explaining the following question:

- How does housing contribute to urban diversity in Beirut and how did this evolve through history?
- How does gentrification influence urban diversity?

Urban activities are catalogued, mapped, and counted to quantize urban diversity in different areas. The result informs the possible solution to prevent new housing project from boosting gentrification, and provide arguments for the site and program.

The result and conclusion of this stage will be elaborated in chapter 3.3.

3.2.4. Potential Research

Group work + Individual work

Key notion and concepts: literature review, case study, urban policies and planning

Research at this stage includes both group work and individual work, aiming at proposing a design brief.

In group work, possible drivers, urban planning, and reconstruction guideline are studied to draw conclusion on group

strategy and future scenarios.

Individual research in this stage focus on policies and legal document review of affordable housing in Beirut, development report and strategies review of the reconstruction neighbourhood, literature review of liveability framework, future trends of housing, and case study of heritage reuse and community-scale infrastructure. Applicable housing model, sustainable measurement, and program that support economic development are concluded from the study.

The role of new housing projects is positioned based on both group strategy and individual study.

3.3 REFLECTION ON URBAN DIVERSITY MAPPING

3.3.1 Classification of Sublayer in Housing Layer

Living activities in housing layer are classified into 4 sublayer: student living, family living, tourist living, and abandoned/empty housing. In the diversity map, apartment buildings with high vacancy rates (means more than 50% of the units can be recognized as vacant units from the appearance) are also marked. Tourist living consists of both hotel and residential building with Airbnb unit, these two types are marked in two colour but counted as one activity in the map. Sublayers can be summarized as follow:

Counted sublayers:

Family living: Family living
Family living _high vacancy
Tourist living: Tourist living_Airbnb
Tourist living_hotel
Student living

Uncounted sublayers:

Abandoned & empty housing

3.3.2 Result of Housing Layer and Refection:

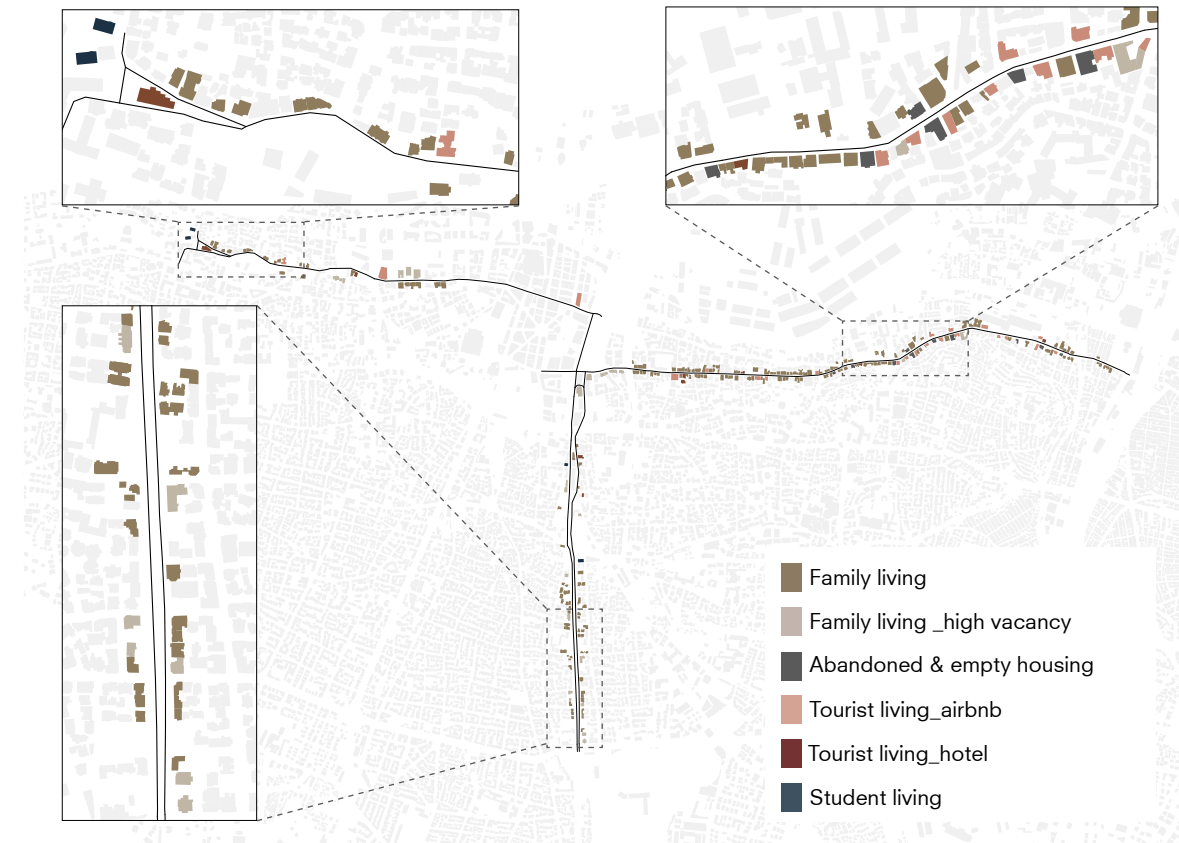


Figure 3.11: Zoom in of diversity map of housing layer (Huang, 2021)

a. From the diversity map (figure 3.11, 3.12):

Except for 2 student dormitories in AUB campus, there are only 2 student housing buildings within the research area, which verify the shortage of small residential units for students. Tourist living activities are concentrated in the east axis, inform the need to consider tourist accommodation in this area.

The high proportion of vacant residential buildings can also be clearly seen on the west and south axis. Abandoned housing is also marked based on survey results from a report of buildings in Mar Mikhael. (NAHNOO, 2020) These two results further illustrate the supply-demand disconnection and the abandonment of housing heritage in the problem statement.

b. From the heat map (figure 3.12, 3.13):

The result of housing layer corresponds with the collective heatmap. Urban diversity reduces along the east axis, south axis, and west axis. This reveals the reduction of urban diversity in gentrified areas, which is more significant in housing and cultural layer.

3.3.3 Contribute of the housing layer and its evolvement through history

a. Contribution:

The diversity of living activities is positive correlation with the diversity of urban activities. Diverse living activities means diverse groups are involving the urban activities, and vice versa, diverse urban activities, especially cultural activities in this study, brings diverse living group.

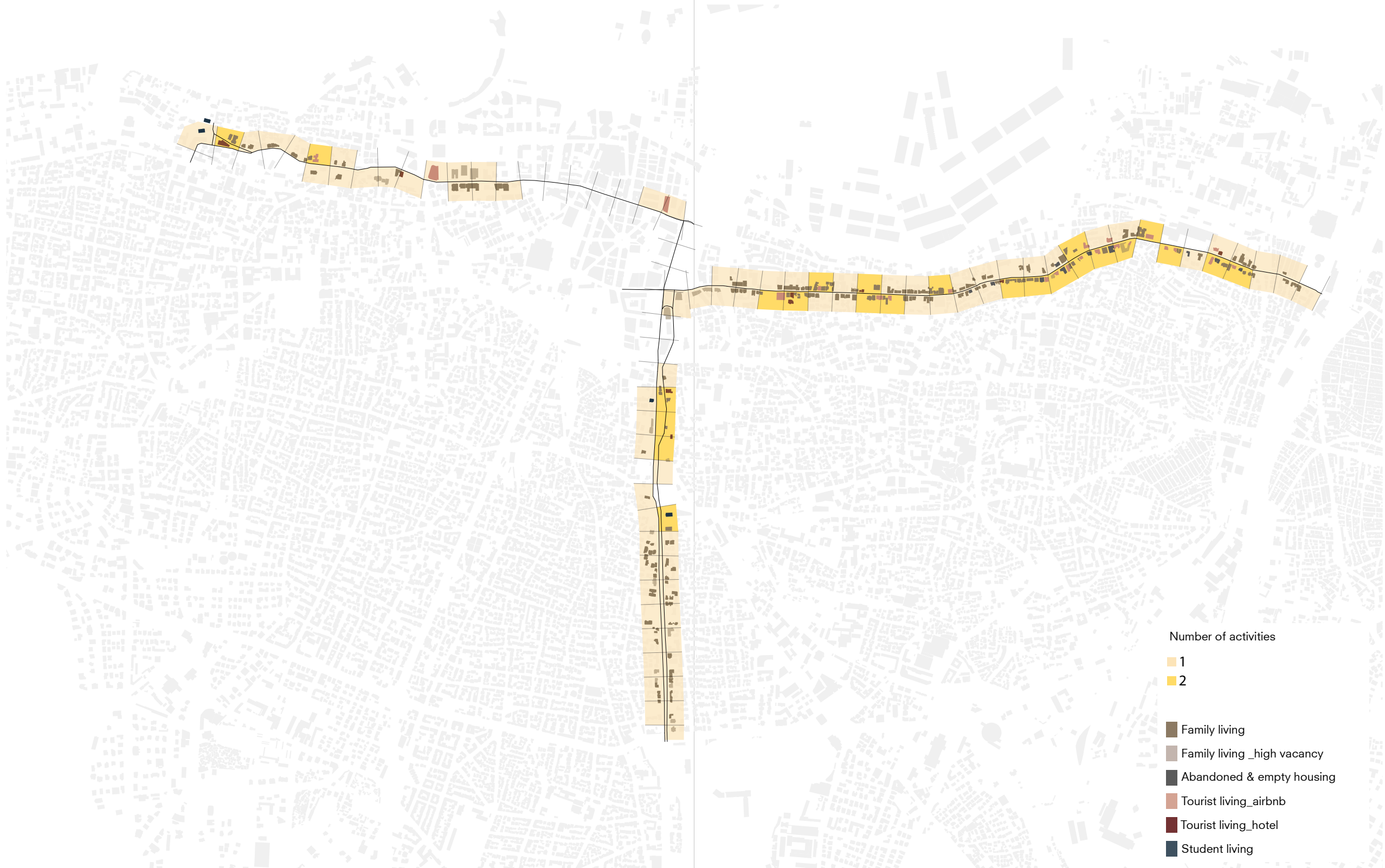


Figure 3.13: Heat mapp and Diversity map of housing layer (Huang, 2021)

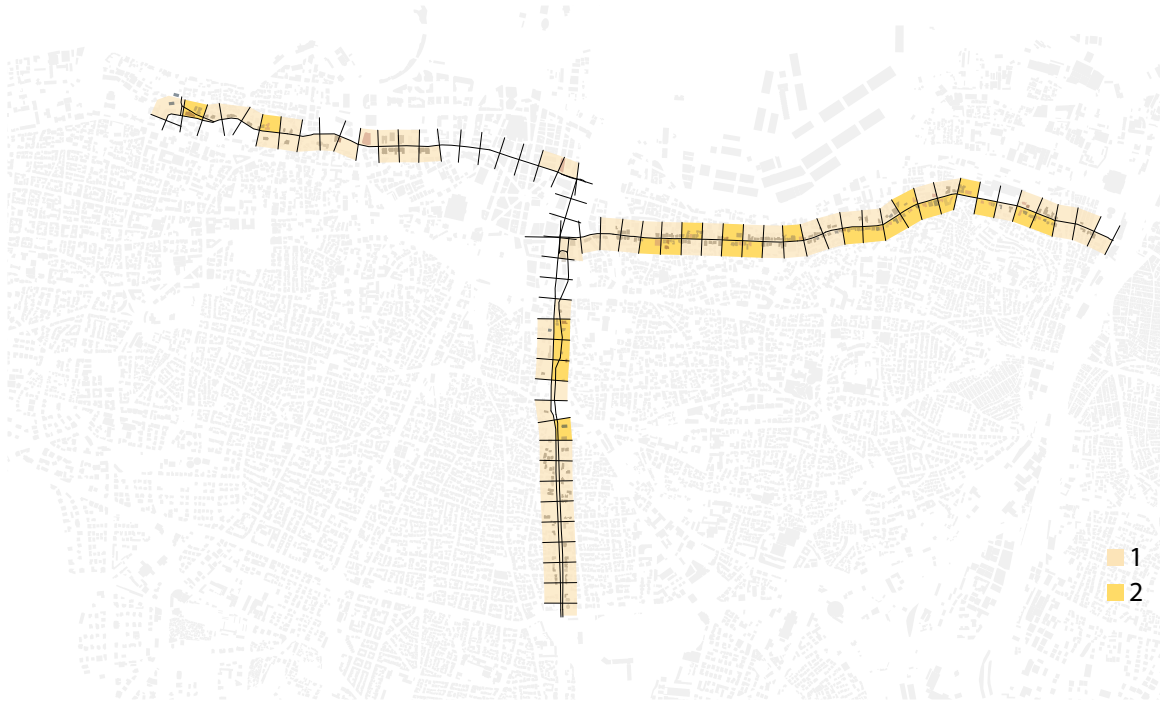


Figure 3.13: Heatmap of housing layer (Huang, 2021)

b. History Evolution:

The west axis represents the high-end neighbourhoods and the south axis represents neighbourhoods that were almost fully reconstructed after the civil war. A large proportion of the housing project in these two axes were constructed in the real estate fervour. Real estate development is fully market-driven, and thus led to the construction boom of monofunctional residential towers with large apartment units, which is the most profitable choice for the developers. On the contrary, the east axis, as a historical area, has more diverse housing typologies, which is able to accommodate multiple living activities. The significantly higher cultural diversity of the historical area attracts tourists, and therefore added the diversity of living activities.

3.4 PRELIMINARY CONCLUSION

3.4.1 Choice of Site

Based on the understanding of context

and the future scenario, The new housing projects will be located on the east block of neighbourhood Karantina (figure 3.14). Arguments are as follows:

- Considering the population density of the whole city, Karantina and the new development area of the port has the largest potential to accommodate the population that is coming back into the city.
- As a low-income, residential and semi-industrial neighbourhood near the port, Karantina is seen as a forgotten part of the city for a long time. Housing projects can be a protagonist to activate the area and the first steps of transforming it into a mix-used residential and creative community.
- In the future scenario, public functions such as performing center, learning center, and transportation hub, as well as offices for IT sector will be concentrate on the redevelopment area on the port. Housing in the periphery of this area is needed to support its development.



Figure 3.14: Choice of Site (Huang, 2021)

3.4.2 Program and Design Strategy

Based on the problem statement and the research, the design strategies are proposed as followed:

- The projects should provide more small apartments for students and starters. Accommodation for tourists and families should also be considered. Housing units should be flexible for future change.
- Community-scale infrastructure for energy generate and water purifying should be combined into the public space, to support its energy self-sufficiency and promote the sustainable idea to the residents.
- Public space for residents and citizens should be considered. Shared living space and facilities such as kitchen and laundry room should be introduced to offer a better life quality with limited space.
- Instead monofunctional residential

community, the community should be multi-functional. Considering the large demand for housing within the city, mix-used housing complexes will be a better development model to support cultural diversity and future economic development, comparing with monofunctional residential complexes. Taking into account of both the future tendency and the current economic potential of the reconstruction area, space for community-based creative economic activities will be integrated into the program.

- Housing should also be used as a program to revitalize abandoned and damaged heritage, bring back the qualities and activate the forgotten neighbourhoods.

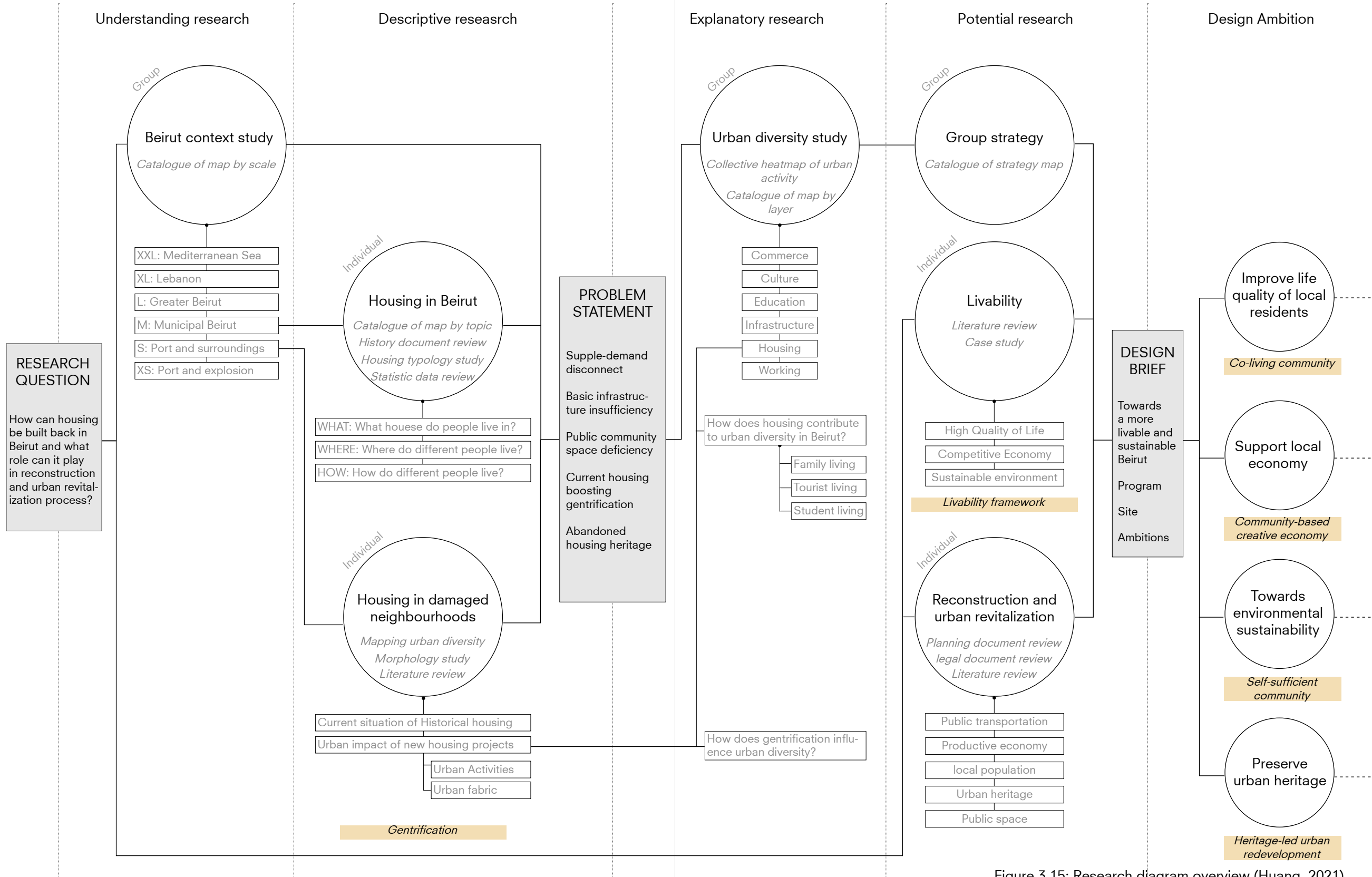


Figure 3.15: Research diagram overview (Huang, 2021)

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PUBLIC SPACE

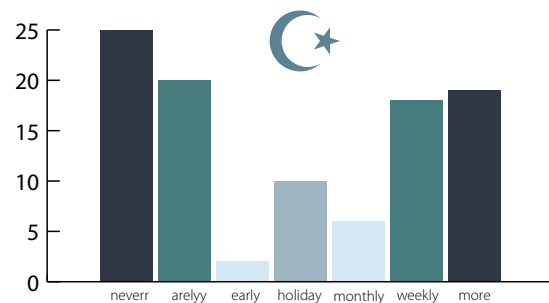
JAN PANHUIS

04

4.0 INTRODUCTION

4.1 Beirut Public Space

This part of the research paper seeks to lay bare the patterns and history behind the public spaces of Beirut. Cultures at the border of east and west are often highly specific, they are influenced by shared history and contemporary economic situations. In this complex environment lies my fascination. The city of Beirut is an example of this, having been the outpost of the Ottoman Empire, The French Empire, and recently under its own control, hence fulfilling the criteria of a complex city influenced by many cultures who informed the spatial environment. Beirut also has problems in satisfying the current needs of the public, The recent neoliberal policies lead the public to lose a significant part of their cities public space. Parcs, Gardens, and even the shoreline had been privatized. During the protests of 2019, the public squatted sidewalks, marinas, and even public roads to voice their discontent with the public policies. This part of the paper seeks to investigate to what extent public space is lacking, of what specific quality, and how it came to be in this context.



4.2.1 culture and religion

To start understanding Beirut's context it is important to know the history of the area which is now called Lebanon. Lebanon and the Mediterranean middle east have not had any official borders till the colonization in the early twentieth century when the French ruled Lebanon. Before this time each village was home to a variety of Muslim and Christian tribes, the latter notably having the biggest presence in the area. The persecution of Armenian Christians by the Turkish drove many refugees towards Lebanon and Beirut to further diversify this part of the Middle east. A sizeable Maronite Christian population lived in the area of what is now Syria and Lebanon, as did the Druze population, which was a tempered offshoot of Islam. On top of this, we add the population of Shia Palestinian Muslims and Palestinian orthodox Christians which also didn't have an official land at any point in history. The French mandate added the French Catholics to the spectrum of religions. After the Expulsion of the Palestinians in the newly found land of Israel, the scales started to tip in favor of a majority of the Muslims in Lebanon. Tensions between the different groups, related to the socio-economic and political situation, lead to the Civil war from 1975 till 1990 and ended with the TAIF agreement. This lead to the reconstruction of the country and a long period of economic growth and the tempering of religious extremism (M. Moaddel, 2008). This ended with the refugee crisis of Sunni Syrian Muslims from 2010 onward and the recent economic collapse.

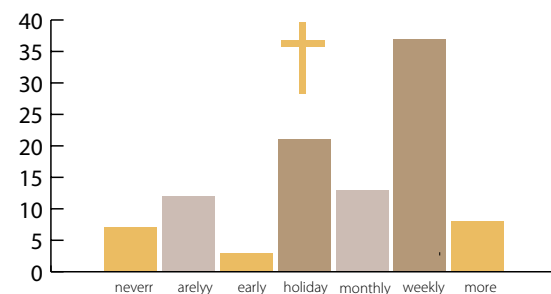


Figure 4.1 : Prayerhouse attendance (Panhuis, 2021)



Figure 4.2 : Religious Buildings (Panhuis, 2021)

4.2.2 Culture in the city

Beirut was the biggest city in Lebanon and the economic heart of the country since the twentieth century. Its population grew twentyfold throughout the century and is still growing to this day. This fast rate of expansion is explained mostly by all the different groups of fugitives from different religious backgrounds, rather than the rate of childbirth. This had a key impact upon the cities urban fabric and its primary role in the civil war. At the start of the twentieth century, the flat area of land which was to become the city of Beirut was mostly unbuilt. The Muslim population lived on the west side of the city, the Maronites on the eastern side. When the Armenian refugees settled they sought out what was to become the

Karantina Neighbourhood east of the city center to live in. from 1945 The expelled Palestinians settled to the south-west of the center in initially temporary refugee camps. They expected to be able to move back to the territory occupied by Israel soon, although this never happened. This lead to these camps growing, becoming the densest areas of the city with the lowest living standards and an unsafe living environment. This also influenced the general density of the city, and thereby the lack of outdoor public spaces at this point in time. In general the eastern part of the city was majority Christian whereas the Western part majority Muslim. When it came to a confrontation during the Civil War the city was split roughly along the lines of the dominant religion of the neighborhoods. (Quinn, 2001)

4.2.3 The religious Building type

Public Spaces in Beirut primarily consist of the religious type, both because of the many different religious groups asserting their presence and the sheer lack of space for any other types of spaces. Another factor is that most of public life could be lead inside the religious building type, for they not only consisted of spaces for religious practice but also schools, Kitchens, places where business is conducted, and offices for humanitarian aid.

The general lack of space and the tendency to adopt most public functions is visible in the Religious building type itself. The first mosque in Beirut the Prince Monzer Mosque is different from the standard mosque type. The Sahn, or public courtyard, is walled off from the public, instead of publically accessible via a traditional gallery of arches. It maximizes its plot in a dense street completely. The same is the case for the Mohammad Al-Amin mosque built much later in 2006, whereas bigger in size and built on a much bigger parcel, it maximizes the plot completely, again no

space for a publically accessible courtyard, rather the Sahn surrounds the main prayer hall and is filled up with a wall to house the interior functions: a school, kitchens, and humanitarian aid facilities.

[fig] mosque monzer al amin

4.2.4 The non-religious Public Space

In the previous chapters, a case is made as to why the main type of public space is religious. The majority of space is taken up by residential areas mixed with prayer houses that don't offer a large amount of outdoor public space, hence the majority being indoors and fixed to a defined purpose. Historically the unexpected growth of the city and the war made the Public space less of a priority. This clarifies the current density of the city, yet the question remains as to why nothing has changed in regards to Public Space in the 30 years after the war ended. Before the influx of Syrian refugees, M. Fawaz writes in the paper 'The city as a body Politic' about the city planning incentives of Beirut the following: 'Faithful to

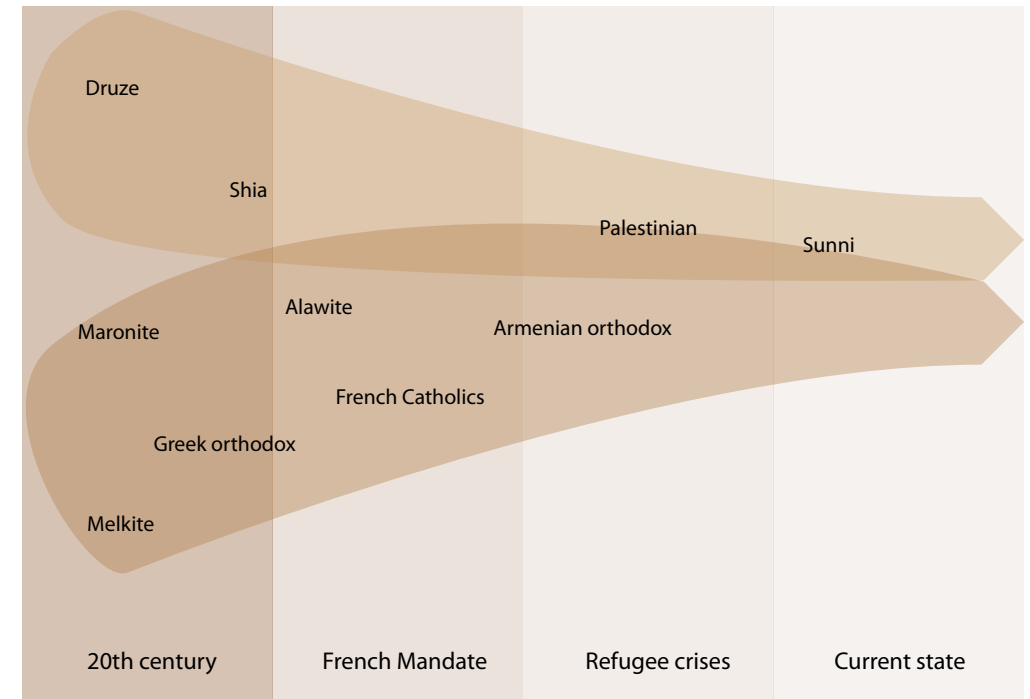


Figure 4.4 Religion in Lebanon (Panhuis, 2021)



Figure 4.3: Emir Munze Mosque (Getty Images, 2019)



Figure 4.5: Emir Munzer urban context and building elements (Panhuis, 2021)

a neoliberal tradition in public governance that conceptualizes the role of the public actor as an entrepreneur whose task is to attract foreign investment rather than as a manager of space or a service provider' (Fawaz, M. (2007). The conundrum exists in that the same reason for the economic growth of Lebanon after the war is also the reason for the negligence towards adding public spaces to the city. The incentives of foreign investors are simply too big to be ignored. In regards to the biggest park in Beirut, the Horsh Beirut, Similarly F. Shayya writes in her paper about the essential role the park plays in the public space of the city (Shayya, 2010). At this point in time the Horsh had been under reconstruction for twenty years, Current day the park is only partly accessible and requires a fee to be entered thus not contributing to the public space to its full potential.

4.3 Research questions

The problem statement is as follows: concerning public spaces, there are many influences that figure into its potential success. Currently, foreign investment funds and the political class seem to have the tightest grip on urban planning, they often refrain to take into account public space in their visions. At the same time, the public demands more meaningful public spaces like public parks where culture could flourish and the public can meet (Sinno, 2020). The disconnect between the current demand and the desires of the public needs to be resolved in Beirut. The research questions hence are as follows:

How will the future Beirut public space be influenced by religious, irreligious, and privately owned public spaces?

What types of public spaces provide the highest degree of freedom of action?

What is historically a public space in the Middle Eastern context?

To see how culture currently influences the use of public spaces in Beirut, the following questions will also be addressed:

What are the current contributions of public space In Beirut's diversity?

In what way could a newly added public space aid diversity in the city?

How can the resulting urban diversity map together with the historical analysis be applied to my design?

4.5 Method and Methodology

The research is conducted using quantitative mapping and qualitative literature research into the different practices around public space throughout history. Sources are traced as to the nature of the divisions between different cultures, mostly stemming from different religions, and changing economic situations throughout the second half of the twentieth century in Beirut. In this way, an account is formulated as to how the religious public space type still is the most predominant type, and what other policies lead to the current increase of privately owned public places (PoP) in Beirut. The mapping part of the research seeks to identify public spaces in Beirut. This is done by creating a heatmap of different functions. First, we identify the different cultural functions along a couple of key axis streets in Beirut. The different functions are subdivided into churches, mosques, bars, restaurants, nightclubs, galleries, and museums. We tally the functions along every hundred meters of the street and apply a color to the multitude of different functions. This results in an insight into the different densities of the juxtaposed axes. This gives insight into the locations with high cultural densities. This also grants the ability to be able to compare the different axes and their respective neighborhoods. To support the accurate locations of cultural buildings use is made of Google Street View, OpenStreetMaps, GIS Data, and the Chrome-Plugin Clean street view. Even with all these tools at our disposal, it remains true that many of them are outdated or do not cover the whole area. Other than that the method is empirical and does not need optimal data to produce reliable mean results.

4.4 Research Framework

Public Space, both indoors and outdoors, is to be investigated. To gain insight into a city like Beirut which does not contain a clear center, a method is required to investigate where the clusters of activity take place. By evaluating the composition of the city in this way I seek to conclude which pieces of the urban fabric are lacking in public space diversity. 'Urban diversity, in general, creates more lively cities and more to be enjoyed for its inhabitants' (Jacobs, 1993) Jacobs writes in her analysis of great cities. Specifically, Public space has the following significance: It is the place where the inhabitants negotiate meaning for the city. It is where the act of communication takes place as a point of transference for the public. Whereas housing, commerce, education, infrastructure revolve around privacy, exchange, or efficiency, the cities public spaces don't have a specific goal. It's ultimately a rare place to where the set of behaviors is not prescribed, which encourages behavior, within some ethical constraints. In Beirut, the main public spaces are inside public prayer houses, which while not necessarily antithetical, have stricter rules around the set of allowed behaviors than in the town square. Thus the frames used in the historical part of the analysis are accessibility of space throughout history, how they leave their traces into the current city fabric, and the planning of public space. In the mapping part of the research, the public layer is framed by the different types of public functions.

Key Terms: Public, Accessibility, Informality, Urban Diversity, Density Mapping.

4.6 Urban Diversity Mapping

East Axis, Remeil

In the Public Space layer, Gouraud Street is the most diverse and dense of our three axes streets. This part runs through the historical Christian center of Beirut. Many cafe's bars and restaurants are situated along this axis. In light of the public function this street serves, it is the densest and varied in regards to religious and irreligious functions. French Catholic churches are combined with museums and art galleries. This street has multiple spots with more than two types of public functions per 100 meter.

West Axis, Hamra

The continuation of Gouraud street towards the west is the least diverse axes of all three however, it has the highest amount of mosques. The Neighbourhood has been largely rebuilt after the war and became the hotspot for foreign investment real estate, This lead to modern building practices of tall apartment buildings largely secluded by gates and parking garages at ground floor level. A big shopping mall at the beginning of the street appears to take away from the public space of the rest of the area. only a handful of restaurants are to be found in this neighborhood.

South Axis, Bechara

The southern axis has lower diversity than Remeil and Hamra. This street used to be the border between east and west Beirut. Currently, it is one of the most important traffic arteries of Beirut. A handful of religious buildings are to be found along this axis. For the most part, Basta el Tahta Square has the highest diversity of Public spaces, containing a couple of restaurants a bar, and a mosque. Its central location could imply that it offers more space for public functions however, the extremely broad

street profile and the high amount of cars may obstruct these places to exist here.

4.7 Contribution to the overall heatmap
In General, the public space layer seems to overlap perfectly with the overall heatmap of the group. This could make sense because public places are likely to attract functions of commerce, housing, education in equal parts, and vice versa. The only layer that seems to have an inverse relationship with the diversity of public spaces is infrastructure. Since public spaces are more likely to be in areas where the amount of traffic is lower this relation too is self-explanatory.

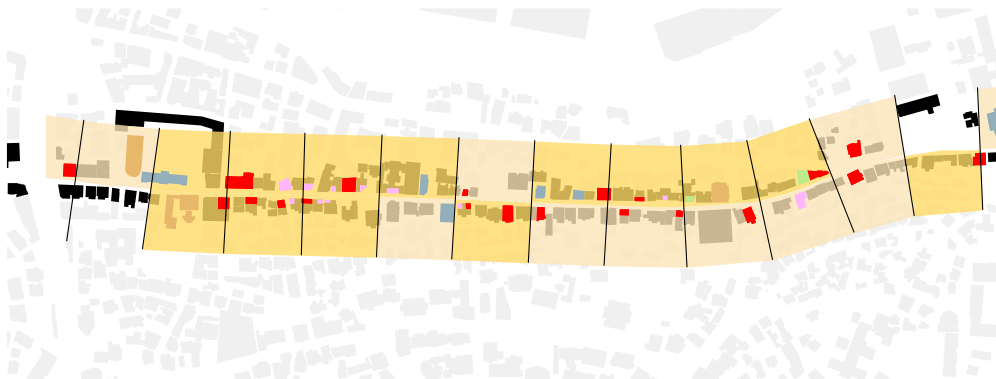


Figure 4.6: Zoom in of East Axis (Panhuis, 2021)



Figure 4.7: Zoom in of West Axis (Panhuis, 2021)

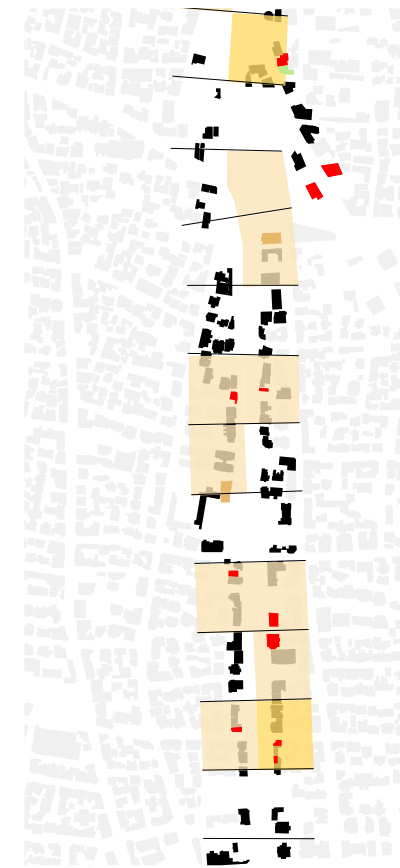


Figure 4.8: Zoom in of South Axes (Panhuis, 2021)

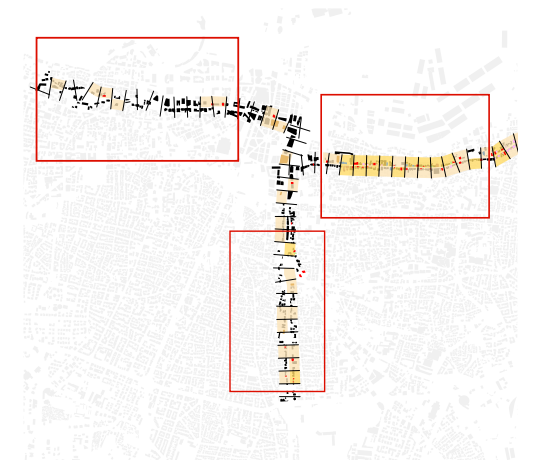


Figure 4.9: Overview of Axes (Panhuis, 2021)

Number of functions

1

2

Religious Building

Restaurant

Bar

Night Club

Gallery / Museum

legend



Figure 4.10: Heat map and Diversity map of Public Places layer (Panhuis, 2021)

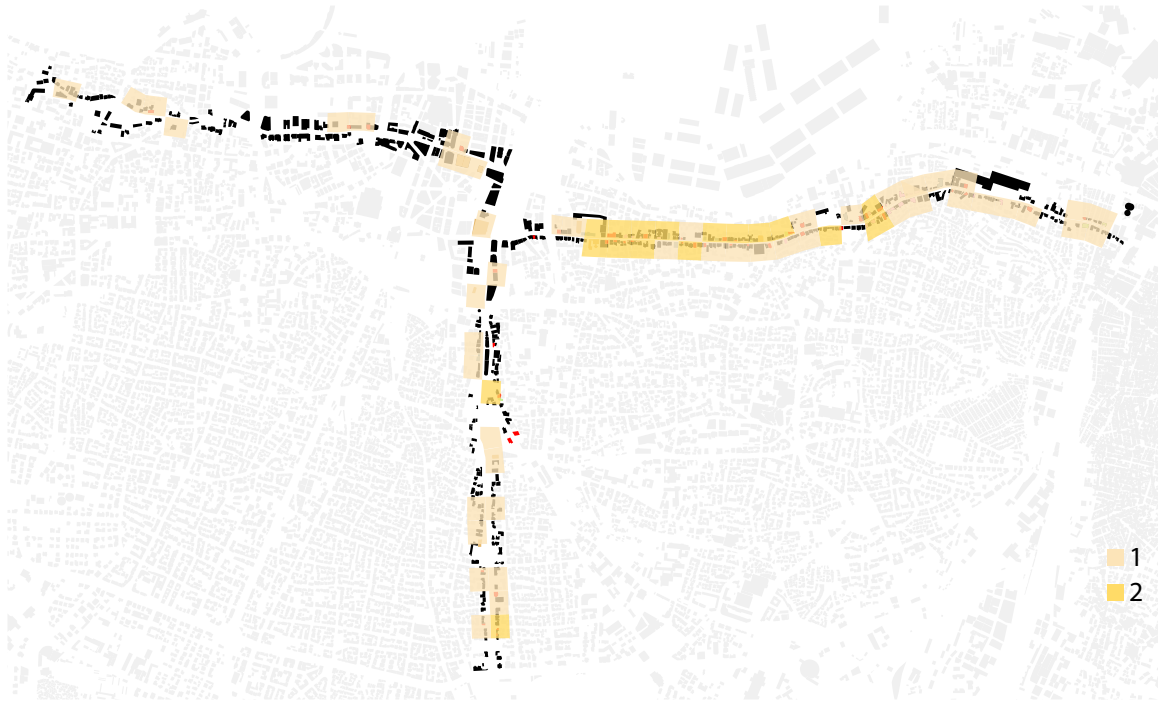


Figure 4.11: Heatmap of public space layer (Panhuis, 2021)

4.7 Contribution to the overall heatmap

In General, the public space layer seems to overlap perfectly with the overall heatmap of the group. This could make sense because public places are likely to attract functions of commerce, housing, education in equal parts, and vice versa. The only layer that seems to have an inverse relationship with the diversity of public spaces is infrastructure. Since public spaces are more likely to be in areas where the amount of traffic is lower this relation too is self-explanatory.

4.8 Validation through historical analysis

As mentioned in the Historical analysis of Beirut's public spaces, the city had been divided between a Christian and Muslim part. Broadly speaking, in military terms the Christian population had the upper hand during the civil war. This caused much larger scale destruction of the western neighborhood where predominantly the Muslim population lived. After the war, the

Christian part of Beirut remained largely intact, including the historic French colonial buildings in Remeil. This is one of the reasons this is still the main touristic and local creative entrepreneurial hotspot in Beirut, attracting the most diverse amount of functions, including public spaces. When the war was over it was the western part of Beirut which was in need of restoration and thus became the place wherein foreign investors would invest. This resulted in tall largescale Appartement buildings which would earn the investors the most profit. Both the investors and the political class largely leaning on them had therefore no incentives to invest in public space. Along the South axis, we find religious buildings of both denominations. This is because this used to be the border between east and west Beirut. This street is also filled with post-war buildings which had no incentives to build back public space, as previously described.

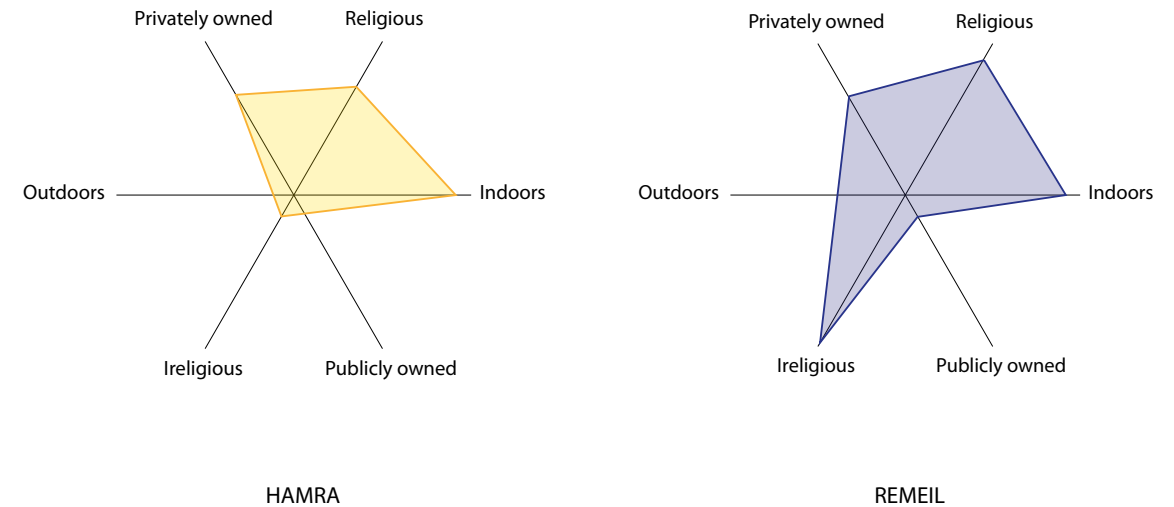


Figure 4.12: Spidergraph East and West Axis concerning public space (Panhuis, 2021)

4.9 Conclusion Results

In Beirut, the concept of public space is not successfully integrated into city planning. Most of the public spaces are indoors, privately owned, or in possession of religious institutions. The post-war period has not been successful in proving the value of public space in Beirut. The highest amount of diversity in Beirut's urban fabric is to be found in the neighborhoods that survived the war. no conscious attempt has been made to invest in new types of public spaces in Beirut. The handful of outdoor public spaces such as parks sportsfields and even squares are being privatized.

4.10 Informing the design process

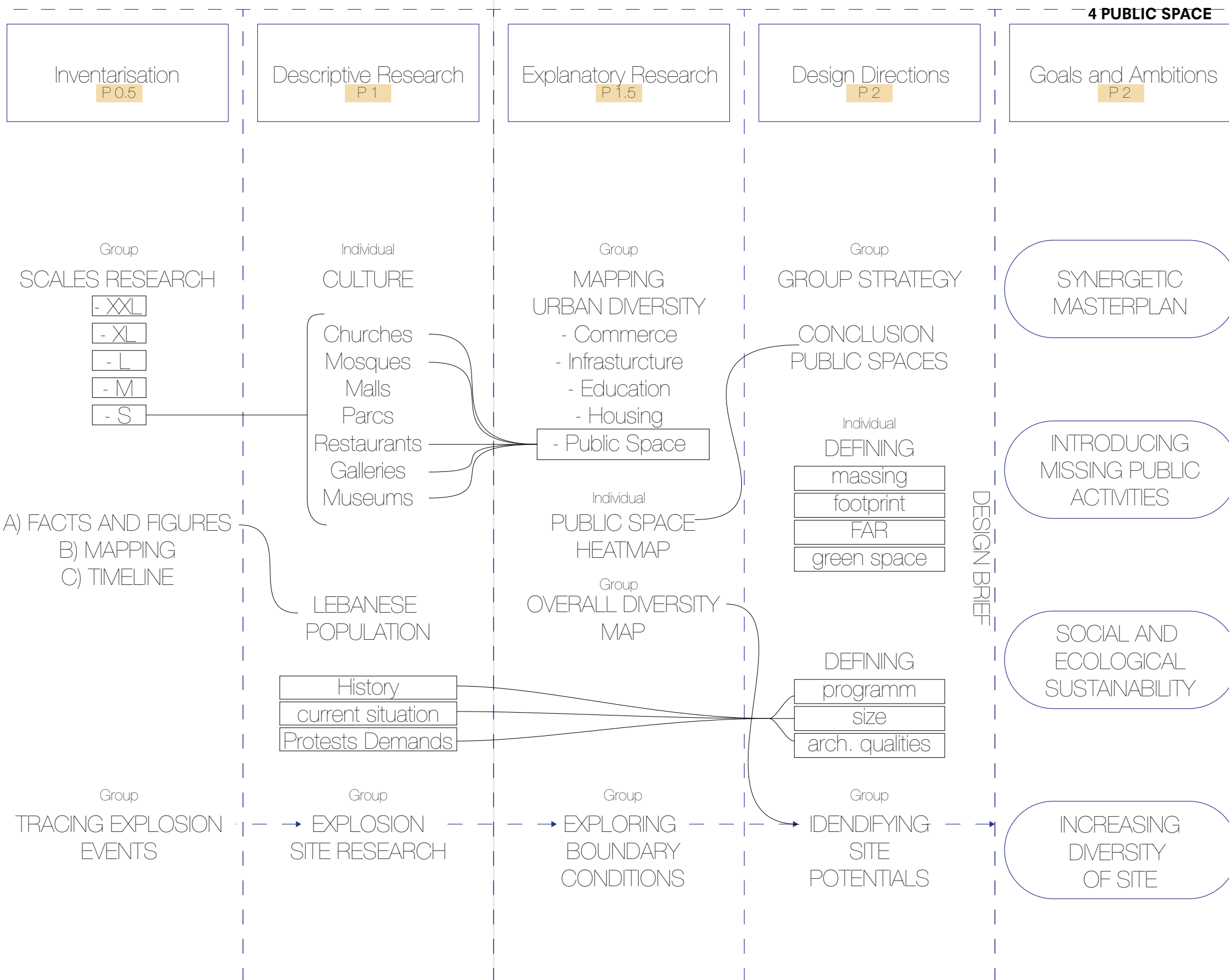
Ideally, the long-term value of public spaces has to be made clear through the design, not only to the citizens of Beirut, who have shown to be in favor throughout 2019 but to the politicians and investors themselves. The protests in Beirut last year made many citizens voice their opinion on the need for more public space in the city, going as far as to conduct these activities in the streets. In regards to the location of where Public space is necessary, it depends on the part of the city and the type of public space. In West Beirut, all types of public spaces are lacking since there is very low diversity in this area. In East Beirut mainly the outdoors type is not provided for. Throughout the city, the type of public space that is lacking most is the Outdoors Irreligious type. For example sports facilities, open theater, festivals terrain, places for recreation.

[fig] spider graph remeil etc

METHODOLOGY DIAGRAM

RESEARCH QUESTION
How will the future Beirut public space be influenced by religious, irreligious, and privately owned public spaces?

Explosion
Beirut



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COMMERCE

MARTIJN VAN AURICH

05

EDUCATION

BETHEL LEMMA

06

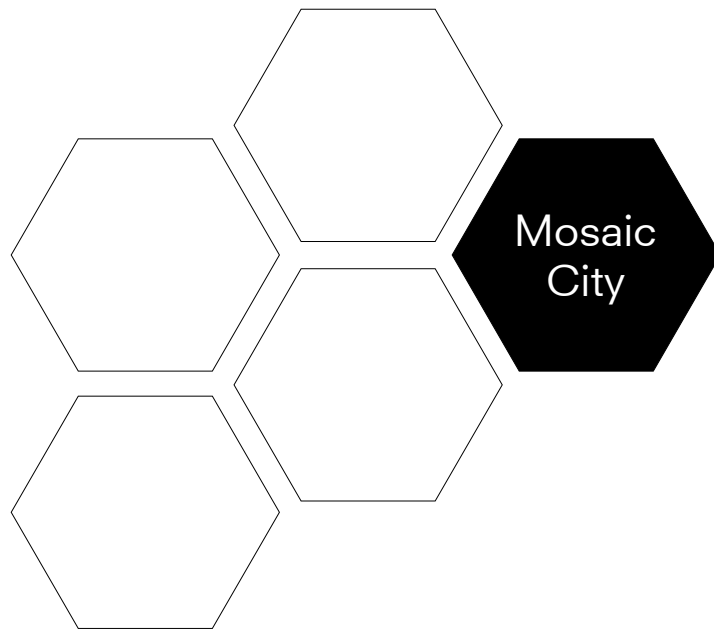


Figure 6.1 Mosaic city diagram by author

6 Education

6.1 Introduction

A mosaic society, a mosaic education

Beirut, the capital of Lebanon, has hosted many empires and civilizations which established a layered and diverse cultural heritage. A key element of Lebanon's identity today is religious and ethnic diversity (Tannous, 1997). By the ages, the politicisation of cultural diversity has created a space of fragmentation, conflict, and complex – physical and non-physical – border conditions. This societal fragmentation was mainly introduced through educational institutions. The majority of these schools have “lend themselves to sectarian biases and rivalry” (Tannous, 1997), perpetuating the socioeconomic disparities. To respond to the future global and local demands, and to facilitate the Lebanese technology advancement, there is an opportunity to rethink urban learning

spaces. As the historically intellectual centre of the Middle East, there is an opportunity for Beirut to be the pioneer of modernizing its school typology, and regain its intellectual reputation.

In this thesis I further clarify the relevance of education as urban activity in Beirut through the observations of its history and how this lead to its current state. This introduction is divided into three sub-chapters.

In the first chapter, *Education and the society*, I explain the relationship between education and society through studies and literatures done by researchers and philosophers. Then I will explain the education-society relationship in Beirut through the lens of the socializing effect. In the second chapter, *Education and the city*, I will present how this education-society relationship is manifested in physical space on an urban scale. The observations of the previous two chapters will then be used as a lens to observe the architectural scale of

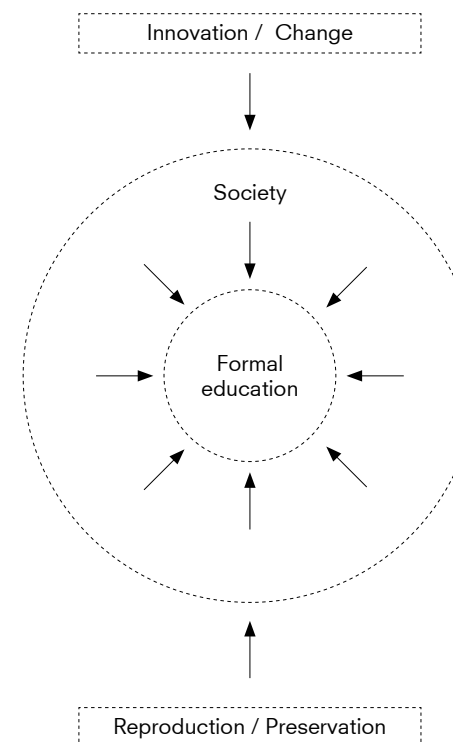
education in the last chapter, *Education and the building*.

Education and the society

Education and society are inseparable notions, meaning that the one influences the other, and vice versa. Both these concepts are in constant change. Paulo Freire, one of the great education philosophers, calls this historicity, which means that we are historical beings since we are always in the process of becoming. This indicates the complexity of reality and truth; rather than it being a static phenomenon, it is dynamic (Freire, 2013). Therefore, education must be democratic which facilitates space for (contradictory) dialogues.

In a conventional manner, education is shaped by society. As Freire says, “it’s not systemic education which somehow moulds society, but, on the contrary, society, which according to its particular structure, shapes education in relation to the ends and interests of those who control power in that

Figure 6.2 Education diagram by author



society” (Freire, 1970). Through education, societies are able to preserve and reproduce that same society. This is realized through the production of effective members of society, both in social and economic terms, which in return results in economic growth. This is achieved not only by building human capital, but also through the socializing effect. The term socializing effect stands for the shrinking of social distances between people. This fosters relationship and trust and lowers transactional costs, which ensues economic benefits. Meaning that educational institutions have the ability to build social cohesion (Gradstein & Justman, 2002).

For Beirut, the socializing effect is observable through the various sub-communities living in the city. Rather than education operating as a social glue on national level, it operates on community level. Accordingly resulting in several societal ecosystems, fragmenting the population. This diversity of educational institutions stems from the extensive Lebanese history wherein its openness to foreign communities is evident. The 1926 Constitution, article 10 emphasizes the freedom of private education providers and the protection of the various communities through the possibilities of establishing their own schools. This freedom maintained the fragmented society, further polarizing and isolating educational institutions. According to Abdul-Hamid & Yassine (2020), “the emphasis reflected the strong presence of the private sector led by religious institutions and foreign missionaries before Lebanon’s independence. It also protected the private sector and allowed its development and expansion” (p.39).

In the book Political Economy of Education in Lebanon, the events of societal and educational changes, in the past hundred years, is categorized into six periods. The Ottoman period, the French Mandate, post-independence, post-civil war, contemporary period and the Syrian refugee crisis.

In the Ottoman period, the purpose of

education was Islamic teaching and the advancement of technology to preserve and gain political superiority (Khuluq, 2005). During that same period, Lebanon witnessed a rise in western Christian missionary schools being established in the country (Gul, 2015).

At the beginning of the French mandate, the Armenians that found refuge in Lebanon, also, over the years, established their own communities with Armenian churches and schools. Within that same period, in 1926 the Constitution allows freedom for private education service providers (Abdul-Hamid & Yassine, 2020). Which resulted in an increase of confessional schools, especially French Catholic.

In accordance with the increasing number of Christian missions, the progressive Islamic institution Makassed, provided alternative education to these Christian missions (Tell, Johanson, Wang, Ali, Mandell, and Ostrander, 2019). This added new types of schools in Beirut.

After independence public education and establishing national universities was essential for the dissemination of anti-colonial ideology. During this time the first national universities were established, which was a great pride for the nation (Sbaiti, 2008).

However, due to tension among the different communities and the lack of nationalism, the country erupted in a civil war. After the civil war, in an attempt to create social cohesion amongst the communities the focus (in the 1994 education reform) was to achieve social oneness through civic and history education. Until now, there is still no national history education due to the still existing disagreements among sects within the responsible committee. Educational institutions still have a lot of freedom in the way they teach history (Abdul-Hamid & Yassine, 2020).

A long history of educational development that resulted in various types of schools.

Public and private. And within the private: secular or non-denominational nationalist schools; schools subsumed under the umbrella of a religio-political community; and schools that promoted French cultural authority but not run by Catholic nuns and priests. Today this results in 527 confessional schools in Lebanon (Centre for Education Research and Development, 2006).

Each of the communities, having their own schools, decides the content of education, resulting in polarized educational institutions and thus a polarized society. However, according to Gradstein and Justman (2002), unified education – which enhances social cohesion – stimulates economic growth. In an environment of cultural complexity like Beirut's, this is a challenge. This space of complex diversity, however, could potentially become an intense and effective network of diverse knowledge exchange. Although social cohesion is more difficult to achieve with multiculturalism, it can become more beneficial as opposed to homogenous societies. Meaning that there is a large potential for a pluralistic city like Beirut to benefit from the advantages of a diverse society in generating knowledge. With globalisation and urbanisation, multiculturalism becomes a general norm

and more urban areas will host this potential of the socializing effect, which makes this research globally relevant, not just for Beirut.

Education and the city

Both the perception and use of urban space in Beirut is dependent on the subject's socio-economic group. The mindscape of Beirutian urban dwellers presents compelling dissimilarities to the physical urban space. In a study done by Sukkarieh (2015), she addresses these urban divisions and how it leads to different perceptions or the urban spaces which in return affects spatial urban activities. The mindscapes of the urban dwellers is constructed from a personal social memory. These social memories are shared with fellow sub-community members, yet are separate from other communities. Despite these divisions, Sukkarieh (2015) emphasizes that these different communities are spatially in connection to each other.

In addition to the mindscapes of urban dwellers based on collective memory, the spatial practices are also highly influenced by physical urban barriers. The mobility of urban dwellers, and their access to public spaces, is hindered by security measures throughout the city [fig 6.4]. Some of

these security measures are arbitrary and subjectively differentiate along the lines of gender, class, race or religious/sectarian belonging (Fawaz, Harb and Gharbieh, 2012). Along formal, organized security, residents of specific communities also take action into their own hand of defending and protecting their neighbourhood from inhabitants of other sects. The intensity of these formal and informal security measures is dependent on national and/or regional political tensions. Fawaz, Harb and Gharbieh (2012), describe how Beirutians know what political tension might be topical based on how much and what kind of security measures are present. Interestingly, in some cases young children benefit from these security measures. Areas with relatively more security guards opens up additional space for children - in a city with scarcity in public spaces and playgrounds - to play. Simultaneously, in many cases young people avoid these areas to avoid the scrutiny of security personnel (Fawaz, Harb and Gharbieh, 2012).

In accordance with mindscapes based on social memory (Sukkarieh, 2015), the type of school (what confession), its location, and its building quality are all in relation to each other. Most rich, western Christian schools



Figure 6.3 History timeline collage by author

Visible Security Mechanisms in Municipal Beirut

Survey conducted between February and July 2009, revised in September 2010

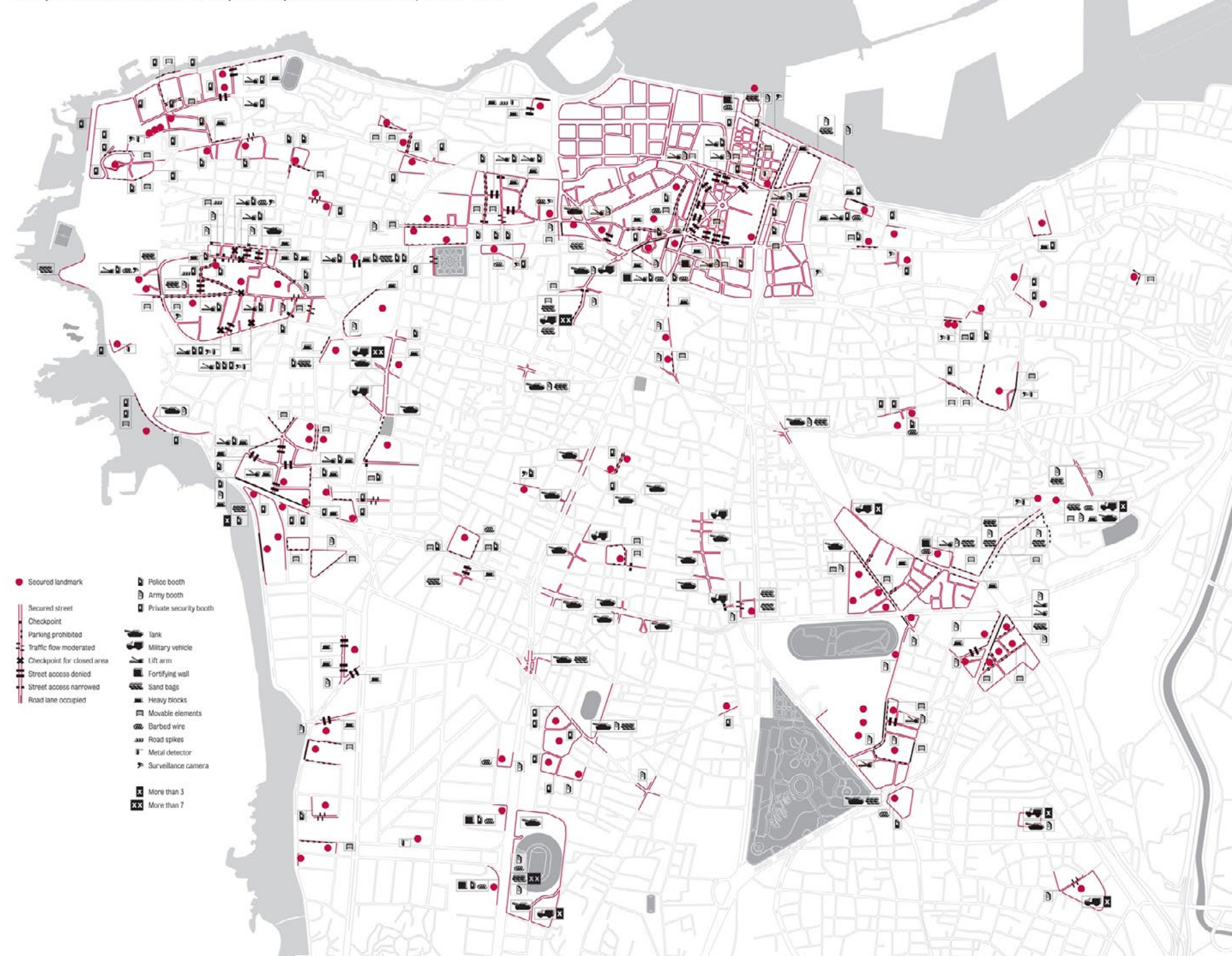


Figure 6.4 Fawaz, M. & Harb, M. & Gharbieh, A. (2012). Security mechanisms in Beirut

are located in the north of Beirut. Whereas public schools or Islamic schools are in higher numbers in the south. This is due to the earlier mentioned urban divisions among socioeconomic and religio-political lines. The distribution of educational spaces follow that same rule.

Correspondingly, school buildings not only create non-physical borders – through socioeconomic fragmentation – but they are manifested in physical borders as well. These educational spaces are introverted, isolated areas in a highly urbanized territory. School territories in Beirut are fenced off for security reasons and limit the access to these spaces (Azzam, 2019). The morphology of these school buildings itself are often inward facing with introverted outdoor spaces. Since most schools facilitate education from preliminary to secondary phase, the school territories are very large. Within these spaces, in addition to formal education, institutions also offer extracurricular activities. Beirut has a scarcity of urban learning spaces outside of school territories. Young people therefore don't meet many peers outside of their school community, since the city doesn't offer other spaces for them. As discussed in chapter 4 Public Spaces, the school territories offer a potential alternative of public spaces for the youth. However, the isolation of these spaces hinder interesting interactions with its urban context.

The lack of public space and free, pedestrian movement in the city, trigger the possibilities of rethinking school territories. Rather than seeing these buildings as objects in a community, they should be seen as objects for the community. By doing so, the interaction between different people can be stimulated. According to researchers, "interaction with diverse out-groups confers benefits from innovation and exploration greater than those that arise from interacting exclusively with a homogeneous in-group" (Stewart, Mccarty and Bryson, 2020, p.1). This asks for an investigation of the threshold conditions that school territories contain. Seeking the balance



Figure 6.5 Security impressions, Google Maps images edited by author

between enclosure, security, openness, and integration.

Education and the building

The morphology of school buildings is a typology that developed through the influence of culture and climate. An often reoccurring spatial organization is the courtyard typology, mostly found in the older Christian schools and sometimes applied to modern school buildings as well. This courtyard typology can be seen as an architectural form that is inward facing and could potentially isolate the building space from its context. One of the main reason why this morphology still exists today in the context of Beirut is its ability to control the climate in the building. In Beirut the daily maximum temperatures exceed the comfort limit between May and August. In addition to these high temperature there is high humidity, thus creating the need for natural cross ventilation. In summer opening buildings to the southwest breeze will offer the much needed thermal comfort (Ragette, 1975). This partly explains the courtyard typology in school- as well as residential buildings. It creates a micro-climate that can be thermally more comfortable than open outdoor spaces by providing protection through shading and ventilation (Taleghani, 2014).

The degree of enclosure in these courtyards buildings determines the extent to which they foster interactions and allow access with its surrounding context. According to Rabbat (2010), not all courtyards are equally enclosed, and not always on all four sides. Meaning that not all courtyard typologies are entirely isolated spaces, an overall enclosure can be suggested without closing off the whole space. However, the school buildings in Beirut – courtyard typology or not – are also enclosed by security fences. This large, fenced threshold spaces between the school building and the city creates an additional barrier for potential smooth flows of people. The decision for highly secured school territories, specifically in Beirut, is aligned with other urban security measures that are

particular for this context. In order to create an open spatial experience for an urban learning space, it is crucial to understand the degree of security that's necessary in Beirut. Looking at the immense security measures that are present in particular areas on urban scale, could influence the necessary security measures on building scale.

Furthermore, the majority schools in Beirut, depending on the wealth of the schools, offer extracurricular activities as well. Historically, schools were community places where civil activities like education, religion and other public functions all took place in one territory. These institutions today still offer after school activities and clubs for children. Although the buildings initially seem monofunctional, in reality they are not. This reflects in the urban scale as well, where the number public libraries, music and sport schools and playgrounds is scarce. These centralized urban learning spaces often allow young people from different communities to meet, but if young people only use the extracurricular activities offered by their school they wont benefit from the advantages independent learning spaces offer. This phenomenon actually adds to the isolation of communities. In an environment of polarized, confessional schools a centralized learning space can be a very interesting addition to the educational landscape of Beirut.

On smaller scale, the class rooms are conventional and teacher centred. According to Dr. Jabbour (2013), the Lebanese hold a traditional view of teaching where the teacher is hierarchically at the top. Teachers hold all knowledge and transmits it to the learners, where the learners assume a passive role in this knowledge transmission. The class room – not only in Lebanon, but globally – is based on this principal (Jabbour, 2013). To facilitate complex interactive learning, spaces need to exceed the banal class room typology, especially considering the shift from teacher-centred to student-centred learning in Lebanon.

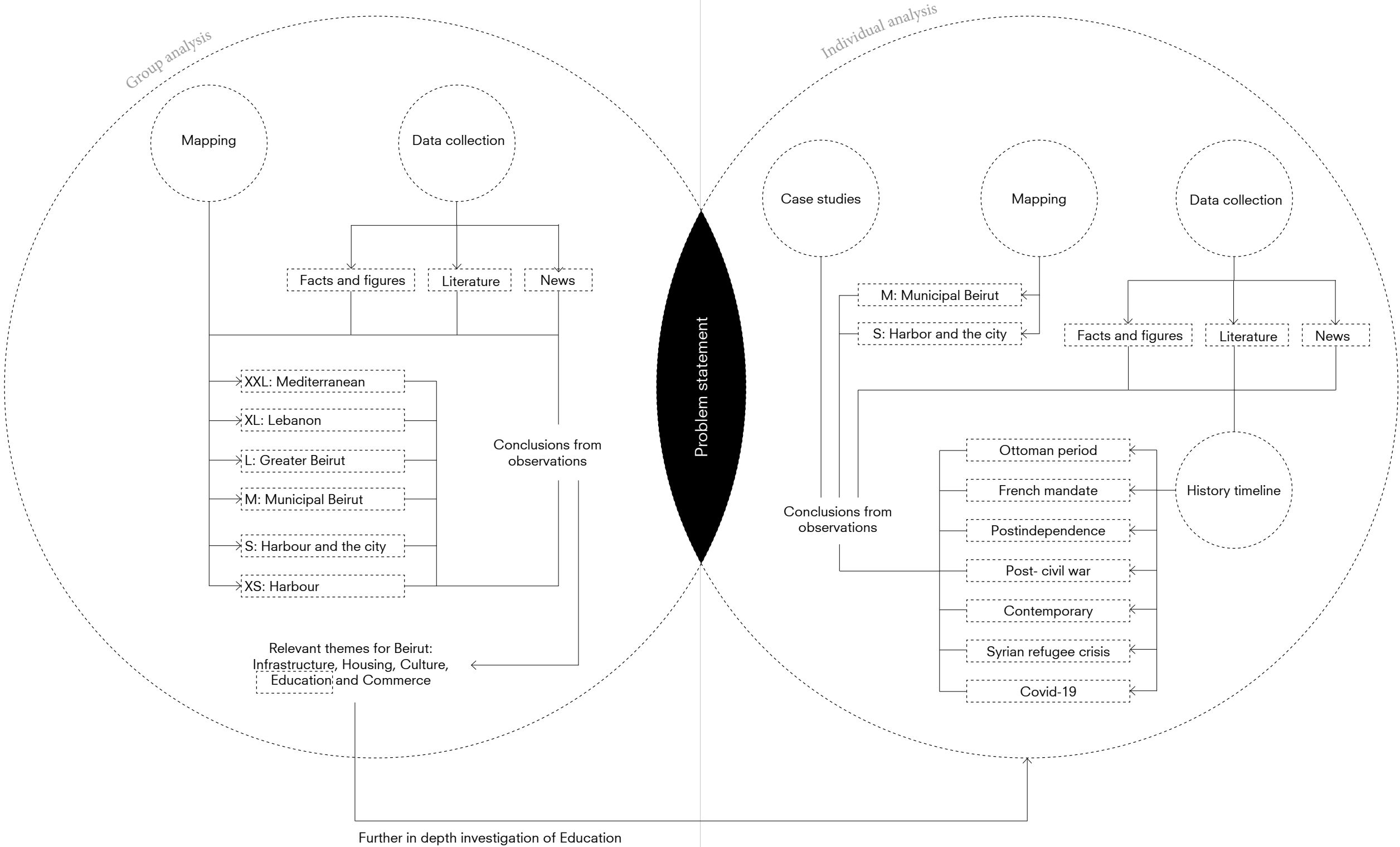


Figure 6.6 Research plan diagram 1 by author (P1-P2)

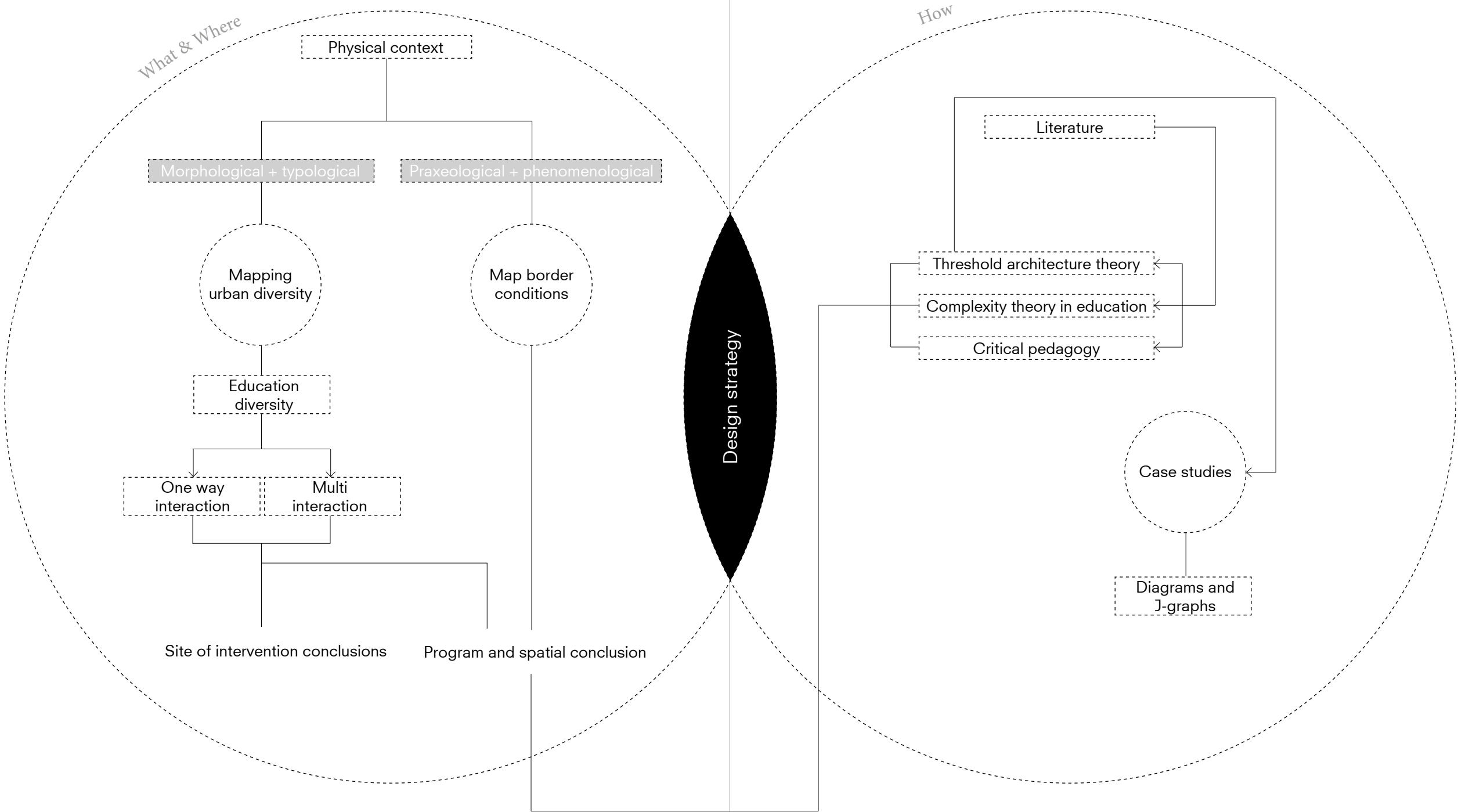


Figure 6.7 Research plan diagram 2 by author (P2-P4)

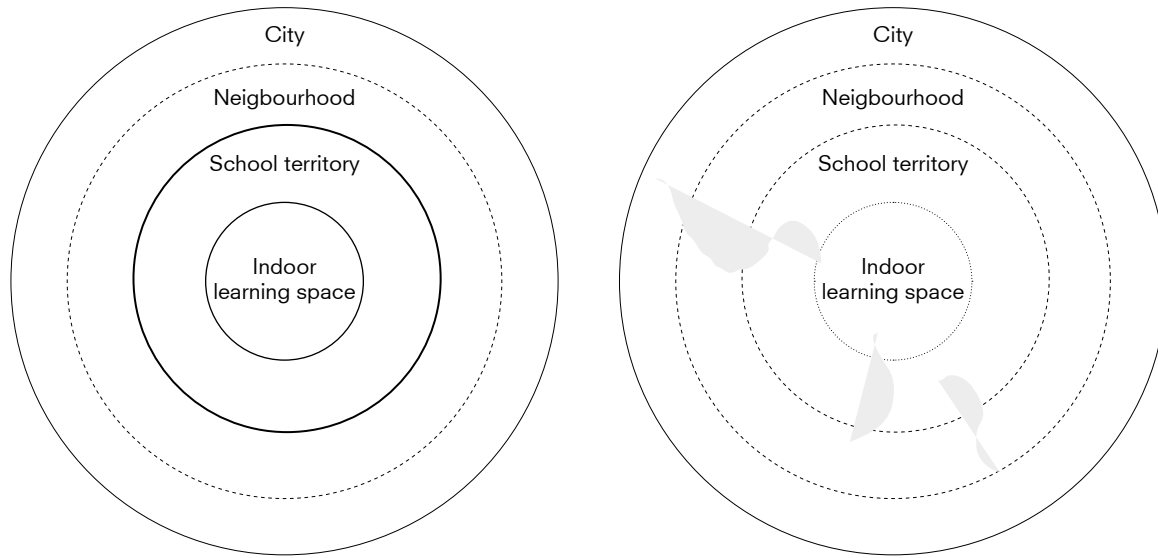


Figure 6.8 School threshold diagram by author

6.2 Problem statement and research questions

Hypothesis

Currently, there exist a gap between the graduates' skills and labour market's demand. Today, the biggest sector in Lebanon is the service sector, however this might shift to a technological sector. According to economists, "Lebanon's comparative advantage no longer lies in services, given the emerging and competing centres in the region, like Dubai. Technology is now the undeniable driving force behind growth and the rise of modern economies" (Karam, 2018).

However, to prepare for this shift, there need to be several educational reforms. Currently the schools in Beirut are teacher-centric, whereas the future will consist of student-centric learning. Some initiatives, like the emergence of STEAM education in Lebanon, aim to introduce children to technology at a young age through interactive and hands-on learning. In summation, the introverted, isolated school buildings, designed as teacher-centric spaces, are decreasing in relevance. With the future in mind, urban

situated school buildings should facilitate smooth space for the flows of people, knowledge, communication, and goods (Havik & Schoonderbeek, 2014).

Research question

As observed, education has a strong relation with society and the city. In urban areas, education is not only through formal education. There is a diversity of learning spaces in the urban realm. This diversity can be further explored and used to facilitate dynamic urban learning space and promote smooth space for flows. This raises the following question:

How does education contribute to the urban diversity of Beirut? And how can this become applicable in an architectural design?

The sub-questions that contribute to the research question are:

How does a system of polarized educational institutions influence the architecture and urban space of public and private schools in Beirut?

How can a student centred, public learning space impact Beirut's social cohesion and what role does it have in the revitalization and reconstruction of the city?

The research questions are also translated into one architectural research question as a framework for the overall research:

How can the threshold spaces within a school building, and between the school and its urban context, facilitate smooth flows of people and knowledge?

6.3 Research framework

Key terms, concepts, and theories

Urban learning, urban diversity, community, interaction.

In the research there are several key concepts. The most important one is the critical examination of threshold spaces. Additionally, the mapping of urban activity diversity in Beirut. The eventual aim is to stage sensitive threshold spaces for student-centred learning spaces, and facilitate diverse educational program.

The research questions all fall under several epistemes. The first question and sub-question, will be in the research framework of architectural typology and morphology, phenomenology and praxeology. Examining the urban diversity of education in Beirut will firstly be done through architectural typology, by simply mapping educational institutions in Beirut. Secondly, by conceptualizing this typology mapping into more meaningful terms, this mapping will be further analysed phenomenologically and praxeologically. Which means, through the understanding of how urban dwellers use and perceive these educational institutions and how that leads to urban activity diversity. By relating these epistemes with each other and understanding the morphological consequences/results, the second half of the main question and the first sub-question can be answered.

The framework for the second sub-question is focused on social studies. Mainly critical pedagogy and complexity theory. These theories explore the impact of society on education and vice versa. Complexity theory in particular, examines the physical spaces as important tools to promote non-linear and dynamic systems of interaction and flows in school design - based on the principles of complexity theory (Uptis, 2004).

Using threshold architecture (Hertzberger) as the main driver and lens for both the analysis and designing, the findings can be translated into specific design strategies which focus on these transition spaces. This research framework relates to the last research question, which works as an umbrella for the overall research.

6.4 Methods and methodology

Toward a problem statement

From the group analysis we continued to research the relevant urban activities that derived from the group analysis. For education, I did this through three actions: Historical analysis, case studies and mapping education (see diagram). Together with actualities, facts and figures, and literature I could fully understand the current state of education, both in physical and non-physical sense.

Toward a strategy

As shown in the diagram on the previous page, I have structured my method into two aims: the exploration of the site of intervention and the examination of suitable programmatic and spatial strategies.

1. Site of intervention strategy

For the exploration of the site of intervention I will use the method of mapping urban diversity. Through it, patterns of educational program in the city can be recognized spatially and potentials can be discovered.

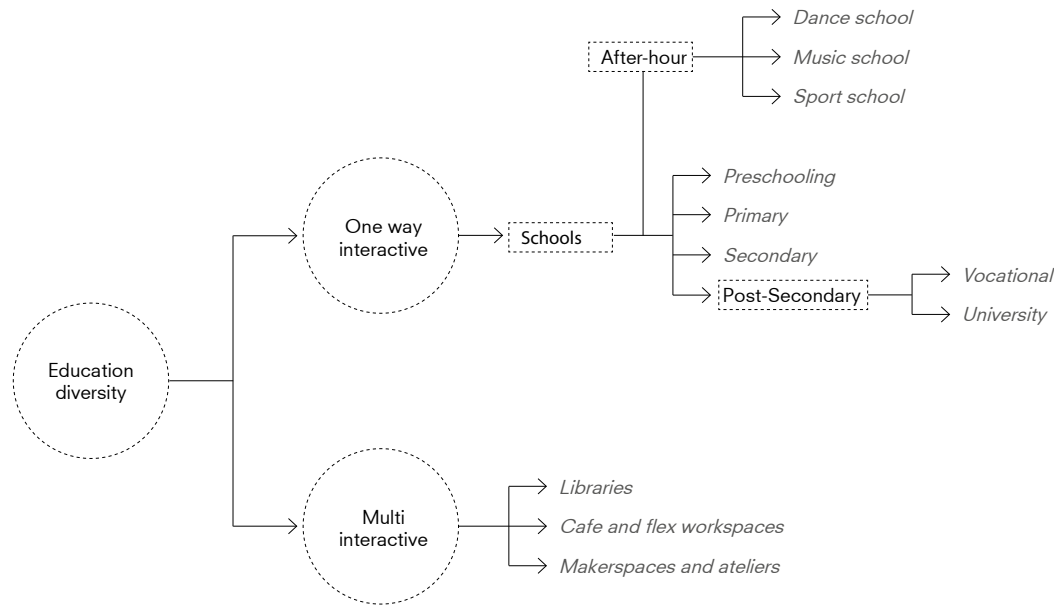


Figure 6.9 Urban diversity layers for education

For this method I have categorized educational urban activity into two main themes: One way interactive and multi interactive education. Considering that these two themes result into different types of urban activities with different types of education-society relationships. One way interactive education (or conventional education) is activity that mainly transmits knowledge and skills through an instructor. An example of this type of educational activity is a school. Multi interactive education is the educational activity where the learner does self-study and depending on where the learner is, interacts passively with other urban dwellers (who are doing the same or another urban activity). An example of this type of activity is a café. These two themes are then subdivided into several typologies (see diagram).

One way interactive education:

- Preschools, Primary, and secondary schools
- Universities and vocational schools
- Dance schools, music schools, workshops

Multi interactive education:

- Libraries

- Cafés and flex workspaces
- Makerspaces and ateliers

The larger university campuses are mapped as one colour, not differentiating between faculty buildings, cafeteria or libraries. In Beirut these campuses are exclusively for students meaning that the diversity within the campus is not relevant on larger scale. Similarly for the differentiation between libraries, canteens or classrooms within school buildings. For assessing whether cafés are used as study and work spaces I used three criteria:

- Availability of plugs and wifi
- Availability of high tables and chairs (not only couches and low salon tables)
- Opening hours during morning and/or afternoon
- Coffee on menu

Once I have mapped the educational urban diversity, each type of educational activity will be mapped on the introvert-extrovert and One way interactive-multi interactive scale (shown in the diagram). Through this, the already existing educational activities, and their physical relationship with the city, can be critically analysed.

The introvert-extrovert scale works as follows. On the y-axis I will graph the degree of openness of the case study. On this axis there are five points in which the case study can be quantified on its extrovert- or introversion. This assessment of openness will be done through J-graphs, a method from Space Syntax [fig 6.10]. The circles represent the spaces. The link between them translates to the access of that space (threshold spaces). The graph starts with a root, which is the starting point, this starting point in my study will always be the outside of the building. Then every space that is directly connected is linked with the root by a line. Every space that is directly accessible from the second row of spaces is also linked by a line, and so on. The number that is given next to the circles represents the 'depth'. This number measures the number of steps required to reach all the other rooms in the building.

The depth will determine where the building will be placed on the extrovert-introvert scale. If the depth of the main learning

spaces is a certain number, that will determine the outcome on the scale:
 $y = -2$ when majority $d =$ between 0 and 1
 $y = -1$ when majority $d = 2$
 $y = 0$ when half of spaces $d = 3$
 $y = 1$ when majority $d =$ more than 4
 $y = 2$ when majority $d =$ more than 4
 To quantify the degree of interaction (one way or multi) I will look at the number of threshold architectural elements directly connected to the particular space that could facilitate outward interaction. This means the number of doors, windows, stairs, balconies etc. The elements that allow visual interaction (windows, etc.) can be derived from architectural drawings and photographs. The elements that allow physical connection as an access element can be found in the J-graph, indicated as lines connecting one circle to another [fig 6.10].
 $x = -2$ when $n = 2$ or lower
 $x = -1$ when $n =$ between 3 and 4
 $x = 0$ when $n = 5$
 $x = 1$ when $n =$ between 6 and 7
 $x = 2$ when $n = 7$ or more

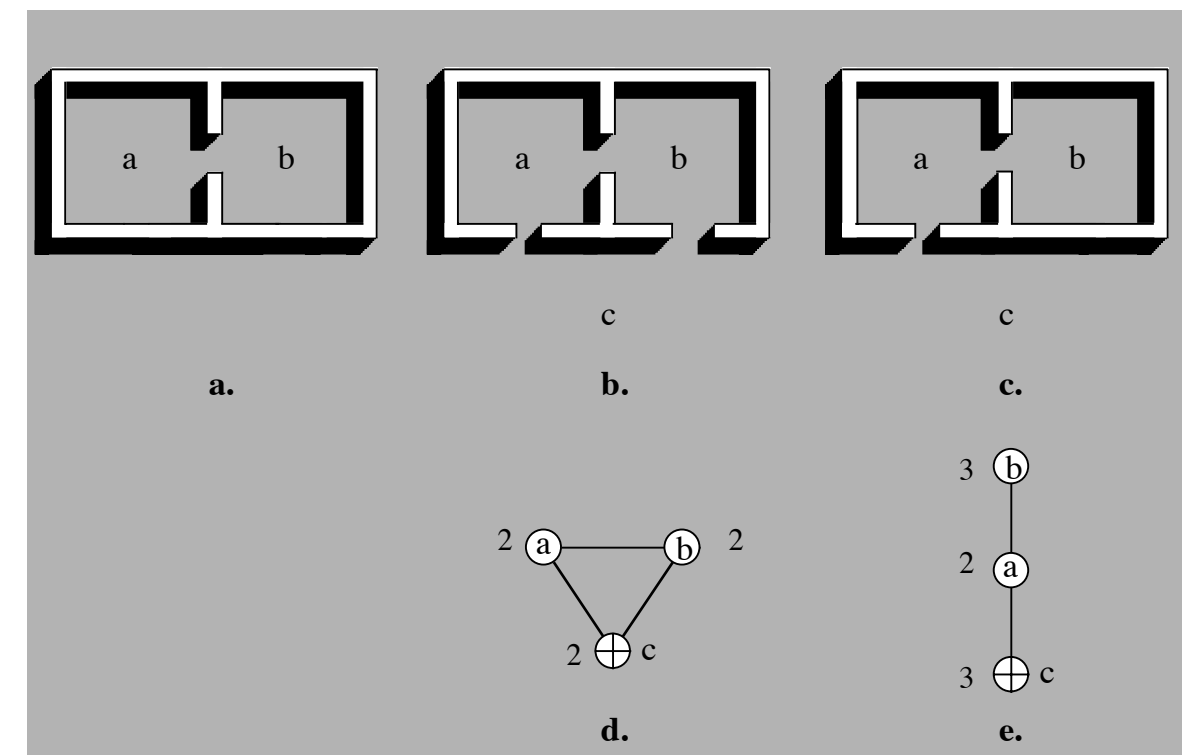


Fig 6.10 Example of J-graphs Bill Hillier (2007) from Space is the machine p. 24

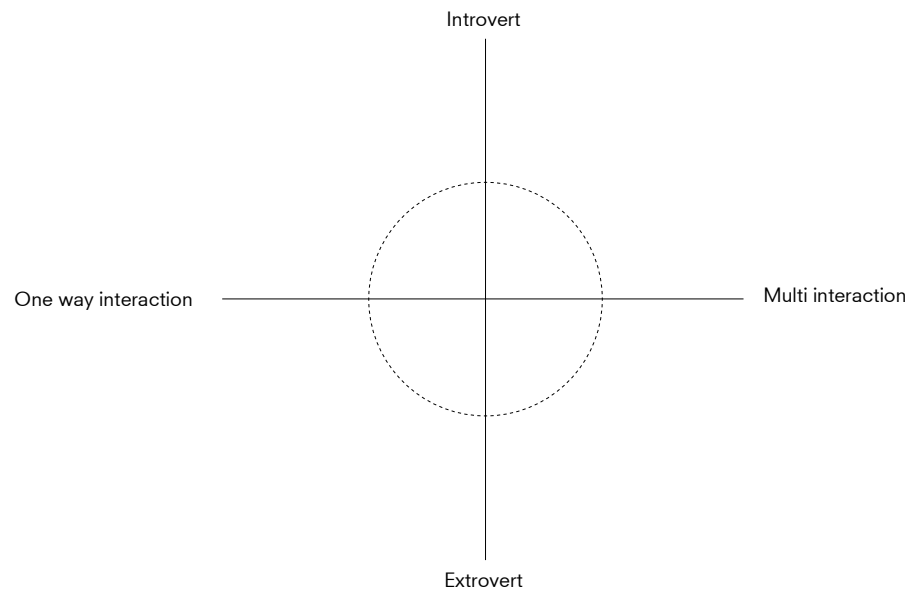


Figure 6.11 Extrovert-introvert scale that will be used for case studies

2. Programmatic and spatial strategy

The mapping of urban diversity and defining the buildings on the mentioned scale, potentially gives preliminary insights on the programmatic strategy for the learning space. It answers the question of how diverse urban learning is. This will be accompanied with case studies by analysing architectural drawings. These case studies will first be done through the lens of morphological and typological episteme. However, to truly understand potential new ways of designing school space, the case studies will also be done through a phenomenological and praxeological lens. This will be done through the use of diagrammatic translations of the case studies and by using Space Syntax's J-graphs (to understand the threshold spaces) and the introvert-extrovert scale.

As a theoretical back bone, literature studies about threshold spaces, complexity theory in school architecture and critical pedagogy will be done. Using threshold spaces as a theoretical research framework both for analyses and the designing.

6.5 Preliminary results

For the urban diversity mapping, two versions are produced. The first version shows all the educational activities as separate layers [fig 6.17]. The second version is a map wherein there has only been categorized into two layers: one way- or multi interaction educational activities [fig 6.16].

Both versions show a higher diversity in the east axis. This is consistent with the collective heat map, meaning that education follows the other urban activities in its behaviour. This eastern strip particularly is higher in its urban diversity due to educational activities which are not schools [fig 6.14 & 15]. These include, cafés, libraries, workshops, ateliers, sport and music schools. With the two versions it's visible how mostly the eastern axis is impacted when the categorization of urban activity layers is differently defined. Which means that within the category of 'multi interactive' education, there is a lot of diversity in the eastern axis [fig 6.15]. The eastern axis is also more educationally diverse near the centre of the three legs. Once more, this is due to the many non-

school educational activities that are found more in the centre and main road of Beirut.

The western axis hosts significantly less educational diversity than the two other legs. Compared to the other urban activities, like commerce and housing, it can be concluded that this axis is a much more commercial, gentrified area. At the end of the axis, we find AUB, which is the most significant educational activity in this axis. In addition to gentrification, this result can also be explained by the building grain of this side of the city. Here, we find a large mall and other larger building blocks which will result in lower diversity in each grid square. These large, commercial buildings take up a big portion of the land in the western axis, resulting in lower educational diversity.

In the southern axis there are two clusters of higher educational diversity. The first, northern, cluster is near the central district and martyr square, with educational facilities like workshops, trainings and libraries. These activities add to the urban diversity. The second cluster, which is more in the south, is at the split of Damascus street. This infrastructure split creates a crossing point of more neighbourhoods than the northern part of the axis - where only two neighbourhoods face each other with a main road passing through. These larger numbers of neighbourhoods coming together could explain the cluster of educational facilities near this crossing point. Meaning that this cluster functions as a sort of centre for these neighbourhoods. This is consistent with the collective urban diversity map, where the diversity is high at the central district of Beirut and at this crossing point, with lower diversity in between the two clusters.

6.6 Preliminary conclusions

From the historical evaluation it was clear that formal education (schools and universities) are very diverse in nature. This diversity is influenced by the socio-political situation of education as well as the neoliberalism which resulted in a division between private and public schools.

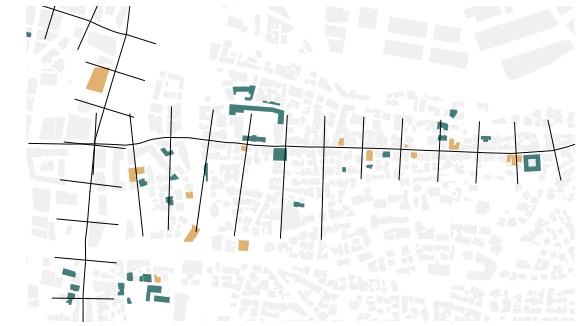


Figure 6.12 Diversity map two categories - east

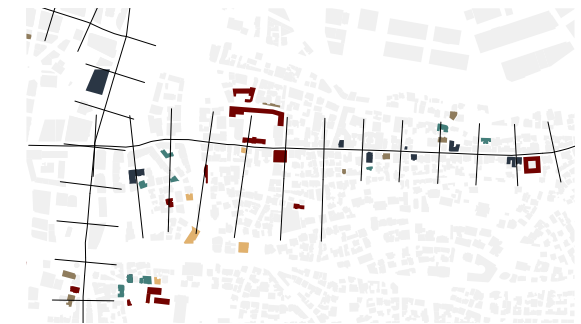


Figure 6.13 Diversity map specified activity layers - east

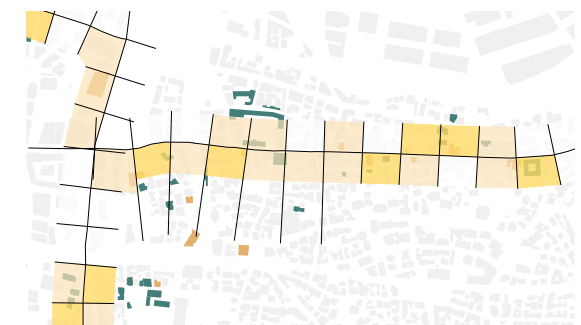


Figure 6.14 Heat map two categories - east

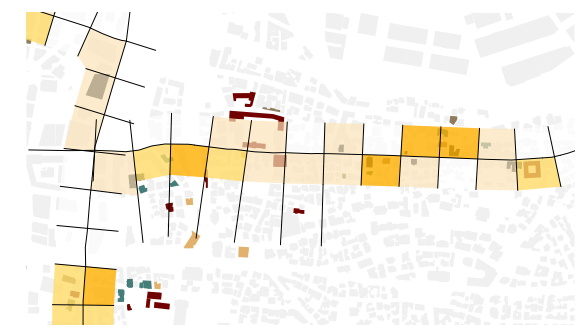


Figure 6.15 Heat map specified activity layers - east

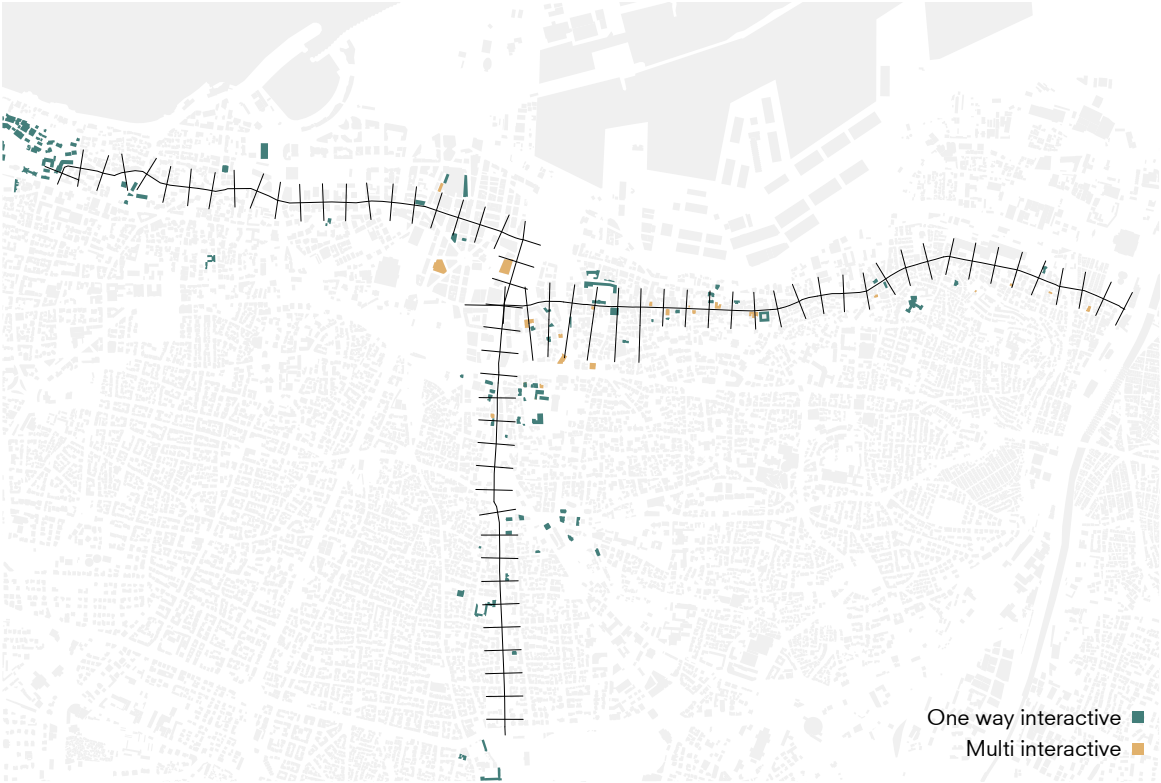


Figure 6.16 Diversity map two categories

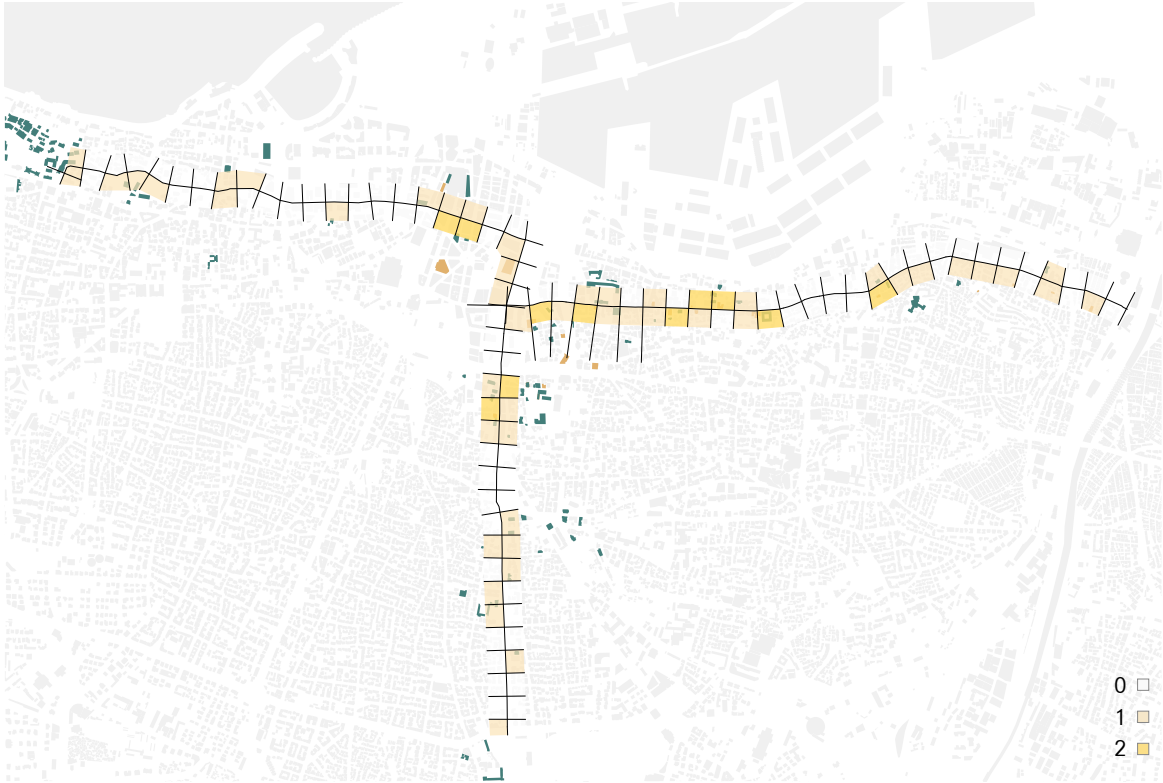


Figure 6.18 Heat map two categories



Figure 6.17 Diversity map specified activity layers

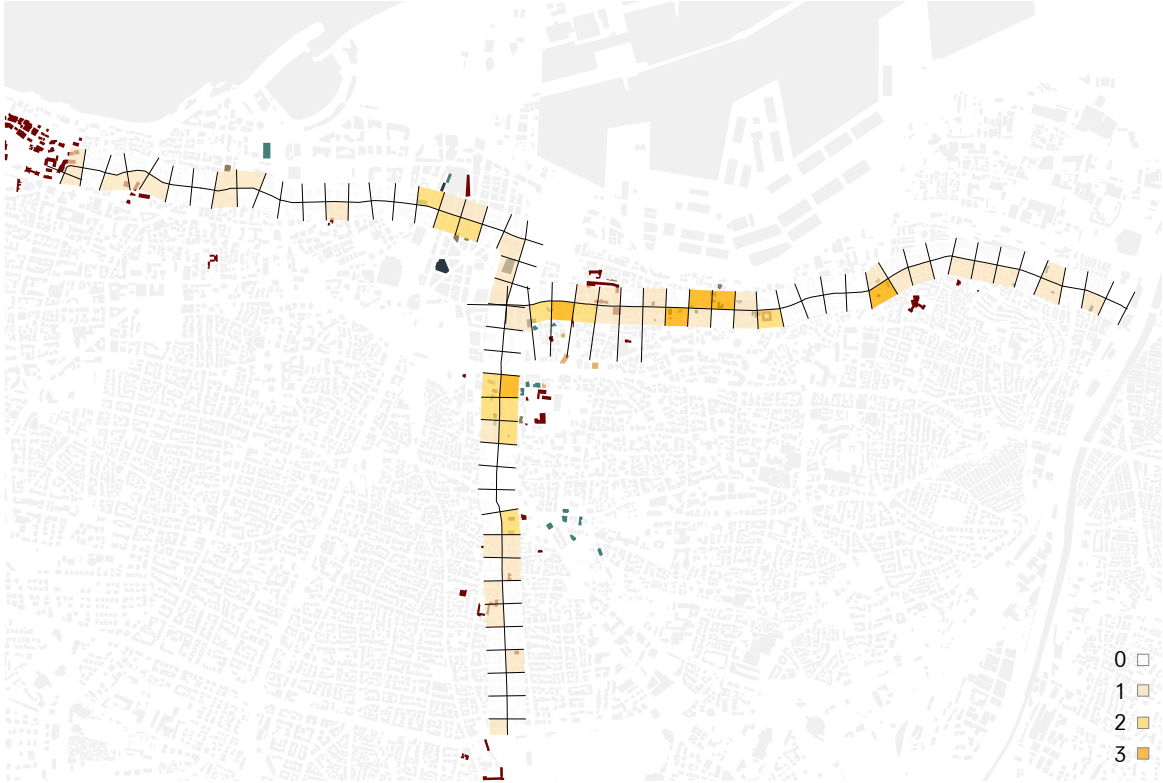


Figure 6.19 Heat map specified activity layers

However, the non-school educational activity is quite limited. One explanation for this can be that the schools themselves already offer extracurricular activities within their institution. Resulting in lower numbers of educational facilities in the city offered independently from schools. This means that young people are isolated in these school territories and are not fully facilitated in the city (especially after school hours).

The diversity of the eastern axis has a great potential to extend its target group to younger people. Throughout the analysis it became clear that most of the non-school activities are used by and meant for adults. Arguably, the educational activities could have been mapped by categorizing it based on target groups, since it's clear that this is an important factor in Beirut. The other axis have a scarcity of diversity in education all together which leaves a potential to add to those axis, both for young people and adults. In general it is clear that targeting young people and children is crucial for the urban diversity in Beirut.

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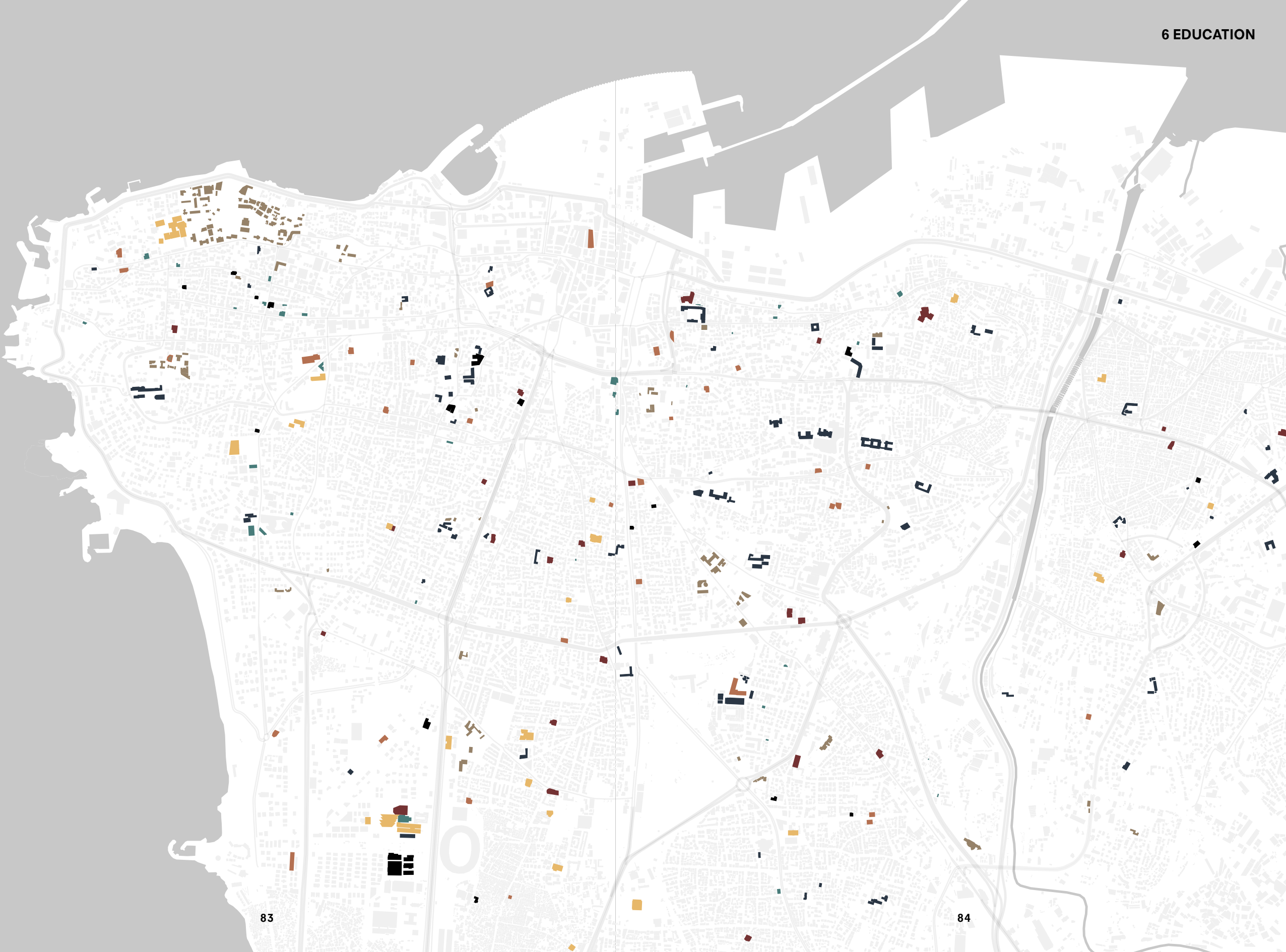
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