MANUFACTURING IN THE CITY

El Hayek Christopher

MANUFACTURING IN THE CITY

Master Thesis in Architecture
EPFL, June 2018

Professor Paolo Tombesi

ABSTRACT

Small manufacturing entities are key drivers for revitalizing a city through its domestic production. Their reputation in generating economic and social growth is a motivation to considering an "urban manufacture" proposal.

Following the shift of large industries towards emerging countries where production is cheaper, many industrial infrastructures are left in a state of disarray. Post-industrial landscapes present derelict buildings in close proximity to current urban developments.

Yet, on the basis of examples, the implementation of small scale industries in abandoned infrastructures has proven success. It is namely the case of the city of Detroit that witnessed an important economic and social renaissance by promoting spaces for small manufacturers and workshops in neglected buildings. In fact, bringing manufacturing back to our cities is gaining popularity due to changing market demands. Consumers are asking for products that are made locally as a counter response to alarming ethics in production.

The interest of the study lies in the applicability of such an urban manufacturing model elsewhere. The city of Beirut is chosen in response to similar concerns with Detroit. Both share a high rate of unemployment, social disparities and derelict building stock. Besides, the choice of Beirut arises from personal motivations and knowledge regarding its geographical presence.

A particular attention is directed upon the eastern suburb of Beirut known for its background in textile manufacturing. Unfortunately, production has scaled down in the region and the number of workshops dropped following the rise of industrial giants. Designers are finding it hard to sustain local businesses given the lack of infrastructure for production.

Social awareness is a crucial topic to taking into consideration in regard to the project's urban situation. Subsequently, the study will focus on delivering a space for garment manufacturing in order to value present resources and ultimately respond to concerns. The aim, first and foremost, is to offer a space that brings designers and craftsmen alongside in order to sustain a productive business line. Such an initiative will promote jobs for a highly and lower educated workforce.

The chosen site for the project is the former train station that is currently abandoned and encloses an important architectural heritage. Nonetheless, the choice was made in regard to its strategic positioning for production. It is a nod between a residential area dense in public functions, another

area rich in craftmanship savoir-faire and an industrial settlement. The project will strive to promote public functions in relation to fashion design practices and attract visitors. The goal is to bring production alongside design schools and exhibition spaces. Such an intent to open up space for public usage will help value present architectural heritage and encourage ethics in production.

In sum, the work is about setting the proper guidelines to promoting innovative practices in manufacturing and defining the elements of success in order to sustain urban production.

ACKNOWLEDGMENTS

I would first like to thank my thesis advisor Professor Tombesi Paolo of the faculty of Architecture at the Ecole Polytechnique Fédérale de Lausanne. The door to Professor Tombesi office was always open in order to ensure a proper follow up of the study content. He consistently allowed this paper to be my own work, but steered me in the right direction whenever I thought I needed it.

I would also like to acknowledge Professor Pedrazzini Yves and Professor Vannucci Riccardo of the faculty of Architecture at the Ecole Polytechnique Fédérale de Lausanne as the second readers of this thesis. I am gratefully indebt to their valuable comments on this thesis.

I would also like to thank the several professors and doctoral candidates who advised me on specific research contents. Namely, Proessor Georges Arbid of the faculty of Architecture at the American University of Beirut whom advised me upon “adaptive reuse” strategies in Lebanon. Professor Weber Thomas at the faculty of Management of Technology & Entrepreneurship at the Ecole Polytechnique Fédérale de Lausanne who gave me guidelines to consider regarding operations and strategies in production. Doctor Mirza Charbel at the faculty of Actuarial Sciences at HEC Lausanne who advised me upon investment strategies and cost revenues.

Finally, I must express my profound gratitude to my parents, family, friends and girlfriend for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you.

El Hayek Christopher

Part I – The opportunities of de-industrialization

Part II – Interest in transposing practices to Beirut

Part III – Project formulation and guidelines to consider

Part IV - Business strategy and involved operations

Part V – Expectations

Part I – The opportunities of de-industrialization

The city of Detroit is an interesting case to study when referring to urban manufacturing. Detroit has witnessed the collapse of its industrial sector by outsourcing production where labour is cheaper. The post-industrial landscape of the city is full of derelict buildings and its social situation is critical. There is a high rate of unemployment and social disparities. Yet, small manufacturers are finding it attractive to settling in Detroit given the presence of space, low real estate prices and a savoir-faire in manufacturing. These initiatives are a proven success to bringing manufacturing back to cities with similar concerns

The following part is going to serve as an introduction to the study. It will foster the importance of thinking small and local in manufacturing as a core principle to keep in mind throughout the analysis.

1. Detroit as an urban failure

a) Abandoned building stock

The city of Detroit witnessed a strong economic decline since the post-world war II period. Its economic standing, population and racial composition kept undergoing radical transformations since the first decades after the 1950's. The economic recession in 2008 had a powerful impact on the city, it was the tipping point to a long-suffering economy that became obsolete. At that time, Detroit witnessed its summit of failure and declared chapter 9 bankruptcy by July 2013.

Progressive waves of disinvestment led to massive population movements to the outskirts of Detroit and beyond. The first striking problem is the resulted urban tissue that is in large part decayed and abandoned.

There are an estimated of 78'000 vacant buildings in the city, that are in a state of ruin as a result of age and neglect. In addition, 114'000 parcels are vacant which accounts for 30% of the city's total. A large share of the urban tissue is for the present moment unused, acting as a barrier to development. Many of these forgotten structures served industrial giants. Detroit lost its position as an automotive hub following the second world war, 840 manufacturing plants were closed since then.

Image by Edward Burtynsky

Source: https://www.edwardburtynsky.com/projects/photographs/oil

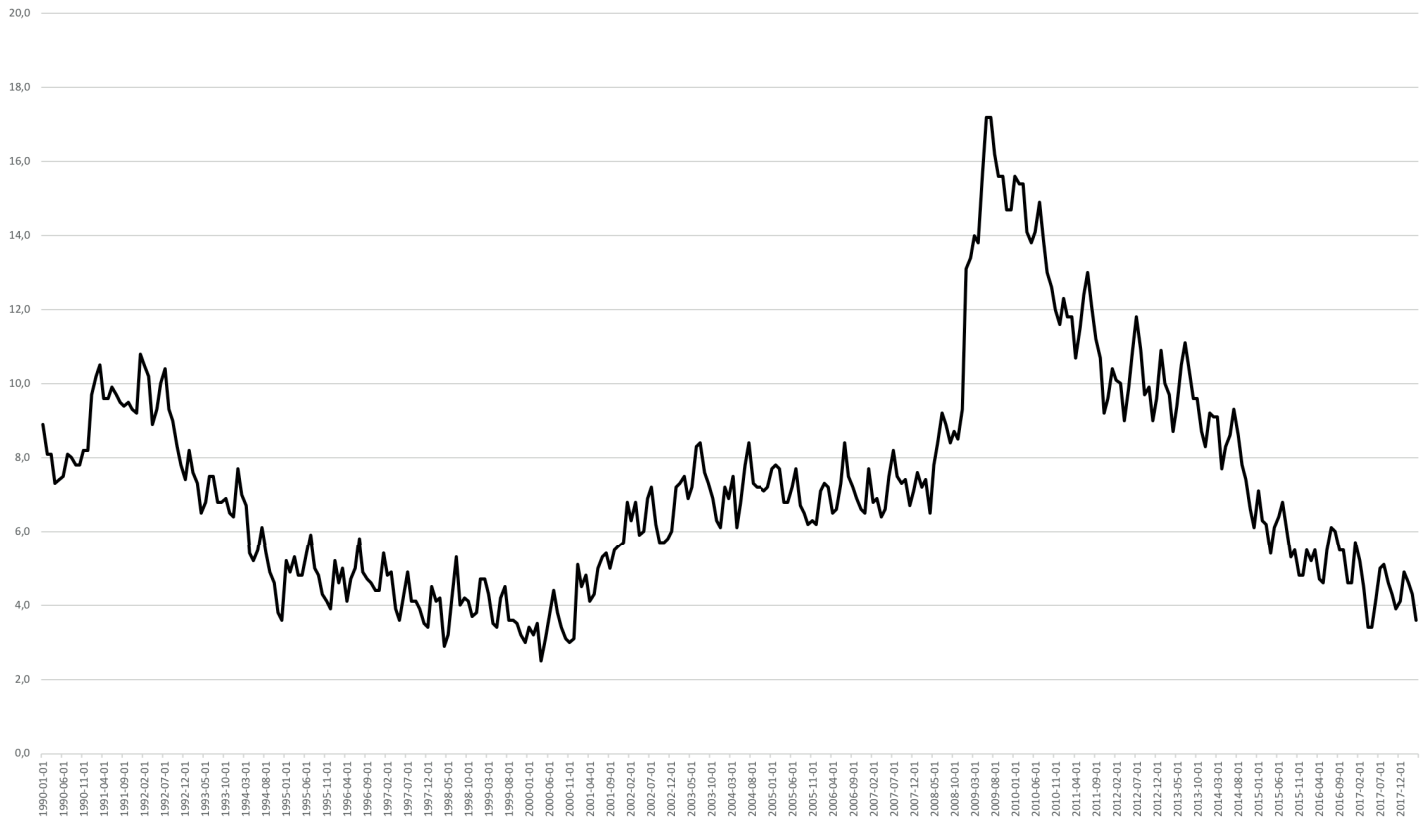
Yet real estate prices in Detroit are much cheaper than elsewhere in the US. Prices have been stable since 2011, whereas other US cities had a strong inflation in their real estate sector since then.

b) Unemployment

Subsequent to the closure of many industrial sites, high number of residents are currently unemployed. Detroit witnessed its highest rate of unemployment by 2009 following the economic recession. The peak registered 17.2%, with a spread of 6.8% compared to the national level.

Job losses are due to the shift of businesses offshore and the decline for the local interest to invest in new operating infrastructures. Given the highly industrialized character of Detroit, the city strongly depended on manufacturing. Jobs in the industrial sector accounted for a very large share of the local economy. Since the end of the Second World War, the city lost more than half of its remaining manufacturing jobs in every 20 year periods. This number dropped roughly from 330'000 in 1947 to 23'000 in 2007 right before the economic recession. Thus, culminating to the bottom level of employment.

Figure 0: Unemployment rate in Detroit (20 years and over)

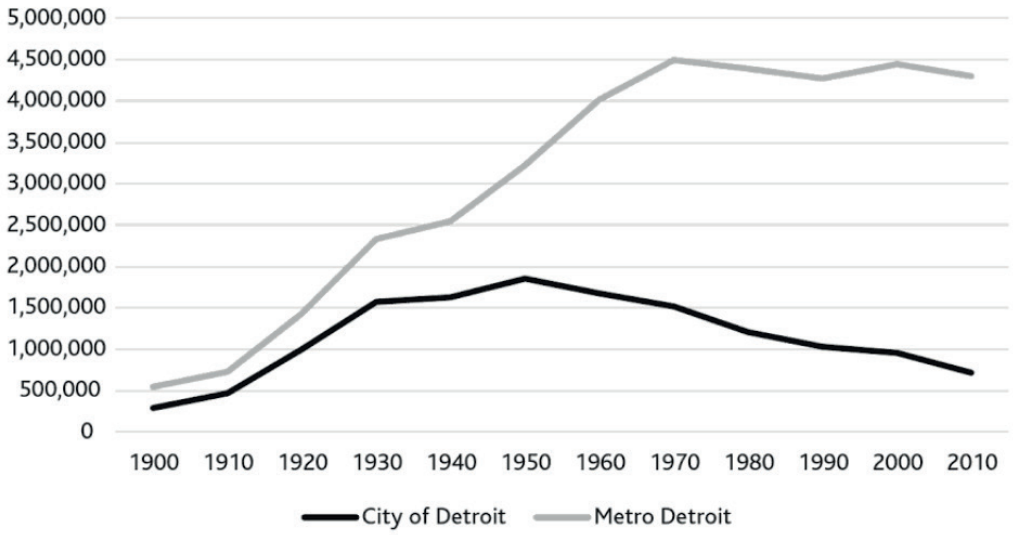


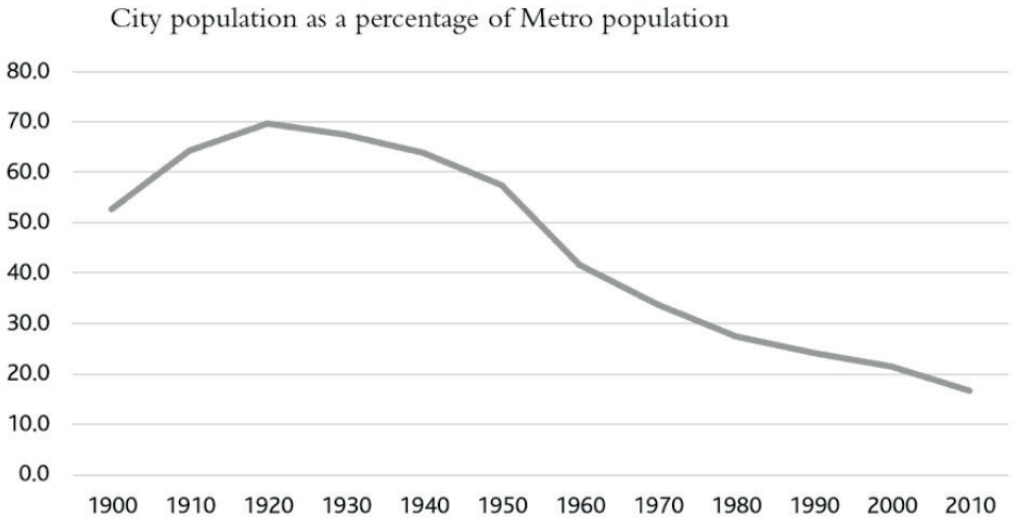
Source: federal reserve economic data, https://fred.stlouisfed.org

c) Social segregation

As a response to jobs decline and housing excess in the suburbs, Detroit city's population was attracted to its outskirts. In 2010, the population in Detroit city is accounted around 710'000, scoring a considerable decline from a peak of 1.86 million in 1950. The city lost over one million residents in less than half a decade. Whereas the two suburban counties bordering Detroit gained a million during that same period. However, the process of suburbanization was mainly driven by middle to high income households. This fact explains the current concentration of poor in the city of Detroit.

Figure 1: City of Detroit and Metro Detroit population, 1900-2010

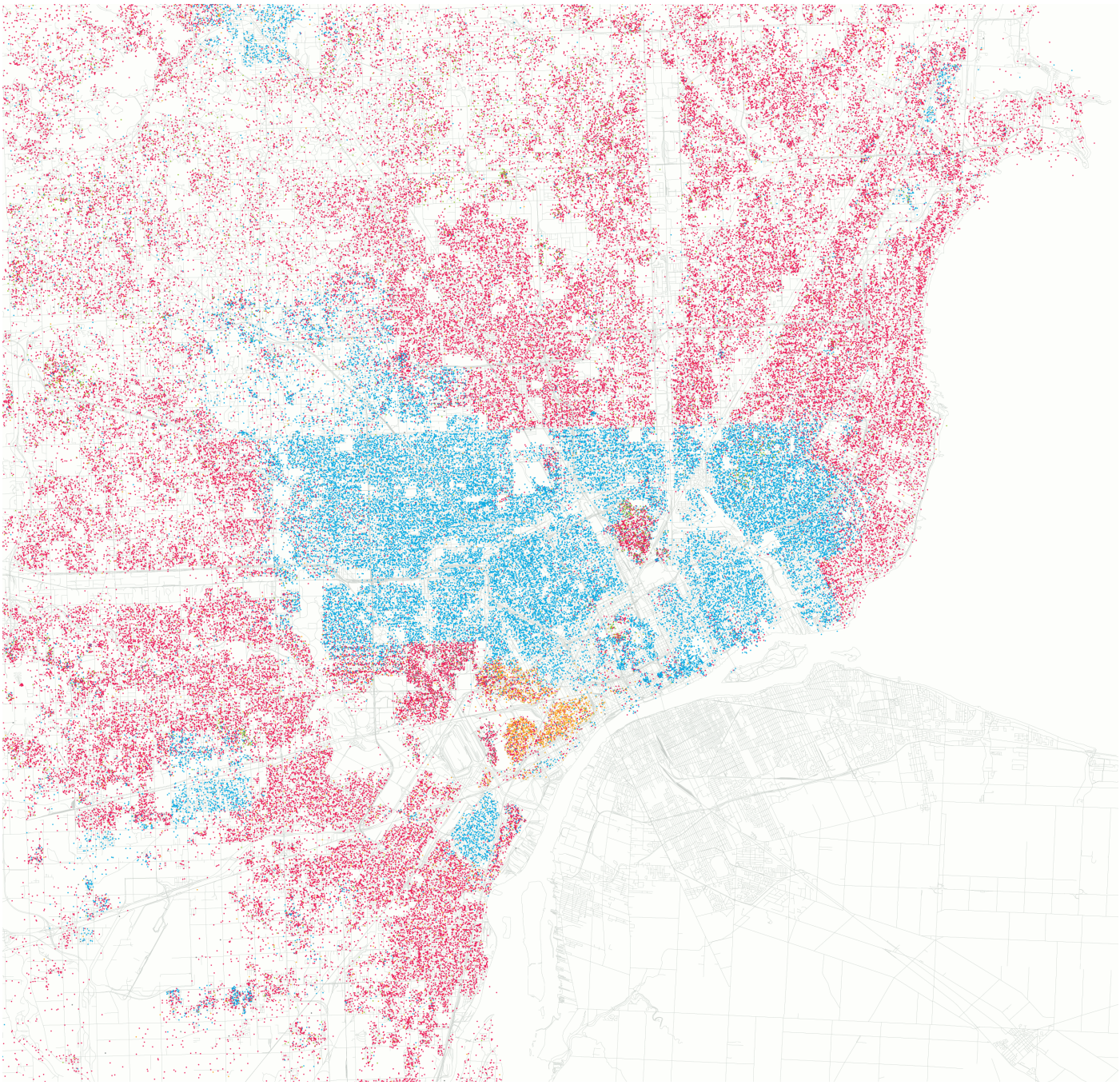




Source: federal reserve economic data, https://fred.stlouisfed.org

Racial changes are also as striking. The city of Detroit, in 1950, was around 84 percent white and 16 percent black. African Americans due to their former lower income stayed in the city, whereas white people immigrated to the outer metropolitan region. In 2010, Detroit accounts 82 percent of African American residents. This strong contrast in race and ethnicity present nowadays is posing severe complications regarding social issues. White entrepreneurs are considered to be taking over the city when investing. Black communities are therefore putting a firm pressure in order to be integrated into new urban reforms.

Figure 2: Racial division in Detroit



Source: Wikimedia commons, https://commons.wikimedia.org/wiki/File:Racial_Divide_Detroit_MI.png

2. Too big: A driver of failure

Detroit witnessed a rapid growth of its economy in the early twentieth century. Heavy industries fuelled this growth, transforming the city into the fourth largest city in the United States. From 1920 till 1950, industries namely in the car manufacturing sector gained incredible success. Nevertheless, the economic system was focused on a few large players shaping the whole market. It follows that the system was very centralized, lacking diversity of investment into other businesses. When manufacturing started shifting towards other industrialized countries in the far east where labour is much cheaper, Detroit underwent strong waves of disinvestment. The lack of interest for automobile manufacturing in Detroit rendered the economy obsolete. It did not have anything else to look forward to.

The following images and cartography illustrates the impact of the manufacturing belt in Detroit and its desolated infrastructure. As seen,industrial developments took place along the railway infrastructures and the river for logistical purposes. Yet the development of these large industries was located outside the boundaries of the city centre of Detroit.

Abandonned factory 1: Ford highland park

Abandonned factory 2: Ford Piquette plant

Abandonned factory 3: Hudson Plant

Abandonned factory 4: Packard plant

Abandonned factory 5: Fisher Body plant

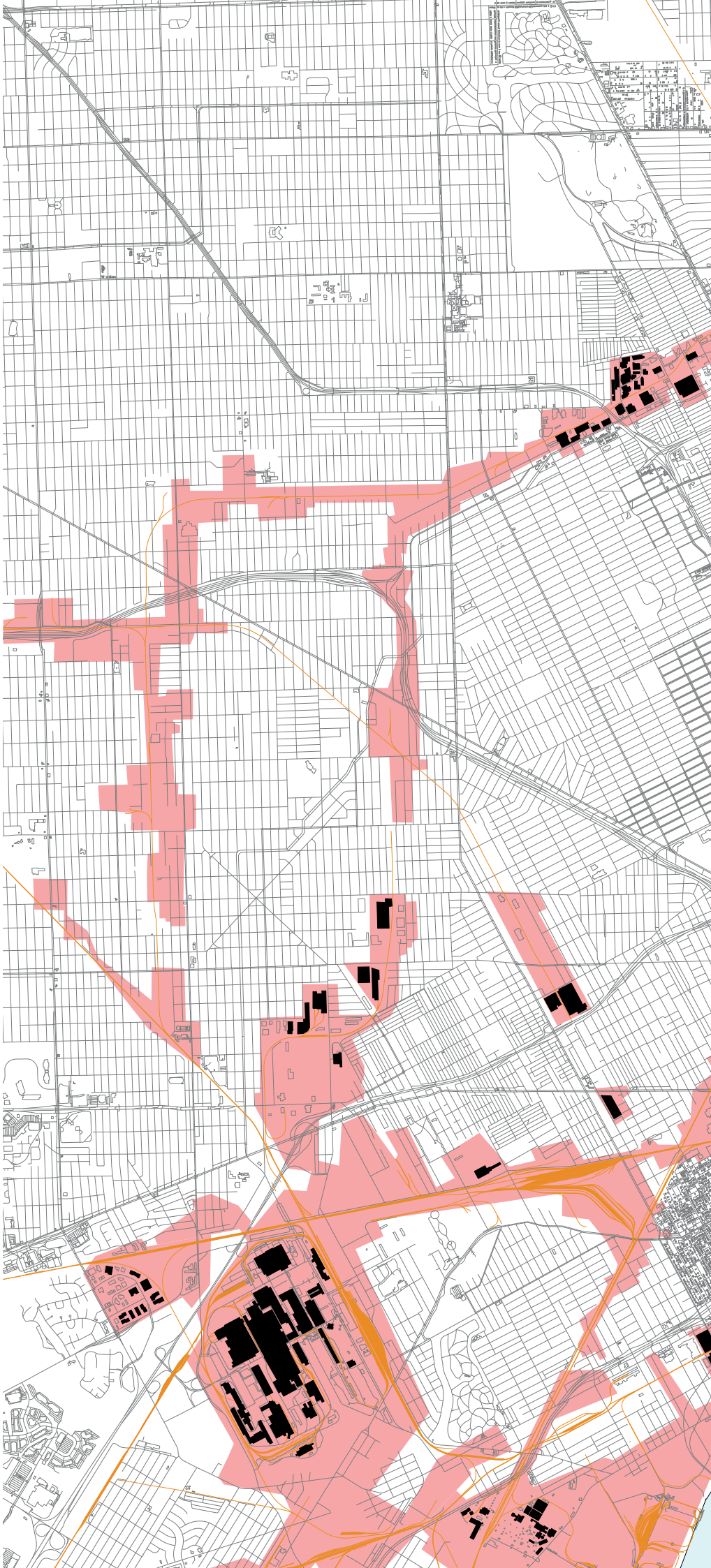
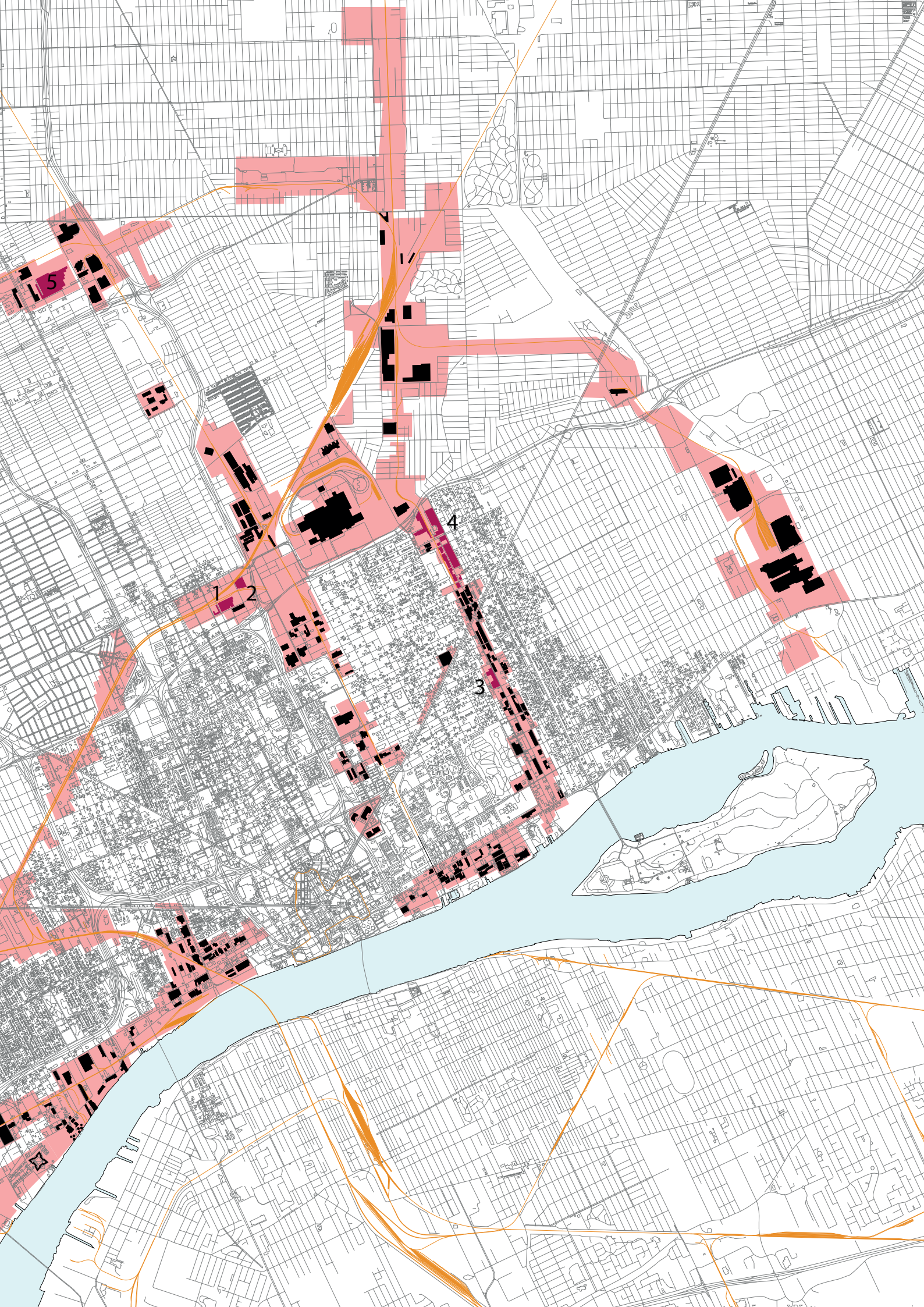


Figure 3:
Detroit’s industrial landscape


1
2
3
4
5

3 Think small: Towards an economic renaissance

Rather seeing the city's struggle as an excuse to shift businesses away, innovative thinkers perceive it as an unprecedented opportunity. Given the availability of open spaces, inexpensive rent and legion of talented workers, Detroit is the perfect city to build and drive fresh business ideas. The city is attracting investors, innovators and young adventurers. Therefore, despite its hard times maintaining economic prosper, Detroit has seen the rise of several young entrepreneurs and small industries in the past few years.

Detroit's decays are now its biggest asset. Small businesses never had the chance to do so much with so little money. The aggregation of small units as part of a city strengthen their whole business ecosystem. These entities are very diverse and vary from a wide range of industries: namely urban farming, restoration, tech enterprises and manufacturing entities. Their collaboration as part of large urban network is proven fortunate. By sourcing local and innovating, new urban dynamics are pushing the boundaries to the current limits of growth. However, the following paper is going to focus on manufacturing start-ups. How are they flourishing in a city that is associated with failure and decline?

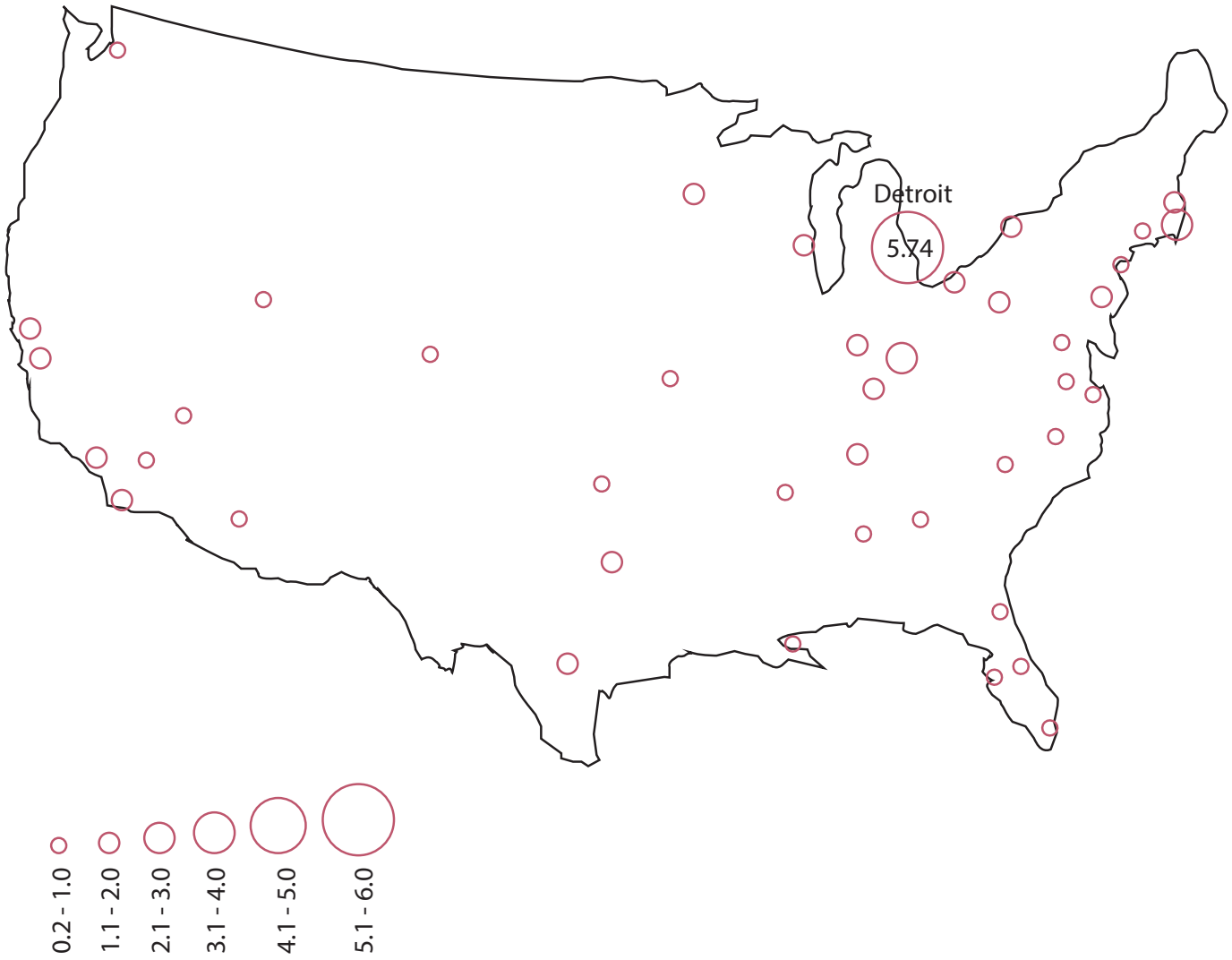
The skilled working hand in Detroit that used to operate in large industries is a key driver. Small manufacturing start-ups find it attractive to operate in a city where skills and demand for employment is present.

Looking at the manufacturing sector in the metro area of Detroit, its number of jobs has significantly risen since the economic crash in 2008. As a matter of fact, 129'000 manufacturing jobs were counted right after the crash, the lowest that Detroit has ever witnessed. Whereas in 2017, this number has significantly risen to 244'000. Therefore, 115'000 positions in the manufacturing sector have been created since then. It is true that the automotive industry in Detroit has also witnessed an important economic renaissance during that same time; it follows that many of those jobs are due to its recovery. Our concern with the automotive industry is its large operating scale. In order to focus on smaller industries; we should subtract the number of jobs in the automotive sector. Given that jobs in the automotive industry have risen from 100'000 in 2009 to 115'000 in 2017, 15'000 jobs have been created since the recession. It follows that the remaining 100'000 jobs are associated with smaller operating industries in Detroit. Hence, small to medium manufacturing enterprises account to the creation of a very large number of new job positions.

Taking that into account, Detroit has the highest number of commercial and industrial designers in the United States. Considering data provided by the "labour market data" and research firm "Emsi"; designers in the city of Detroit grew at a ratio of 29% between 2009 and 2013. It follows that unemployment has gradually been decreasing since the recession due to the entrepreneurial spirit

of small companies supporting local workers and designers.

Figure 4: Location quotient of commercial and industrial designers in the US



An additional driver to manufacturing entrants in Detroit is its easy access to financing, available spaces and the cheapness of rent.

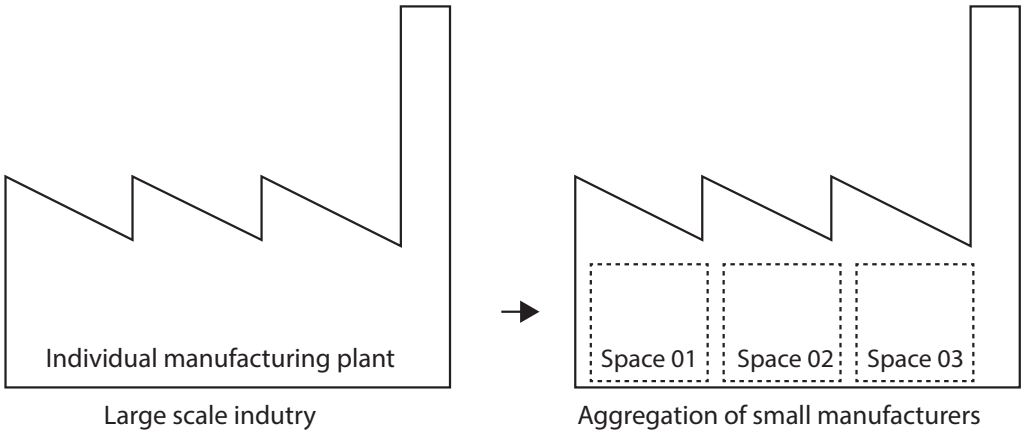
As discussed before, the Motor City is filled with ruins and empty buildings that act for the present moment as barriers in a city which is in thirst of development. Giving a new life to those spaces is therefore a key entrepreneurship strength. Detroit is the perfect example showing how cities can connect old assets to new innovation practices.

The city is undergoing a creative revival. Present ruins in Detroit, are in large part an important architectural heritage, with some of the finest Art Deco buildings and many spacious industrial buildings. Nowadays, young entrepreneurs are attracted to repurpose such spaces, attracted by both their reasonable cost and striking beauty.

First of all, these spaces are much cheaper than any other alternative to kick-start a business and their former industrial function is an added value. Young entrepreneurs are settling into old industrial entities, large enough to house enormous machines and long production chains. Whereas emerging technologies scaled down the impact of heavy industries, machines became much smaller and smarter. The need for large production spaces is less present. Entrepreneurs are interested in investing into smaller operating units. Sharing large industrial spaces is a common solution for Detroiters. It pushes designers and workers to aggregate under a common roof, thus bolstering collaboration between different practices.

For instance, the Ponyride Centre, housed in a former car manufacture, offers versatile spaces that can host entire manufacturing operations to individual workshops. It is a perfect example showing how abandoned industrial plants in Detroit are being rehabilitated in order to offer spaces for small manufacturer.

Figure 5: Former and new trends for manufacturing in Detroit



Images by Ponyride

Source: https://www.ponyride.org/

Secondly, giving life to former concrete barriers enhances fluidity in a city. Manufactures in general, namely heavy industries, act as segregated monolith volumes. Whereas new manufactures in Detroit are much more transparent and connected to the urban fabric. Let us note that most of these new manufacturing entrants are located at the boundaries of Detroit city centre. This shows their need to connect with the energy flow within a city while enjoying cheaper rent prices compared to the centre characterized with higher prices.

In sum, small is bountiful. By thinking and acting small, Detroit has witnessed the rise of several manufacturing start-ups that beheaded the economic renaissance. Although representing a tiny share of the global economy as individual entities, their aggregation has proven to be fortunate. Unemployment has significantly decreased and the urban fabric is slowly reviving. Referring to Anthony Hatinger, a Detroit citizen, “It’s incredible to hear some of the stories of people who’ve continued to try to make it work. The heart is so present here. This is the place to be. There’s tremendous need, and tremendous opportunity, in land, in structures, and in spirits—a lot of opportunity to transform.” (National Geographic, “Taking back Detroit”)

Sources

Bureau of Labor Statistics Data. State and Area Employment, Hours, and Earnings. 2017,
https://data.bls.gov/timeseries/SMU26198203000000001?data_tool=XGtable.

Colt, Sam. 13 Inspiring Young Entrepreneurs Are Rebuilding the City of Detroit. 2014,
https://mic.com/articles/81449/13-inspiring-young-entrepreneurs-are-rebuilding-the-city-of-detroit#.HuQRsxFgv.

“Defining Blight in Detroit.” The New York Times, 27 May 2014. NYTimes.com,
https://www.nytimes.com/interactive/2014/05/27/us/Defining-Blight-in-Detroit.html.

“Demographic History of Detroit.” Wikipedia, 6 Dec. 2017. Wikipedia,
https://en.wikipedia.org/w/index.php?title=Demographic_history_of_Detroit&oldid=814100971.

Detroit Area Economic Summary.
https://www.bls.gov/regions/midwest/summary/blssummary_detroit.pdf. Accessed 26 Dec. 2017.

Detroit Area Employment - June 2017.
https://www.bls.gov/regions/midwest/news-release/2017/pdf/areaemployment_detroit_20170731.pdf. Accessed 26 Dec. 2017.

Doucet, Brian, editor. Why Detroit Matters: Decline, Renewal and Hope in a Divided City. 1st ed., Policy Press at the University of Bristol, 2017. JSTOR,
http://www.jstor.org/stable/j.ctt1t896c9.

EMSI. Automotive Manufacturing Jobs Graph.
http://media.mlive.com/news/detroit_impact/photo/automotive-graphjpg-feb444a8bde309f1.jpg. Accessed 26 Dec. 2017.

Kinder, Kimberley. DIY Detroit, Making Do in a City without Services.

Kinkead, Dan. Why Detroit Matters, Part 3: Made in Detroit: Detroit’s New Industrial Economy.
http://www.smithgroupjjrblog.com/why-detroit-matters-part-3-made-in-detroit-detroits-new-industrial-economy/. Accessed 26 Dec. 2017.

Klonsky, Evan. “5 Reasons to Start a Business in Detroit.” Inc.Com,
https://www.inc.com/guides/2010/10/5-reasons-to-start-a-business-in-detroit.html. Accessed 26 Dec. 2017.

Marchand, Yves, and Romain Meffre. The Ruins of Detroit.

National Research Council. Unit Manufacturing Processes: Issues and Opportunities in Research.
www.nap.edu, doi:10.17226/4827. Accessed 26 Dec. 2017.

Parilla, Rachel Barker and Joseph. “Detroit’s Big Bet on Small Business.” Brookings, 23 May 2017,
https://www.brookings.edu/blog/the-avenue/2017/05/23/detroits-big-bet-on-small-business/.

Pizzo, Laura. “Beyond Bankruptcy: How the Detroit Economy Has Recovered.” Emsi, 28 July 2015,
http://www.economicmodeling.com/2015/07/28/beyond-bankruptcy-how-detroit-has-used-data-to-encourage-opportunity-investment-and-a-resurgence-of-its-auto-industry/.

Reese, Laura. Is Detroit Really Experiencing a Full Recovery? 19 Feb. 2017,
https://www.citylab.com/equity/2017/02/detroits-recovery-the-lass-is-half-full-at-most/517194/.

Reuters, Thomson. “Small Manufacturers Bet on Detroit Brand Despite Bankruptcy.” Business of Fashion, 2013,
https://www.businessoffashion.com/articles/news-analysis/small-manufacturers-bet-on-detroit-brand-despite-bankruptcy.

Serbinski, Ted. “Why I Love the Detroit Startup Scene.” Crain’s Detroit Business,
http://www.crainsdetroit.com/article/20170811/blog111/636106/why-i-love-the-detroit-startup-scene. Accessed 26 Dec. 2017.

State of the Region 2014.
http://www.detroitchamber.com/wp-content/uploads/2014/12/StateoftheRegion_FINAL.pdf. Accessed 26 Dec. 2017.

Part II – Interests in transposing practices to Beirut

Following the success of small scale manufacturing entities in Detroit, the interest of the study lies in its applicability elsewhere. The city of Beirut, namely its eastern suburb, is chosen in response to similar concerns with Detroit. Both share a high rate of unemployment, social disparities and abandoned building stock. Besides, the choice of Beirut arises from personal motivations and knowledge regarding its geographical presence.

The following part will therefore underline the reasons to conceive a small scale production facility in Beirut. Implementing a factory in the city shall seek to value present resources and respond to concerns.

1 Area description

Growing up in Beirut, I developed a particular interest to reviving craft practices that are disappearing in the region with the rise of industrial powers. In other words, engage local craftsmen and promote job opportunities as a response to unemployment. On the other hand, the presence of desolated architectural heritage has always been a topic that I strive to defend and value. These two issues remind me very much of Detroit. I therefore believe that Beirut can follow similar venture strategies.

Precisely, the eastern suburb of Beirut is alluring to study given its poor social standards and background in manufacturing. The area is segmented into three different regions: Karantina, Bourj Hammoud and Rmeil which is still considered part of Beirut residential fabric.

The area of Karantina was home to industrial developments since the early 20th century. However, many factories are closed or have been destroyed due to the shift of production offshore. Current facilities include heavy industries for metal manufacturing, waste dump and garbage treatment, firefighter station and a slaughterhouse. These industries are highly criticized for their ethical standards and may not be durable to collaborate with. On the long run, new manufactures will hopefully relocate there. The project should strive to open the way for new industrial developments and illustrate the proper lessons for manufacturing in the city. The area's proximity to the port, available spaces, cheap land value and flat topography is a potential for new manufacturing settlements.

The adjacent district of Bourj Hammoud, on the contrary, is a saturated residential area suffering from poor social standards. This region is known for its savoir faire in craftsmanship, namely in textile manufacturing. Unfortunately, the number workshops in the area have been declining and unemployment is on the rise. Labor supply is therefore present.

Both districts are in close contact with the residential fabric of Beirut benefiting from wealthier standards. Public functions such as restauration, shopping and religious monuments are gathered along mar Mikhael road.

The nod between these three urban entities is a perfect fit for conceiving a manufacture. At a first glance we can already define the following assets for manufacturing: Space, labor and consumers.


De-industrialized landscape
Consumers
Crafts and wokshops

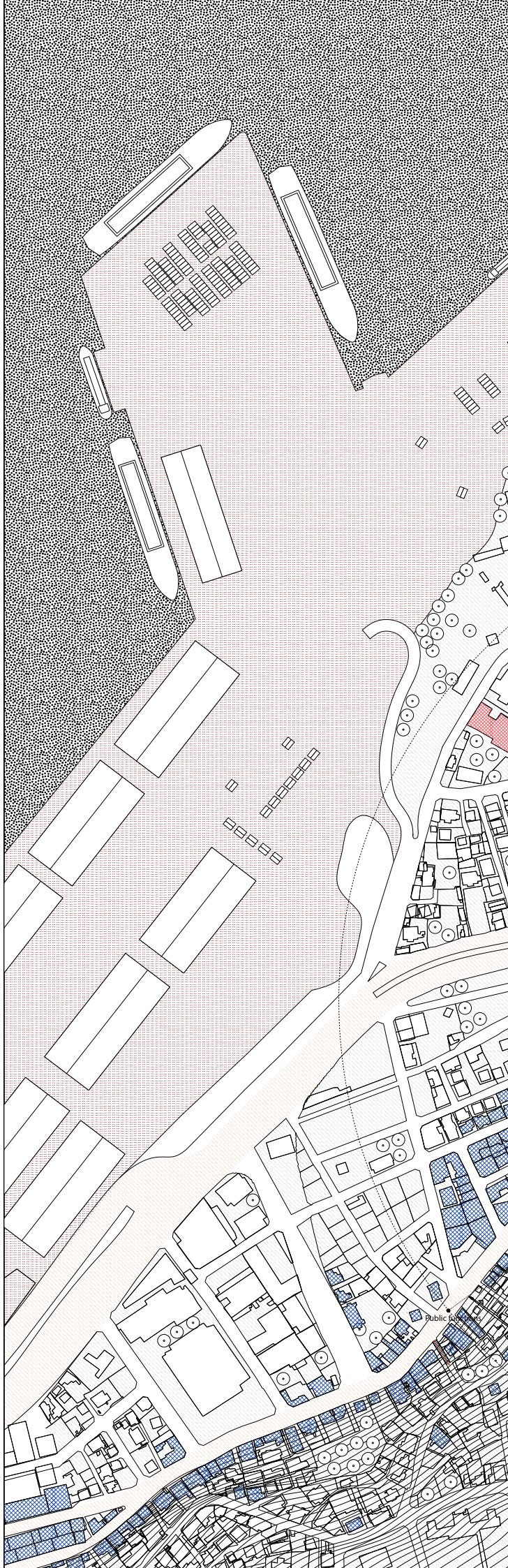


Figure 6: Area segmentation

Port infrastructure

Connecting roads to city center

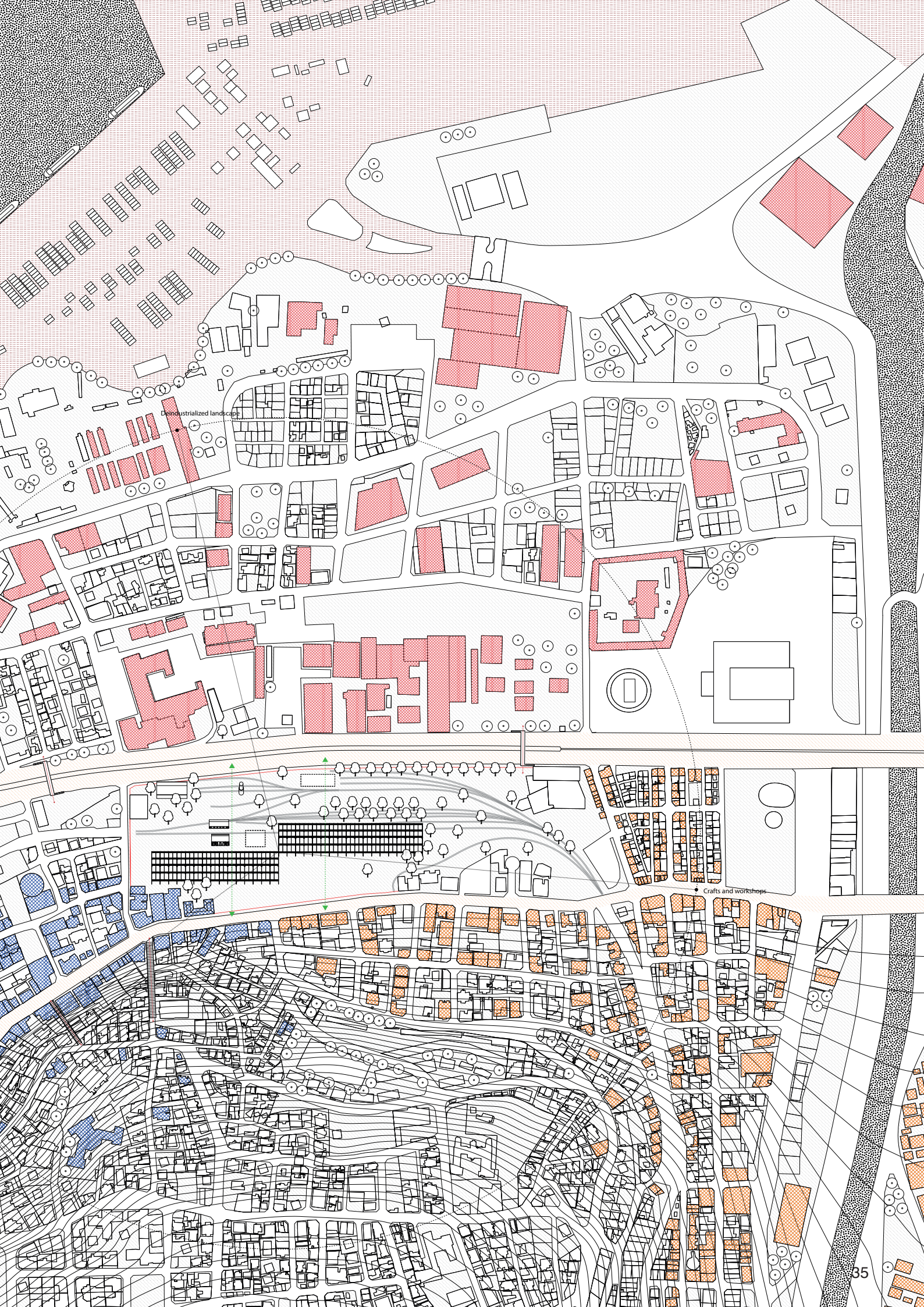
Crafts and workshops

Public activities

Industry

Pedestrian connections

Connections to promote


Deindustrialized landscape
Crafts and workshops

2. Expressing concerns

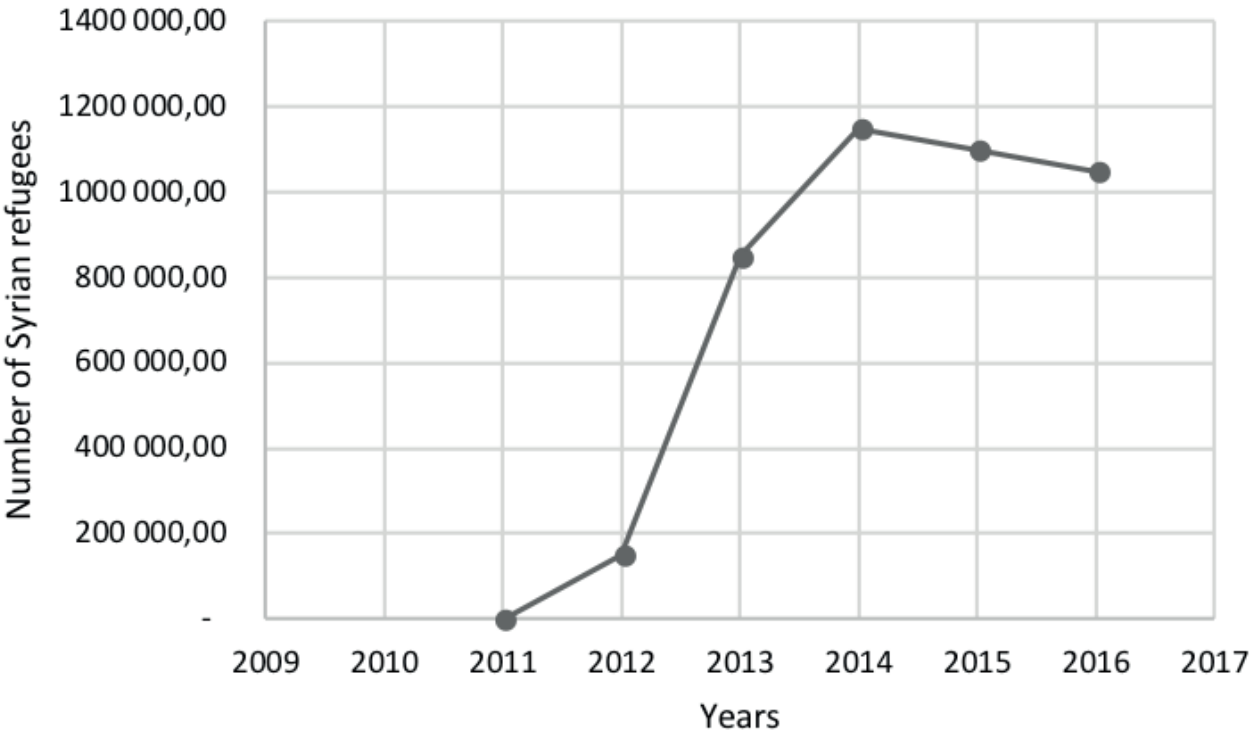
Beirut has been an attraction hub for many Lebanese residents and neighboring countries' citizens. Around 1.9 Mio citizens are currently registered in Metro Beirut, 360'000 of which live in the city itself. Its eastern suburbs are problematic due to lower living standards. The region suffering the most is Bourj Hammoud, it is located right outside the administrative boundaries of Beirut. This neighborhood witnessed important demographic changes in the past few decades. Taking that into consideration, its urbanization led to the following complications:

a) Identity segregation

The city of Beirut is diverse in its population. The city center is alluring for the establishment wealthy residents and investors. However, its outskirts are quite problematic due to low and poorer living standards.

Bourj Hammoud developed since the 1930's from an empty agricultural land with some farmhouses to a densely built up residential area accommodating low income population. It has been the hub to many refugee's arrival during the past century. First, Armenians fleeing the genocide from their home country built camps in 1915. In 1980 and 2006 Israeli invasions displaced Lebanese residents from the south of the country to Bourj Hammoud. From 2011, the neighborhood witnessed a dramatic demographic increase with the arrival of Syrian residents seeking refuge from the war.

Figure 7: Syrian refugee influx to Lebanon, a recent crisis.

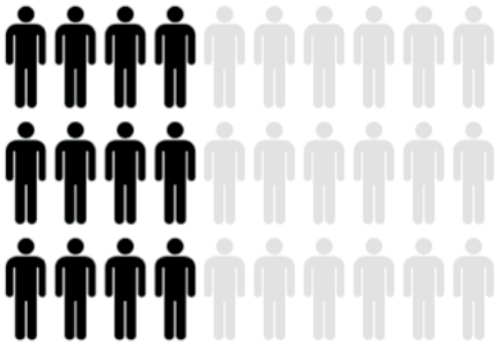


Source: UNESCO Education Response to the Syria Crisis, 2016

Official figures show that the total population in Bourj Hammoud sums to 93’881. 75’866 residents are Lebanese [1] – mainly from Armenian origins. The rest of Bourj Hammoud population are immigrants. Syrian refugees account for the majority and represent an official share of 17’927 [2]. Other migrants, such as Palestinian refugees along smaller minority of Iraqi refugees and foreign migrant workers from African and Asian countries, account for 11’938 [3]. Yet, based on satellite image analysis of the cadastre’s built-up area, the total local population can be estimated at 104,873 residents [4]. The difference in numbers is due to the non-registered residents that are of Syrian nationality, having arrived after the 2011 influx. It follows that Syrian refugees represent a total of 28’919. In terms of proportions, Non-Lebanese residents in Bourj Hammoud add up to a total share of 38%.

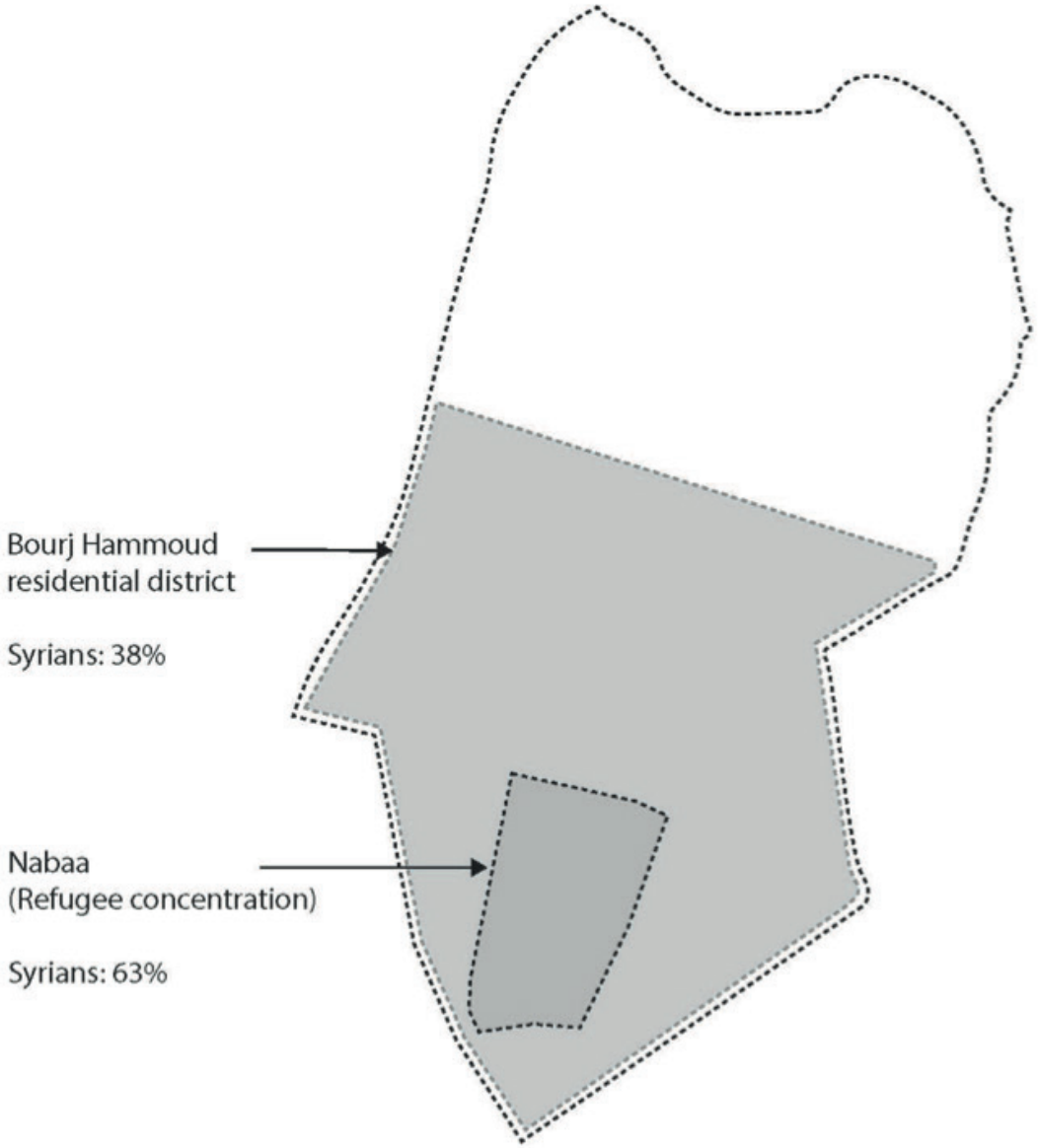
Cohorts	**Official figures**	**UN-Habitat extrapolation**
Lebanese	75’866	-
Syrians	17’927	-
Palestinians & others	11’938-	-
Total	93’881	**104’873**

Figure 8: Proportion of Syrian refugees to Lebanese residents in Bourj Hammoud.



Unfortunately, such an urban mix in ethnicities and race leads to social segregations. Refugees tend to gather in clusters. It follows that very little social cohesion is established between Lebanese residents and refugees. For instance, the Nabaa neighbourhood located in the cadastre of Bourj Hammoud presents important Syrian gatherings. The total residents in Nabaa account for 14’760, out of whom 33% are Lebanese and 63% from Syrian belongings. A clear difference in the share of Syrian residents is observed compared to the area average of 38%. [4]

Figure 9: Bourj Hammoud social segregation



Social segregation leads to poor social stability due to present tensions between cultures. A feeling of insecurity is noted among the residents as crimes and problems are increasing; affecting the business eco-system in return. Alcohol and drug addiction among youth is on the rise – 1 over 5 children reported to suffer from drug addiction [5].

b) Unemployment

The area of Bourj Hammoud was known for its craftsmanship. Due to its flat landscape and proximity to the port, Armenians refugees have developed a network of workshops for craftsmanship to sustain their livelihood. Gradually transforming an agricultural land towards an industrial settlement for local artisans.

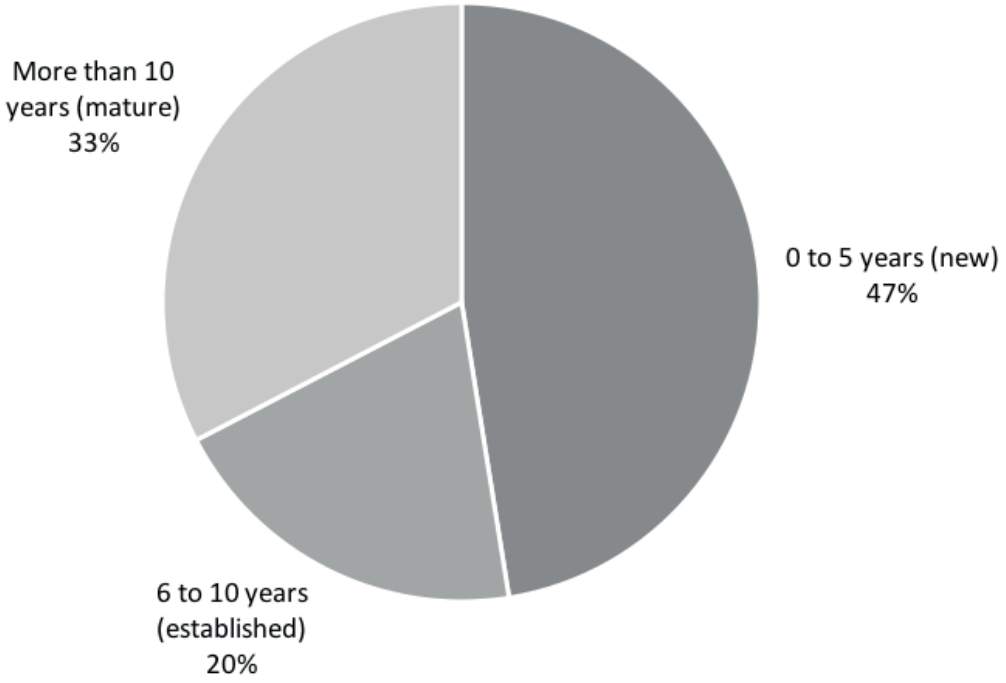
Unfortunately, as a result of cheaper production offshore, an evident decline of local artisans is witnessed nowadays. An estimation of 40% of crafts have closed down in Bourj Hammoud since the 1990's [5].

Currently, workshops account for 17% of commercial premises. Whereas shops account for 83% of economic activities in the neighbourhood. Shops include: food and groceries (30%) boutiques (17%), beauty salons (11%), hardware-furniture and storage (13%) and restaurants and cafes (6%).

Shops	**83%**	**Workshops**	**17%**
Food and groceries	30%	Carpenter	22%
Boutiques	17%	Electronic repair	13%
Beauty salons	11%	Mechanic	30%
Electronics and phones	15%	Metal works	6%
Hardware-furniture and storage	13%	Tailor	23%
Restaurants and cafés	6%	Miscellaneous	6%
Miscellaneous	9%		
Total	100%		100%

Alas, shops are not opportunity oriented, they have been established due to primary needs. Residents having limited education to sustain business development find it easy opening small markets and selling products due to the low rental prices. Nevertheless, such businesses are not durable and do not favour viable job creation. All of the shops are micro sized – 10 employees or fewer. They are often limited to 1 or 2 employees with very low payments, 98$ on average per month. 47% of business are new and have been established within the last five years. It turns out that it is an observed pattern showing high turnover of businesses in the neighbourhood. Few are able to sustain economic growth and reach maturity. [6]

Figure 10: Business maturity in Bourj Hammoud



It follows that the unemployment rate has been shooting higher in the past decades. In 1995 unemployment in Bourj Hammoud is at 10.2% and has reached 30% by 2016. Current unemployment rate is highly superior to the regional average of Beirut that is at 13.1%. [7]

In addition, there is a high rate of school dropout specifically among Syrian children. It is mainly due to lack of vacancies in school, lack of educational awareness and scarcity of financial resources. Only 5% of Syrian attend formal secondary school. Most refugees go to public schools. There are 985 students schooled in public schools. However, public schools offer very low-quality education and limited vacancy. [8]

Education and employment are highly correlated. Low skilled workers on the market, when not promoted and guided properly, find it hard obtaining a durable job. Moreover, since foreigners labor dominates low skilled (less productive) activities, high GDP growth rates have not translated into significant job creation for the Lebanese. In fact, the long-run employment-growth elasticity is estimated to be 0.2 as reported by the world bank, much lower than an estimated MENA (Middle East and North Africa) average of 0.5.

c) Public area scarcity

Urbanization and mass population movements have rendered the area contrasted in its building supply: Heavily saturated in residential areas yet desolated in zje region of Karantina.

The main road of Charles Helou, marks a clear separation between residential and industrial settlements.

The south area is crowded with habitation. Due to the shortage of public spaces in residential areas, citizens are not encouraged to meet. Cultural segregation is heavily pronounced in Bourj Hammoud, alas buildings occupy the totality of the urban tissue. Young men end up strolling in the street, creating insecurity among visitors.

The north of the road is contrasting with the presence of heavy industries separated by large abandoned land. It is house for many industrial infrastructures that repel the public.

However, the band surrounding the road is rather commercial with light industries and acts as a tampon between both areas. It is at the forefront of urban settlements. It is an urban hub attracting many public functions such as restaurants, bars, religious buidings etc. Yet, some spots are still abandoned and act as a barrier in the city. Urban developments should therefore strive to revive such spaces and make them accessible for public usage.

Figure 11: Public space interruption in the area of Mar Mikhael (The case of the former train station site).


المحفل الأكبر للنجوم الثلاث
GRAND
LODGE OF THREE STARS

Example of an old brewing factory destroyed recently in Mar Mikhael.

d) Endangered heritage at the cost of real estate greediness

Architectural concern

The city of Beirut has suffered from nameless many conflicts in the past years. The civil war that spanned from 1975 to 1990 had a huge impact on the city's infrastructure. Bullets, missiles and bombings rendered buildings obsolete due to their critical positioning in the war scene. A large part of building stock has been left abandoned throughout the years.

Nevertheless, these buildings have remained in Beirut's collective memory. Most of them are a heritage from an old architecture prowess that was deeply rooted in the country's culture. In addition, blighted buildings are witnesses to conflicts that the society underwent. Building scars are therefore acting as reminders to sufferings that should be at any price avoided.

Sadly, many investors are finding it easier to demolishing abandoned infrastructures in order to rebuild new ones. Promoters find it more attractive making profits on the short term through real estate sales rather than thinking onto long term profits. It follows that new buildings are popping up like wildflowers, without any concern to heritage, and are sold for housing purposes: the city's heritage is endangered.

Importance of alternative investments

The real estate market in Lebanon is currently saturated, the supply is much higher than the present demand. Many new apartments are left unsold. It is therefore important to think new alternatives of investment. Manufacturing can be a viable solution to the problem. In fact, effective investment in industry and manufacturing has a potential for higher that average returns due to low starting levels. Banks do support for instance manufacturing investments at a much lower interest rate, compared to real estate loans.

Figure 12: Value added for the Lebanese industrial sector as a percentage of nominal GDP

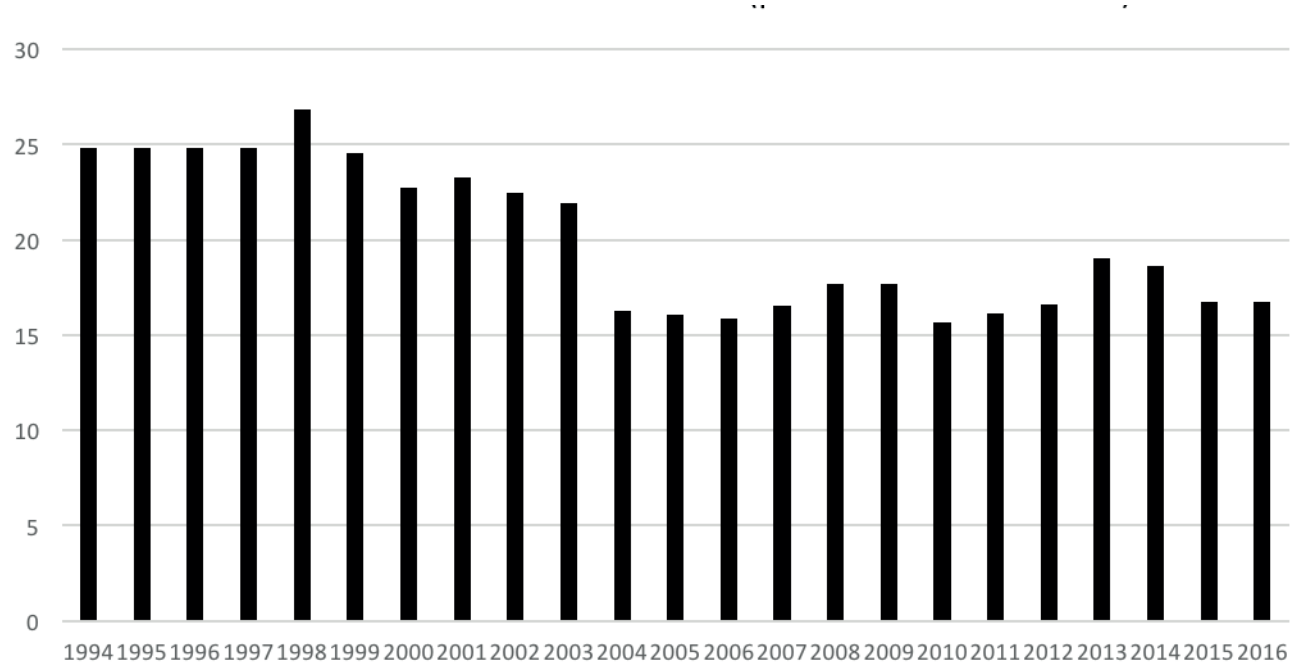
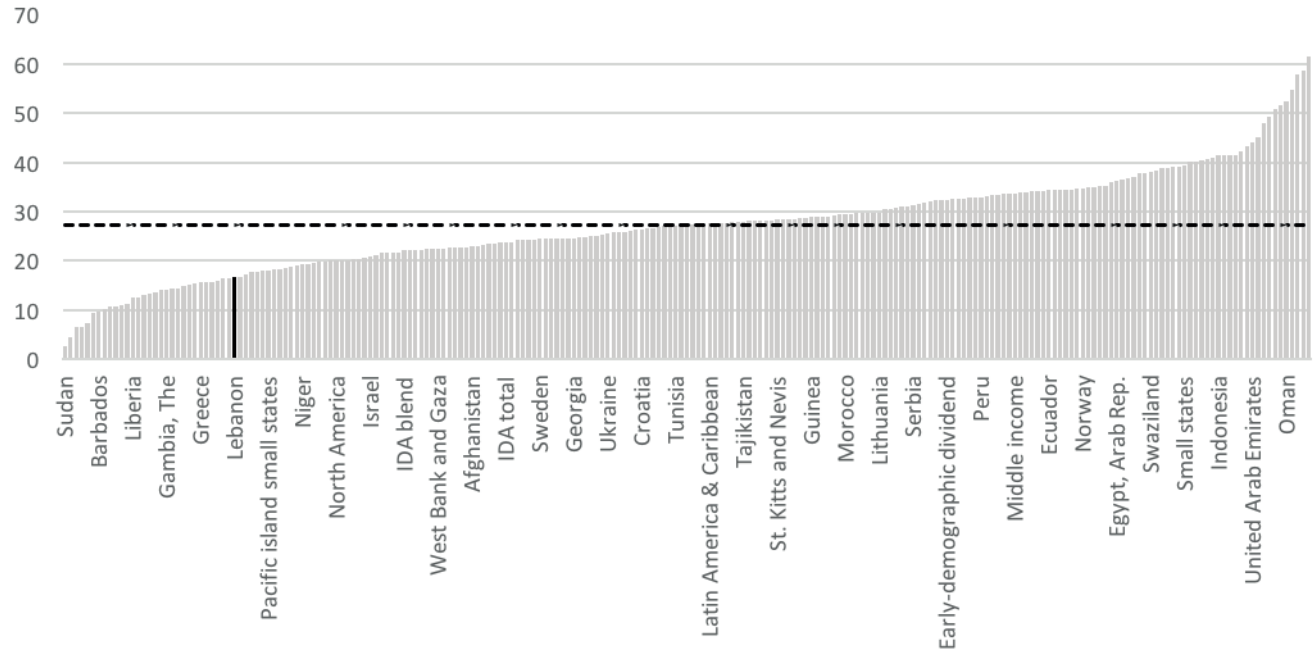
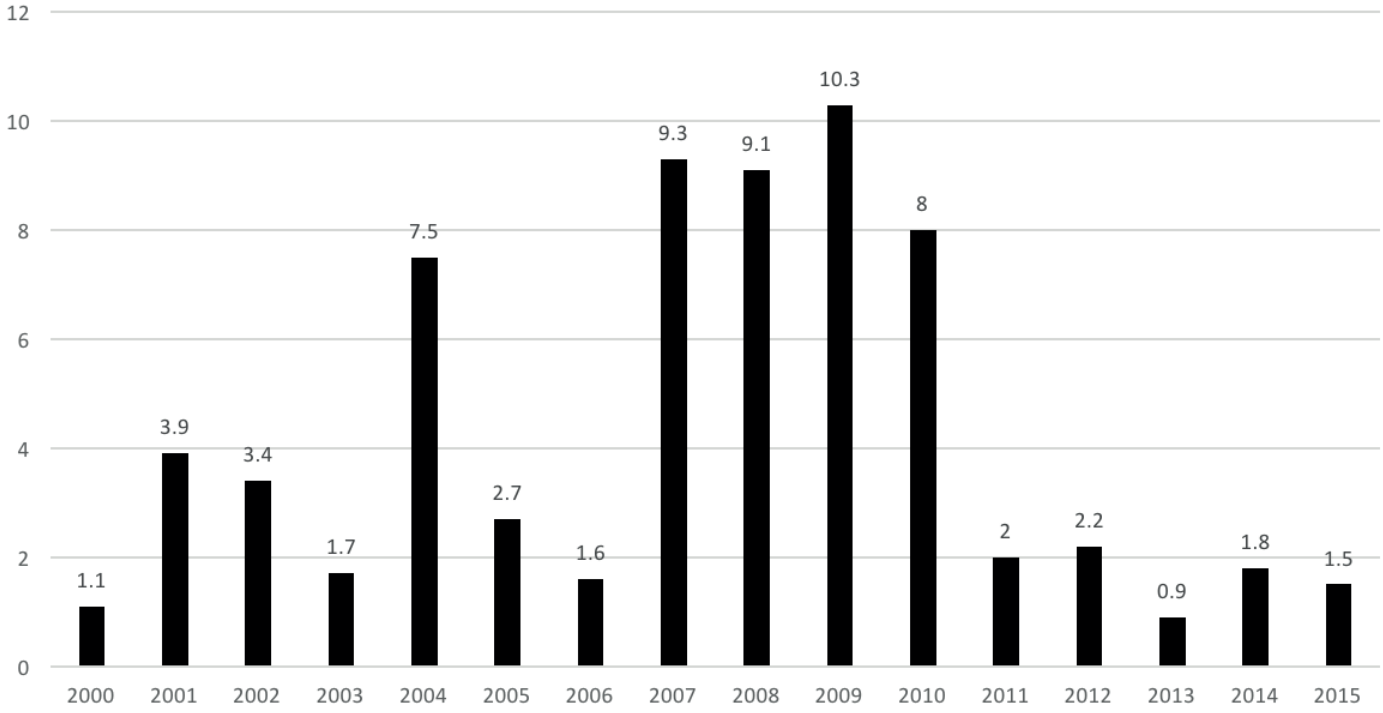


Figure 13: Comparison of the Lebanese industrial sector to other economies.



As seen in the following figures, the Lebanese industrial sector is way behind other countries, accounting for an added value of 18% percent to the nominal GDP compared to the world average of 28%. Such numbers translate into a poorer performing economy. As a matter of fact, the Lebanese economy relies mainly onto the real estate sector. Unfortunately, real estate is much more correlated to the political stability of the country compared to manufacturing. Given the political instability of the region, these observations translate into rather a volatile GDP growth in the country.

Figure 14: Volatility of GDP growth in Lebanon (in %)



Taking that into account, supporting the manufacturing sector will promote a stable GDP growth.

Furthermore, implementing manufacturing in blighted infrastructures will give them a new purpose for their existence in the city. Such an initiative can help save the endangered heritage. Contrary to housing, manufacturing units do not necessitate makeup interventions; buildings can be preserved in their raw form.

3. Identifying present resources

The eastern boundaries of Beirut have nevertheless important resources for manufacturing to strive. Its industrial background and demographic conditions are crucial drivers. Let us examine the resources that should be valued before formulating the project.

a) Human capital

Manufacturing can attract three separate groups of human capital:

- An industrial workforce that is not necessarily educated yet needs to undergo basic formation to operate within production guidelines.

- An industrial workforce with high crafting skills for task specific labor.

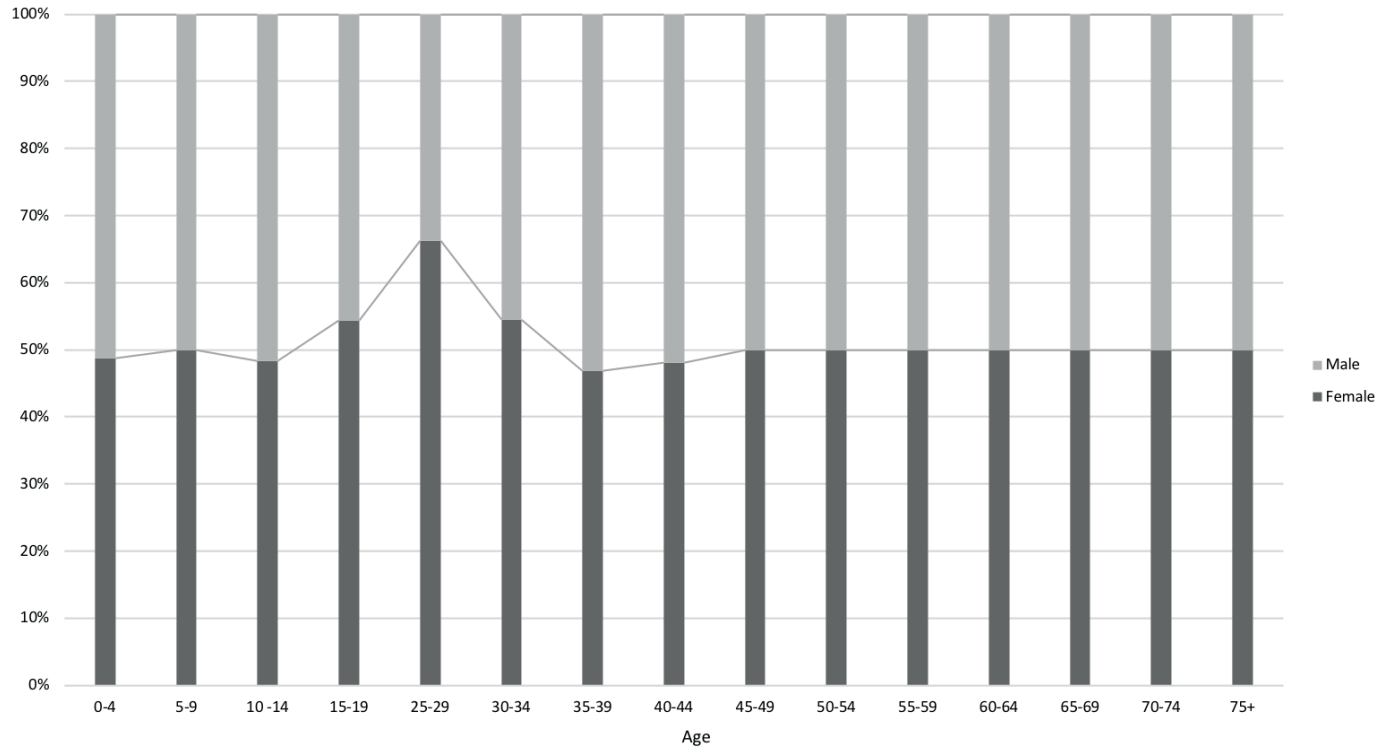
- Qualified workers to fulfil design, R&D and marketing positions.

Industrial workforce analysis:

Following the challenges that were identified, the region of Bourj Hammoud creates an incredible opportunity to fulfill positions for the industrial workforce among unemployed Lebanese and refugees. In addition, the craftsmanship background of the neighborhood brings an added value to the considered business.

The population pyramid of Syrian refugees in Lebanon shows that the bigger majority of youth in their working age (15-35 years) are women. As mentioned earlier, a critical share of Syrian refugees is unemployed. These numbers are even higher among Syrian women that constitute the majority. It follows that majority of women and girls have limited access to the job market in a context of space appropriated by males. Henceforward, manufacturing shall strive to value job opportunities that empowers women due to their major presence among society. Fostering gender equalities will help promote better social standings.

Figure 15: Percentage of female to male among Syrian refugees



Furthermore, the important presence of youth and children among Syrian refugees is a priority to value. They represent an upcoming generation of workers and should therefore be trained and educated to become a vital resource. Given that the access to public schools in the region is limited, the project should envision workshop spaces to form future generations specializing into manufacturing.

Nevertheless, Syrian refugees are not the only resource to cultivate. Lebanese residents in the surroundings are also in need for employment regarding manufacturing tasks. Many have developed a strong background in craftsmanship due to the artisanal identity of the district. They represent for instance a high valued workforce in manufacturing.

As seen in the previous part, tailoring is among the practices involved in small workshops in the area. However, about 20 years from now, it was the core of craftsmanship production in the region. It follows that older generations still have strong crafting skills in tailoring.
Tailors in Bourj Hammoud are still considered masters in their field. However, there is no proper infrastructure to help them sustain production.

Narsis, depicted in the picture above, is one of the few tailors with a standing business. He says to suffer from poor social stability in the region and lack of provided infrastructure, alike many of his fellow colleagues whom already closed their businesses.

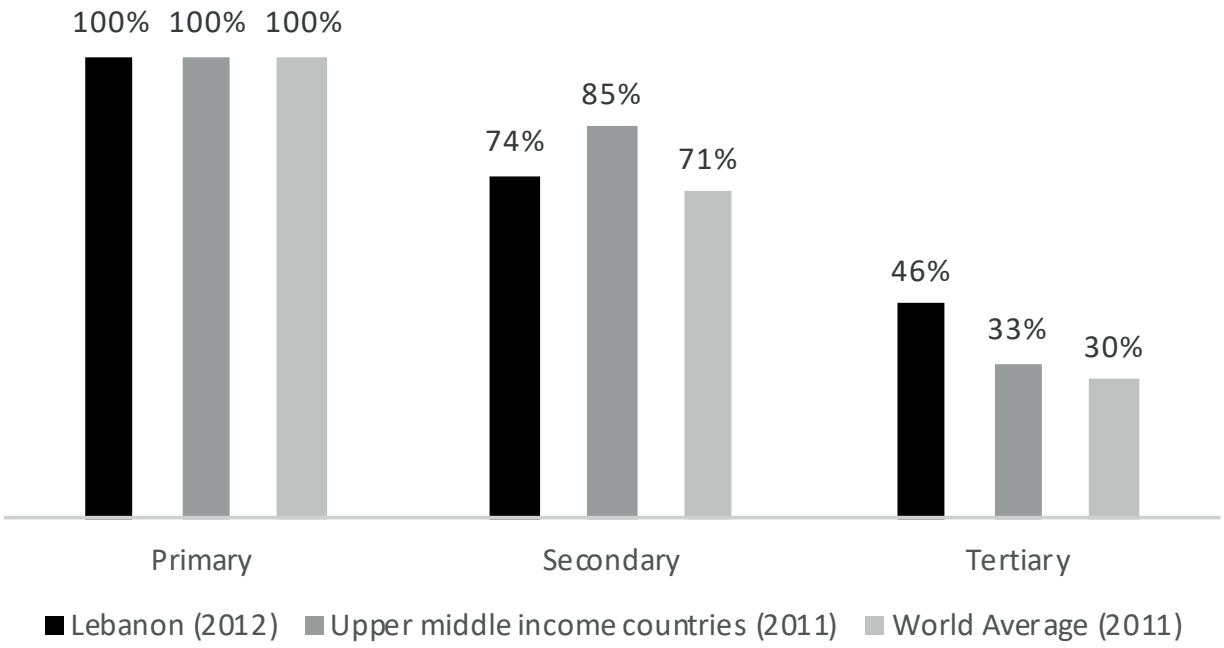
The presence of a savoir faire in tailoring is a first driver to orienting production towards garments manufacturing. In addition, such production is not considered labor exhaustive and can therefore include women in production.

Bringing together the present yet different profiles of workers can help foster better national and gender relations.

Managerial workforce analysis:

In parallel to industrial workforce, an important supply of skilled labor is provided. The city of Beirut has access to highly educated workforce that exceeds the average upper middle-income countries. As shown in the following graph, 46.3% of population have completed tertiary education compared to the upper middle-income average of 33.4%. In terms of numbers, approximately 900’000 of Beirut residents hold a tertiary diploma certificate [9].

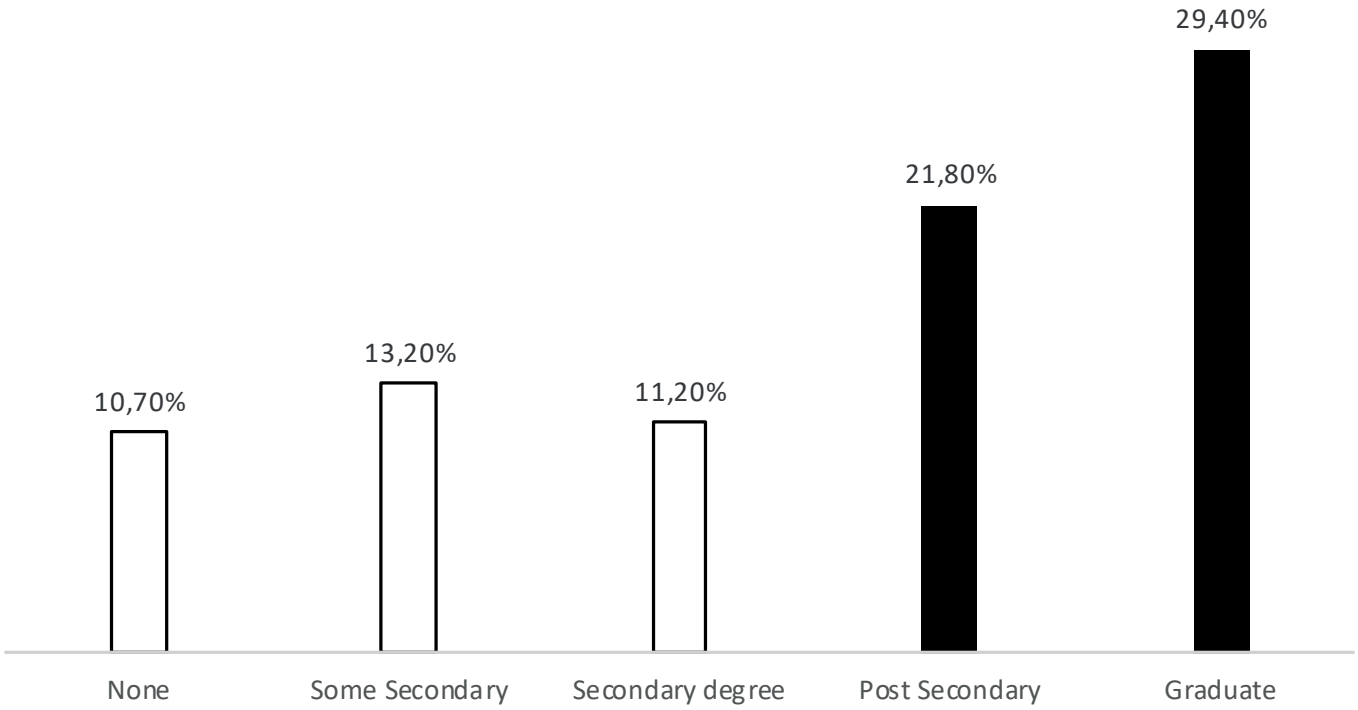
Figure 16: Education enrollment rate.



Source: Lebanon SME Strategy, A Roadmap to 2020, Inventis

In addition, following statistics made by the ministry of economy and trade, highly educated persons are more likely to start and operate a business in Lebanon. Such a workforce can therefore operate under autonomous conditions and manage successful business strategies.

Figure 17: Entrepreneurial activity by education level



Source: Lebanon SME Strategy, A Roadmap to 2020, Inventis

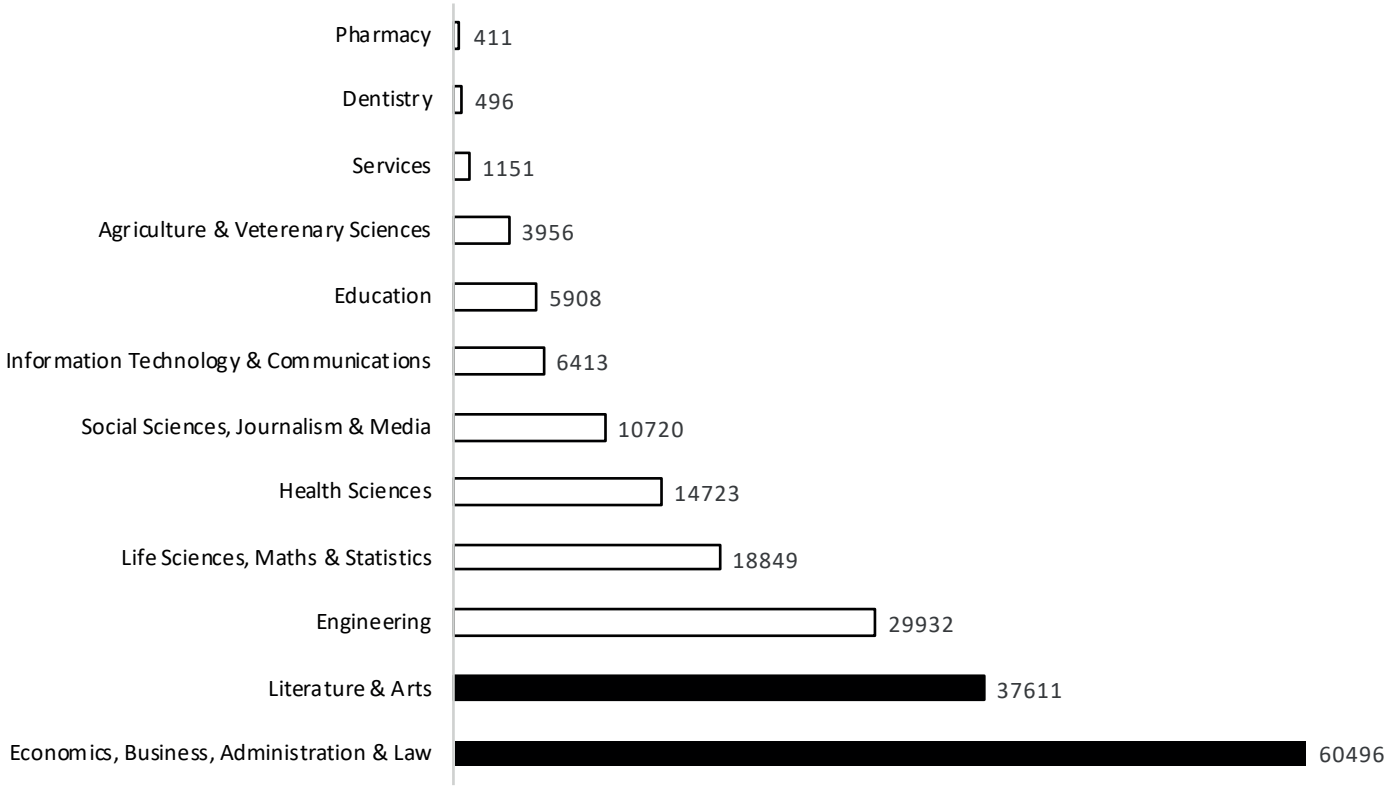
However, qualified workers are fleeing the country due to unfavorable socio-economic conditions and poor infrastructures to help sustain businesses. Lebanon faces a scarcity of educated mid-level managers with a first experience. In terms of numbers, emigrants between 25 to 34 years present the biggest share at 44%. The second largest wave of emigrants are those below 25 years and account for 33% of total emigrants. Furthermore, 44% of emigrants have completed tertiary education. It follows that 26% of total Lebanese population in Lebanon are currently holder of a university diploma [9]. Assuming that 1 over 4 residents in Beirut holds a tertiary diploma, numbers can be summarized in the following chart: [10].

Age	25 - 34	35 - 44	45 - 54	55 - 64	**Total**
Nationality	LB	LB	LB	LB	
Beirut	61271	51244	40662	29724	**182'901**
Diploma holder	15318	12811	10166	7431	**45'725**
Specialized in Fashion*	1225	1537	-	-	**2'762**
Marketing & business	4595	3843	3050	2229	**13'718**
Mount Lebanon **	239181	200040	158732	116032	**71'3985**
Diploma holder	59795	50010	39683	29008	**17'8496**

**Numbers are interpolated using a 30% estimation for enrollment in business studies and an 8% share for fashion related studies.*

***Residents from mount Lebanon are used to commute to work in Beirut and therefore should be considered as a potential workforce.*

Figure 18: Number of students in major field studies



Source: http://investinlebanon.gov.lb/en/doing_business/labor_force/education

The following figure shows that the majority of graduates are enrolled into either art or business-related fields. Such an educational output helps promote the local interest for jobs in design and manufacturing related fields. This resource encourages the creation of an industry related to design practices, namely garment manufacturing.

b) Land and desolated building stock

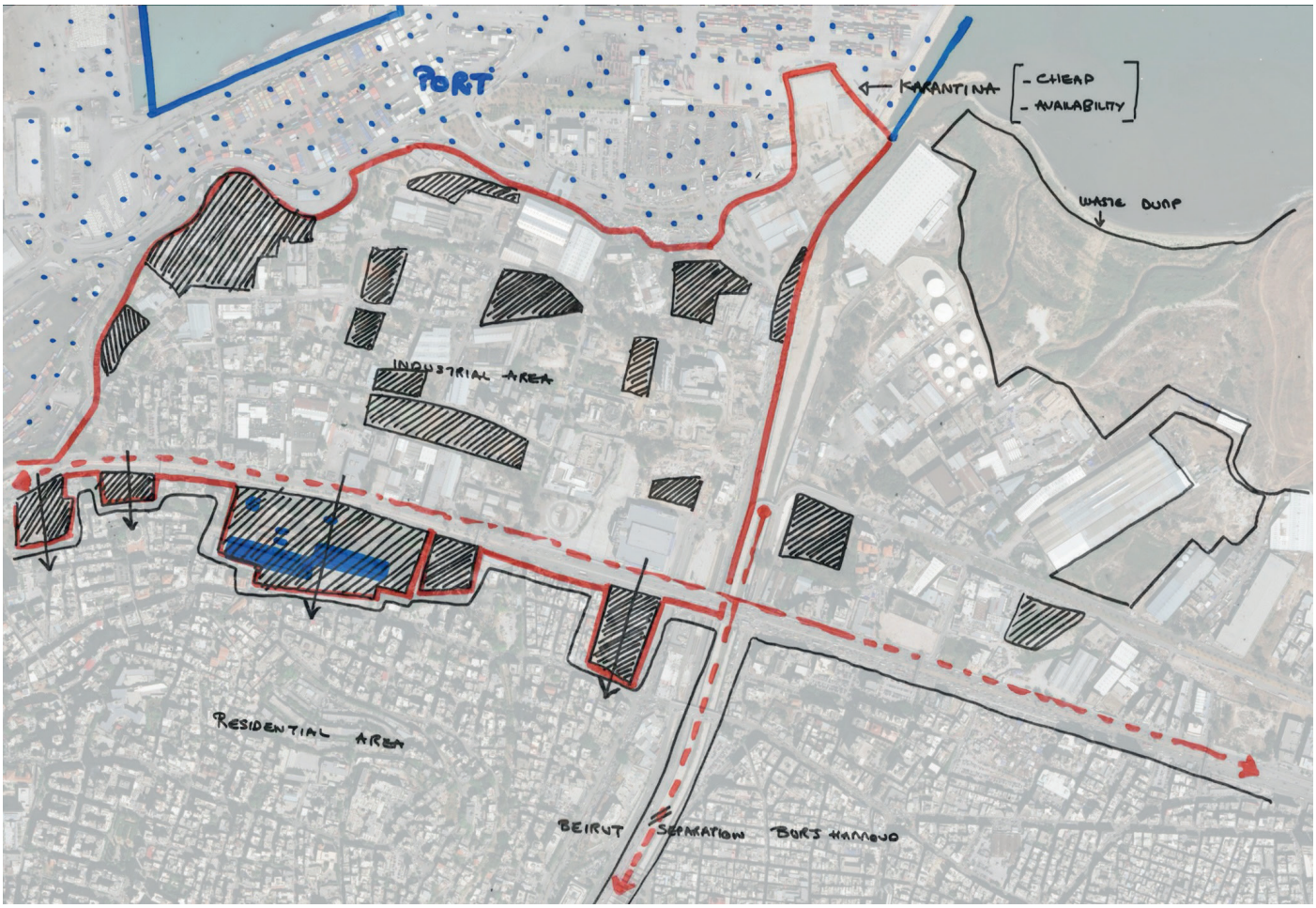
Large amount of land is available to accommodate new projects in Karantina, the eastern suburb of Beirut. Their close proximity to Beirut city center along their low real estate price make them an attractive opportunity for ongoing developments.

Figure 19: Estimated land values in Beirut (USD per square meter)

Beirut Central District (Waterfront)	4'000 - 5'000
Beirut Central District (Inland)	3'000 - 3'500
Jnah	2'000 - 2'500
Corniche el Nahr	1'000 - 1'500
Bachoura	1'500 - 1'750
Karantina	**500 - 1'500**

Source: http://ramcolb.com/blog/karantina-investors-playground/

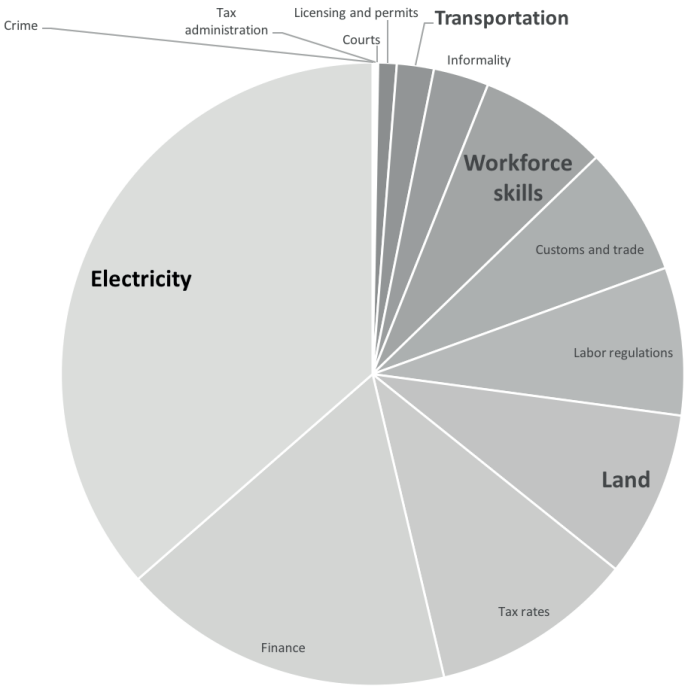
Figure 20: Land availability around the Karantina region.



c) Electricity

Electricity is a scarce resource in Lebanon and the major barrier for industries after political instability. Nevertheless, Beirut enjoys a much better supply than the rest of the country with an average of 21 over 24 hours of electricity income per day.

Figure 21: Major obstacles for manufacturing in Lebanon.

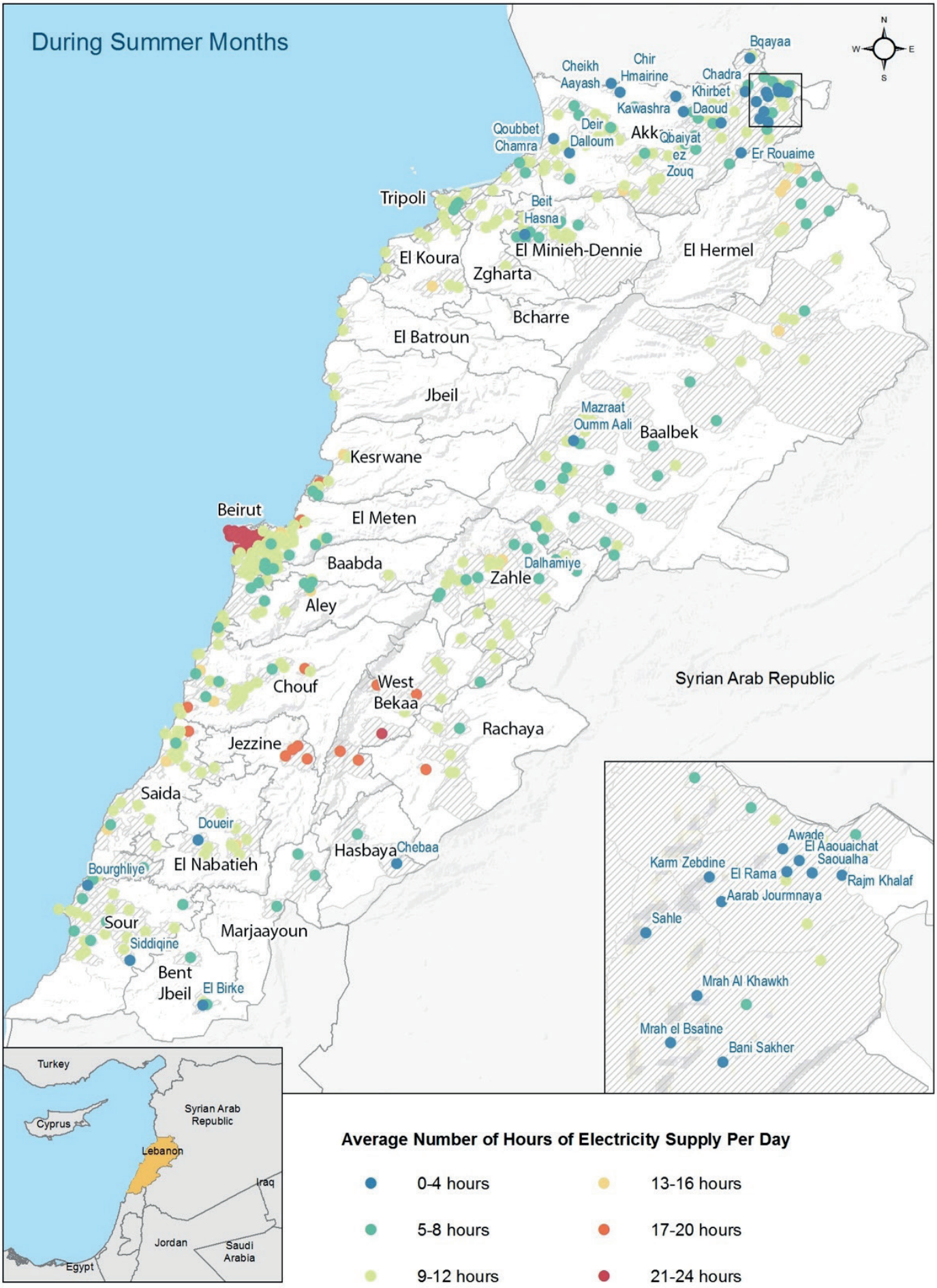


Source: Lebanon Economic Monitor, The World bank, 2016.

Figure 22: Electricity performance and costs in manufacturing.

Area	Average hours of electricity outages per month	Losses from electricity outages (% of annual sales)	Electricity identified as a major constraint
All countries	16.6	2.6	32
MiddleEast & North Africa	114.4	4.7	40.5
Lebanon - all entreprises	262.6	5.7	55.1
Lebanon - manufacturing	323.4	8.1	69.8

Figure 23: Electricity supply in Lebanon (average number of hours).



Source: OCHA

d) Suppliers ecosystem

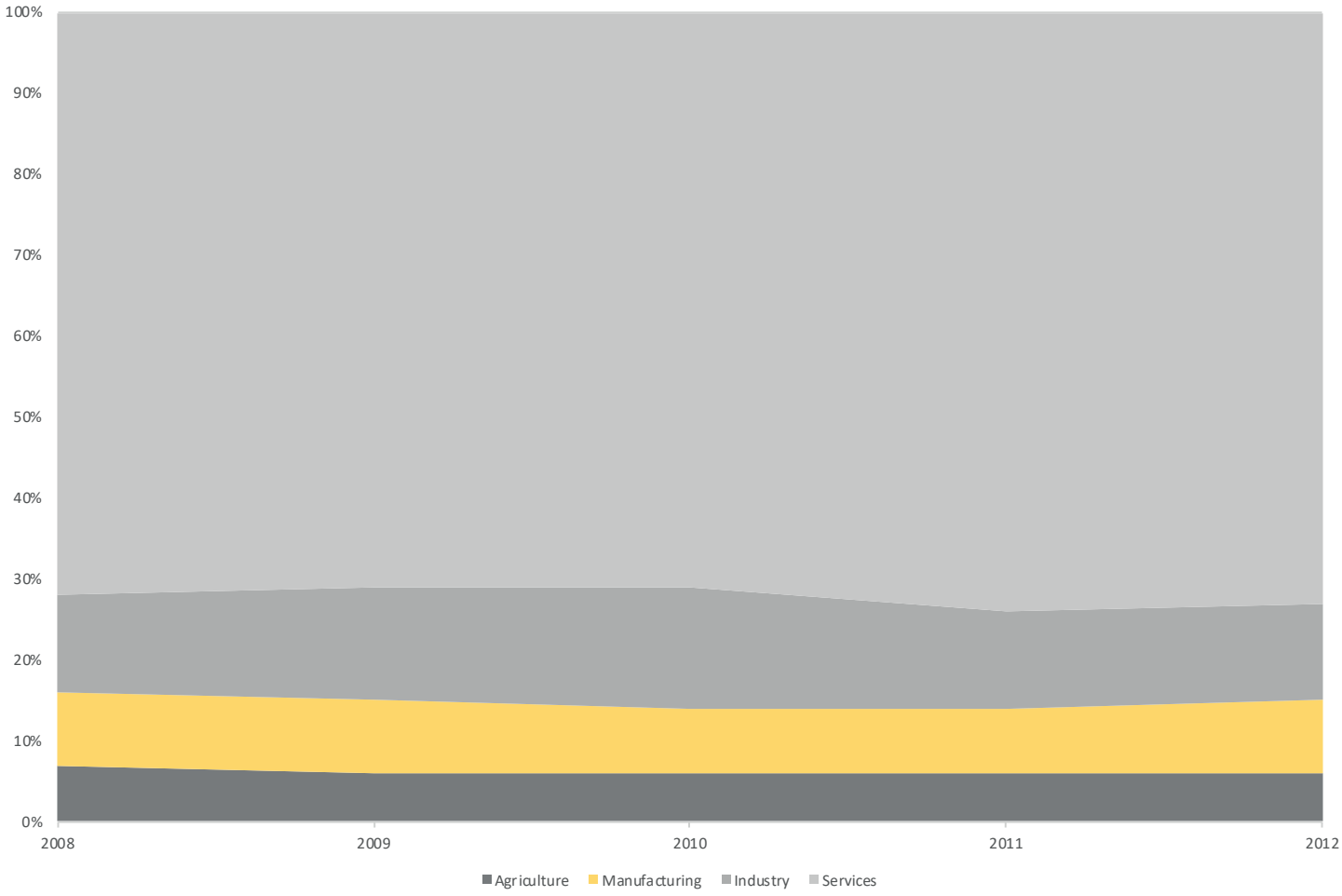
Most enterprises are Micro-sized in Lebanon (10 or less employees), accounting to a total share of approximately 80% of total enterprises. 31% of those enterprises are located in Greater Beirut, and 48.6 % in Mount Lebanon. Out of these, 11% are specialized in manufacturing, hence representing a small share. Yet the location of Beirut benefits from the strongest manufacturing ecosystem due to its proximity to Mount Lebanon. The region of Beirut and Mount Lebanon accounts a total of 79.6% of SME specialized in manufacturing: it's the highest national ratio. Beirut can therefore have an easy access to 8.7% out of the total SME's specialized in manufacturing, compared to the 11% of total manufacturing in the country. [13]

Figure 24: Total of SME turnover by gouvernorat :

Mount Lebanon	**48.6%**
Greater Beirut	**31%**
North Lebanon	7.7%
Bekaa	5.4%
South Lebanon	5.4%
Nabatiyeh	1.8%

The Lebanese manufacturing ecosystem is unfortunately week on a national scale. Yet industrial activities in Beirut can help leverage the access to other manufacturing suppliers. In addition, investment in industry and manufacturing has a potential for higher-than-average returns due to low starting levels and limited competition.

Figure 25: Value added of manufacturing in Lebanon.



As mentioned earlier, the area of Bourj Hammoud is known for its craftsmanship. Workshops account for 17% of commercial premises, yet they used to represent a much bigger share in the past. Workshop are divided as follow: [14]

Mechanic	30%
Tailor	**23%**
Carpenter	22%
Electronic repair	13%
Metal works	6%
Miscellaneous	6%

Mechanics represent the biggest share at 30% of total workshops. Nevertheless tailors (23%) and carpenters (22%) are the most famous craft practices in the region. They have been there for a very long time, and craftsman benefit of the transmission of several generation's savoir-faire. On that

account, textile production and carpentry are two potential drivers to benefit of and develop when considering the implementation of a factory in the specified site. It follows that the site's biggest asset is its proximity to a cluster of manufacturers, that can flourish in return when injected with local demand.

Analysis of tailoring practices:

Leather production is concentrated in the district of Bourj Hammoud: it is the most common practice among tailors. The presence of a tannery in the area supports local and easy sourcing among leather craftsman. For that purpose, leather industries tend to relocate in the surrounding area. Craftsmen are mainly specialized in shoe making, bags and clothing apparels.

On the other hand, cotton production in Lebanon has increasingly declined throughout and after the civil war. Textile factories which numbered 1'239 in 1999 have now downsized to 560 with a majority of small workshops located in the southern suburbs of Beirut, Bourj Hammoud and Tripoli. [11] Still, the majority do not produce textile in-house, they are simply limited to garment manufacturing. Numbers in employment have dropped from 15'470 in the textile industry to 7'000 at present. Even textile exports have declined: in 1996 they represented $92 Mio accounting for 12.52% of total exports alas this number is at $65 Mio for the present moment and represents 4.24% of total exports. A clear evidence of decline is observed in the textile industry, mainly due to the competitive prices of far-Eastern countries that monopolizes the market. [12] The regional and national eco-system for textile manufacturing is weak. Local suppliers need higher demand for their products in order to strive and sustain their business.

Garment manufacturing units either rely on importing fabric offshore or sourcing locally at a higher price. Local manufactures suffer from higher production costs due to low economies of scale. However, the competitive advantage of such local manufactures lies in its attention to manufacturing high quality made garments.

Manufacturing garments in Beirut is an added value to sourcing locally given its proximity to other manufacturing facilities. The concentration of industries in Mount Lebanon Governorate is a key driver.

4. Understanding challenges:
Interviewing a local designer, Timi Hayek

Timi Hayek is a young fashion designer, established recently in Beirut. Having studied at Central Saint Martins College in London and worked with reputable fashion houses such as Louis Vuitton and Alexander McQueen; she felt the need to come back to her native country Lebanon in order to contribute her skills to the local fashion scene. Her focus is directed upon creating quality hand-made garments.

What is the biggest challenge for manufacturing in Lebanon?

It's hard to rely on production houses in Beirut. Professionalism, skills and communication are my main concern. Finding reliable workers in the surroundings is a challenge. The process of outsourcing production - either to Lebanon or abroad - takes time and information is distorted along the way. It's a whole process of back and forth in order to meet the final product requirements. I rarely find satisfaction in manufacturing from the first shot.

And what about sourcing?

I buy some of my fabrics from local fabric shops. The problem is that they either have very limited stock, or if they do have a decent stock, every designer in Beirut will end up using the same fabric. They also jack up the prices since they have a strong monopoly on the market. As a young designer, I do find their prices to be a strong barrier for scaling up production. In addition, I am limited with choice and quantity.
Nevertheless, I source a lot of my fabrics from Italy. This label ensures quality, and as a plus I encourage Italian craftsmanship and their respect for it, as well as their ethical production. Unfortunately, there is not enough supply for fabrics that are made in Lebanon. I hope that in the near future more designers will want to produce locally; creating the need for a bigger supply of fabrics made in Lebanon.

Is the access to infrastructure easy?

I think that there is a lot of potential for setting up a strong infrastructure in Beirut, there are many spaces that can house manufacturing studios and workshops. As a plus, prices are relatively affordable for rent in certain areas. But everything has to be equipped from scratch.
There is the possibility to rent workspaces that are already equipped with machines and a working hand. However, such spaces are limited, prices are higher and the provided services lack professionalism in production.

Having said this, do you still encourage local workers? Should people like you have the responsibility of creating new job opportunities for local craftsman?

Yes. I believe it is a mission that every entrepreneur should seek to enrich. I am happy to know that I can make a small yet positive difference. Still, local workers need to be trained at a cost. I believe we have lost manual skills that we used to have a couple of generations ago, before craftsmanship lost ground in Lebanon and other western countries.
Also following waves of refugees arriving to Lebanon lately, the rate of unemployment has significantly risen. A lot of Lebanese and foreign residents, currently unemployed, would appreciate to be involved in manufacturing.

What is a typical operational process for your creations?

Designing and prototyping takes place at my studio. This is where I also store, showcase and sell my final products. Once the prototype is finished, I send it to the manufacturing house to be copied and reproduced. The factory is located in Beit-Chabab, a small and beautiful town in the outskirts of Beirut. I deal with a woman who is in charge of directing a group of locals and refugees who produce the clothes. I have been working with them over the past couple of years since they are very reliable. Spotting the right manufacturing house took some time and effort though.
Would you prefer having the totality of manufacturing close to your design studio?
This would be ideal. I believe I get to save a lot of time if the production house was close by. For the present moment, a lot my time is spent in traffic and phone calls trying to get in touch with my production team.

And how does your brand stand out in its market?

My main focus is on design and select quality. These two assets are helping me compete with other clothing brands that mass produce. Consumers who care about clothes can tell the difference, and are therefore ready to pay more for a ‘Timi Hayek’ creation. This is why I strongly focus on the handmade aspect behind each product.

Finally, how can you define your market?

Consumers who are well travelled, educated and who can afford higher quality garments. A lot self-made women who want to encourage other entrepreneurs with whom they can relate to, and women who are ready to invest into a business with purpose.
Unfortunately, I still haven’t stepped up into online shopping. It follows that my clientele are people that can drop by the shop when around. A lot of them are Lebanese living abroad and looking forward to consuming local when back home.

Sources

[1] Government of Lebanon & the United Nations, 2017

[2] UNHCR 2015

[3] UNRWA 2016

[4] UN Habitat, Nabaa Neighbourhood profile & strategy, March 2017

[5] Bourj Hammoud Municipality
http://www.bourjhammoud.gov.lb, Accessed March 5 2018

[6] UN Habitat, Nabaa Neighbourhood profile & strategy, march 2017

[7] The World Bank, Lebanon Economic report, 2016

[8] Janae bushman, Syrian refugees
https://www.slideshare.net/JanaeBushman/aliim-smartphone-schools-contextualizing-mobile-learning-for-syrian-refugee-girls-janae-bushman, Accessed March 5 2018

[9] Lebanon SME Strategy, A Roadmap to 2020, Ministry of economy and trade.

[10] Head of Statistics Department, Ministry of Public Health

[12] UN Habitat, Nabaa Neighbourhood profile & strategy, march 2017

[13] Lebanon SME Strategy, A Roadmap to 2020, Ministry of economy and trade.

[11] Women ecnomic empowerment portal, clothing and textile in Lebanon
http://www.weeportal-lb.org/news/clothing-and-textile-lebanon-en-route-extinction-amidst-globalisation-and-official-neglect, Accessed March 5 2018.

[12] The daily star
http://www.dailystar.com.lb//Business/Lebanon/2004/Apr-10/550-textile-industry-focuses-on-niche-markets-to-get-by.ashx, Accessed March 5 2018.

Part III – Project formulation and guidelines to consider

The selected site to host a manufacture is the former Train Station. It is located at the intersection of the different urban entities. Besides it is currently sealed and encloses important architectural heritage. Its positioning and present built value are two factors supporting the choice for selecting the site. Having defined resources and concerns in production, the project will aim to promote an infrastructure supporting the manufacturing of handmade garments while encouraging the local workforce. Yet, such an urban intervention should strive to responds to its surroundings and value its present infrastructure. It is therefore important to understand the dynamics of the place prior delivering design solutions regarding architectural and programmatic concerns.

The following part will illustrate my approach to designing tailored solutions in response to identified problematics.

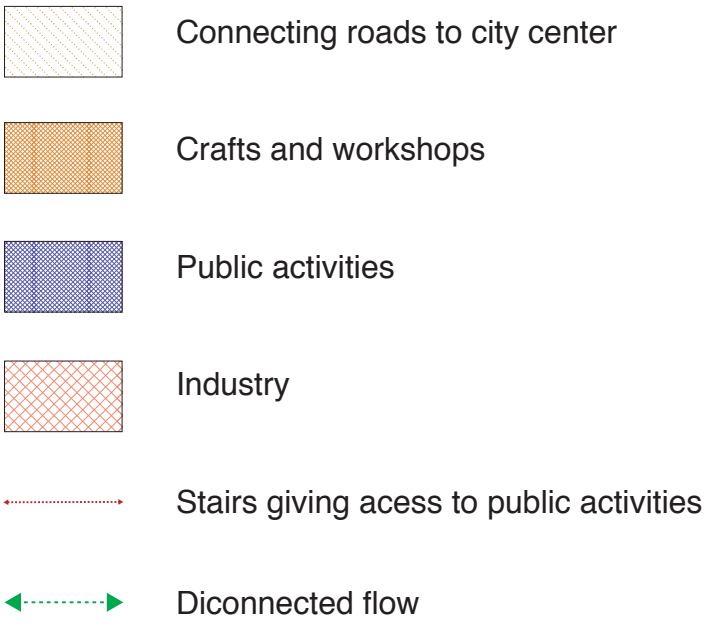
1. Site analysis

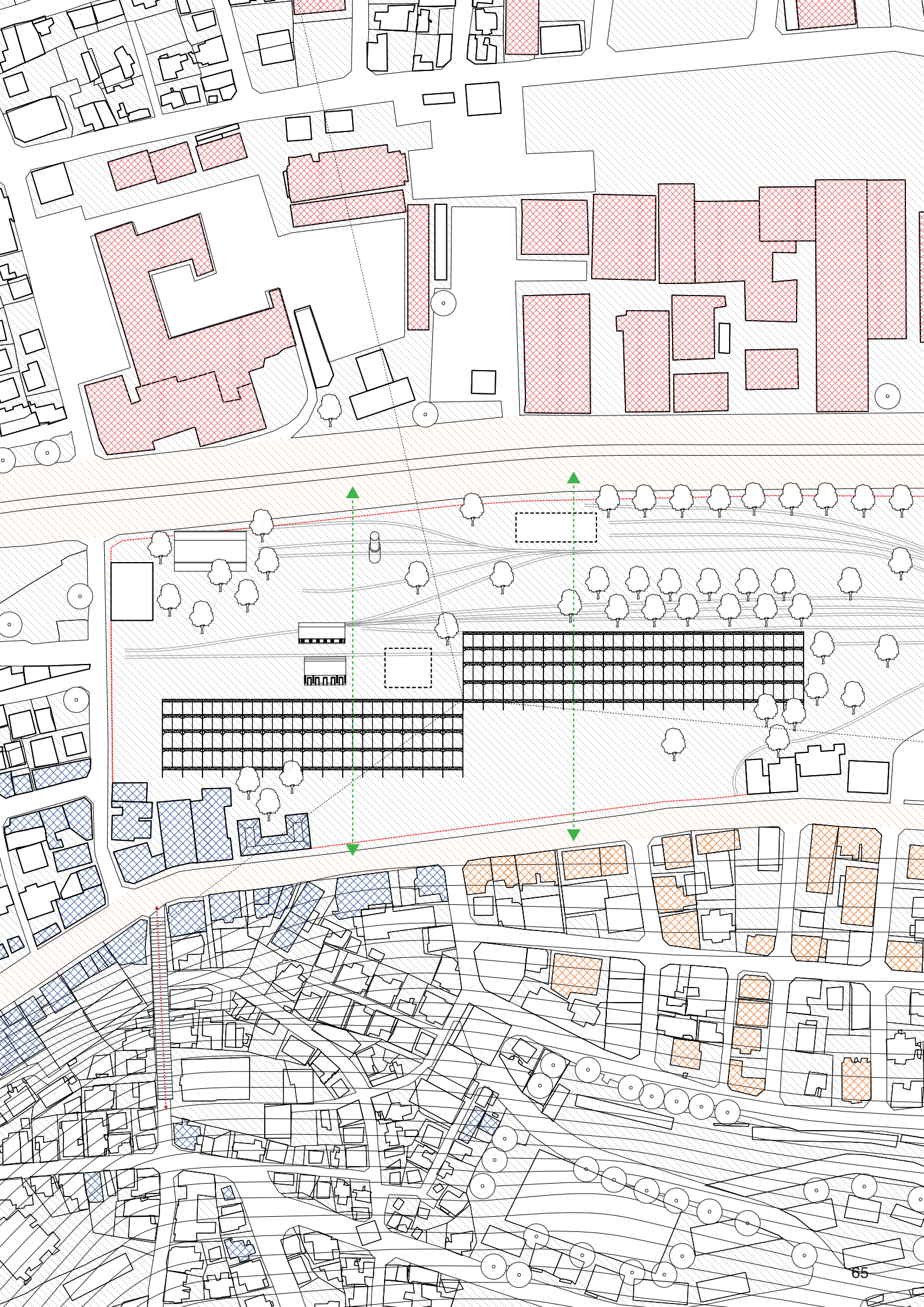
a) Neighborhood context

The site acts as an articulation between several urban programs. It is a hub between a habited urban landscape and another industrial landscape, to its north, which is starting to attract young artists. Nevertheless, the connection between both urban entities is still vague due to the enclosed boundaries of the site and presence of a main road cutting in between.

The road of Mar Mikhael, to the south of the plot, deserves mainly pedestrians and restauration activities at a ground floor level. However, the strip consisting of restauration and other public activities ends by the proximity of the plot, leaving place for established workshops mainly specialized in car repair. The road of Mar Mikhael can therefore be divided into two parts. The first part is rather occupied with entities alluring to the public and a second part which is still less attractive. Yet, both entities share a common function of housing in its upper floors.

Figure 26: Urban dynamics surrounding the site





b) Circulation

As mentioned, pedestrian area is rather concentrated to the south of the plot, where many public activities are located such as restaurants, bars, retail stores and religious monuments. Stairs in the region of Mar Mikhael are key elements in the urban landscape: they invite flows of residents from the upper hill of Beirut residential district. Close by residents are therefore used to commute to Mar Mikhael area by foot.

The road to the north of the site is mainly limited to car circulation. Its presence is a main asset to facilitate logistics for the project proposal. Yet two bridges overlooking the main road are currently located at both sides of the plot. However, their usage is still limited due to low pedestrian activity in the industrial zone of Karantina. Nevertheless, their positioning encourages the extension of new urban dynamics towards the other side of the main road.

2. Plot scrutiny

a) History

The site of interest, referred to as Beirut's "Train Station" has known its development in two separate stages in time.

The first phase, as the name indicates it, was intended for the development of an infrastructural complex to host the arrival and departures of trains. The station was of a particular interest because it used to serve both axis: a coastal line connecting the northern and southern extremities of the country and a second line going inland. The construction of the station took place under the Ottoman rule in late 19th century and was directed under French guidelines. Edifices built at that time were small monoliths built out of rocks and wooden ceilings; they recall similar constructions of train stations in western Europe.

Unfortunately, during the civil war that was ignited in the 1970's, railway transportation ceased to function in Lebanon. The site was ever since restricted to public usage. Yet the standing of the place has given it the reputation of a landmark known as the "Train Station".

However, during the civil war rail transportation was replaced with a bus network. The site had known a second phase of development during that time to host the parking of the 350 operating buses. Two hangars of 4500m2 each were built at that time. Their architectural language is in a stark contrast with the other edifices on site. Their skeleton is made out of metal trusses and covering a 30 meters span without any supporting pillar in between. Thus, the hangar architecture generates a supreme lightness.

Currently there are 30 buses functioning with the rest left abandoned due to high costs of operation and maintenance. It follows that a large part of the infrastructure, hosting buses, is left unused at that time.

Edifices of both eras still stand on the site as a collective memory of the changes that the place has undergone.

b) Landscape & present infrastructure

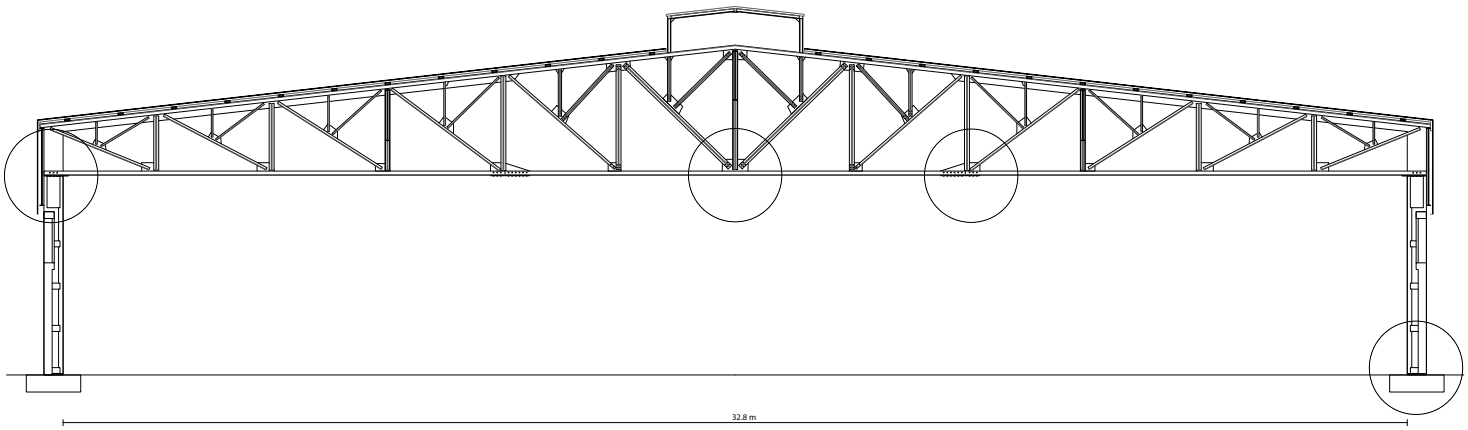
The segmented development of the site has affected the overall landscape of the site. The northern part of the plot, close to the main road, is outlined with railways on its floor. The following section was kept untouched during the second phase of developments and therefore vegetation grew around. A green band acts at the present moment as a tampon between the autobus hangars and the main road. However, due to bus operational purposes, the southern area of the plot is covered in cement for an easy access from the street.

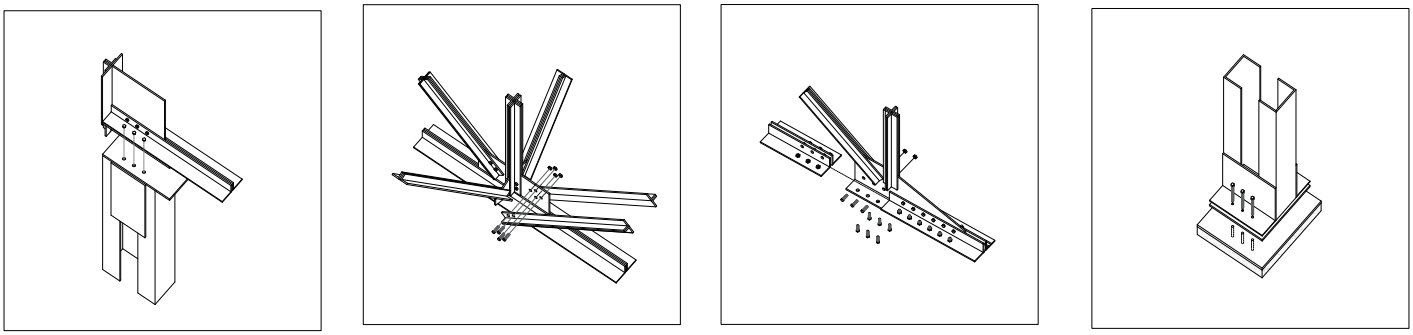
As mentioned in the historical description of the site, there are two types of building infrastructure. The first category of buildings, associated with the train station infrastructure, refer to an old era of French influence. These buildings include a water tower, a service station for train and a waiting platform with two office buildings. These infrastructures are for the present moment in a state of ruin, yet some of them are better preserved than others.

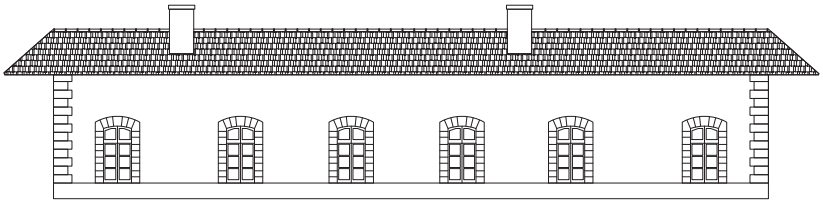
The second category is a contrasting architectural prowess referring to a rather post-industrial era with a very light metallic structure. It includes two hangars built out of a repeated truss structure with pillars on the side every 10 meters. The interior space is liberated from any structural element and presents an ideal open floor with a roof span of 30 meters.

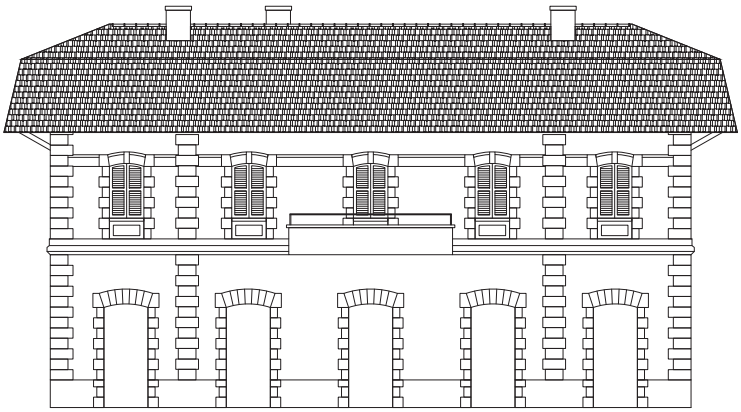
In order to better grasp the image of the site, the following section will offer a photographic classification of the different present infrastructures.

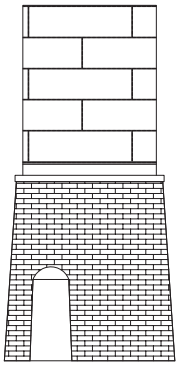
Figure 27: Structure elevation of the hangar and assembly detail

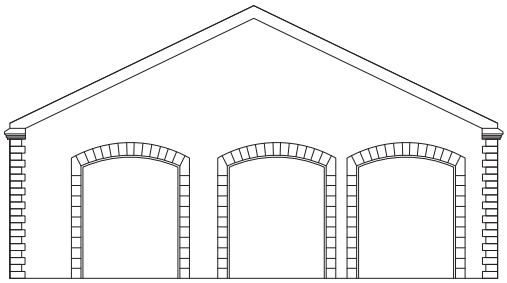













الدنيا أوسع
من حدود عينيك
ACK XIST
CAN'T PUT ME DOWN

3. Project proposal

a) Intentions

The manufacturing unit will focus on delivering textile garments. The supply of unemployed workforce specialized in textile manufacturing and the need to support fashion designers to produce locally are at the forefront of consideration to defining the output identity. Yet, production is designed in order to grow with demand. Area for production is therefore divided into units that can be replicated with time.

Furthermore, the project will strive to become a hub for textile production. In parallel to manufacturing, forming new generations to fashion design and textile manufacturing is a must in order to ensure a durable development. Finally, the project should also attract citizens by promoting public activities such as retail and expositions related to design practices.

b) Programs definition

Programs involved in the project can be segmented as follow:

Figure 28: Concept elaboration for program division

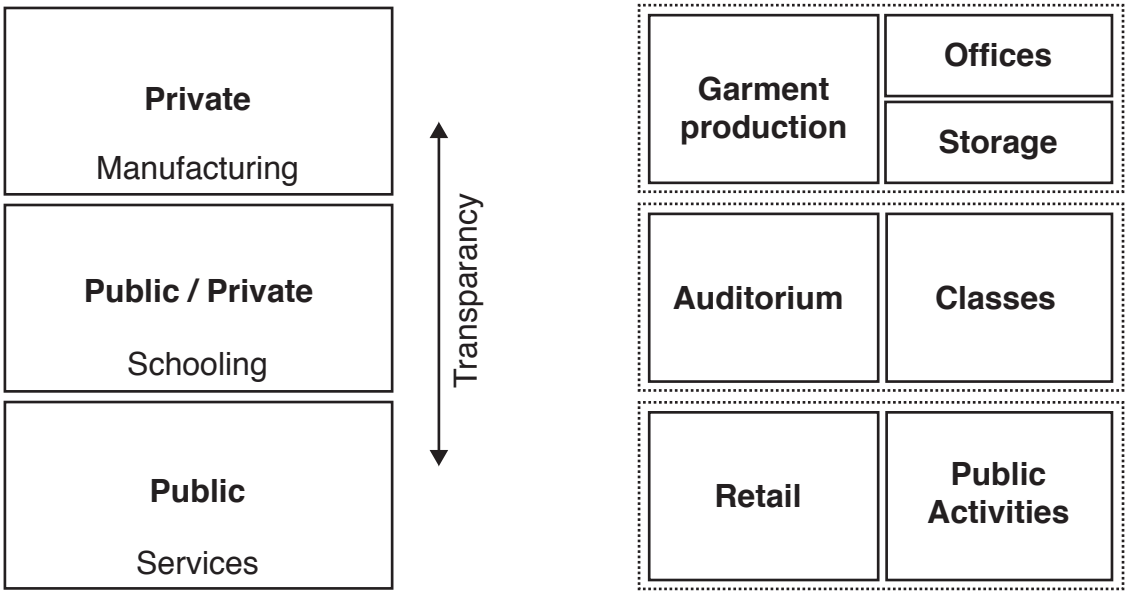
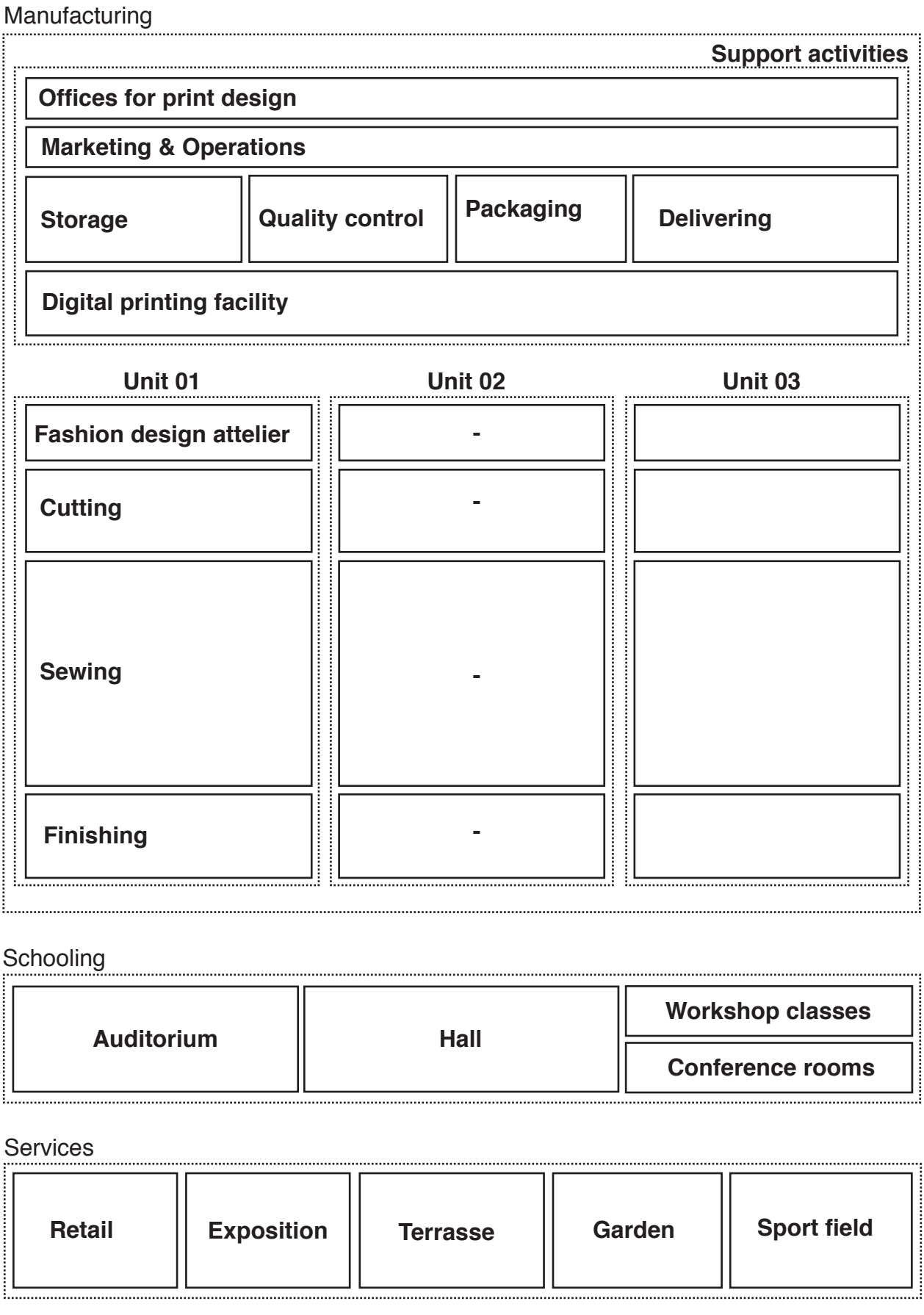


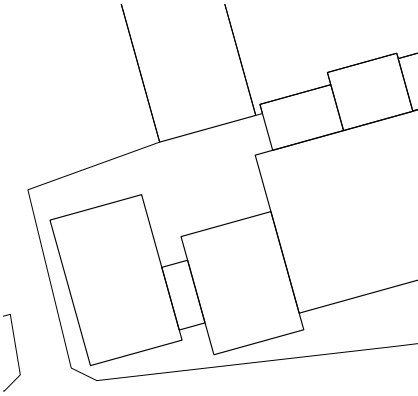
Figure 29: Complete program division



FURTHER DIVISIONS

c) Design guidelines

The presence of a large scale metallic structure in the midst of the site is a principal guide to defining design strategies. In fact, the hangar is decorticated from its envelop and structure is kept visible in order to show its engineering prowess. Such a structure, nevertheless, generates a certain directionality. The repetition of metallic trusses suggests transversal paths that are drawn from north to south; thus, linking the two roads.



Yet both hangars are connected upon their angle. A strong tension is therefore present at this given point.

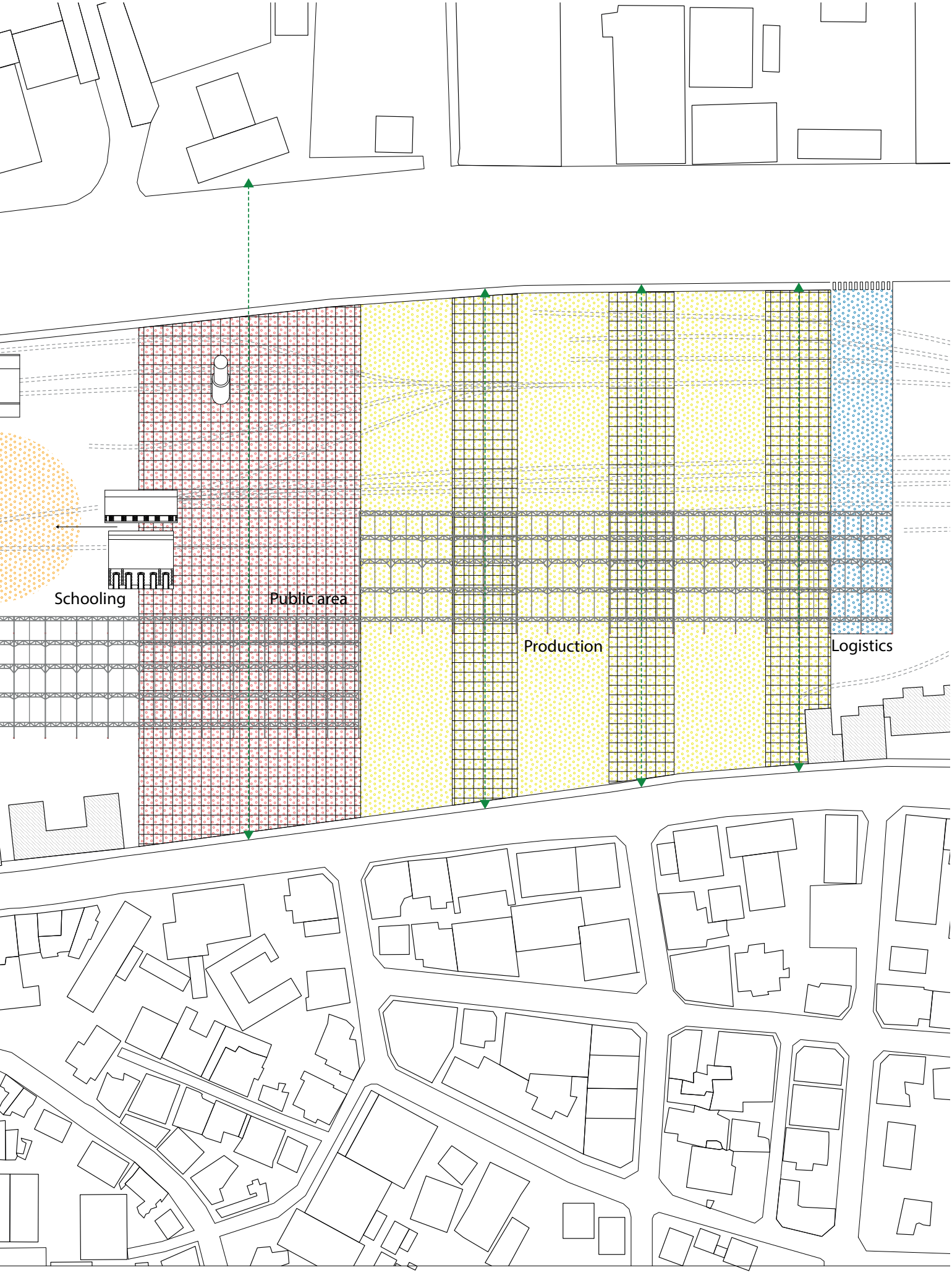
A main path, defined by its ground paving, is designed as link between the two hangars. The proximity of the western hangar to Mar Mikhael road suggest an entrance at this level. This area is therefore designed to host public function such as exhibition space, auditorium and the remains of the train infrastructure to its back.

Towards the east side of the public band, lies the manufacturing facilities. The space is defined by the setback of the second hangar and the large terrace generated in front of it.

Towards the other side, schooling programs are projected, while maintaining close contact with the main auditorium. However, the transversal direction is less present in here due to the presence of a built tissue between the road and the hangars structure. Therefore, the logic is rather redirected toward a cluster where atelier and train station heritage are connected throughout a central space.

As mentioned earlier, bus parking is present on site and the project opts to value its presence. Towards the western side of the site, bus functions are designed in close link with the road connecting Charles Helou Avenue with Mar Mikhael street. The buses will support mainly workers to easily commute to work.

In sum, the plot is segmented in response to the present metallic structure, as follow:


Schooling
Public area
Production
Logistics

Part IV - Business strategy

Having settled the projects main intentions and design guidelines for implementing a manufacture, the following part will dig into quantitative reasoning for production. On that account, we will start by defining the what and how's of production. What are we producing? How are we producing it? For who are we producing it? And how many goods should we opt to produce in total?

1. Business plan

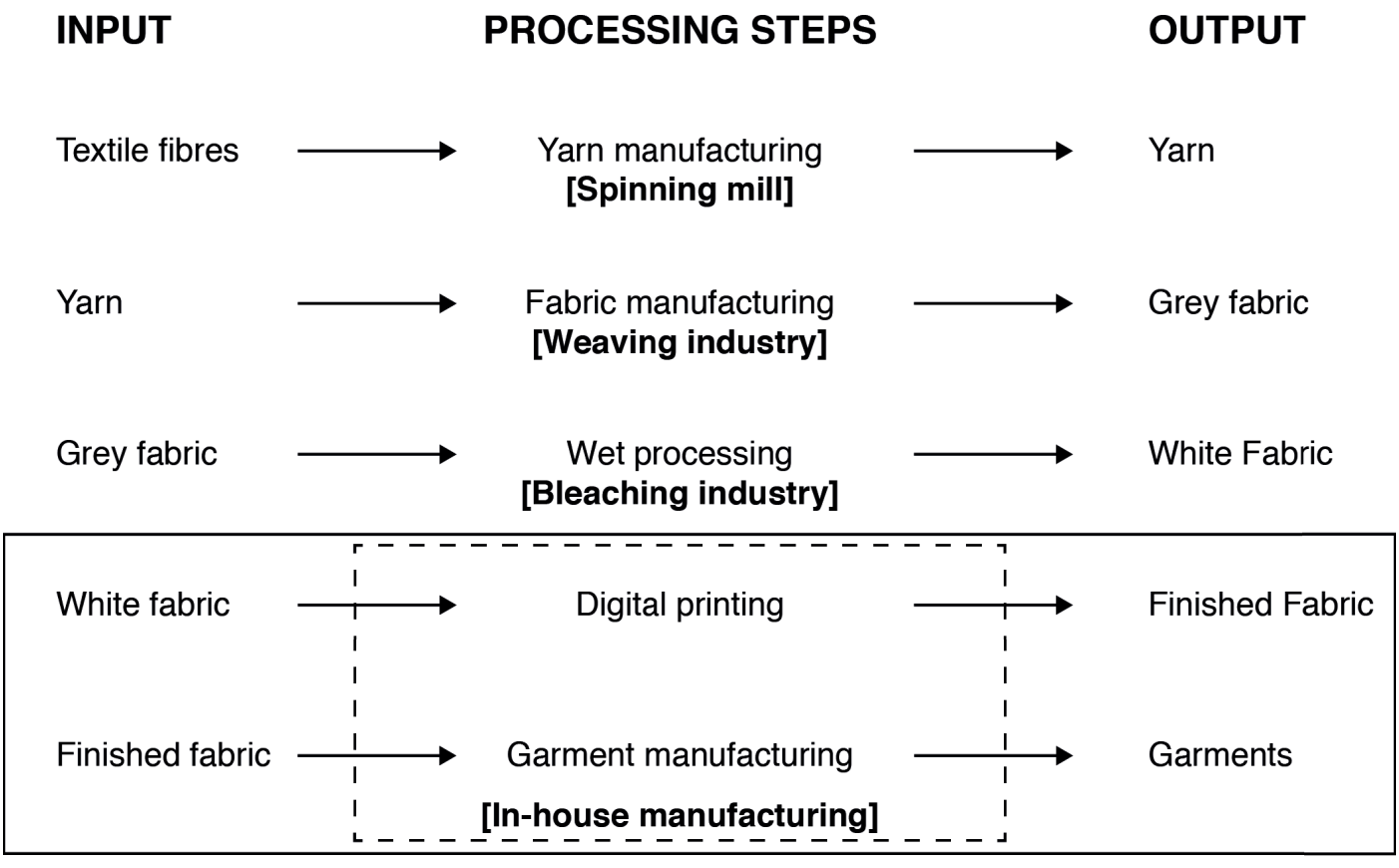
a) Involved steps in production

Prior defining the involved process of the product life cycle, it is important to note that cotton textile industries emits high pollution levels in its early production stages. Pollution in textile manufacturing contributes to important sonar, health and environmental stressors.

Due to its implementation in the city and its need to promoting clean spaces for public usage, the project will focus on importing finished fabric and operating at later stages of the manufacturing process.

The strategy in manufacturing relies on importing white fabric clothes, omitting the support for dyeing processes that heavily pollute waters and its environment. Fabric coloring will be done in-house with the provision of digital printing facilities. Giving the opportunity for designers to test and create their own fabric prints is an added value for design. Furthermore, it considerably facilitates logistic operations prior delivery. Orders are limited to one article: white finished fabric rolls.

Figure 30: Cotton textile manufacturing flowchart



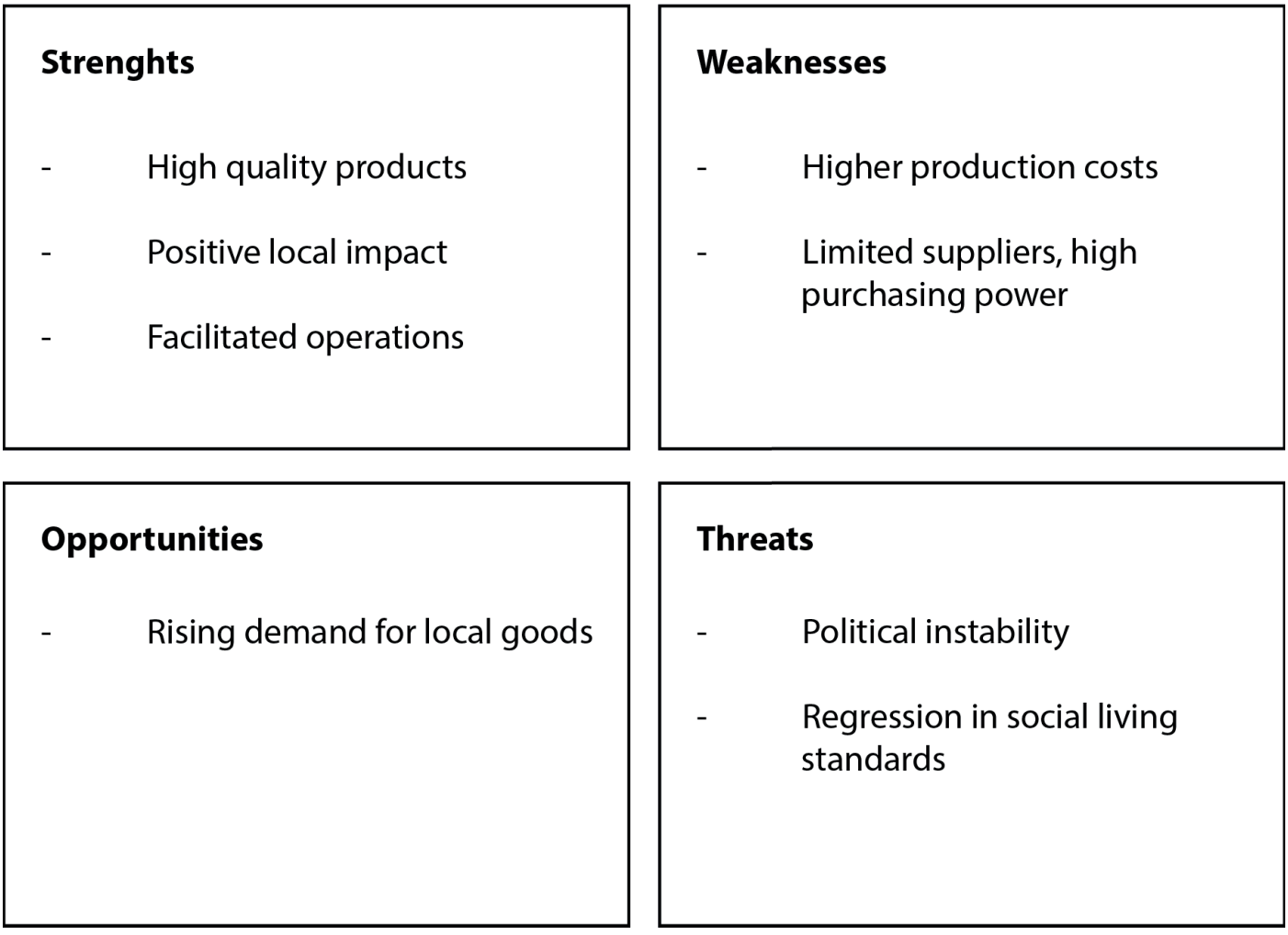
Project's process flowchart

b) SWOT analysis

The SWOT analysis helps define the organization strengths and weaknesses in order to focus on its important business assets. In the case of textile manufacturing in Beirut, competition is very strong with industrial giants in fashion. Therefore, the project output should focus on product differentiation in order to sustain competition. In other words, it should focus on a specific asset that large industries don't have.

The competitive position of manufacturing in Beirut should rely on slow fashion. The high quality of goods produced and their social etiquette can help overcome competition, despite higher prices in manufacturing.

Figure 31: SWOT analysis for the textile production in Beirut area



2. Process flow studies

In the following chart, an arbitrary size of production, close to the market demand, has been defined. Yet, it is interesting to note the relation in size and flow of products between the different programs. Nevertheless, a proper size for production will be stated in the following chapters in respect to the optimal production output.

Program	Area m2
1 Fashion Design Studio	850
1.1 Prototyping space	
2 Print Design Studio	140
3 HR	55
4 Production management	55
5 Inventory management	55
6 Sales & Marketing	55
7 Factory manager office	20
8 Managing director office	20
9 Conference room	45
10 Storage	300
11 Printing facility	450
11.1 Screen printing *	
11.2 Digital printing *	
11.3 Block printing **	
12 Cutting	300
12.1 Net drawing plotter *	
12.2 CNC cutter *	
12.3 Straight knife cutters *	
13 Sewing	900
14 Finishing **	275
15 Photography studio	50
16 Distribution & packaging	350
17 Showcase & retail	1000
18 Lounge	400
Total	**5320**

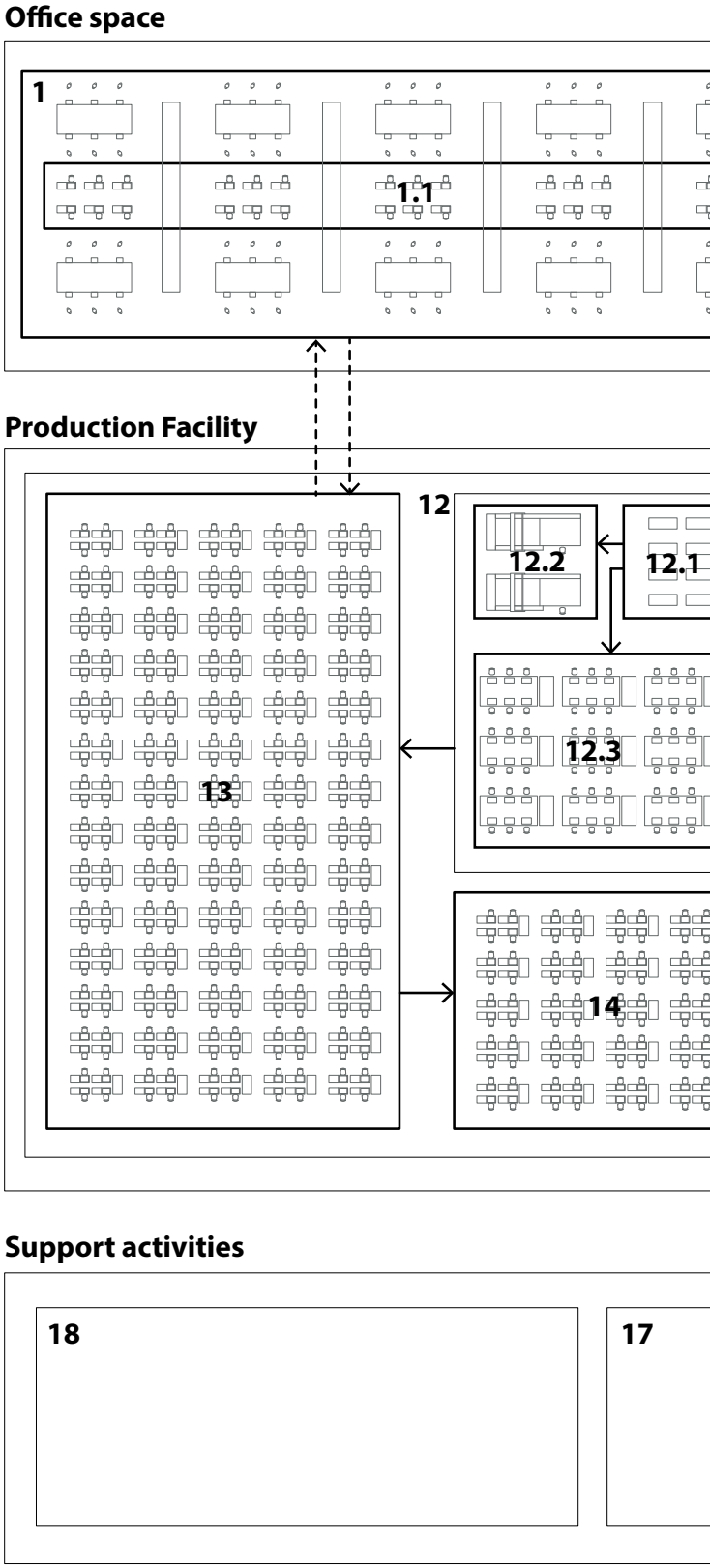
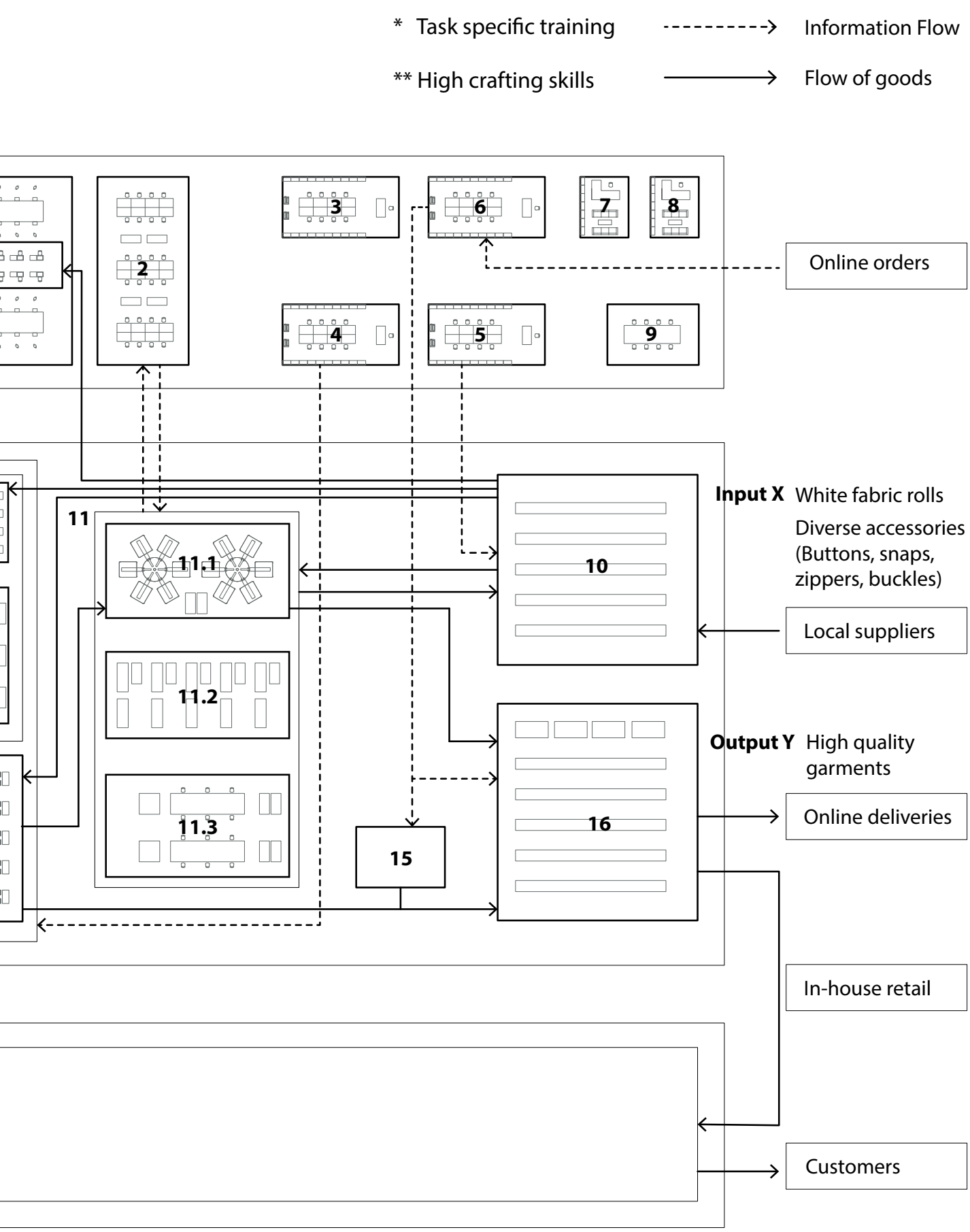


Figure 32: Process flowchart for production



The following points will illustrate the reasoning behind the size estimation of the different major programs taken into consideration. The following sizing estimation apply to a demand of 300 goods per day, chosen arbitrary at first.

- Garment manufacturing

It takes approximate 1.5 hours to sew a regular plain shirt. If we are to brake the process into further steps, it takes about 20 minutes to cut out the fabric and another 30 to 45 minutes to sew the shirt. The collar requires another 20 minutes and 10 minutes to sew it on.

However, a button up shirt – with collar and cuffs – takes up to 5 hours of work. The cutting process takes more time than a regular shirt; 2 hours on average. Then an additional 2 to 3 hours in order to sew and make the required finishing.

On that account, we can estimate an average workload of 3.5 hours per produced good.

Assuming workers work an average of 8 hours a day, they get to produce 2.4 pieces a day. In order to meet the total demand of 300 finished goods, we therefore need to deploy an average of 133 workers.

Following the previous output volume estimations, the size of production space can be defined.

Assuming a working station occupies 5.5 square meters on average – including desk for cutting fabric, knitting and circulation – the total necessary space for manufacturing sums up to 750 m2.

- Printing facility

Based on a proxy analysis with other textile manufactures, 272,4 m2 of textile are needed in order to produce 100 shirts (including waste). It follows that the daily required output for printed fabrics sums up to 866 m2.

Digital printers print at an average speed of 555 m2 per hour. Thus, exceeding the total output demand per day for a single printer.

Digital printers average a size of 2 x 5 m, occupying 10 m2. It follows that the space required for digital printing facility is minimal.

- Storage

Due to the close proximity of suppliers, deliveries can be made more often thus helping reduce storage space.

A textile roll size is usually around 135 m2. It follows that 6.5 rolls are needed a day. If orders are processed monthly, then a total of 160 rolls are made per order.

The surface footprint to store these rolls is estimated at 25 m2, assuming that a roll occupies a box of 1.5 x 0.2 x 0.2 m. An additional 25 m2 are needed to store finished printed rolls.

- Quality control / Packaging / Delivering

Inspection time per garment is estimated at 30 seconds. Thus, a single worker can inspect up to 900 garments per day, which exceeds the daily manufacturing output. Packaging time can take up to 1 minutes, considering the package design. Yet 1 worker is enough to complete the work.

Assuming that every designer is assigned a storage row (footprint 10m2) prior distribution, then total required surface for control, packaging and delivering can be estimated around 300 m2.

- Offices

Instead of having a centralized operating structure, the project aims to give access for young designers to manufacturing infrastructure. Therefore, supplying office spaces for several fashion and print designers.

Given the accessible manufacturing workforce, office numbers are based regarding an estimation of 7 workers per designer. Therefore, spaces account for a total of 17 offices for fashion designers and 3 other offices for print designers; sustaining strong collaboration between both parties is essential.

If an office is estimated at 20 m2 – for design and prototyping space – then the total surface is 400 m2. An additional 50m2 are required for financial and managerial tasks, assuming that an average of 5 employees will take care of marketing and operational decisions.

3. Market size volume (For who are we producing)

a) Market definition

Local manufacturing initiatives, due to lower economies of scale and higher attention to ethical standards, suffer from higher production prices. On that account, people have been more receptive to fast fashion during the past few decades due to its attractive prices and quick turnover.

However, the market is starting to grasp the negative impact of such industries on environmental and social levels. They are looking forward to supporting businesses with purpose and value local products.

Local products are alluring for their quality and durability. Their price is expected at a higher premium than the average industrial output price. For instance, their market is limited to middle-high income consumers that can afford comfort.

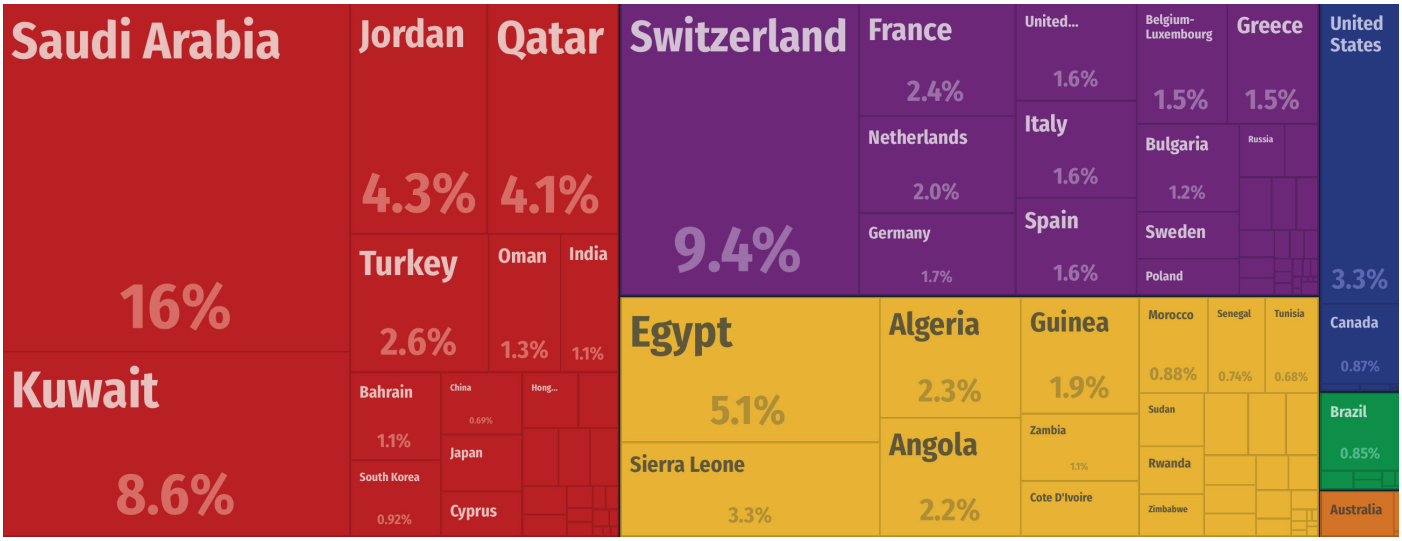
b) Market size and segmentation

Manufactured garments in Beirut will have to consider their market size in respect to the following opportunities and constraints: Age, financial status, distance to retail and taste for local products.

Production output will aim to cover the Lebanese market and key export markets for the Lebanese economy. The proximity of the site to the port is an added value to facilitate operational strategies for foreign shipments.

Foreign markets are considered regarding their proximity which facilitates delivery and shipping procedures for a start. The following figure undermines key export partners. We will retain the countries with which strong export ties are already present, including: Saudi Arabia, Kuwait, Jordan, Qatar, Egypt, France and Switzerland.

Figure 33: Key export partners for Lebanon



Source: MIT media Lab

The large presence of Lebanese Diaspora in the highlighted foreign markets is an asset. It represents a market that is seeking to contribute to their national economy and favors local taste. It is therefore important to note the presence of Lebanese diaspora accordingly, in order to grasp the market impact. The second driver for foreign demand resides in online shopping. On that account, we will trim the market to the numbers of online users that are familiar with online shopping. An estimation of 40% is considered in order to size online consumers.

The manufacture will aim to supply the principal foreign markets in term of registered exports and number of Lebanese residents.

Regarding the Lebanese market coverage, we will assume a 100% rate for the area of Beirut and Mount Lebanon due to their proximity. However, the first constraint to question is by asking the following: how many can afford garments at a slight premium? Middle to high income residents in Beirut and Mount Lebanon area are estimated at 75% of total population. However, in the northern and south parts of the country, such estimations fall down to 62%. Furthermore, they are less likely to commute to Beirut. Analysis is summarized in the following table:

Figure 34: Market size estimation

Age		0 - 4	5 - 14	15 - 24
Lebanese Market				
Region	**Beirut**	27'346	70'148	77'480
	Mount Lebanon	106'750	273'836	302'457
Total		134'096	343'984	379'937
Market size	Middle to high income (75%)	100'572	257'988	284'953
	Age group target	0	0	284'953
	Concerned niche*	**-**	**-**	**170'972**
Region	North Governorate	43'442	65'265	42'929
	South Governorate	33'079	84'854	93'722
Total		76'521	150'119	136'651
Market Size	Middle to high income (62%)	47'443	93'074	84'724
	Distance barrier**	14'233	27'922	25'417
	Age group target	-	-	7'625
	Concerned niche*	**-**	**-**	**4'575**
Diaspora Market				
MENA	Saudi Arabia			
	Kuwait			
	Jordan			
	Qatar			
	Egypt			
Europe	Switzerland			
	France			
Total				
Market Size	Middle to high income (95%)			
	Online shopping demand (40%)			
	Age group target (70% above 15)			
	Concerned niche			
Total market size				

* Demand for local products or capacity to shift for local taste (by age group).

Nb. Assumption are made as hypothesis, no study has been conducted on that subject so far.

- Consumers from 15 to 34 years old are the most locavores and fast adapters to market shifts. They represent for instance a potential interest of 60% of the total market size.

- Consumers from 35 to 64 years old are less adaptive to market shifts. They represent for instance a potential interest of 40% of the total market size.

- Consumers above 65 years old are less likely to shift for new local products. They represent for instance a potential interest of 10% of the total market size.

** Potential customers living outside the boundaries of Beirut and Mount Lebanon will enjoy a less better access to products.

25 - 34	35 - 44	45 - 54	55 - 64	65+	Total
61'271	51'244	40'662	29'724	38'443	396'318
239'181	200'004	158'732	116'032	150'068	1'547'096
300'452	251'248	199'394	145'756	188'511	1'943'414
225'339	188'436	149'546	109'317	141'383	1'457'561
225'339	188'436	149'546	109'317	141'383	1'098'974
135'203	**75'374**	**59'818**	**43'727**	**14'138**	**499'233**
40'804	22'085	12'511	6'540	4'028	237'604
74'115	61'986	49'186	35'955	46'502	479'399
114'919	84'071	61'697	42'495	50'530	717'003
71'250	52'124	38'252	26'347	31'329	444'542
21'375	15'637	11'476	7'904	9'399	133'363
6'412	4'691	3'443	2'371	2'820	40'009
3'847	**1'876**	**1'377**	**948**	**282**	**12'003**

	160'000
	40'500
	35'000
	25'000
	30'000
	4'000
	35'000
	329'500
	313'025
	125'210
	87'647
	70'118

					581'353

In conclusion, the total market size is estimated at a value of 581’353.

c) Market volume

Yet, in order to define the market volume, we should specify the penetration rate of the output products.

Penetration rate = (#Customers)/(Size of target market)

It follows that:
Customers = Penetration rate* Size of target market

Penetration rate is usually calculated upon first observations of an implemented business. It is hard to speculate without having any establish sales data. However, we are going to assume a rate of 16% (average representation for the penetration rate of fashion brands) and deduce the final result by proxy.

Customers = 0.16 * 581’353 = 36’500.

Consumers tend to buy less often high-quality garments compared to fast fashion demand frequency.

If consumers buy on average 2 garments per year, then the total necessitated output during a one year period is 73’000 garments. Thus, such an annual output can be reduced to a daily production output of 200.

4. Optimal production volume (How much are we producing)

a) Method

Now that the demand has proved to be present, is investing in a textile manufacturing economically viable at the given market size?

In order to respond to that concern, the analysis is going to tackle costs and generated revenues through different scenarios of production volume and justify whether the demand is above the brake even point of production. Therefore, the aim is to prove that the investment is profitable starting at a certain quantity of production q that shall not exceed the present market demand.

As seen earlier, a preliminary study to size different programs of production is made in respect to 280 sewing units. The different components and elements for each program are drawn in plan. We can therefore define - as a start - the necessary area of production for the different program required in textile manufacturing in respect to 280 sewing units.

In order to facilitate the reasoning, the variable x is limited to one and defines the number of sewing units. It follows that all other programs are sized in response to the changes in the value of x. For example, the required area to hosting 280 sewing desks is 900m2 and the area for fabric finishing is 275m2. Taking that into consideration, we can define a ratio to correlate the size of fabric finishing in respect to the number of sewing units. In that case the ratio equals 1/3.5.

Figure 35: Sizing of the different programs involved in textile manufacturing (where x= 280)

Entities		Ratio: sewing to related activity	Working stations	Area per unit m2	Total area m2
Creative	Fashion design studio	4.7	60	10.0	600
	Prototyping space	9.3	30	8.3	250
	Print design studio	11.7	24	5.8	140
Printing	Screen printing	140.0	2	75.0	150
	Digital printing	28.0	10	15.0	150
	Block printing	23.3	12	12.5	150
Garment manufacturing	Drawing plotter	35.0	8	6.3	50
	CNC cutter	140.0	2	25.0	50
	Straight knife cutting machine	5.2	54	3.7	200
	Sewing	**1.0**	**280**	**3.2**	**900**
	Finishing	3.5	80	3.4	275
Total variable area					2915
Logistics	Storage		5		300
	Distribution		5		350
Management	HR		8		55
	Production management		8		55
	Inventory management		8		55
	Sales & Marketing		8		55
	Photography studio		0		50
	Factory manager office		1		20
	Managing director office		1		20
	Conference room				45
Total fixed area			44		**1005**
Total area			**44**		**3920**

Costs and revenues are going to depend on the size of each entity in production.

Furthermore, the number sewing units outlines the daily output of production. For instance, assuming that one unit produces on average 2.5 garments a day:

Figure 36: Variable correlation to total manufacturing output per year

Sewing units (Variable to change	**280**
Garments per sewing unit	2.5
Output Z (per day)	700
Output Z (per year)	255'500

b) Revenues in manufacturing

Figure 37: Revenues from goods sold

Goods sold q	255'500
Price per good ($) p(q)	70
Total revenue	**17'885'000**

c) Costs in manufacturing

The following charts illustrate the quantitative reasoning to determine the total costs involved for a production with 280 sewing units as sized earlier for the process flowchart. Yet, the same reasoning process can be applied to different scenarios of production volume.

Figure 38: Cost of equipment

Category	Item	Cost per item $	Quantity	Total cost	Depreciation span (years)	Linear depreciation (per year)
Furniture	Chairs	50	574	28700	20	1435
	Working desk	200	130	26000	20	1300
	Sewing table	150	390	58500	20	2925
	Storage racks	1000	5	5000		
Lighting						
Services						
Machines	Sewing machine	400	390	156000	20	7800
	Screen printer	25000	2	50000	8	6250
	Digital printer	20000	10	200000	8	25000
	Net drawing Plotter	9000	8	72000	8	9000
	CNC cutter	17000	2	34000	8	4250
	Straight knife	1200	54	64800	8	8100
Electronics	Computer	1500	118	177000	5	35400
Total				**753'800.00**		**101'460**

Figure 39: Cost of labor

Education background	Number	Salary ($ per month)	Salaray ($ per year)	Total salary per education profile ($)
Holders of a university diploma	118	2000	24000	2'832'000
High crafting skilled worker	92	1000	12000	1'104'000
Task specific training	348	800	9600	3'340'800
Total				**7'276'800**

Figure 40: Cost of facility

Size (m2)	3920
Cost of construction ($ per m2)	1000
Total	**3 920 000**

Figure 41: Cost of goods sold COGS

Goods sold	255'500
Cost of production per good	30
Total	**7'665'000**

Figure 42: Cost of energy

Price public electricity (cents/kW)	12
Price private generators (cents/kW)	25
Electricity shortage per day (hours)	3
Number of working hours	8
Number of non working hours	16
Electricity consumption during working hours (kWh)	30
Cost of private electricity consumption per hour	750
Cost of public electricity consumption per hour	360
Total cost ($)	48
Electricity consumption at night (kWh)	6
Total cost ($)	11.52
Total energy costs per day ($)	60
Total energy costs per year ($)	**21'834**

Figure 43: Total costs with interest per year

Total costs of production (year 0)	$ 18’985’094
Total costs of production > year 1	$ 15’065’094
Interest rate	5%
Loan (for first investment)	$ 18’985’094
Loan period (years)	10
Interest to repay per year	$ 94’925

Total costs with interest (year 0)	**$ 19’080’020**
Total costs with interest (year 1-10)	**$ 15’160’020**
Total costs with interest (After year 10)	**$ 15’065’094**

d) Free cash flow analysis

The profit of a given project is the difference between the generated profits and the required costs for production, given a certain quantity of production q.

$\Pi(q) = p(q)*q - C(q)$

In the following chart the numbers are generated in respect to 280 sewing units which corresponds to a production volume of 255'500 garments per year.

Figure 44: Total profits per year (for a production size of 280 sewing units)

Gross profit	
Year 0	$ -1'195'020
Year 1-10	$ 2'724'980
Year >10	$ 2'819'906

Taxes to repay	
Tax rate	10%
Year 0	$0
Year 0-5	$0
Year 5-10	$ 272'498.02
Year >10	$ 281'990.57

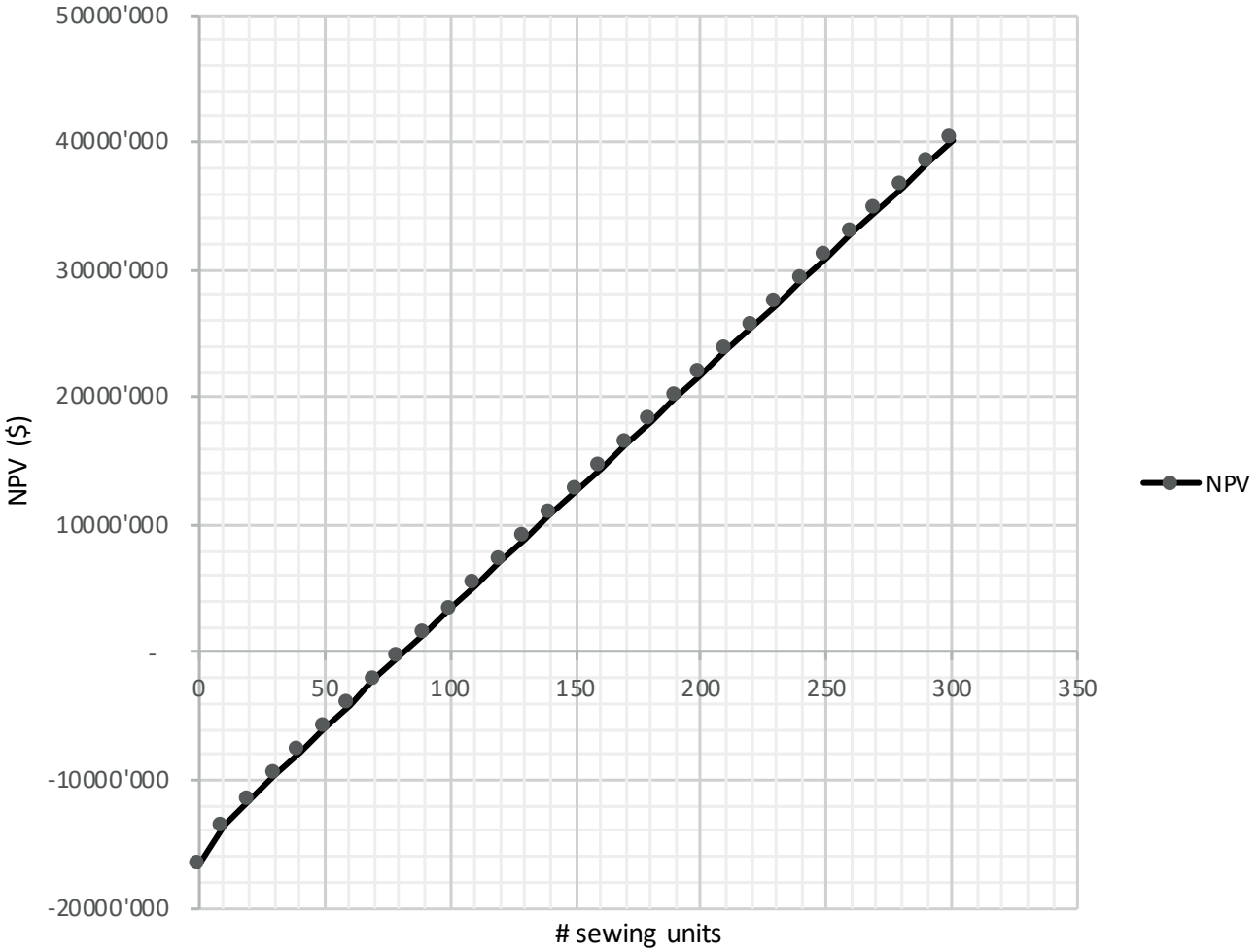
Net income FCF	
Year 0	$ -1'195'020
Year 1-5	$ 2'724'980
Year 5-10	$ 2'452'482.21
Year >10	$ 2'537'915.13

Considering an interest rate of 5% the Net Present Value of the investment with an annuity of 30 years is equal to $ 36'513'371

The NPV depends on the size of factory. Therefore, by varying x – the number of sewing units – we obtain different results.

An investment is considered worth undertaking when the NPV is positive over its whole life cycle. The different scenarios for production size are summarized in the following chart :

Figure 45: Net present value of investment as a function of the production size



In this case, the net present value is null for a factory with 82 sewing units. It follows, that the minimal size of the factory should be greater than that.

Free cash flow analysis (For x=82)

Interest rate	5%
NPV (Annuity over 30 years)	$ 61’003.68
Return on investment ROI	0.03

Given that the size of the market is satisfied for a production with 200 units (200>82), the investment is worth considering. Thus, there is enough demand for such a production size. The optimal size should respond to market demand in order to avoid losses.

5. Opportunity costs and main objectives

It is important to consider other alternatives for investment prior deciding what is the best business venture to undertake. For instance, let us assume the case of investing into real estate and selling apartment to generating quicker profit.

In the following example, we are going to assume that the market demand for housing is at its peak and that apartments are sold during the first year of construction.

Zoning laws in Mar Mikhael region	
Max building height (m)	61
Façade drawback to plot limit (m)	4.5
Construction percentage	70%
Coef. of exploitation	3
Site characteristics	
Hangar area (m2)	10894
Plot area (m2)	70588

Real estate development project	
Land value in Mar Mikhael ($ per m2)	1000
Apartment price ($ per m2)	3150
Construction cost ($ per m2)	300
Maximum number of floors	20
Total surface (m2)	217880
Total cost	$ 76’258’000
Total revenues	$ 686’322’000
Profits	$ 610’064’000
Return on investment ROI	**8**

Alternative investment: Manufacturing with 200 sewing units	
NPV (Annuity over 30 years)	$ 21’861’426.62
Return on investment ROI	**6.01**

In the following example, we realize that investing into real estate development can generate slightly higher return on investment and higher profits (ROI of 8% compared to 6% in manufacturing). However, the assumptions are utopic. As mentioned earlier in part II, the real estate sector is saturated for the present moment in Lebanon: the supply is much higher than the demand. There is a very high chance that many apartments will be left unsold.

The real estate market is highly dependent to the stability of an economy. Considering the political and economic instability of the region such an investment becomes very risky. Given the high costs of the project prior development, the investment is not worth undertaking the risk.

In addition, investing in manufacturing promotes economic and social value creation. Therefore, by focusing on the social aspect of manufacturing as an added value, it turns out that such an investment becomes the best choice to undertaking.

Sources

Rob Thomposon, Manufacturing processes for textile and fashion design professionals, 2014

Potts Jason, The economics of creative industries, 2016

Wojtyna Jean-Pierre, Hans Breandenburg, L'approche du processus mode d'emploi, 2006

Weidmann Daniel, Technologies des textiles de la fibre a l'article, 2009

Aga khan Award for Architecture Grand Saconnex, Architecture and identity proceedings of th regional seminar held in Kuala Lumpur, 1983

In sum, the project's success depends upon two separate factors. The first type of factor is demand, it is external and can therefore hardly be controlled. However, its presence guarantees the success to manufacturing in the city. On the contrary, the second type of factors refer to internal practices and represents the different elements for success that the project should take into consideration. These elements are defined upon the basis of this study and expected to be put into practice once the project is being conceived.

Referring to external factors, the first key to supporting local manufacturing initiatives consists of consumer shifts. Fed up with mass-produced items, consumers are gradually embracing smaller and local brands. The presence of a niche market looking for quality made goods with attention to ethics is growing in size. In fact, people are more and more willing to pay a slight premium to supporting slow fashion practices. Furthermore, with the impact of digitalization, shopping became accessible at a larger scale. New entrants to the market in manufacturing can benefit from a much bigger exposure than ever before through online sales and marketing. Having said this, small manufacturing entities that aim to deliver high quality products have better chances to scaling up production.

On the other side, the project should aim to deliver an added value in production in order to sustain competition. The following elements are essential ingredients to promote innovative practices in production and supply the demand accordingly.

First if all, the site for manufacturing should not be limited to production itself. The overall programs should support the creation of a textile hub that seeks to attract people from different backgrounds. Such programs include for instance the presence of exposition spaces, retail and workshop to form new generations in textile manufacturing. The

intent to educate and cultivate a bigger niche in fashion is beneficial on the short and long-term development. On the short run the exposure for production is promoted and people are better aware of the ethical practices operated on site. Yet, on a longer run the whole ecosystem for textile manufacturing becomes more solid with the increasing supply of talented workers. The overall image of the project becomes associated with socially oriented efforts. On that account, the place can expect to become an international landmark for fashion where people can learn, discover and buy quality made garments.

Secondly, aligning different practices together is essential to test things much quicker and therefore innovate in production. In the case of this study, fashion design is conceived in order to operate along textile design entities. Henceforward, fashion designers can test their textile patterns in-house and prototype at a much faster rate. The proximity of both practices can help avoid costs and distorted information issues involved when relying on external suppliers. Similarly, design units for garments and prints are present alongside production. The close collaboration between designers and craftsmen is an additional asset to testing things much quicker and benefiting from a shared know-how in manufacturing.

Finally, the forecasted demand will eventually grow with time. Making production flexible to develop respectively is important from an investment point of view. In order to meet such an intention, production should be divided into autonomous operating units. Each unit consists of a design, production and retailing space. Taking this into consideration, the project can therefore start production by investing into one unit and replicate it when demand is present. Hence, by starting small the project's output is better off avoiding losses.