# 1.3

**BILLION TONS OF MUNICIPAL SOLID WASTE ARE GENERATED EVERY YEAR BY CITIES WORLDWIDE...**

# 1.3

**BILLION TONS OF UNUSED RESOURCES.**

ARTICLES

# TRASH TO TREASURE


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**An investigation into how Beirut's waste can be turned into a valuable resource.**

by Edda von Hodenberg

5140277

# 01 ABSTRACT

This research paper investigates how Beirut's unused waste can be turned into a valuable resource through the activation of Lebanon's heritage in textile making. Thus, the hypothesis of turning the country's plastic waste into textile threads in order to feed the sector with innovation and competitive qualities will be the key provider for this research.
This hypothesis is to be seen against the background of today's fragmented production network which is globally separated in time and space. The flagship store occupies a central position in this system. It embodies inspiration, encourages participation, and carries the responsibility to promote the company's identity. Therefore the extent to which a flagship store can perform in a social, cultural as well as an economical way in the center of Beirut shall be examined throughout the research and design process.

The conceptual framework is based on different theories that support the research in its different layers. Methods such as fieldwork, explorative interviews and case studies will expand the hypothesis with diverse knowledge.

Resulting, the research shall lead to outcomes which will be supportive in following design choices. The investigation into different layers of research intends to encourage design questions regarding urban positioning, materialization, concept, and desired image.

Key words:
• Waste Crisis
• Textile manufacturing
• Cultural Heritage
• Technological Innovation
• Fragmented Production
• Education
• Participation
• Flagship Store
• Circular Materials



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# 02 INTRODUCTION

Beirut has constantly been facing disastrous consequences of a collapsing waste management system, dating back to the beginning of the civil war in Lebanon (1975-1990). With most of the country's infrastructure damaged and a government unable to supply public services due to difficult socio-economic and political conditions, Beirut and many other areas in Lebanon have been left without waste management facilities for years (Boswall, 2019). With this volatile and unreliable system not seeing any development throughout the past decades, Lebanon's waste catastrophe has turned into an unheard call for help (HRW, 2017). Unauthorized landfills and incineration sites have become a common phenomenon near inhabited areas and are further adding to the gravity of the situation (K2P, 2015). The country is facing a severe waste crisis without prospects.

Within the context of the 2030 Agenda for Sustainable Development, waste management is becoming an increasingly important topic on a global scale (UN, 2015). Multiple countries have adopted alternative, environmental friendly waste management procedures such as source reduction, collection, recycling or composting, there is still no serious attempt for change visible in the case of Lebanon. Japan e.g. achieved a 84 percent decrease in landfills of industrial waste, while the resource productivity rate between 2000 and 2010 increased by 51 per cent, mainly due to political regulations, voluntary measures for industries and awareness-raising programs (UNEP, 2013).
In Israel, the closure of hundreds of unregulated garbage dumps and the following establishment of a small number of sanitary landfills made the amount of landfill waste drop 17 percent. Moreover, the introduction of recycling centers and a law mandating a deposit/refund on beverage containers supported the shift towards a more sustainable strategy and have turned into economic drivers (Di Maria, 2017).
A 2004 World Bank study on Lebanon showed that improved waste management practices, such as recycling and composting, could not only reduce ecological and health risks, but also save the State $74 million a year (HRW, 2020).
Plastic, making up for 11,5 percent of Lebanon's waste, illustrates one of the most environmentally harmful contributors and is yet the share with the biggest potential in economical value (GIZ 2014). By acknowledging this potential and understanding waste as a rich resource instead of a purposeless polluter, a new perspective for Lebanon can open up.

## 2.1 PROBLEM STATEMENT

In Lebanon, waste is still considered as a dead-end scenario of a linear process. The preferred waste management method of landfills and dumpsites, accounting for 85 percent, reflects the country's perspective on waste solely seen as a valueless substance (HRW, 2020). It seems that even though landfilling is scientifically proven to be associated with serious human health risks as well as severe threats for the ecological system, Lebanon's government does neither realize the urgency, nor the opportunity of the situation (K2P, 2015).

Beirut has dumped its waste on landfills near the port before the country's civil war (1975-1990) already (Figure 1). Since then, the governmental failure for alternative long-lasting, environmental-friendly solutions has only exacerbated the situation and turned into a country-wide disaster.





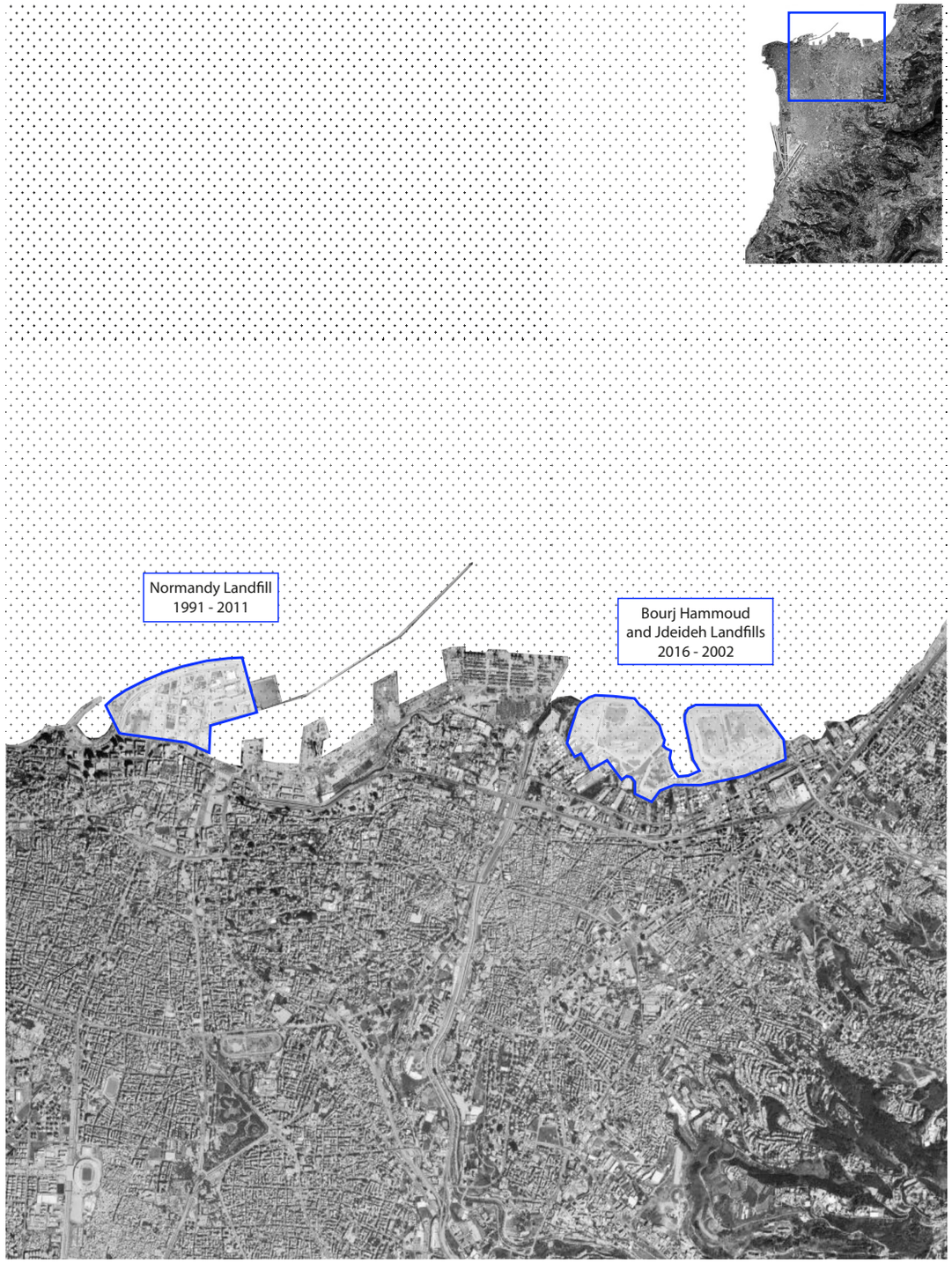


Figure 1. Map illustrating the location of two former landfills within the city of Beirut.

The peak of Beirut's solid waste crisis was triggered by the closure of Naameh, the capital's main landfill, in July 2015, after years of protests by local residents (Figure 2). While government authorities refused to introduce any alternative waste disposal plan, Naameh's waste started to pile up in streets of Beirut - uncollected for weeks, festering in the summer heat for months. Protestors subsequently started a movement called #you stink which targeted the corrupt and dysfunctional political system for its failure to address the crisis - yet without any success (Pandey, 2020).

Despite the ongoing political and economic problems in the country, the wide-spread awareness across Beirut's population shown through the protests can be seen as a symbolic will for change. Altering the country's perspective on waste from a burden into a resource must be the first step towards exploiting the unused potential of Lebanon's huge amounts of waste. The shift towards alternative waste treatment methods through the activation of Lebanon's heritage and tradition in craft making can generate progress within the threatened manufacturing production sector. Plastic, which embodies the most harmful proportion of all sorts of wastes, can offer a great opportunity for up-cycling into long-lasting, sustainable products. Therefore the association of waste with production can enable Lebanon's industrial sector to compete on a global level.
Since Lebanon's treasure of its local craft making tradition has been weakened significantly due to industrialization shifting its focus towards mass-production and the simultaneous rise of the global market, the sector is in urgent need for innovation in order to compete in today's world (FNS & TSF 2020). The textile industry, one of the oldest parts of the craft sector, is still greatly embedded in the collective memory. However, with the discovery of low-cost fabrics, Lebanon's silk enterprise became obsolete. This disappearance is not only a danger to a treasure of Lebanon's heritage, but also an underestimated and unexploited potential for its economical development. Thus, the hypothesis of turning the country's plastic waste into textile materials in order to feed the sector with innovation and competitive qualities will be the key provider for this research.





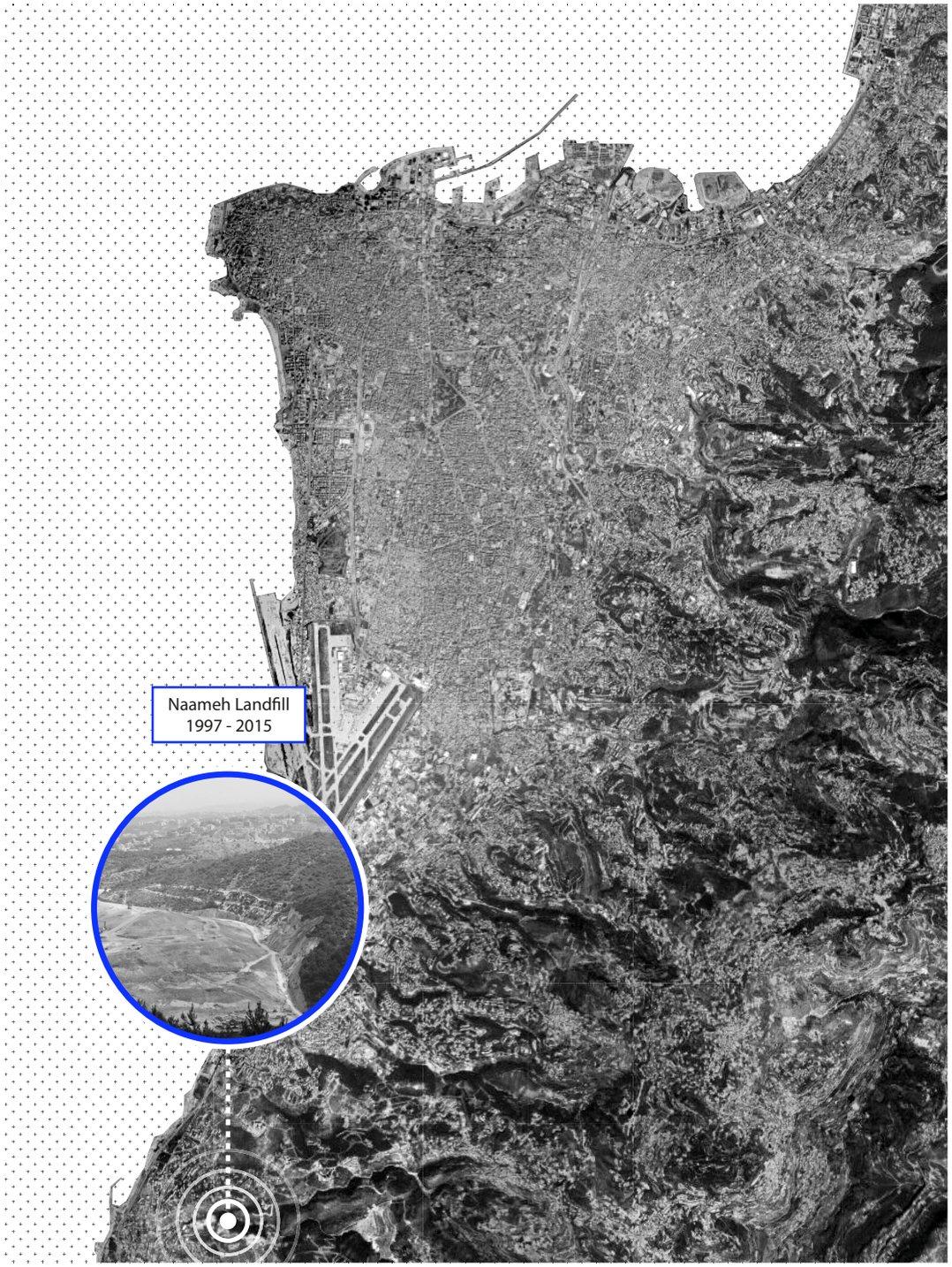


Figure 2. Map showing the proximate location of the Normandy Landfill to the city of Beirut.

## 2.2 RESEARCH QUESTIONS

Lebanon's textile industry is one of the country's most precious crafts and is today still seen as an important part of the national cultural heritage. Even though the enterprise has become obsolete since the 1980s, Lebanon had enjoyed 2000 continuous years of prosperous silk production, being the most important economic driver during the Ottoman Empire (Mahdaw 2010). Hence, the history of Lebanon's textile industry does not only have a socio-cultural association, but also an economic tie. Feeding the threatened sector with the innovation of up-cycling plastic waste as a resource for textile threads can enhance Lebanon's competitiveness on the international market. The revolutionized sector aims to respond to global questions on ethics, sustainability and empowerment within the context of a knowledge based economy.

On a global scale, waves of technological innovation have constantly been changing the situation of production mechanisms and networks within the creative and cultural industries. These innovations are not only causing an expansion of the demand possibilities, but also an expansion of the production ones (Sacco, 2011). Thus, this transformation of audiences into practitioners can be seen as a huge potential in the context of Beirut's craft making sector as well. Open innovation as a catalyst for the revival of Lebanon's textile industry can further strengthen the relationship between cultural activity and the generation of economic and social value added.

In addition to the change of roles, today's modern industry is clearly fragmented in time and space. Production supply chains are distributed in many different locations, both on a national, as well as an international scale. Processes are simultaneously taking place in many locations, creating a metaphysical network across the whole country and further. Besides its industrial production sites, the specific case of recycling as an innovative implementation requests educational and informative institutions. These follow the purpose of educating the public, creating interest and transferring knowledge. The resulting participation and curiosity within the topic can positively affect the future of the industry. Since the city's waste crisis, as well as Lebanon's textile heritage is already closely linked to Beirut's local residents, public engagement offers a lot of possibilities in flourishing the sector.

Waste collection can locally be done as a means of bringing the active production closer to the public. However in order to sustain an efficient system, a strategic waste collection plan is required. This is asking for a fragmented spatial, as well as temporal distribution within the network.

A central role in this framentated network is occupied by the flagship store. By representing a universal power of inspiration for the public, it engages people and encourages active participation. The role as a physical display of possiblities, aspirations and ambitions turn the flagship store into an incentive institution. Furthermore, a flagship store has the role and responsibility to glocally promote its corporate identity and the cultural, ethical and local values of its enterprise. As a result of these key characteristics, flagship stores are usually located in prime urban places, which enable them to gain the most attention from the public.

Characteristic attributes such as the architectural representation, scale and operational feature of a flagship store are all important aspects that need to be determined. Therefore the investigation into the functionalism and philosophical concept of a flagship store in regard to Lebanon's modernized textile industry shall be examined. Can such a store act in an educational, communal, as well as a commercial way?

How can it encourage innovation, social cohesion, new entrepreneurship and local identity? How can the transformation process of turning waste into a resource be inspirational for design and possibly be incorporated and eventually reflected in the building?
The project aims to represent an inspiring example which is able to start a movement not only for Lebanon's textile industry, but also for many other cultural fields.

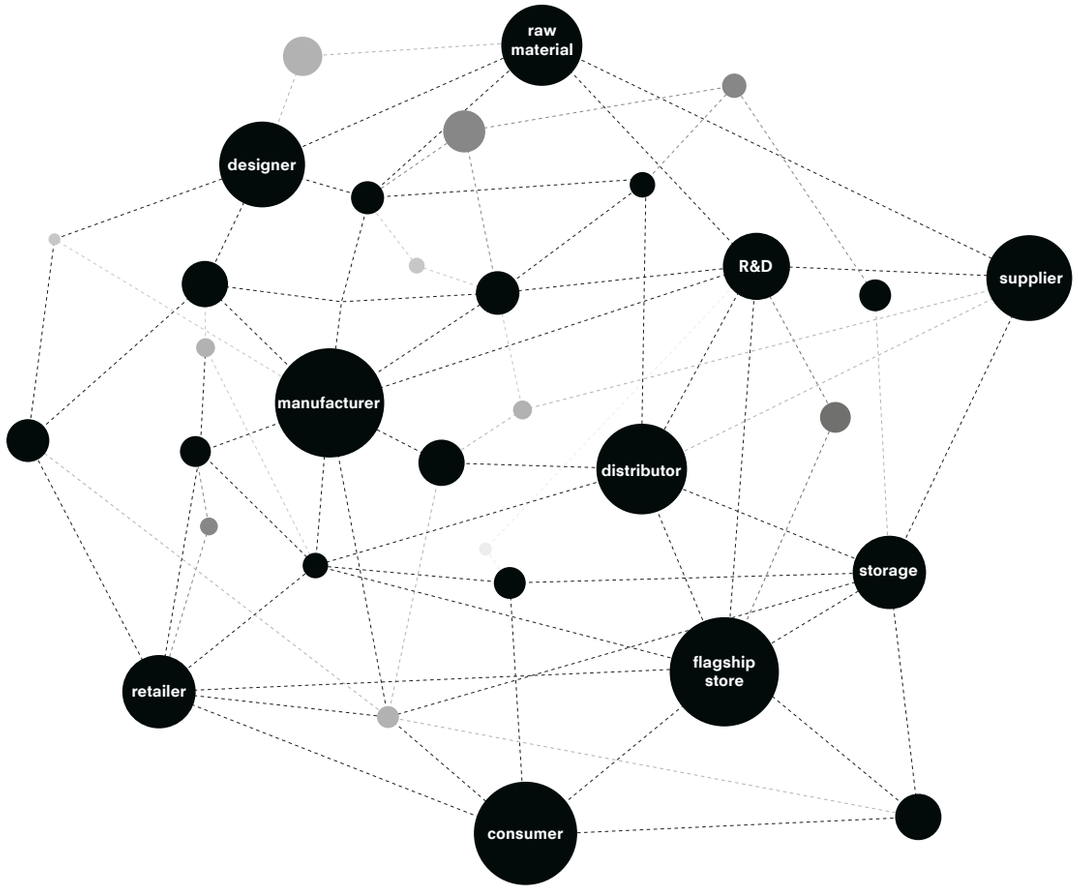


Figure 3. Interconnected stakeholders of a framentated modern Industry.

# 03 THEORETICAL FRAMEWORK

The conceptual framework is based on different theories that support the approach of a metabolic cycle and a flow model of goods and resources. Moreover, it includes theories about metaphysical heritage conservation in a modern world and Venturi's theory of complexity and contradiction in architecture.

The theory of Karma Konsa "Time and Space of Heritage Preservation: Conservation Theoretical Perspective" supports the concept of temporal values which are in the context of this research represented by the craft of textile making. According to Konsa, to build bridges between tradition and innovation is a method which enforces heritage. The preservation of non-material culture, which is made up of values and beliefs, social norms, and all kinds of symbolic systems (language, numbers, art), encompasses people's thoughts and behavior, their ideas, and all sorts of abstract entities, is the key guideline cultural and collective memory. It reflects on memory's relation to history and its social, cultural and political roles. Questions of history, memory and identity shall be risen and potentially be answered throughout the design process.

Following the theoretical approach of Hebel, Wisniewska and Heise in their publication "Building From Waste", there are two possible readings of waste: either to see it as the biggest polluter, following the traditional understanding of waste; or to see it as an enormous richness of resources. The latter perspective requires a different view of garbage production and is the one that will be followed throughout this research paper. By acknowledging the huge potential of waste and understanding waste as part of societies' wealth, a new scope of possibilities can open up. Once we start seeing waste as a gift, rather than a burden, it will start to be freed from its "pejorative stigma" and exploit its hidden potential (Hebel, Wisniewska, Heise, 2014). The theoretical position of relationships between industry (economy) and culture in a glocal world of empowered individuals is described by P. L. Sacco in his paper "Culture 3.0: A new perspective for the EU 2014-2020 structural funds programming" (Sacco, 2011). He describes the persisting gap in the conceptualization of the role of culture in an advanced, knowledge based economy. Sacco claims that we have entered an active cultural participation today, which is eventually reshaping our own social identity.
Globalization has driven many enterprises towards change in their strategies. Not only the decentralized geographical distribution of manufacturing has altered but also the general approach and attitude towards a modern sector. There is a universal trend towards the creation of desire including principles such as ethics, hybridity, glocal, show-case, active participation, local making and empowerment. These values have gained more and more importance throughout the years and are becoming the manifesto of modern production.

In his book "Complexity and Contradiction in Architecture", Robert Venturi states his theoretical approach of complexity and contradiction in architecture based on the richness and ability of modern experience (Venturi, 1966). He encourages to welcome problems and further exploit uncertainties. This approach is aiming for a messy vitality as well as validity and duality.
"In an inclusive, rather than an exclusive kind of architecture there is room for the fragment, for contradiction, for improvisation, and for the tensions these produce (Venturi, 1966)".
In an attempt to translate this theory to today's context, the framework asks for the embrace of a multiplicity of problems, rather than focusing on a singular one.





Venturi's framework shall be a guidance for the following design in terms of it aiming for complexity and a need for a variety in visual, as well as conceptual experience. The urban positioning within the context of Beirut's city center, as well as the building program both ask for a richness of meaning and expression, and an architecture which includes "both-and" rather than exclude "either-or". The historical tradition of craft making, as well as a future oriented innovation ought to both give character and meaning to the building.

The "cradle to cradle" principle by William McDonough is another key guidance for this research. The framework was developed to introduce the idea that all materials used in the industrial and commercial production processes should be acknowledged as constituents of a continual circular growing process (McDonough & Braungart, 1958). It is explained how products can be designed so that, after their useful lives, they will provide nourishment for something new.
In addition to this theory, case studies will be analyzed in regard to their choice of materials and their origin. Which lifecycle have they gone through? Where do they come from? How is the ecological footprint defined?

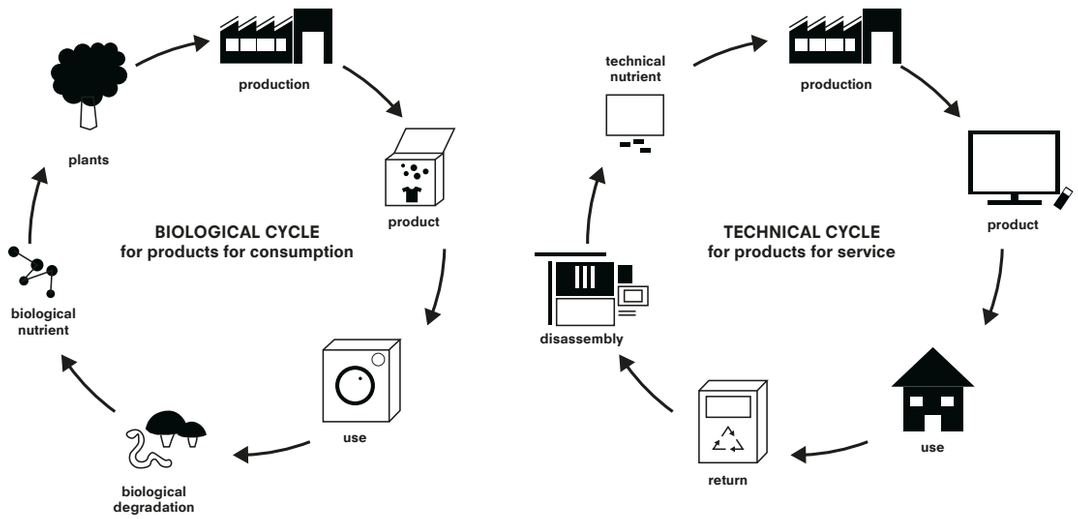


Figure 4. Cradle to Cradle Diagram showing the biological & technical cycle.

# 04 METHODOLOGICAL POSITIONING

**Fieldwork**
The fieldwork methodology for this thesis is oriented towards complementing the theoretical framework and answering the posed research questions. The research follows a qualitative approach to data collection, mainly based on non-participant observations, mapping, field documentation, collection of previously published research, (archival) literature review, online resources, image analysis and the analysis of relevant precedents and practices. Literature and online resources will support further investigations on an urban, as well as a historical layer.

Field research will limit itself to the site of Beirut's corniche and its proximate surrounding area. It will therefore represent information on a site layer. Traces of waste will be mapped along the corniche of Beirut, according to their age, their type, their size and their condition. This will make the project closely related to its context and shall furthermore lead to plausible assumptions on how these specific kinds of waste can be used for the upcycling process, (what is the percentage of plastic waste) and what type of end-product they can potentially embody as building materials. This process shall then be linked back to the theoretical framework of the "cradle-to-cradle" principle.

In addition to this, old silk industries in the closer context of Beirut will be analyzed and re-drawn in order to understand their functionalism. They shall support the following design decisions in terms of strategic production layouts, as well as their representation of a collective memory.

**Explorative Interviews**
Explorative interviews will help to close the gap between the designers' perception and the inhabitants', users' perception. They shall elaborate on personal concerns of Beirut's residents regarding the waste crisis. What are conceivable solutions that can be approached even without governmental support? What are the desires of the local public? These interviews aim to be conducive for the assessment on the current attitude of Beirut's residents towards a modern shift within the heritage craft sector. Is there a common sense on need for innovation?
A supplementary elaboration on the site's historical importance, its character, its specific cultural and social activities shall point out possible potentials that it carries. Further on, interviews with textile company owners will assess the current situation of textile production in Lebanon. Is there a will for change? What are main values to keep and revive?

**Case studies**
Case studies will support the research through a comparison of strategies. This will serve two separate goals. One is the analysis of materials and their use in relation to their location. The other goal represents the strategy of the plan layout of projects representing similarity in relation to function, program and contextual location. Through the methods of re-drawing, re-modeling and abstracting existing plans, a better understanding of those concepts shall be achieved. Moreover, the production process of upcycling from plastic to threads will be further assessed through the investigation of pilot projects. Which machines are needed? What is the scale? What is the duration of the process?





# 05 PURSUED OUTCOMES

This research plan aims to investigate new ways of how to modernize Lebanon's endangered textile industry as well as setting new milestones of innovative building materials by raising awareness. Both goals are linked to the same strategy: Creating value from unused waste for „new" materials. Innovation within Lebanon's textile manufacturing will work against the industry's decline. The underestimated and unexploited potential for its economical development, as well as its importance for Lebanon's heritage could both be positively influenced by progressive thinking and attempts for innovation. Opening up towards modern ways of production and adapting to the global trend of fair trade, ethical consumption, sustainability, handicraft and products that carry a story can be supported through the use of recycled materials and therefore representing a completely different approach.

The long standing history of the textile manufacturing, its collective memory, skillful labors and its sentimental connection to Lebanon's population paired with the innovation of up-cycling can serve as a catalyst to revitalize Lebanon's textile industry. The project shall exemplify a pilot project that acts as an inspiration and encouragement for others.

The study on case studies can act as a 'library' of possibilities in terms of circular architecture. (What) are the(re) limitations to reused/recycled building materials? What are the possibilities? But also, what is the architectural expression of such materials, what atmosphere is hereby created, how do they interact with their natural/urban surroundings. Therefore, the research shall underpin the architectural articulation of circularity in terms of materialization.

The reference of case studies will furthermore help to develop a building program and to understand scales and proportions of functions and spatial organization. Comparisons will lead to a better understanding of needs and demands for the specific case of Beirut.

Thorough research on the location at the Corniche of Beirut aims to investigate context-specific characteristics in terms of social, historical, as well as cultural values. These will form a base for the following design decisions.
Analyzing the different urban layers of Beirut's waterfront with its strengths, as well as its weaknesses shall help to find the correct positioning and architectural expression within the urban context.
Evaluating the historical evolution of the location will further guide the understanding of urban patterns, social ties and ecological changes.

The research shall eventually support the design process for a project which responds to its genius loci in a sensitive, respectful and appropriate way. The project shall further represent the values of Lebanon's heritage and culture of craft making, while simultaneously reflecting its potential for change in a modern way of industry.
The project design needs to reflect an equivalent of the modern production network and shall therefore carry the same values, such as transparency, participation, encouragement, inspiration and innovation.

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