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TECHNICAL ECLECTICISM AS REVITALIZATION OF BUILDING TRADITION: THE CASE OF FRENCH MANDATE BEIRUT

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SHORT ABSTRACT (150 WORDS)

Turn-of-the-20th century technical eclecticism has been blamed for eroding local building crafts leading to their eventual disappearance. This paper argues that this transitional movement between tradition and modernity actually reinvigorated traditions and led to unprecedented technical innovations. The paper differentiates between the high culture of engineers and architects and the popular culture of builders. It explains how the duality between industrialization and craftsmanship has impacted both cultures and how this duality was handled differently in metropolitan versus provincial contexts. The paper uses Paris and Beirut as case studies because of their colonial ties. It concludes by finding the specificities of Beirut's technical eclecticism as having suffered from 1) the difficulty of bridging the gap between importation and local manufacturing, 2) the lack of a critical discourse about the assimilation of contemporary building cultures, and 3) professional hybridism that failed to differentiate engineering and architecture as both complementary and autonomous professions.

LONG ABSTRACT (400 WORDS)

In both metropolitan and provincial contexts, turn-of-the-20th century eclecticism has been qualified as a transitional stage between tradition and modernity. The architectural movement tends to be politically charged with national aspirations and a will to modernize in order to resist Western hegemony. In its provincial dimension in the Middle East and North Africa, eclecticism has been interpreted as a mostly aesthetic phenomenon (stylistic hybridism) and a social one (plan

morphologies). The movement has rarely been dealt with in relation to its technological aspects, i.e. building construction and materials. Furthermore, some have blamed eclecticism for eroding local building crafts and leading to their eventual disappearance. This paper starts from a contrary premise. It argues that technical eclecticism actually reinvigorated local traditions and led to unprecedented technical innovations from the hands of local builders. The architectural movement aligned traditional and new industrial materials, revitalized old practices and generated new ones, while also giving birth to home-grown typologies and crafts. The paper differentiates between two types of building cultures: the high culture of engineers and architects based on scientific inquiry and artistic pretension and the popular culture of builders based on hands-on experience. The author explains how the duality between industrialization and craftsmanship has affected both cultures in different ways and how the dual adaptation was handled differently in metropolitan versus provincial contexts. The paper uses Paris and Beirut as case studies because of their colonial ties at the technical and commercial levels, with an emphasis on the ideological exchange between the two regarding educational models and professional practices. The paper focuses on how domestic architecture witnessed at the hands of "concrete builders" a drastic remake while keeping its "inner" identity. It celebrates the typical Beiruti house of the second half of the 19th century as the ultimate expression of a vernacular building culture. These houses succeeded in using traditional materials with the integration of industrial ones, leading to the creation of an original building type anchored in both its local context and a long building tradition. The paper concludes by finding the specificities of Beirut's technical eclecticism (and provincial eclecticism in general) as having suffered from 1) the difficulty of bridging the gap between importation and local manufacturing, 2) the lack of a critical discourse about the assimilation of contemporary building cultures, and 3) professional hybridism that failed to differentiate engineering and architecture as both complementary and autonomous professions.

INTRODUCTION

The import of mass-produced building materials from Europe increased during the second half of the 19th century leading to a gradual change in domestic building forms and structures. As in

Europe, transition between traditional building craftsmanship and industrialization was undertaken in two phases. An *empirical phase* was characterized by technical hybridism that incorporated "actualized" traditional materials and newer ones i.e., "the materials of modernity". A *scientific phase* was dominated mainly by the use of reinforced concrete. During the empirical phase, the domestication of imported materials was undertaken by the artisans themselves. The scientific phase saw the emergence of a new breed of professionals, the engineers, who introduced for the first time the role of the designer as an agent of the scientific know-how. In this sense, this article differentiates between two types of building cultures: the "popular culture" pertaining to local artisans and whose source is the pragmatic know-how, and 2) the "high culture" of the engineers, rooted in a theoretical knowledge of universal significance. The dialectic between these two cultures shaped construction practices during the transitional phase between tradition and modernity. Starting from such hypothesis, this paper explores the two building cultures and their respective role in shaping architectural production both public and private. The paper's purpose is two folds: 1) to demonstrate that technical eclecticism is a source of revitalization of local building practices; and 2) to extract the specificity of "provincial" technical eclecticism as practiced in Beirut by placing it in the more encompassing context of metropolitan eclecticism as exemplified by Paris.

THE EMPIRICAL PHASE

Technical eclecticism emerged during the second part of the 19th century when the preindustrial city started expanding beyond its medieval walls. This expansion led to the creation of a new building type: the extra-mural house, or the Beiruti house, with its triple arch, central hall and red tile roof. This new model combined imported materials from different sources: wrought-iron I-beams and roof tiles from France, mechanically-cut timber from Romania, cast-iron balustrades and hardware from England, and marble tiles and slabs from Italy[1]. The process by which these materials have been synthesized into a new model is still to be investigated. However, the process should be qualified as empirical since it was informed by a traditional know-how while still open to new materials.

Assimilation of local and imported building materials

As seen in historical photographs dating back to the turn of the 20th century (Fig. 1), the grafting of imported materials on existing structures was introduced first in a fragmentary fashion. Sehnaoui noted:

> "The flat roofs of houses done from compacted earth were replaced progressively by tile roofs, mainly in new constructions and also in the old residences of rich merchants … A factory for manufacturing tiles was built in 1897, not far from Beirut, which proves the magnitude of the market demand".[2]

Thoumin explained the advantages of using the tiles roofs for people:

> "If the terrace [the flat compacted earth roof] was not packed and rolled during autumn, it was transformed soon into a skimmer… The town dweller wanted a more comfortable residence where he was protected from the cascades falling from the roof, even if he forgot to roll his terrace. Some Lebanese traveled to France, and saw the tiles and their advantages. Fifty years ago, giving away the terrace roof expressed both wealth and a desire to copy the Occident ."[3]

The adoption of the pitched red tile roof with a timber frame was a major innovation compared to the massive preindustrial flat roof. This new structure reduced the compression on external walls while liberating internal partitions. In the first generation of the new buildings, the ground floor was usually vaulted, while the intermediate floors consisted of a timber frame with machine-cut beams. Their spacing and dimensioning were based on empirical experience. I-beams were later added to reinforce the timber floors. Hybrid structures were simplified at a later stage, keeping the I-beams with lime concrete fill. Finally, the vaulted ground floor was abandoned to follow the same type of structure as the intermediate floors. (Fig. 2)

Before the generalized use of concrete skeleton structures in the 1920s, floors consisted of concrete slabs supported by I-beams. The last stage was the drop beams resting on bearing walls. Finally, the pitched roofs will be replaced by the concrete slab announcing the second generation of postindustrial buildings and the start of the scientific phase.

These transitional techniques based on empirical knowledge were applied not only to domestic architecture, but to most building types including the institutional buildings of the Ottoman administration. In parallel to this evolution, the latest modern materials and techniques were

introduced through massive infrastructural projects undertaken to colonial economic and political interests.

Imposition of contemporary building technology

These new programs and building types were implanted in provincial territories as a showcase of engineering skills of metropolitan centers such as Paris. The enlargement of Beirut's port in 1889 served as one act of engineering bravado, featuring metallic structures in the warehouses designed by Gustave Eiffel himself. Orosdi Bak, the first department store in the city, which opened in front of the warehouses, was the first building in the city to use an elevator. While most of these buildings have disappeared, the first major structures in reinforced concrete are still standing. Concrete edifications include the missionary educational buildings of the *Ecole du Sacré-Cœur* and some buildings from the same period standing on the American University campus.

In brief, this empirical phase may be qualified as 1) a passage from a traditional to a semi-industrial order through the merging of local and imported materials by the builders themselves, and 2) as a sharp break with the past with the imposition of new materials, techniques and programs designed by European architects and engineers in isolation from the local building culture. During this phase, the duality between builders and engineers was not apparent. The two building cultures evolved in parallel with limited overlaps. Dualism emerged during the next phase, the scientific phase, with the establishment of engineering programs in local universities.

THE SCIENTIFIC PHASE

At the turn of the 20th century, most of the building materials were imported from Europe (Fig. 3). However the most significant change was initiated in the 1920s when cement became an integral part of the local construction practice. First imported, cement was manufactured locally starting in 1931. This change was accompanied, a decade earlier, with the graduation of the first breed of practicing engineers. For the first time civil engineering appeared as an independent profession and a new area of specialization in a sphere of activity limited until then to traditional building crafts. This section analyzes the itinerary of the first generation of professional designers who navigated the

transition from building in stone to building in concrete, and the assimilation of cement in the vernacular tradition by local builders.

Genesis of the cement industry

By the turn of the century, cement production and concrete construction were already established as an integral part of the European building industry, because of the pioneering role played by the empirical British, the theoretical knowledge contributed by the French and the improvement of production methods introduced by the Germans[4]. Builders and the public perceived concrete as "artificial cast stone", fit to inexpensively reproduce various historical styles. Beirut followed this trend. By 1920, imported cement, mainly from France, invaded the various components of residential buildings, first by reproducing local architectural features such as the triple arch, then by emulating the European revival styles. Between 1923 and 1930, consumption of imported cement increased about five times in the Levant states of Lebanon and Syria (Fig. 4). Since infrastructure projects alone cannot account for this increase and since French Mandate domestic architecture in Syria was predominantly in stone, the residential growth in Beirut during the 1920s and 1930s likely absorbed the increased concrete consumption. A field survey conducted of the peri-center districts[5] confirms that the final transition from traditional apartment houses to concrete apartment buildings occurred in the 1920s, with an accompanying boom in residential construction (Fig.5). The fast growth in cement imports between 1923 and 1929 stimulated the creation of the first cement plant in the Levant states. The *Société des Ciments Libanais* was established in 1929 through a joint French / Lebanese private venture and at the urging of the Archbishop of Tripoli, Monseigneur Arida, who hoped to reverse the rural-to-urban migration from north Lebanon to Beirut.

The local production of cement necessitated the creation of a modern building industry. Starting in 1930, leading merchant houses, such a Nagib Araman and Darwiche Haddad, progressively changed from importation to industry through the establishment of their own lines of local manufacturing that were based on foreign licenses. Western models inspired attempts to produce concrete blocks. Early molds were even patented. Meanwhile, foreign-educated designers such as

Antoine Tabet introduced "artificial stone", less as an imitation of traditional masonry and more in the spirit of the pre-cast elements used in modern construction[6].

Emergence of the Engineering Profession

While local manufacturing of cement established concrete as a standard material of construction in the states of the Levant, universities introduced the related theoretical knowledge through engineering education. In parallel to the Bachelor of Arts degree in Engineering offered by the American University of Beirut, the *Université St. Joseph* initiated a four-year program in 1913[7] that lead to a *Diplôme d'Ingénieur* . Archival records show that 60 candidates (including many Syrians) graduated between 1922 and 1929 from the *Ecoles Françaises d'Ingénieurs de Beyrouth*, and another 126 between 1930 and 1939. Although schools originally intended engineering education to prepare a new breed of specialists who could forward the industrial development of the country, most of the early graduates ended up as *bétonniers* or "concrete builders", a casual designation for practicing engineers mostly involved in building construction. [8]

Another category of professional designers, who participated in the residential boom of the 1920s and 30s, were the privileged few who received their education overseas, either in the United States (such as Bahjat Abdelnour, Yussef Aftimus, Salah and Faouzi Itani) or in France (such as Antoine Tabet, Farid Trad, Joseph Najjar). Most of them were entrusted with the design of major public buildings and new building types. The American-educated group showed a higher concern for regional materials and local architectural identity. On the other hand, the Paris-educated group that started practicing mainly during the 30s was far more influenced by the modernist ideology. Their designs broke all ties with the local context and attempted to transfer the new abstract concrete aesthetic from the French "metropolis" to the Levantine provinces.

But, the majority of buildings may have been designed and executed by anonymous builders who operated as designers and contractors. They acquired their skills through apprenticeship rather than through formal education. At the turn of the century, some of them were sent by rich patrons like the Sursocks to Italy apprentice with Italian architects in order to learn firsthand the construction work

behind large mansions. Accordingly, they were called by the name of the city in which they apprenticed (e.g., the prestigious name of muallem tuscani for somebody trained in Tuscany). Equally regarded were the ones who worked in Istanbul (called muallem istanbuli). These designers probably passed their trade to a second generation of builders or practiced their craft themselves during the 1920s and 1930s. They had their own catalogs, compiled from brown sheets of paper on which they drew the different ornamental patterns they learned through observation, practice and travel. They would not repeat the same design twice in the same city quarter for two years. Known master build included such names as Badrane, Wardini and Zoreik.[9]

Early Cement Construction: a new vernacular tradition?

In the following passage, Gayle and Gillon described the ease of working with iron:

> Virtually every architectural style was within reach. None was too bold or too delicate to be reproduced in iron, no decoration too intricate. Any desired shape could be recreated so long as the initial patterns could be carved and then pressed into damp sand to form sand molds into which molten metal could flow.[10]

By substituting the word "concrete" for "iron", Gayle and Gillon's quotation could thoroughly fit the 1920s and 1930s concrete architecture in Beirut. Following the industrial revolution, both concrete and iron proved to be economical substitutes for stone-dressing and carving. Builders began emulating stonework through molding and casting, leading to the mass production of building elements that could be marketed far and wide in pattern books and trade catalogs. These catalogs played a central role in the diffusion and popularization of revival styles within the colonial metropolises and their provinces. Local retailers and representatives of foreign merchant houses in Beirut and elsewhere had easy access to such publications, which they used as a source of inspiration to start their own lines of local production.

Since both iron and concrete imitated stonework, their catalogs could be used interchangeably. However, the main difference between the two resided in the building process itself. Whereas cast-iron construction could rely entirely on a "kit" of prefabricated elements, concrete structures were created on site with a limited use of pre-cast elements. Cement products soon invaded most building components beyond the structure itself. Door and window frames, balustrades, floor tiles, brackets,

and columns were all cast in concrete, and the industry of cemento tiles developed an impressive range of colored designs patterns, skillfully reproducing the latest designs found in French catalogues.

METROPOLITAN VS PROVINCIAL ECLECTICISM

In summary, Beiruti eclecticism may be defined as a transitional phase between craftsmanship and industrialization. This phase has been conditioned by an "indigenous capitalism"[11] initiated by the merchant aristocracy as well as a mounting professional bourgeoisie. Its originality resides less in the emergence of an imported scientific building culture, and more in the remarkable skills of local craftsmen who were able to reconcile available traditional materials with industrial ones in a unique synthesis creating the traditional Beiruti house of the second half of the 19th century.

Beirut eclecticism also features a symbiosis between the work of expatriate and local architects and engineers and of indigenous building practices. Big mansions and key public buildings built during the Late Ottoman and French Mandate periods display this creative merging between high and popular building cultures. However, some questions remain: How can we qualify Beirut's technical eclecticism vis a vis its Parisian counterpart? In more general terms, how do metropolitan and provincial eclectic practices differ? Taking Beirut and Paris as case studies, the following is a preliminary attempt at defining the commonalities and differences between the two in assimilating modernity and tradition.

Delay in the diffusion of materials and techniques

The delay in the diffusion of materials and techniques marks a clear difference between metropolitan and provincial eclecticism. While I-beams were commercialized since 1840 in France, they only appeared in Beiruti bourgeois houses at the turn of the 20th century. Similarly, cement factories proliferated between 1850 and 1860 in France and proved instrumental in the strong emergence of reinforced concrete in public and private architecture. But, the "Société des ciments libanais" didn't start Lebanese production of cement until 1930 about 70 years later.

From importation to local production

Despite late diffusion, the Lebanese industry proved to be remarkably dynamic in initiating local production to compete with imported materials. Traders and artisans originated this dynamic. As mentioned above, the leading merchant houses created their own lines of local manufacturing based on licenses from foreign companies. In that sense they acted as the first agents of local industrialization and the generators of an "indigenous capitalism" applied to the building sector. The artisans themselves produced the architectural elements that necessitated more manual than mechanical work, such as molding, wrought-iron works and the manufacturing of cemento tiles. Therefore, importation was limited to basic industrial materials as shown in the case of wrought-iron and cast-iron works. Although elaborate designs and ready-made, cast-iron products were mass-produced in Europe and marketed worldwide through trade catalogs, their use in Beirut remained restricted to late-19th-century mansions and upper-status apartment houses. But wrought iron was imported in small rolled sections and then bent into desired shapes by local smiths who excelled in reproducing and adapting Parisian ironworks to Beirut's 1920s eclectic apartment buildings.[12] For artisans as well as for architects, wrought iron works had the advantage of reconciling indigenous creativity with the advantages of industrialization.

A dualistic assimilation of cement industry

The assimilation process of cement in building practice took two forms: evolutive and dualistic. In metropolitan contexts, the integration of reinforced concrete went through an empirical phase first (during the last quarter of the 19th century), followed by a scientific phase until the first World War. These two phases paved the way for the modernism movement of the 1920s and 1930s. During the first phase, associated with the "triumph of artistic cement", concrete would be used for its resistance to compression in foundations and for its malleability as artificial stone or cast stone. After 1900, newly acquired theoretical knowledge engendered the first attempts at elaborating an architectural expression proper to the nature of the material itself.[13]

In Beirut, these two phases of transition occurred simultaneously leading to a dual building culture: a popular culture shaped by the builders and artisans and a high culture led by the engineers. The first was empirical, based on practical experience and characterized by an excessive use of steel in reinforced concrete (based more on estimation rather than on calculation). The other was anchored in the theoretical knowledge of strength of materials and the optimal dimensioning of structural elements.[14] Bridging the gap between the two building cultures was a fascination for "artistic cement" and mechanical ornamentation allowing for the economical imitation of stone. Such a technique "democratized" the beautification of facades, and made it accessible to all levels of the bourgeoisie.

Absence of a reactionary intellectual base

The rapid appropriation of concrete in provinces, as opposed to its progressive integration in metropolitan settings, prevented the formation of a philosophical and critical discourse concerning its assimilation in the prevalent building culture. In Paris, the transitional period between tradition and modernity was underlined by a long-term polemic concerning the new materials and their expression, more precisely, the correspondence between structure and architectural form. Accordingly, the Revivalism and Art Nouveau movements were mainly a philosophical quest for solving the duality between craftsmanship and industrialization. This quest found its roots in the rationalism of Viollet-le-Duc and the Anglo-Saxon empiricism[15].

With their transfer to the provincial context, Revivalism and Art Nouveau lost their ideological content. They were superficially appropriated in the Beirut of 1920s and 1930s as a range of stylistic trends easily replicated due the malleability of cement. The provincial discourse was limited only to the search for a regional and national identity, ignoring the intellectual relationship between technology and aesthetics. Consequently we can qualify the building practices in a provincial context such as Beirut as mainly opportunistic, undergoing an abrupt transition between tradition and modernity without being substantiated by any theoretical discourse or critical reflexion.

Professional Hybridism

The lack of critical discourse on the subject can be attributed to the absence of any distinction between engineers, architects and entrepreneurs as separate professions in Beirut. While in France, attempts by architects to gain their academic and professional autonomy began in 1830[16], this practice didn't mature in Lebanon until the 1950s 60s. During the mandate period the engineers, architects and entrepreneurs were interchangeable and referred to by the generic Arabic designation of *mouhandes*[17].

The hybrid approach to practice during that period is exemplified by two pioneering figures: Youssef Aftimus and Bahjat Abdelnour. The former studied engineering in the United States and architecture in Europe, while the later graduated as "architect-engineer" from the Massachusetts Institute of Technology in 1915. Abdlenour opened his own office as an entrepreneur and worked with the private and the public sectors including the mandatory power. In his work portfolio, he referred to himself as "engineer-entrepreneur", and letters of recommendation from his clients qualified him as an "engineer-entrepreneur", "architect-entrepreneur", "architect-engineer" or just "engineer". Aftimus, who worked as irrigation engineer in Egypt and later designed infrastructural works as well as residential buildings in Lebanon, received the same titles. He is also the architect of such colonial landmarks as the Beirut municipality and the Grand Serail clock tower[18].

Professional hybridism was not confined to provincial practice. It also prevailed in France with such figures as Auguste Perret and Hector Guimard, two key architects of the first quarter of the twentieth century. However, professional hybridism had a different meaning in Paris than in Beirut. In Paris, mixing professions was part of a polemic on behalf of the architects to re-appropriate the terrain they lost to engineers given the rise of scientism. It was also an intellectual and artistic stand on behalf of the Art Nouveau adherents, who advocated a "total art" where ornamentation is conceived as a synthetic, sensual and symbolic translation of structure and where architecture and engineering are fused into a single discipline. In Beirut, professional hybridism was simply a phase of transition between an empirical and a scientific building tradition. The small number of practitioners and graduates from local and western engineering schools were not enough to trigger a polemic about specialization. Only in the 1960s was the dualism between architects and engineers acknowledged and

a distinction made at the level of the professional code. Still, the generic Arabic term mouhandes is currently used to designate both engineers and architects emphasizing more a professional status than a specific area of professional practice.

Technical gap between public and private architecture

Finally, a common characteristic of metropolitan and provincial eclecticism is the technical gap that existed between residential architecture and public works. New materials such as steel and concrete were always used first in infrastructural projects, then introduced at a later date in the construction of houses and apartment buildings. In Beirut, reinforced concrete was used in the last quarter of the 19th century in the extension of the port and its related buildings. After about three decades (1920s), concrete began appearing in domestic buildings.

CONLUSION: TOWARDS A MODEL OF TECHNICAL ECCLECTICISM

From the above commonalities and differences we can articulate a comparative model of technical eclecticism in metropolitan and provincial contexts (Fig.6). But while the empirical phase in France ended at the turn of the 20th century (with the establishment of a scientific base for reinforced concrete construction), the phase extended in Beirut until the 1920s. Two building cultures overlapped during this extended period: the popular culture that produced the Beiruti house and the high culture, dominated by European engineers working mainly on infrastructural projects. The scientific phase, which started with the French Mandate, saw the birth of university education in engineering and the formation of the first breed of local practitioners. Dominated by the use of concrete, this period would also generate a popular culture of its own having its techniques and modes of production for appropriating the new material mainly in residential architecture.

In brief, Beiruti eclecticism, unlike its Parisian counterpart, was first and foremost the outcome of a fascination with ornamentation made possible by the malleability of cast concrete. This fascination led to the indiscriminate borrowing of styles during the scientific phase, which removed the historical and rational content from their forms. Although this encounter with new materials and techniques revived the construction trade and introduced a new base for professional practice, it failed

to create an intellectual discourse about the concordance between technology and form and tradition and modernity. However, on the technological level, building culture re-appropriated with ease and creativity both the traditional and new materials leading to the initiation of numerous cement-related industries and crafts. Did other regional cities such as Cairo, Istanbul, or the capital cities of the Maghreb have the same industrial dynamism as Beirut? Why did the Lebanese production of cement and its assimilation in local building practices precede the same phenomenon in neighboring countries such as Syria?

It is difficult to answer these questions at this stage of the research. Studies examining the passage from craftsmanship to industrialization in provincial contexts have still to be developed. However, some hypotheses can be drawn to help further research.

Beirut's industrial dynamism is mainly linked to the mercantile spirit and personal initiative of a rising bourgeoisie. This differed from other colonial port cities such as Alexandria which saw early industrialization mainly in the hands of Westerners. Beirut's rapid urbanization during the late Ottoman and mandate periods resulted in a real estate boom and intensified speculation. Therefore, the market demand and ingenuity of local merchants and artisans led to the premature dynamism of Lebanese industry. Compared to the endogenous technical contexts such as France, however, this dynamism remained on a small scale and at a semi-industrial stage because it did not benefit from a high mechanization level or a scientific base of research and invention. Consequently, the development of new materials, their standardization and commercialization remained the prerogative of metropolitan centers. Provinces played the role of consumers and partial emulators. They were constrained to a process of catching up and adaptation rather than the pursuit of innovative know-how. This is one the essential characteristic of the exogenous technical eclecticism.

FIGURES AND ILLUSTRATIONS

Fig. 1. A view of Beirut in1910 shows the penetration of red tile roofs into the townscape of the old city. In the background we see the strong emergence of the bourgeois suburban house. Source: F. Debbas. 1986. Beirut our memory: An illustrated tour of the city from 1880 to 1930. Paris: Folios, p. 41,42

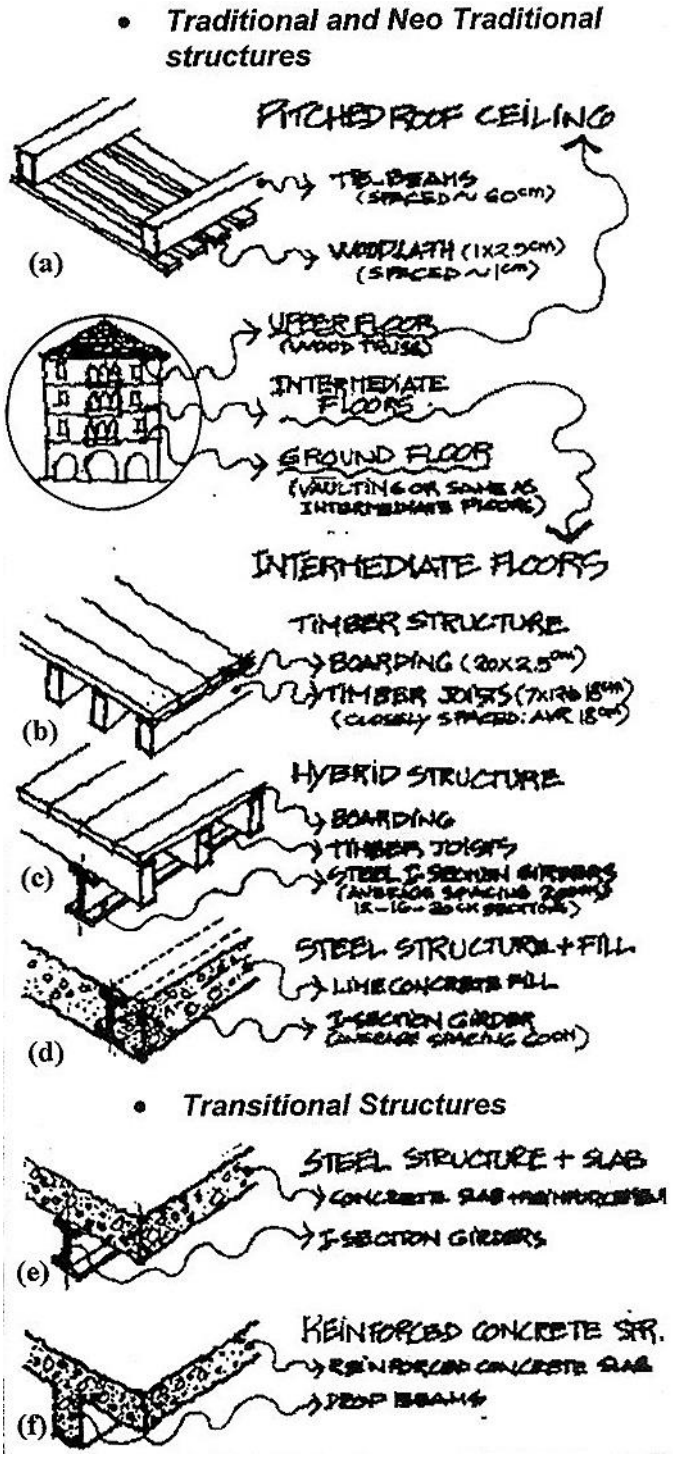

Fig. 2. Evolution of floor construction from traditional to transitional structures. Source: author

Fig. 3. Dependency on mass-produced materials imported from Europe covered most components of domestic buildings. A 1928 advertisement in Lisan el Hal promotes cement, iron bars, and I beams for superstructure; marble and mosaic tiles tiles for flooring; metal sheets and red tiles for roofing; sanitary equipment and fixtures; and appliances for central water heating. Source: Lisan el Hal. April 18, 1928, p.6

Year	Production	Import	Exports	Apparent Consumption*
1923		28		28
1924		34		34
1925		72		72
1926		55		55
1927		73		73
1928		97		97
1929		110		110
1930		133		133
1931	10	149		159
1932	47	147	2	92
1933	64	113	2	175
1934	107	79	4	182
1935	133	78	15	196
1936	194	29	29	194
1937	250	12	65	197
1938	251	6	49	208
1939	222	3	50	175
1940	91	3	9	85

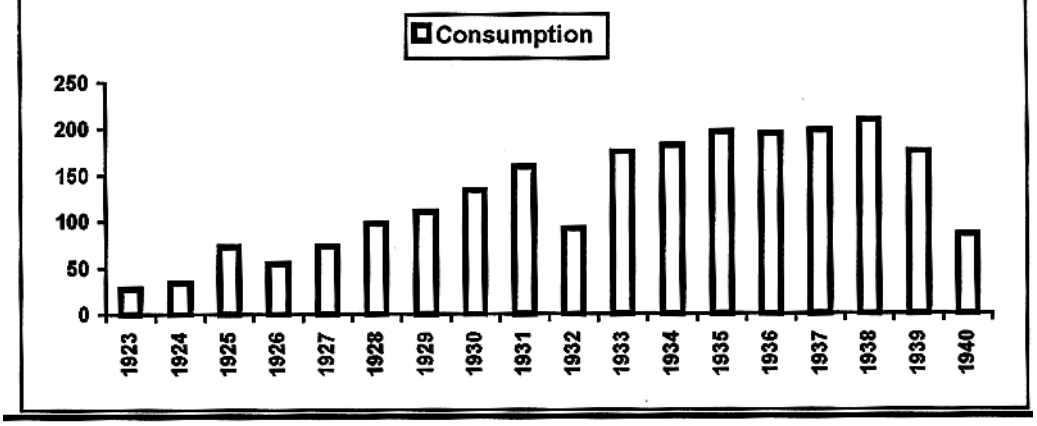

Fig. 4. Production, import, and consumption of cement in the Levant states of Syria and Lebanon: 1923-1940 (in thousands of tons). Source: adapted from F. el-Farra. 1969. The cement industry in Lebanon. MBA thesis, American University of Beirut, p. 38

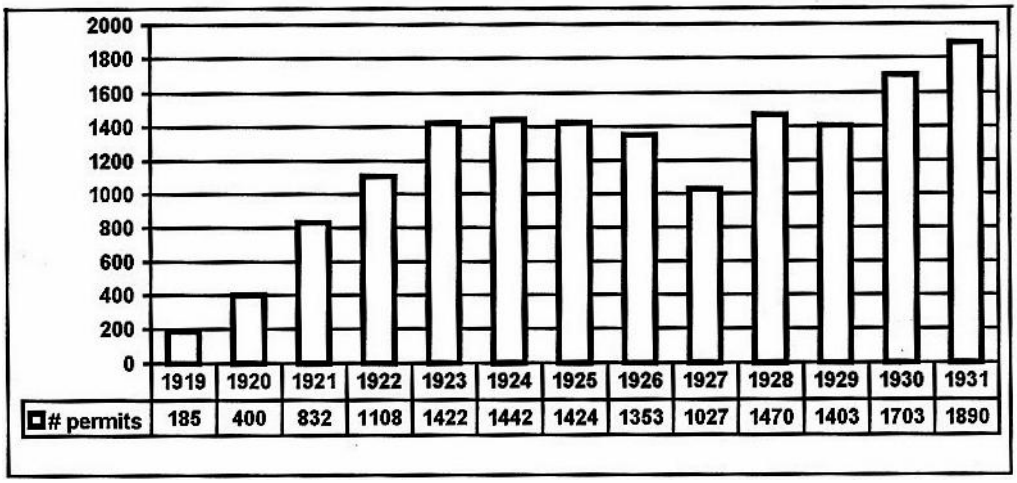

Fig. 5. Beirut: Construction permits delivered between 1919 – 1932. Source: Plan Danger. 1932. Rapport d'enquête et justificatif

THE EMPIRICAL PHASE		
	Domestic architecture	**Infrastructure / Public and institutional buildings**
Metropolitan eclecticism		
Materials and Techniques	Actualized traditional materials with "materials of modernity" Slow mutation of arts and crafts toward industrialization	Accelerated passage from arts and crafts to industrialism (experimentation and "tour de force")
Form	Revivalism executed with new materials	New forms liberated from past references and executed with new materials
Provincial eclecticism		
Materials and Techniques	Assimilation of traditional and industrial materials (Beirut case) by local trades	Predominance of industrial materials in infrastructural projects
Form	The creation of a local architectural syntax (the Beiruti house) through a creative synthesis of traditional and imported forms	Strong impact of imported forms
THE SCIENTIFIC PHASE		
Metropolitan eclecticism		
Materials and Techniques	Simultaneous use of actualized traditional materials and reinforced concrete	Predominance for reinforced concrete and steel construction
Form	Naturalism (Art Nouveau) and Structural Classicism / Introduction of regional styles	Initiation of modernist forms
Provincial eclecticism		
Materials and Techniques	Dominance of concrete construction by engineers and local trades (cement imported and manufactured locally)	
Form	Eclecticism (emulation of Western revivalism and Art Nouveau)	Early modernism

Fig. 6. Technical Eclecticism in metropolitan and provincial contexts: a comparative table.

[11] N. Sehnaoui. 2002. *L'occidentalisation de la vie quotidienne à Beyrouth, 1860-1914.* Beirut: Editions Dar An-Nahar, p. 86-110. Interview with Georges Araman and Salah Itani.

[2] Ibid.

[3] R. Thoumin. 1936. *Géographie Humaine de la Syrie Centrale*. Paris: Ernest Leroux, p. 294.

[4] P. Guedes (ed.). 1979. *Encyclopedia of Architectural Technology*. New York: McGraw-Hill Book Company, p. 254-258.

[5] R. Saliba. 1998. *Beirut 1920-1940: Domestic architecture between tradition and modernity*. Beirut: Order of Engineers and Architects, p. 94-197.

[6] Interview with Georges N. Araman, owner of N.G. Araman & co; see also L'Orient, Sept. 26, 1957, for the early attempts of Negib Araman at manufacturing cement pipes and hollow blocks.

[7] Interrupted by World War 1

[8] Interview with Joseph Najjar (1908-2006) one of the pioneers of the engineering profession in Lebanon. He is a graduate of the prestigious *Ecole Polytechnique* in Paris (1929) and the *Ecole Nationale des Ponts et Chaussées* (1931); He was professor of civil engineering from 1932 to 1978 at the *Ecole Supérieure d'Ingénieurs de Beyrouth*.

9 Interview with Pierre Ivanof, son of Leonid Ivanof, Russian émigré who worked with the French officer Camille Duraffourd on Lebanon's cadastral reform during the 1930s. Information about master builders is based on the accounts of his father and the builders themselves.

[10] M. Gayle, and E. Gillon . 1974. *Cast-iron architecture in New York: A photographic survey*. New York: Dover Publications, p. viii.

[11] A literal translation from the French "capitalisme indigène" borrowed from J. Heffer and W. Serman. 1992. *Le XIXe siècle: Des révolutions aux impérialismes, 1815-1914*. Paris: Hachette, p. 177.

[12] Saliba 1998, p. 86.

[13] C. Loupiac. 1997. «Les prémices de l'architecture moderne, 1889-1914» in *L'architecture moderne en France, tome 1*. G. Monnier, (ed.) Paris : Picard, p. 25-33.

[14] The notion of optimal dimensioning as a result of theoretical knowledge is borrowed from A. Picon. 1992. « La notion moderne de structure », in *Culture constructive*, Marseille : Éditions Parenthèses, p. 102.

[15] Loupiac 1997, p. 35-37

[16] J-L. Massot. 1992. *Architecture et décoration du XVIe au XIXe siècle*. Aix-en-Provence : Édisud, p. 24.

[17] *Mouhandes* means literarily *engineer* in Arabic. The term *mi'mari* has been added to mouhnades to qualify the architect (*mouhandes mi'mari)*.

[18] R. Saliba 2003. Beirut city center recovery: The Foch-Allenby and Etoile conservation area. Göttingen: Steidl, p. 122; R. Saliba. 2004. Paysage colonial et éclecticisme provincial: La Formation du Beyrouth résidentiel 1840-1940. Ph.D. Dissertation, Université de Paris VIII, p. 70,71.