

THE ADOPTED PROCUREMENT SYSTEMS IN THE CONSTRUCTION PROCESSES OF THE INFORMAL SETTLEMENTS IN BEIRUT

KHALED SADEK¹, IBTIHAL EL-BASTAWISSI², ROKIA RASLAN³, and SAMER
SAYARY

¹ Senior lecturer, Faculty of Architecture, Design and Built Environment, Lebanon

² Professor, Faculty of Architecture, Design and Built Environment at Beirut Arab University, Lebanon

³ Senior lecturer, Institute of Environmental Design & Engineering, University College London, UK

⁴ Assistant professor, Faculty of Architecture-Design and Built Environment, Lebanon

ABSTRACT: *Compared to other cities, the construction of informal settlements in the city of Beirut is caused by a range of interrelated factors including population growth, rural-urban migration and political intrigues. These settlements follow a reverse development process where people occupy the land, then build on it, install infrastructures, and finally, acquire ownership. The aim of this study is to identify the adopted procurement methods in the construction process of informal settlements in Beirut through the different construction phases of these settlements.*

The methodology used in this study is based on a qualitative analysis of the informal housing in Beirut as a case study. The analysis focuses on the role and the responsibilities of the main actors and stakeholders in the construction process while relating this process to the construction procurement systems categories: Separated and Cooperative System (Design/Bid/Build), Integrated System (Design/Build), and Management Oriented System.

The results of this study help identify the gaps in the processes adopted in the construction of the dwelling units in the informal settlements, which lead to the unorganized development of these settlements impacting the image of the city as one that is permanently 'under construction'.

KEYWORDS: *Construction Process, Informal Settlement, Procurement Systems, Beirut*

1. INTRODUCTION

Construction project clients usually aim at the end of any project to have a quality structure delivered on time and within budget. However, this is not the case in informal housing sector, where social groups on limited-incomes use inappropriate procurement arrangements to primarily provide shelter without emphasizing the need for quality assurance. These measures magnify the problem and as a result, these residents live in a polluted environment, suffer from unhealthy living conditions and a lack of basic services.

Several factors drive limited-income social groups to adopt unorganized construction processes, such as the high construction cost and limited time and resources. These inappropriate practices make the construction phase a complex process that lacks organization, quality, and does not meet the minimum standards.

Although building regulations govern the construction process in Lebanon and necessitate formal land tenure as a mandatory condition, informal housing settlements follow a reverse development process where within this context.

The aim of this study is to identify the procurement methods used in the informal settlements in Beirut through the highlighting the responsibilities of the main stakeholders and identifying the gaps in the processes adopted in construction.

2. CHARACTERISTICS OF THE INFORMAL SETTLEMENTS

Given that informal settlements are subject to significant challenges at the social and physical level, the identification of a systematic procurement method similar to that adopted in the construction industry is not expected. Thus to determine the construction methods or processes used in the informal settlements in the city, the characteristics of these areas should be first analyzed in order to highlight common construction criteria that match with the procurement methods used in the formal construction industry (if applicable). This will be undertaken within the context of Beirut as a case study, to identify the causes that differentiate the construction processes in its informal settlements from those used in the other areas of the city.

2.1 Analysis of the Informal Settlement in Beirut

The lack of municipal statistics and data related to population, immigration, and poverty in Beirut makes the identification of the informal settlements a difficult process. Thus, most previous studies related to the informal settlements in Beirut relied on a qualitative approach based on field research and interviews with informal settlement inhabitants (Fawaz and Peillen, 2003). In this paper, the analysis of Beirut informal settlements will be based on the framework adopted by the United Nations Human Settlements Program in the Global Report on Human Settlements issued in 2003. This categorized informal settlements according to a set of criteria including formation process, spatial organization and construction Origins and Age, Location and Boundaries, Size and Scale (UN-Habitat, 2003).

2.2 Causes of Informal Settlements emergence in Beirut

Numerous reasons underlie the emergence and growth of the informal settlements in Beirut City. These causes include:

- **Poverty and unemployment**

Poverty is the primary cause of informal settlements in Lebanon. Unemployment is around 20% and many jobs pay very low salaries, despite the high cost of living, trapping families in a cycle of poverty - Figure 1 (a). Governments suffer from financial deficits and economic stagnation, therefore promote industrial sectors to revitalize the economy. Low-income groups as a result struggle to find shelter for protection (UN-Habitat, 2003).

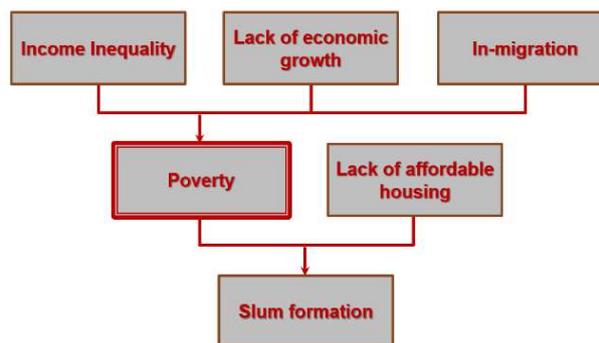


Fig.1 (a) Poverty and Informal Settlements formation
Reference: (UN-Habitat, 2003)

- **Demographic Changes**

Demographic changes within cities result from a combination of natural growth and outward migration. These phenomena are often accompanied by internal displacement of native people. These processes collectively affect the shape of the city and the formation of its urban fabric. Lynch illustrated the growth of the city through internal migration in the form of rings - Figure 1(b) (Shane, 2005).

While applying Lynch's theory to Beirut, the demographic changes that took place in the city during the various historical eras can be clearly differentiated (Figures 2 & 3).

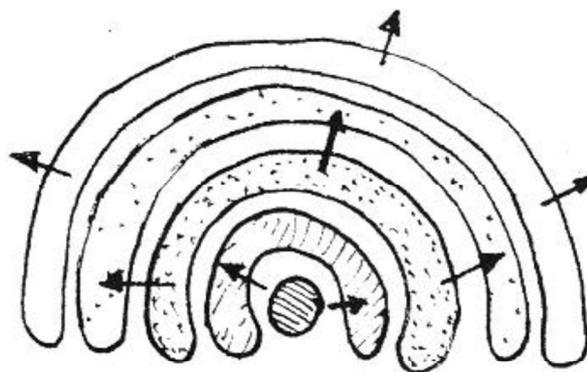


Fig. 1(b) Demographic Change of Cities
Reference: (Shane, 2005)

Beirut was a secondary city during the Ottoman rule, with 5,000 inhabitants in 1840. The city began to grow during the period before the French mandate, becoming an important coastal city and

a key transit point to Europe. These factors lead to the establishment of important infrastructure such as the Beirut-Damascus road (1863), the railway to Horan and the expansion of the port (1895). In 1915, the city had a population of 130,000 (Fawaz and Peillen, 2003).

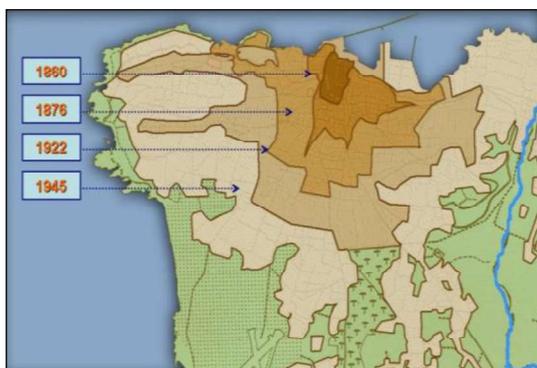


Fig. 2 The historical evolution of Beirut
Reference: (Sadek, 2007)

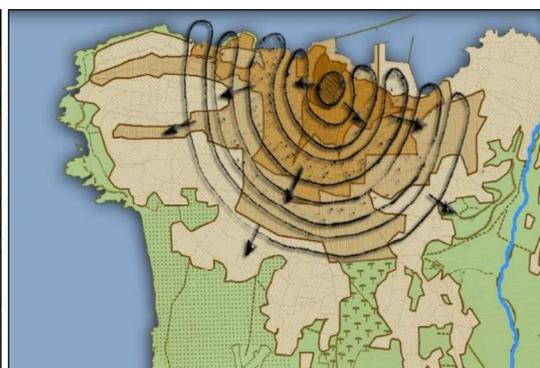


Fig. 3 The growth of Beirut in the form of rings
Reference: (Sadek, 2007)

In 1920 Beirut became the capital of Greater Lebanon and the administrative center of the French mandate in Syria and Lebanon, giving it a great boost on the economic and political level. The city then grew around the redesigned commercial center, destroying most of the old city. Beirut also developed new residential neighborhoods such as Armenian neighborhoods in the eastern suburbs (Figure 3).

- **Rural-to-urban migration**

People left rural areas towards Beirut in pursuit of employment opportunities, and receiving benefits pertinent to educational and health services. The country's industrialization and urbanization encouraged rural to urban migration and the growth of this category provided rental opportunities for many low-income people who came to Beirut city and its suburbs from South Lebanon and the Beka'a (Fawaz, 2003).

- **Armed Conflicts**

From 1975 until the early 1990s, civil war in Lebanon destroyed or damaged homes and infrastructure and ruined its fragile society. Around 1 million people were displaced and hundreds of thousands were injured, killed or disappeared. More homes were destroyed in the July–August 2006 war, which also displaced 1 million people and damaged more than 100,000 houses. Reconstruction from these wars left Lebanon heavily in debt, and political conflict influenced its economy. Rapid urbanization due to displacement lead to informal settlements spreading in Beirut.

Due to the Syrian civil war, Lebanon has suffered from the huge influx of Syrian refugees who exert an enormous pressure on the housing industry and the infrastructure. UN agencies estimate the number of Syrian refugees in Beirut at 350,000 persons. The majority of these refugees have also found shelter in informal settlements, and especially in refugee camps (Fawaz, 2017).

2.3 Origin and Types of the Informal Settlements in Beirut

Through the application of the analytical framework adopted by the United Nations Human Settlements Program in the Global Report on Human Settlements to Beirut city, its informal settlements can be categorized into three main categories: (Sadek, 2007).

- **Informal Settlements Started as International Refugee Camps**

This includes low-income housing areas started as camps for international refugees. Historically, this category is considered as the oldest informal-settlement typology in Beirut. These are located inside and outside the city's municipal boundaries and accommodated Armenian refugees in 1920s, Syrian refugees in 1920s and Palestinian refugees after 1948 (Fawaz, 2003). The initial construction of these camps started with the help of international organizations. Today, only traces

remain of the Armenian camps (Figure 4) while the Palestinian camps have expanded and transformed to main “Informal Settlements for Rent” or “Slum Estates” in Beirut (Figure 5).

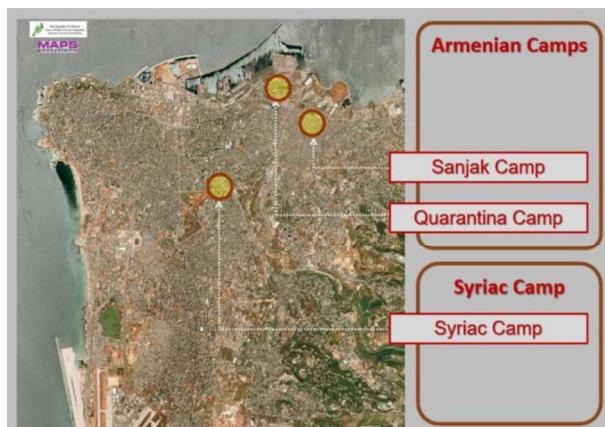


Fig. 4 Armenian and Syriac Camps in Beirut
Reference: (Sadek, 2007)

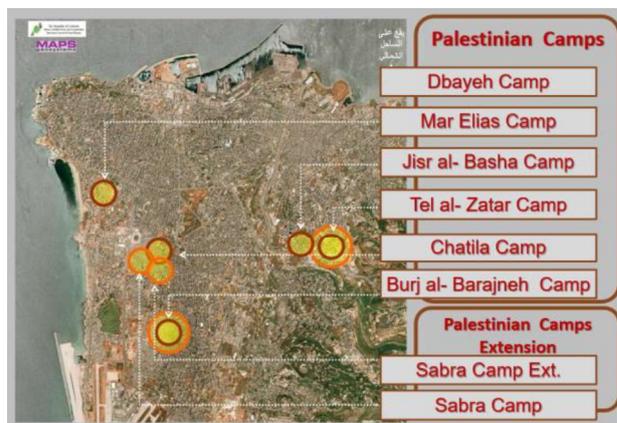


Fig. 5 Palestinian Camps in Beirut
Reference: (Sadek, 2007)

- **Informal Settlements for Rent or Slum Estates**

This category includes slums that started as housing areas for rural-urban migrants (1950s-1960s). It includes several types (Figure 6):

- Informal settlements that developed as a direct extension of existing refugee camps, or in their adjacent areas.
- Informal settlements that developed in the suburbs on green land mainly dedicated for agriculture.
- Informal settlements that were established as ‘chaotic’ settlements in the regions suffering from disputes on property rights. These conditions generated illegal land occupation and unorganized subdivision.

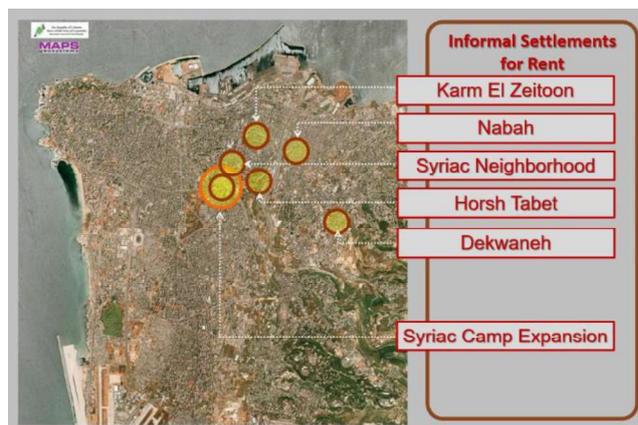


Fig. 6 Informal Settlements for Rent in Beirut
Reference: (Sadek, 2007)

- **Consolidating Informal Settlements**

This category began as squatter settlements during the period of the civil war (1975-1990). During this period, refugees were displaced by the early events of the Lebanese civil war (1975) and occupied either individual buildings in selected areas or entire neighborhoods, abandoned by their owners or occupied large plots of land and transformed them into large squatter settlements (Fawaz, 2003). Nowadays, the informal settlements of this category have witnessed the development of large-scale rental markets and renting has become,

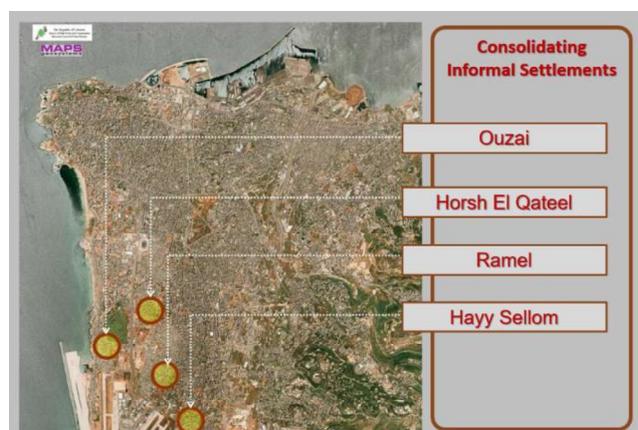


Fig. 7: Consolidating Informal Settlements in Beirut
Reference: (Sadek, 2007)

since 1982, the primary method of accessing housing and a major source of income for the old property owners (Figure 7).

2.4 The Construction criteria of the informal settlements in Beirut

Despite the obvious diversity in the informal settlements in Beirut, in terms of social, economic and political characteristics, as well as their origins and types, a set of common characteristics can be identified. These characteristics are grouped according to a set of common features observed in the informal settlements in Beirut. These characteristics and their corresponding features are listed in the Table 1 below.

Table 1: Characteristics of the informal settlements
Reference: The Author

Characteristics Group	Features
Construction and Architectural Characteristics	<ul style="list-style-type: none"> ○ Absence of engineers, planners, and controllers. ○ Use of primitive techniques in construction ○ Use of heterogeneous and non-permanent materials ○ Use of inadequate building structures, ○ Construction of low quality buildings that do not meet the required standards ○ Ignorance of construction details
Lack of basic services Characteristics	<ul style="list-style-type: none"> ○ Lack of access to public sanitation network facilities and ○ Lack of potable water sources ○ Absence of waste water collection and rainwater drainage systems ○ Lack of electricity supply and absence of street lighting
Overcrowding and high density Characteristics	<ul style="list-style-type: none"> ○ High occupancy rates ○ High number of single-room units. with five and more persons sharing a one-room unit ○ Using the same space for living, cooking and sleeping
Unhealthy living conditions and hazardous locations Characteristics	<ul style="list-style-type: none"> ○ Unhealthy living conditions that results of a lack of basic services and polluted environments ○ Built on hazardous locations or land unsuitable for settlement, such as floodplains ○ Hazardous layout because the lack of accessibility
Unsecure tenure; irregular or informal settlements	<ul style="list-style-type: none"> ○ Lack of security of tenure. This is a central characteristic of informal settlements. It causes by: ○ Informality of occupation ○ Un-compliance with land-use plans settled by the statutory authorities.
Poverty and social exclusion Characteristics	<ul style="list-style-type: none"> ○ Low levels of education. ○ Low income and high unemployment. ○ Urban isolation and social discrimination ○ Prevalence of extremism, violence, and crime.

3. PROCUREMENT SYSTEMS IN THE CONSTRUCTION INDUSTRY

Beyond informal settlements, the construction of new projects in the city follow an organizational system that assigns specific responsibilities and authorities to people and organizations, and defines the various elements in the construction (PMI, 2013). This organizational system is commonly referred to as the

‘Procurement System’. Procurement is the act of acquiring, buying goods, services or works from an external source at the best possible cost to meet the needs of the customer in terms of quality, time, and location. Ramus (2006) defined procurement, in construction, as the process of acquiring a building. Procurement derives from the word ‘procure’ that means to obtain by care or effort (Rashid et al 2006). Procurement methods or systems reflect a series of measures undertaken to meet the client requirements (Kadiri et al 2003). Project procurement includes the required processes for contract management and change control. (PMI, 2013).

Mastermann classified project procurement systems into several categories based on the relationship and critical interaction between design and construction responsibilities. The categorization of the various procurement systems are illustrated in Figure 8 below (Mastermann, 1996)

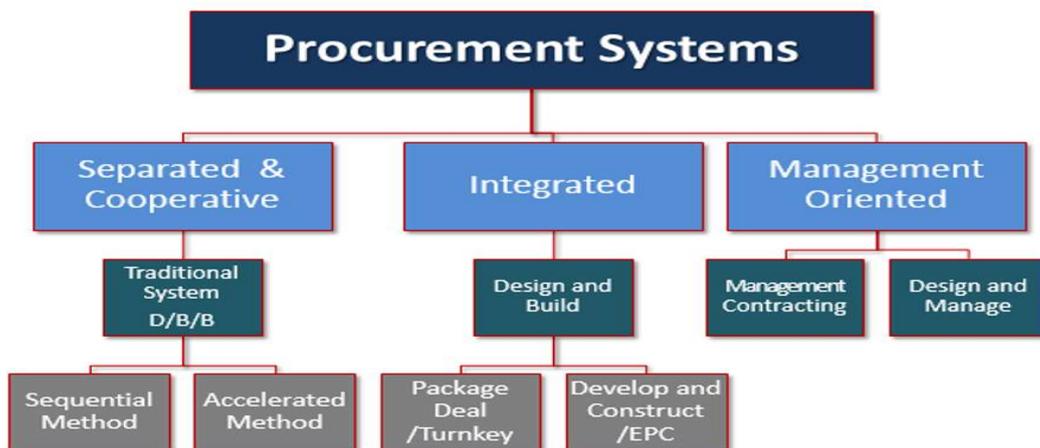


Fig. 8 Different types of procurement Methods
Reference: Mastermann (1996)

3.1 Separated and Cooperative System (Design /Bid /Build)

This system separates project design and construction responsibilities. These responsibilities are handled by two different parties: the design consultant and the contractor. This method is also known as a linear or sequential contracting system. In this method, the project design and construction process are developed sequentially (Figure 9), where the detailed design package of the project must be prepared by the design consultant before starting the construction actions and activities on site (Babatunde et al, 2010). However, this system is considered as the slowest project delivery system but provides price certainty to the project owner at an early stage. In regards to quality, this method provides a high degree of quality certainty since it allows the project owner to achieve design and construction best-practice over the design stages. The risk in this system is shared between the project owner and the contractor. (Rashid et al 2006)

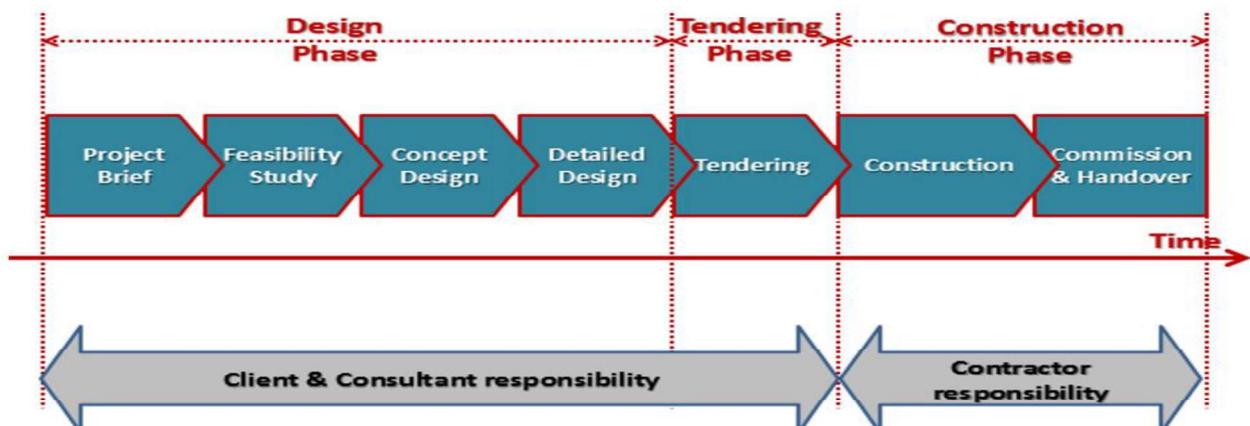


Fig.9 Separated and Cooperative Procurement Model
Reference: the Author

3.2 Integrated Procurement System (Design / Build)

This system combines the project design and the construction responsibilities by contracting out all these responsibilities to one contractor. This system is also known as ‘single responsibility procurement’ or ‘design and build procurement’ system. The adoption of this system gives the project owner the opportunity to deal with one party (the contractor), who is responsible for providing design and construction services (Rashid et al 2006). In this system, the owner sets the project description and the requirements that should be fulfilled by the contractor (Figure 10). The adopted contract is usually a lump sum contract with fixed price and construction duration. However, this system is considered to be a fast-track project delivery approach, since the design services and the construction works on site are integrated. The dedication of the design and construction duties to the same party usually leads to client loss of control in regards to design and construction processes, thus impacting negatively on the project end quality. The risk in this method lies almost entirely with the contractor.

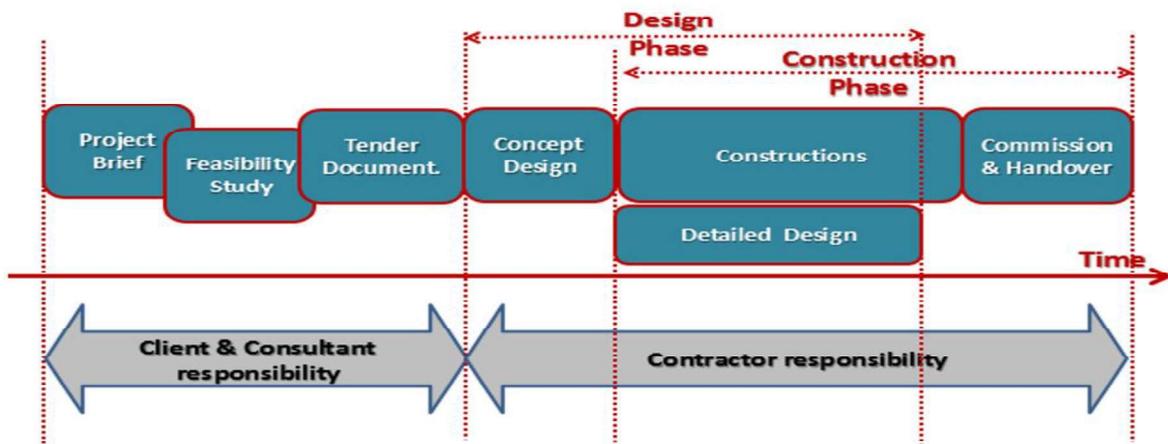


Fig. 10 Integrated Procurement Model
Reference: the Author

3.3 Management Oriented Procurement System

In this system, the management of the design and construction processes is performed by a third party contractor hired by the project owner to act as the project manager. The main duty of this contractor is to work on behalf of the project owner and manage the project design and construction processes that is divided into packages and contracted out to different sub-contractors, specialists, and suppliers. This system has many advantages in regards to project quality and time, since the experience of the project manager has a significant impact on package identification, sub-contractor selection, and quality control.

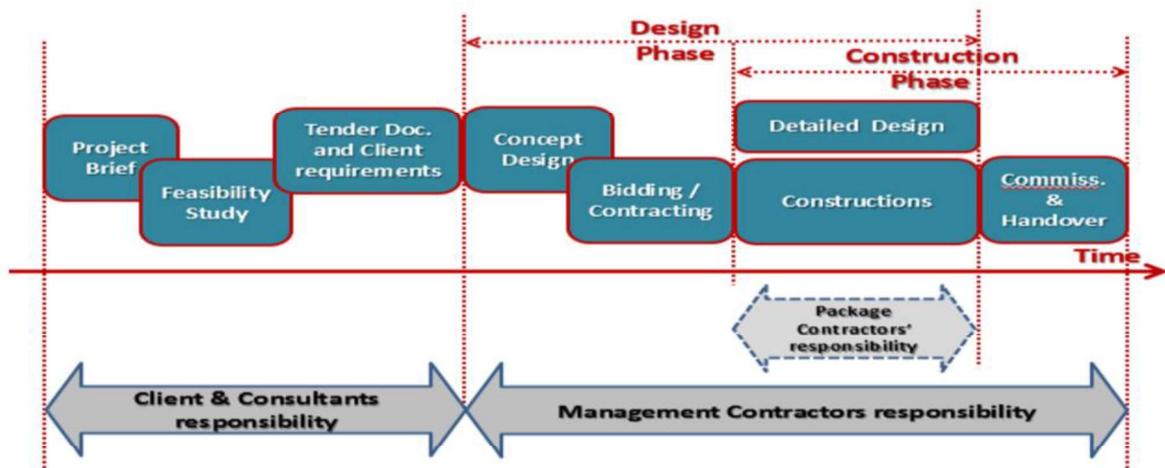


Fig. 11 Management Oriented Procurement
Reference: the Author

It also allows early initiation of construction (for some packages) in parallel to the design packages (Figure 11). In regards to cost, this system tends to be more cost-effective than other procurement systems. However, the associated risk is very high and lies mainly with the project owner.

There is no general consensus on the best procurement system to be adopted in the construction industry since the selection criteria of a proper procurement system are based on time, cost and quality (Wood et al, 2010). These criteria can be used as a guide to assist decision-makers with an initial understanding of the basic attributes of a particular procurement system. However, these criteria should not be used as the only basis for the procurement system selection. This is because of the complexity of matching the owner requirements and priorities with a particular procurement system (Davis et al, 2008). Thus, additional factors should be taken into consideration. Some of these factors are related to the owner’s experience, knowledge, and flexibility. Some others are related to the characteristics of the project itself such as the size, complexity, location, external factors (Saha et al,2009). Table 2 illustrates the comparison between the above-mentioned procurement systems in terms of cost, time, quality and the associated risk on the project owner.

Table 2: Comparison between the Procurement Systems
Reference: the Author

Procurement Systems Categories	Cost	Time	Quality	Risk on the Owner
Separated and Cooperative System (Design /Bid /Build)	○	○	○	○
Integrated Procurement System (Design / Build)	●	●	●	●
Management Oriented Procurement System	○	○	○	○

Legends:



4. THE FORMATION PROCESSES OF INFORMAL SETTLEMENTS

The analysis of informal settlements categories in Beirut, discussed in Section 2 of this paper, illustrates that they started in the form of international refugees camps which either quickly evolved into randomly-developed areas designated for rent or slum estates or consolidating settlements. Thus, the development of informal settlements in Beirut follows the same model of the formation of informal settlements in other countries in the developing world as described by De Soto (1989). These settlements follow a reverse

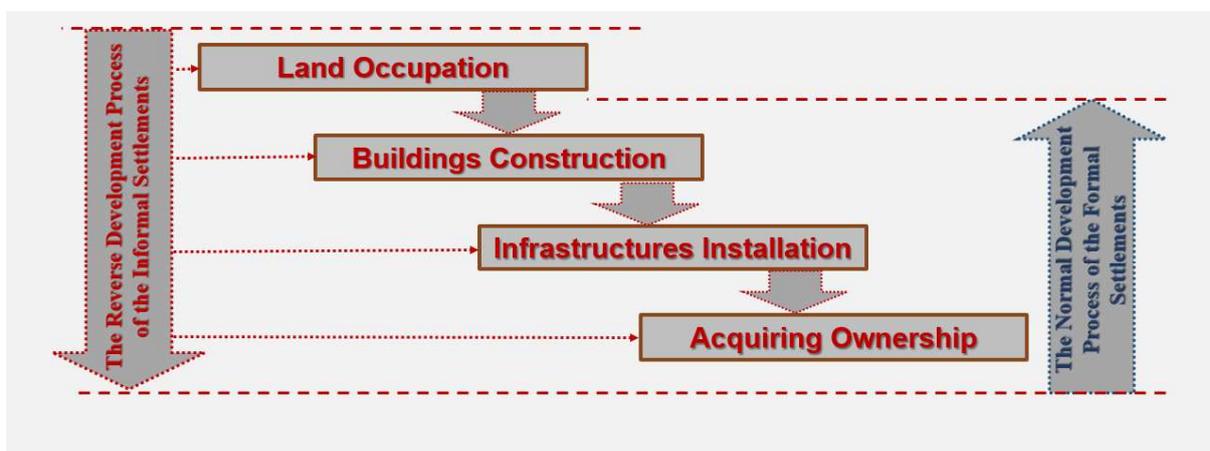


Fig.12 The Reverse Development Process of the Informal Settlements
Reference: The Author

development process where land is first occupied, built on, infrastructure installed, and finally ownership is acquired (Figure 12).

To acquire the land, people follow two ways: The Invasion (gradual or violent) and the Illegal Land Sale (Desoto,1989).

• **Gradual and Violent Invasion:**

Gradual Invasion involves attempts to occupy owned properties (Figure 13). Usually, agricultural workers settle in the farms they work on and are consequently joined by their relatives, gradually exerting massive pressure on the property owners. In violent invasion, occupiers meet and plan to obtain houses illegally, selecting suitable plots and the appropriate strategies to occupy them (Figure 14). Large groups often assemble to reduce the possibility of opposition.

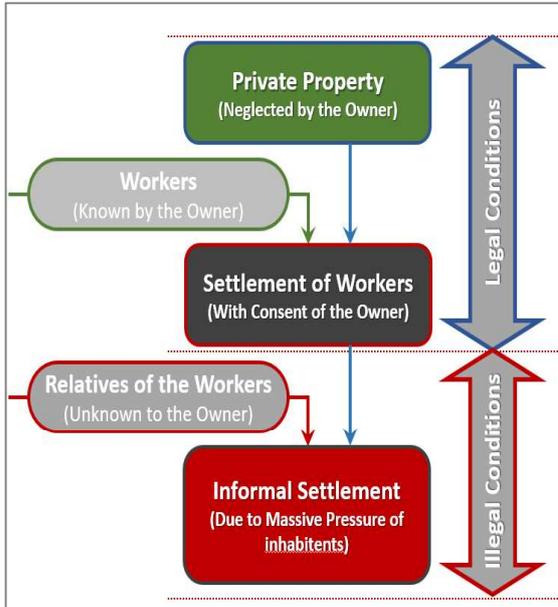


Fig. 43 Gradual Invasion Model
Reference: The Author

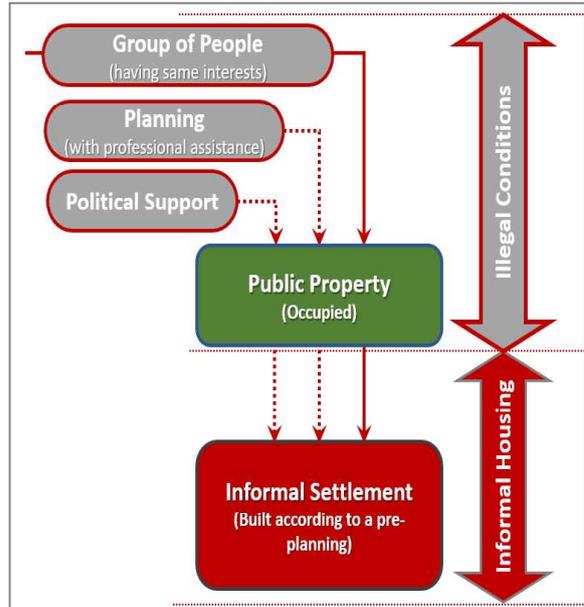


Fig. 54 Violent Invasion Model
Reference: The Author

• **Illegal Land Sale (Informal Associations and Cooperatives)**

Illegal land sale requires the establishment of an association or a cooperative directed by real estate brokers and business professionals. The process in this method involves the selection of suitable plot for the new settlement and the legislation of contracts with the owners of the land (Figure 15). Occupiers obtain the protection of the state as legitimate organizations aiming to obtain housing, then invade the land illegally.

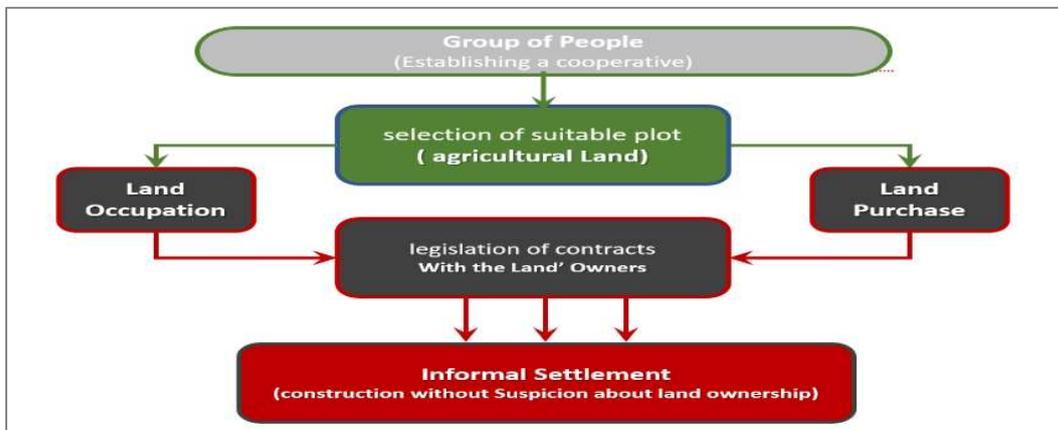


Fig. 15 Illegal Land Sale Model
Reference: The Author

• **Informal Construction Processes**

The construction processes used in the informal housing areas in Beirut are similar to each other, especially in slum estates and the consolidating informal settlements. The intensive construction movement that took place in the Nabaa camp after the civil war in Syria provides a clear example of the construction processes adopted.

Historically, Nabaa is one of Beirut’s oldest informal settlements. The development of this settlement started in the early 1940s on the site allocated by French Mandate authorities for the permanent resettlement of Armenian refugees. This settlement housed the rural migrants seeking employment opportunities in the nearby port and industries in Beirut. The buildings of the settlement developed gradually creating a very dense residential zone of multi-story buildings including buildings three to five floors in average. Many early-settlers became property owners, residing on the ground floor and renting out the rest of the building to those who reached the city at later phases.

While analyzing the expansion of the housing stock in the informal settlements in Beirut, Fawaz (2017) identified the processes adopted by different stakeholders to increase the dwelling units needed for refugee accommodation. These processes are typically the same as the ones that occurred historically when informal settlements responded to the pressure of housing demand by increasing its housing stock informally.

The increment in the housing stock was established either by subdividing the existing two-to three-room apartments into single-room apartments or by gradually constructing rooms on building roofs to be rented out for additional inhabitants. Most of these processes of housing production happened without the knowledge of the statutory authorities, violating the zoning guidelines and neglecting the building norms and regulations. These violations are protected by the power of the local politicians and other actors when necessary (Fawaz, 2017).

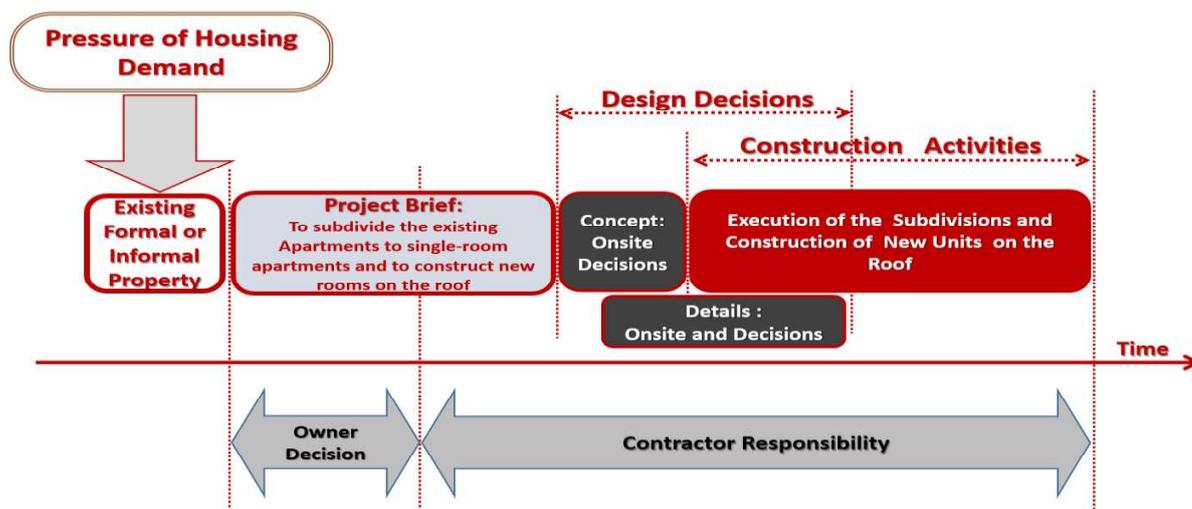


Fig. 16 The Construction process in the Informal Housing Settlements
Reference: the Author

While comparing this model with the models of the different types of the procurement systems in Section 3 of this paper, the following similarities between this model and the Integrated Procurement System model can be identified:

- The fast-track delivery approach that necessitates the early start of the construction without having a complete design package.
- The assignment of the project design and construction duties to one contractor.
- The loss of the owner control in regards to design and construction processes.

The main reason of the resemblance may be due to the fact that the Integrated Procurement System is best placed to deal with the particular circumstances of the construction process in terms of time limitation and risks handling, since the contractor is often powerful and can withstand such risks.

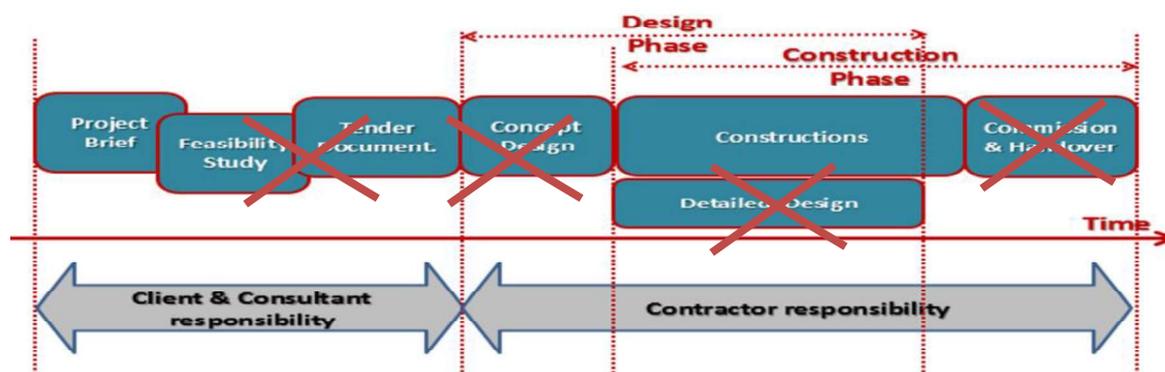


Fig. 17 the Model of Integrated Procurement System in the Informal Settlements.
Reference: The Author.

However, the construction process in the informal housing settlements eliminates the following stages (Figure 17):

- The Feasibility Study Stage
- The Tender Stage
- The Design Stages (Conceptual and Detailed)
- The Commissioning and Handing over Stage

The elimination of such essential stages from the construction process is caused by a wide range of inter-related factors that interact and produce such low quality dwelling units. Some of these factors are related to the desired purposes and required resources in each of the above stages (i.e. engineers, architects or other specialists from different disciplines), while others are constrained by the informal housing conditions in terms of limited choices, budget and time. The Table 3 explains the conditions causing the elimination of the above-mentioned stages from the construction process in informal housing.

Table 3: Reasons for eliminating essential stages from the construction process in informal housing
Reference: The Author

	Construction Industry		Informal Housing	
Stage	Purpose	Main Actors	Conditions Causing the Stage Elimination	Results /Impact
Feasibility Study	To determine if the project will be profitable based on detailed Analyses	Owner's Consultant	The decision of starting the project is based on the urgent demands	No preliminary studies are made
Tendering	To select the best contractor	Owner's Consultant	Limited choice because the Contractors who can do such constructions are often protected by the power of the local politicians	One contractor is contracting out all the responsibilities
Conceptual Design	To articulate the broad outlines of function and form	Architects / Engineering Teams	The site conditions impose limited design solutions in terms of sizes of spaces and internal relationships.	On site decisions are taken by the contractor

			Thus, on site decisions are taken by the contractor	
Detailed Design	To provide the necessary design calculations construction details, and specifications		The limited budget imposes the use of inappropriate material with no calculations and detailed studies	
Commissioning and Handing over	To assure that all systems and components of a building are designed, installed, tested, operated, and maintained according to the owner requirements	Performed by the Contractor Team /Suppliers and controlled by the Construction Supervision Team (Architects, Engineers, Surveyors....)	The owner doesn't have a construction supervision team to test or control the end product	<u>Low Quality / building does not meet the minimum standards</u>

5. CONCLUSION

The historical study of the informal settlements in Beirut shows that the growth of these settlements is continually increasing to respond to the pressure of affordable housing demands. This has led to the spread of the construction of the informal settlements over many zones within and outside the city boundaries.

The construction of these housing units is produced by adopting informal construction processes imposed by the limitation of budget and time. The analysis of the adopted construction processes in the informal settlements (slum estates and consolidating settlements) shows that there are some similarities between these processes and the Integrated Procurement System. However, the construction processes adopted in these settlements lack the main factors essential to improve the end quality of dwelling units, namely design duties, pre-set specifications, compliance with the building norms and regulations in addition to the quality control processes. This explains the common attributes of slums, described as dilapidated structures constructed on hazardous sites with non-permanent materials. These often lack basic services in terms of electricity, potable water resources, rainwater drainage, and waste collection systems.

Finally, the higher rate of demand for affordable housing units in Beirut poses a real challenge as it exacerbates the informal settlements problem. The implication of this result is that efficient measures should be taken to avoid the negative effects created by the elimination of essential design and control stages from the construction process. A possible approach to avoid and neutralize this substantial negative impact would be to establish a multi-stakeholder platform to organize and control the construction process within this context. This platform may include public sector, non-government organizations, and essentially slum dwellers who are the main concerned party in the enhancement of the construction process. This collaborative work helps to improve daily life conditions by raising living standards.

REFERENCES

- Babatunde, S.O. Opawole, A. Ujaddughe, I.C. (2010). *An Appraisal of Project Procurement Methods in the Nigerian Construction Industry, Civil Engineering Dimension, Vol. 12, No. 1, March 2010,*
- Davis, P. Love, D. Baccarini, G. Welson, R. Lopez Report: Capital work Procurement: the Selection of a Building Procurement Method , CRC Construction Innovation, April 2008
- Davis, P. Love, D. Baccarini. (2008). *Report: Building Procurement Method, CRC Construction Innovation, June 2008*
- De Soto, H. (1989). *The Other Path, the Economic Answer to Terrorism.* Harper & Row Publishers. United States.
- Fawaz, M. (2017). *Planning and the refugee crisis: Informality as a framework of analysis and reflection. Planning Theory ,*
- Fawaz, M. Peillen, I. *Urban Slums Reports: The case of Beirut, Lebanon*
- G. Wood, A. Muro, Cobra (2010), *A comparative analysis of procurement methods used on competitively tendered office projects in the UK, RICS*
- Kadiri, D. Ogunkola, O. (2014) *Assessment of Procurement Methods Based on Clients Selection Criteria in Ogun State, Nigeria.* Department of Quantity Surveying, Obafemi Awolowo University, Ile-Ife.
- Masterman J W E (1996) – *Building Procurement Systems: An Introduction,* E & FN Spon, London

- PMI. (2013). *A Guide to The Project Management Body of Knowledge (PMBOK GUIDE)* Project Management Institute (5th Edition).
- Ramus, J., Birchall, S. Griffiths, P. (2006), *Contract practice for Surveyors*, 4th Edition, Laxton, Great Britain
- Rashid, R. Taib I. ..., Zainordin, Z (2006). *Effect of procurement systems on the performance of the construction projects*, Covenant Journal of Research in the Built Environment (CJRBE) Vol.2, No.1.
- Sadek, K. (2007), *The impact of the informal settlement on the urban fabric of the city – the case of Beirut* , Master Thesis, Beirut Arab University
- S. Saha, M. Hardie, (2009), *Builders' perceptions of the impact of the procurement method on the project quality. Challenges, Opportunities and Solutions in Structural Engineering and Construction*, London
- Shane, D., (2005). *Recombinant Urbanism, Conceptual Modeling in Architecture, Urban Design, and City Theory*. Wiley-Academy .John Wiley & Sons Ltd, England.
- UN-Habitat (2003). *The Challenge of Slums – Global Report on Human Settlements*
- UN-Habitat (2015). *22- Informal Settlements*, Habitat III Issue Papers, New York, 31 May 2015