

Universität Stuttgart

**Processes of Consolidation and Differentiation
of Informal Settlements**

Case study Ciudad Nezahualcóyotl, Mexico City

Von der Fakultät Architektur und Stadtplanung der Universität Stuttgart
zur Erlangung der Würde eines Doktors der Ingenieurwissenschaften (Dr.-Ing.)
genehmigte Abhandlung

vorgelegt von

Milton Montejano Castillo

Aus Rioverde, San Luis Potosí, Mexiko

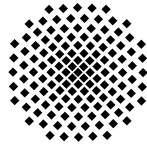
Hauptberichter: Prof. Dr.-Ing. Eckhart Ribbeck

Mitberichter: Prof. em. Dr.-Ing. Lothar Götz

Prof. Dr.-Ing. Hanno Ertel

Tag der mündlichen Prüfung: 06. Mai 2008

**Städtebau Institut der Universität Stuttgart
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Milton Montejano Castillo, Stuttgart, May, 2008

Abstract

The objective of this work is to document the spatial and functional differentiation of informal settlements, thereby using Ciudad Nezahualcóyotl in Mexico City as a case study. As an interpretation reference of such differentiation, the growth stages of settlements were used. Still, the major finding of this research is, that the evolution and resulting characteristics of such settlements can be better understood, if the phenomenon of informal urbanization was considered from the perspective of the concept of a *City* framework. Nevertheless, the qualities of this new type of urban agglomeration can be considered unique so that it differs strongly from the conventional idea of city.

Key words: *informal settlements, Ciudad Nezahualcóyotl, differentiation, new type of city.*

Kurzzusammenfassung

Ziel dieser Arbeit ist es, die räumliche und funktionelle Ausdifferenzierung informeller Siedlungen zu dokumentieren. Dazu wird hier als Fallstudie die informelle Siedlung Ciudad Nezahualcóyotl in Mexiko Stadt untersucht. Die räumliche und funktionelle Differenzierung wurde anhand der Wachstumsphasen der Siedlung beschrieben. Das wichtigste Ergebnis der Untersuchungen ist jedoch, dass die Entstehung und die entsprechenden Charakteristika dieses Siedlungstyps besser verstanden werden, wenn man sie aus stadtplanerischer Perspektive betrachtet. Die Charakteristika informeller Siedlungen unterscheiden sich allerdings stark von denen konventioneller Städte. So können informelle Siedlungen kaum dem konventionellen Stadtbegriff zugeordnet werden, sondern stellen vielmehr einen neuen Stadttyp dar.

Kernwörter: *Informelle Siedlungen, Ciudad Nezahualcóyotl, Ausdifferenzierung, Neuer Stadttyp.*

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Cities growing inside other cities: small scale Urban Mirrors?

In the last fifty years the largest cities of the developing World have been the place where an urban phenomenon without precedence has taken place: the informal urbanization.

Around 1970s the informal settlements already represented a vast proportion of some of the major Metropolises of the *South Countries*. In some cases this figures were very large as the cases of Calcutta or Santo Domingo showed, where almost three quarters of the population lived in inadequate shelter conditions.

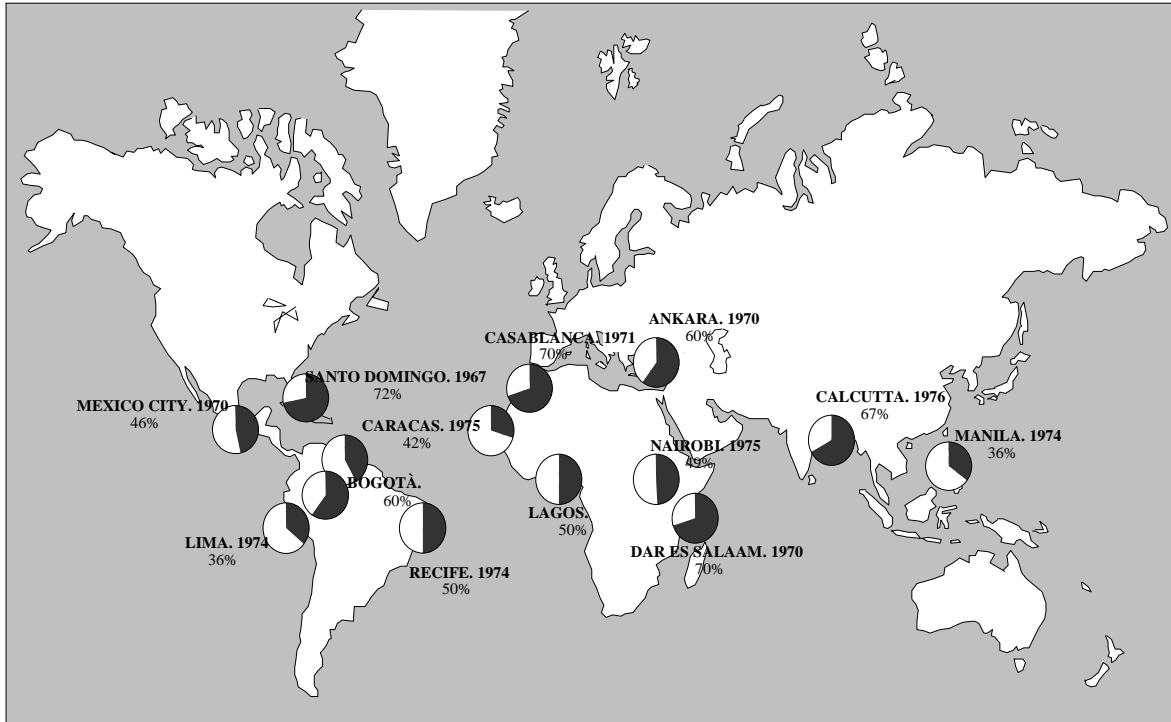
Today it is difficult to calculate the amount of people living in such agglomerations worldwide due to different parameters established for housing quality in various countries and regions. However, it is estimated that there are approximately one billion people living in this conditions. This represents about one third of the world population living in cities today.

This new type of urban agglomerations have been growing outside the conventional urban and constructive systems around the world. The causes of this phenomenon as well as changing measures have been deeply investigated. However, at the time of the elaboration of this work the opinion of urban specialists about the internal, functional and spatial characteristics of this cities coincides: the lack of knowledge about it. And these are questions which motivate this work:

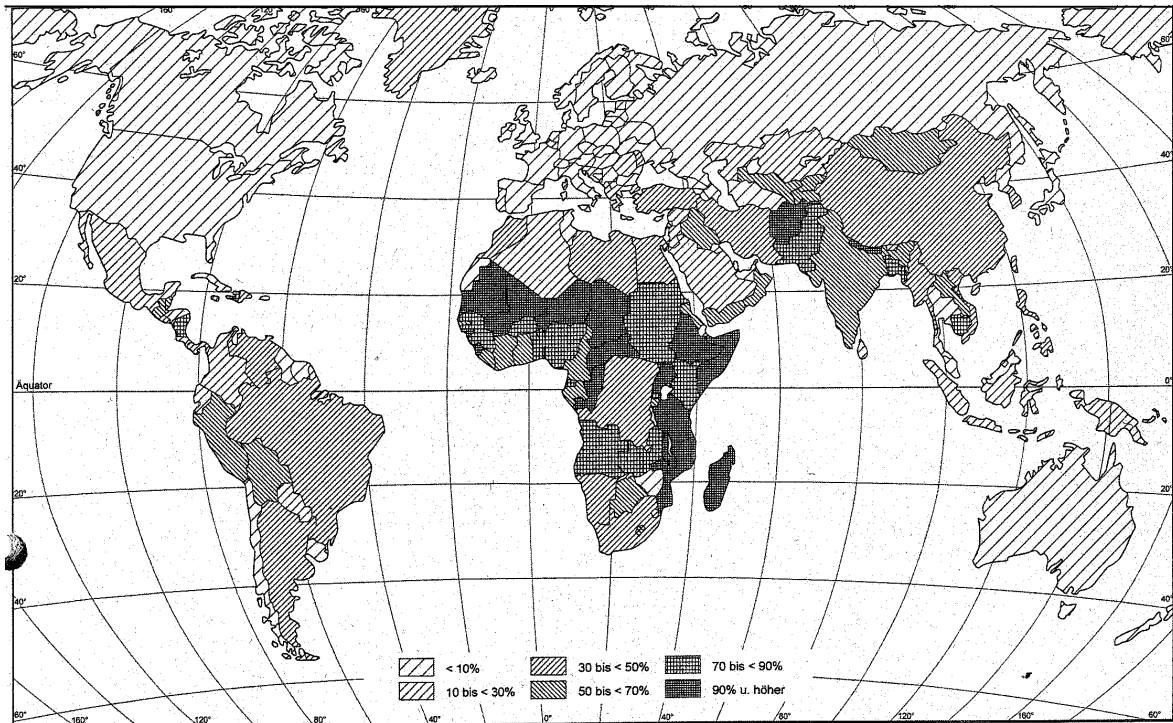
- How do this urban agglomerations function and how do they look like?
- Do they follow urban processes like those of the “formal city” or follow specific ones not yet understood?

Opposite page (top): Own drawing based on: Ribbeck, Eckhart: *Bilder und Stichworte zur Vorlesungsreihe „World Cities“*. WS 02/03. Städtebau-Institut, SIAAL- Städtebau in Asien, Afrika, Lateinamerika, Universität Stuttgart, CD-ROM. 2002.

Opposite page (bottom): Bähr, Jürgen: „Informalisierung der Städte im subsaharischen Afrika“. *Geographische Rundschau* 57. Heft 10. 2005. P. 10. after United Nations Centre for Human Settlement, UN-HABITAT (Hrsg.): *Slums of the World: The face of urban Poverty in the new Millenium?* Nairobi 2003.



Proportion of urban population living in informal settlements in some cities of Asia, Africa and Latin America middle 1970's



Proportion of the urban population living in inadequate shelter conditions, including informal settlements. 2001

Of crucial importance to understand these agglomerations is to capture their changes in time. However, such a task represents a challenge because these settlements are rarely documented in records or official sources.

An attempt to track these changes will be made based on the example of one of these cities: “Ciudad Nezahualcóyotl”, a 2.2 million people city which during the last fifty years has been informally developed as a part of the Metropolitan Area of Mexico City.

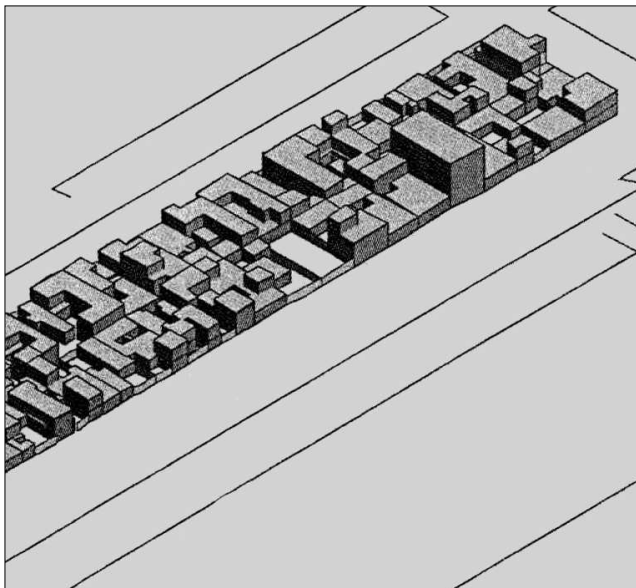
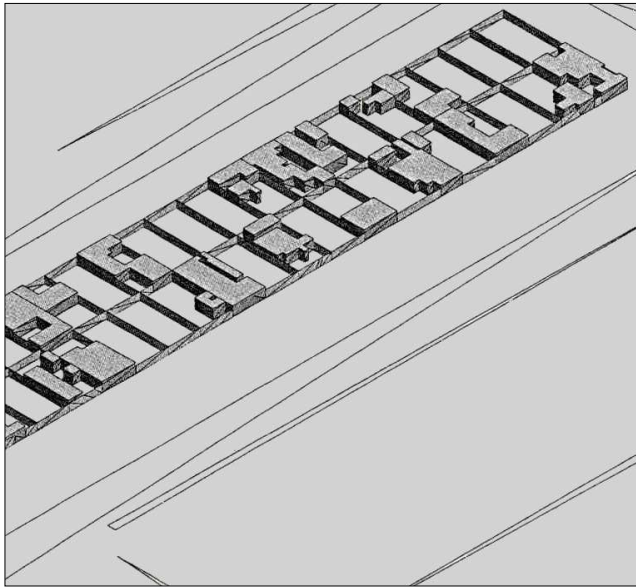
To try to capture the changes of this city as far as possible, this work is divided into four parts. In the first Chapter an overview of the main characteristics of the informal urbanization is presented with the aim of obtaining a global picture of the historical development of the phenomenon to situate, in this context, the case of informal urbanization in Latin America. In this chapter the major approaches, perceptions and methods regarding the phenomenon of the informal urbanization are also presented. For this, a methodological framework for the case study has been developed.

After an overview of the methods and theoretical assumptions of this urbanization, in a second Chapter the urban development of Nezahualcóyotl is presented. The development of Ciudad Neza is documented in five stages from 1940 to 2003. While a first section documents the changes at the urban scale, in a second section the results of a field study are presented, making emphasis on the constructive aspects. Finally, concluding remarks about the global phenomenon as well as particular conclusions are discussed in a fourth Chapter.

Opposite page: Ribbeck, Eckhart: *Die informelle Moderne. Spontanes Bauen in Mexiko Stadt*. AWF-verlag, 2002. P. 301.

Picture in the opposite page (top): Huitrón, Antonio (1975): *Nezahualcóyotl. Miseria y Grandeza de una Ciudad*. Toluca, México. P. 193.

Picture on the opposite page (bottom) taken by the author.



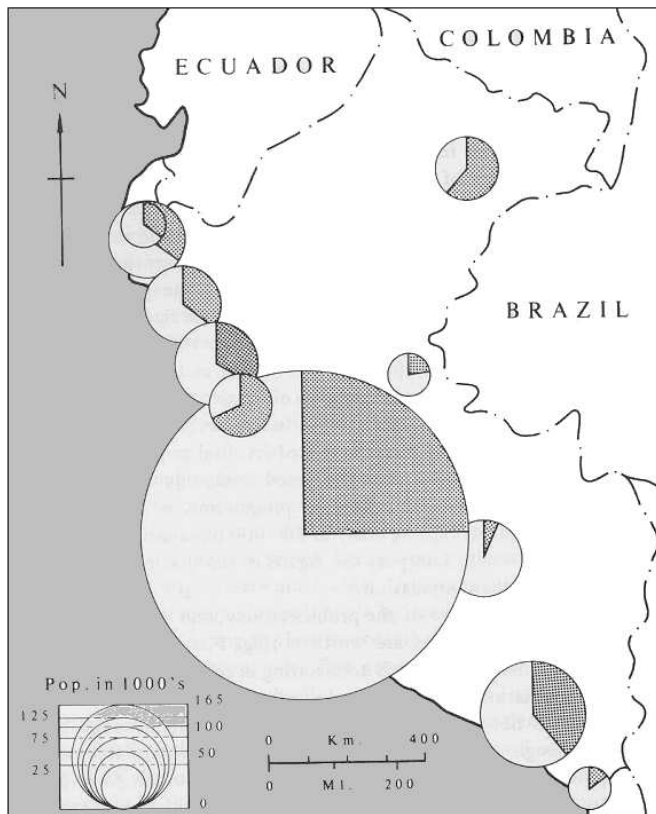
Densification process in Ciudad Nezahualcóyotl in approximately thirty years

1. INFORMAL SETTLEMENTS: AN EMERGING URBAN WORLD

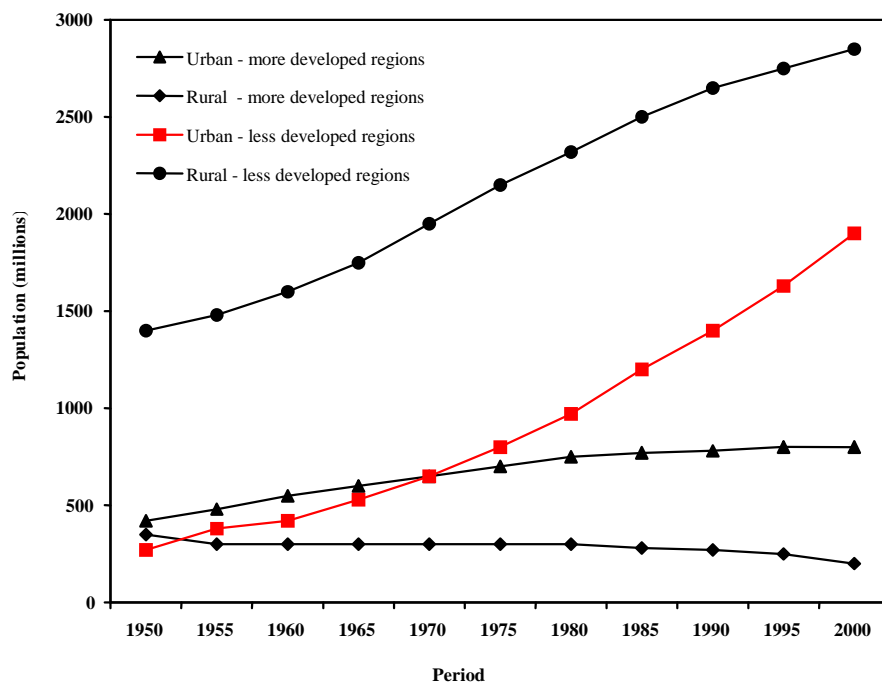
The purpose of this Chapter is to describe and provide the historical background on the appearance and development of informal settlements within an urban setting in order to identify their causes and characteristics. For the purpose of this dissertation, an informal settlement is a concentration of dwellings built without compliance to official norms or urban planning.

1.1 Informal settlements as a global phenomenon

The first informal settlements began in the mid-20th century in densely populated cities in developing countries. Their origin was mainly associated to the appearance of a social class without the means to buy, rent or build their own dwellings through legal or formal methods. This situation was mainly the result of several factors associated both to demographical and macro economical changes [1,2]: the combination of reduced mortality rates, sustained fertility and an agricultural crisis, which created massive migration into the cities (see Figures 1.1.1 and 1.1.2); This migration caused important urban centers to become over populated, but the productive system in these cities was unable to absorb the massive amount of labor. Therefore, this group was unable to become part of the productive sector of the city and to create enough income to have access to the real estate market. Additionally, governments were not able to supply housing due to the lack of economic resources. As a consequence, these inhabitants were forced to find a different way to get a roof over their heads. Lacking sufficient income, land purchase was not an option, so property was appropriated in an informal manner in areas where dwellings were forbidden. Private or public property were occupied arbitrarily and spontaneous dwellings were built there. These dwellings were built for minimal survival conditions. Initially, they were built with discarded material or rubble and without any type of urban infrastructure. Under diverse names such as *favelas*, *bairros de lata*, *barriadas*, *pueblos jóvenes*, *gecekondus*, *kampungs*, *bustees*, *mabandas*, *slums*, *villas miserias*, *asentamientos irregulares*, *colonias populares*, informal settlements have become an homogeneous global phenomenon, but with differences as to forms, origins or locations, as the following examples show.



1.1.1
 Informal settlements in Peruvian towns around 1961 (Proportion of total town population living in informal settlements is shaded)



1.1.2
 Urban and rural populations in more and less developed regions, 1950-2000

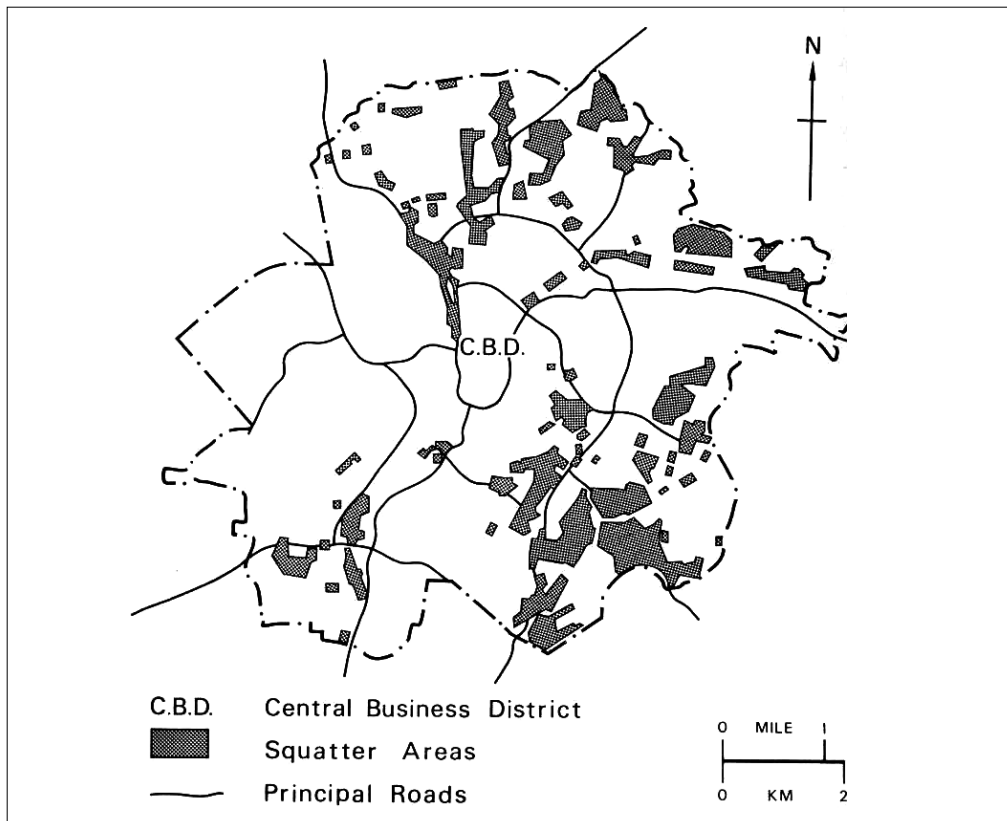
In Asian cities like in Indonesia the informal settlements are known as “kampung” [3]. The Indonesian word, “kampung” is typically used to refer to a certain type of residential area in a city, as opposed to the word “desa”, that refers to a village or rural residential area.

Historically, “kampung” were autonomous settlements or villages located in rural areas or on the edges of cities in Indonesia. As these areas became more populated, their sanitary standards deteriorated resulting in disease and poverty. Due to the negative effect these settlements had on the cities, authorities incorporated them administratively and made them responsible for improving their own living conditions.

There are two types of kampung: the central and the peripheral kampung. A central kampung is characterized by low income inhabitants, high density and located near the business centers. They typically range from 15 to 120 hectares with a population density of 350 to 1,250 people per hectare. Kampung dwellers usually work in the business centers, as food vendors, garbage collectors, or other informal activities.

A peripheral kampung is located far from the city center but with access to urban services. They are less populated and their inhabitants usually show higher incomes than those in a central kampung. At some point, peripheral kampungs became a viable option for middle class inhabitants so they became more populated, but with better construction, and increasing land and real estate value.

The location of the settlements often takes the form of scattered islands because they locate close to the Central Business District or in peripheral locations, following motorways or available land (see Figure 1.1.3).



1.1.3

Location of informal settlements in Kuala Lumpur, Malaysia, 1970s



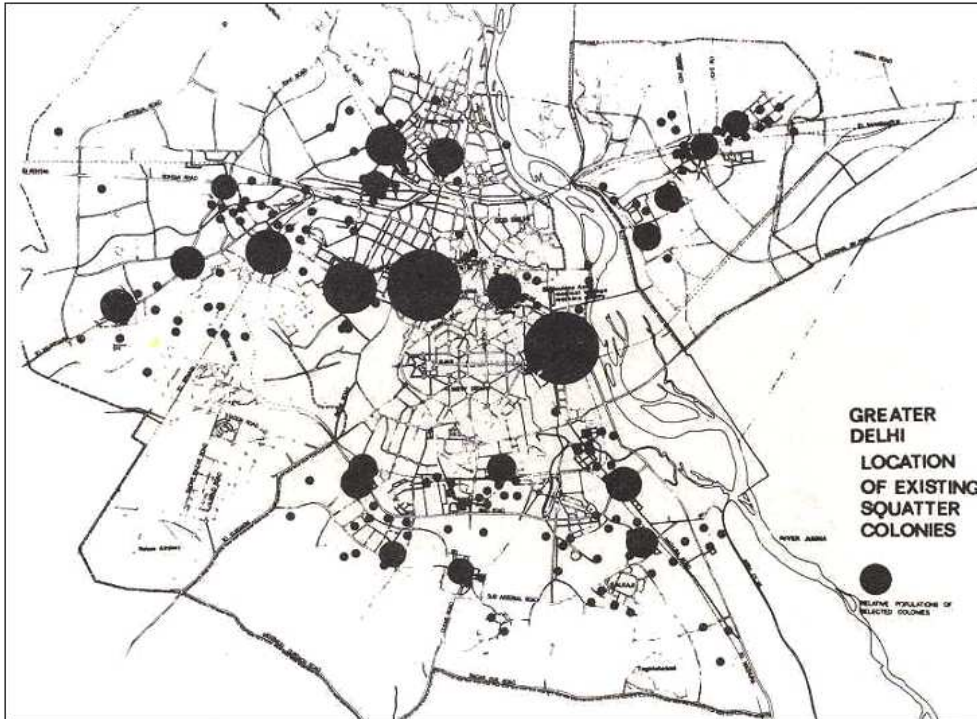
1.1.4

Informal settlements in Jakarta, Indonesia

In India, various social and political factors have brought about massive migration and dramatically increased population growth [4].

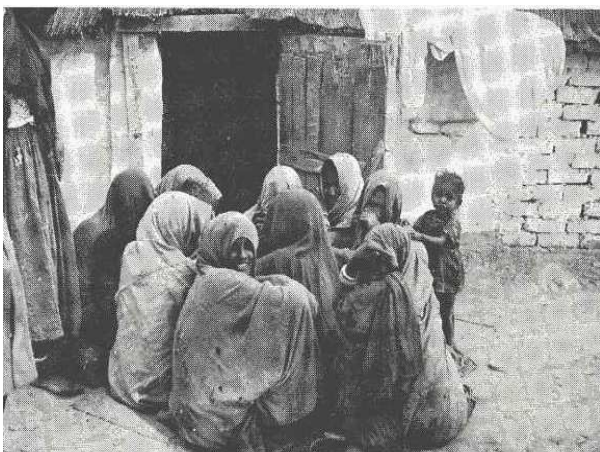
From 1950 on, population growth in New Delhi has increased over 50 % each decade. However, numerous housing programs have not been able to keep up with the demand and people have opted for informal dwellings set up on other's property (squatters) and refugee camps. Approximately 40 % of the population lives in such conditions in Delhi. These settlements are located primarily near the old center as well as in the outskirts of the city.

In Mumbai, there were 1.25 million inhabitants living in inadequate shelter conditions in 1971 and by 1985 the numbers soared to 5 million (out of a population of about 8.5 million people). Living conditions in these dwellings commonly are very deficient, due to lack of ventilation and overcrowding.



1.1.5

Location of informal settlements in Delhi, India by 1968. The small circles represent the location of settlements whereas large circles represent the relative population of selected sites



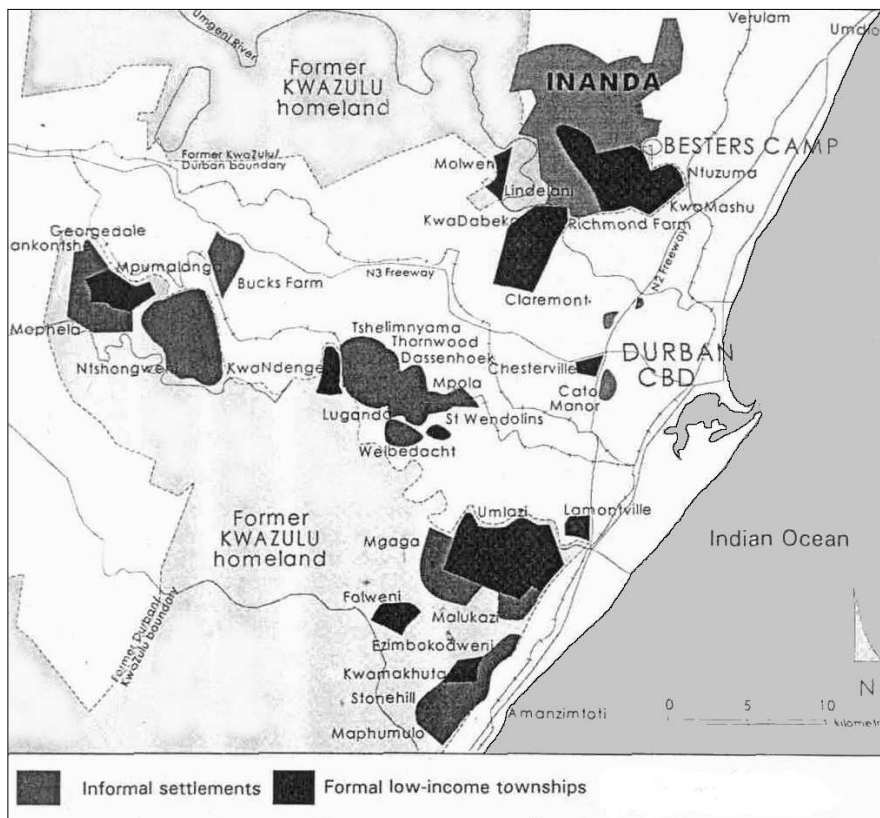
1.1.6

Informal settlements in Delhi, India

In Africa, since the end of the 1980's, the gap between housing offer and housing demand has dramatically increased and course of urban development has been lost [5]. Today the percentage of people living in precarious conditions in this region is the highest in the world, reaching in some cities of Central Africa an alarming 90% of population living in inadequate shelter conditions.

The precarious dwellings are built of diverse materials like wood, cardboard or concrete, depending on land ownership and socio-economic levels.

Aside from informal settlements, low income groups can be found in very diverse living conditions. In the case of Cairo, poor people have even gone so far as to live in cemeteries with an estimated population of one million people today who use the mausoleums as their home, a phenomenon known as the "City of the Dead" [6].



1.1.7
Informal settlements in South Africa

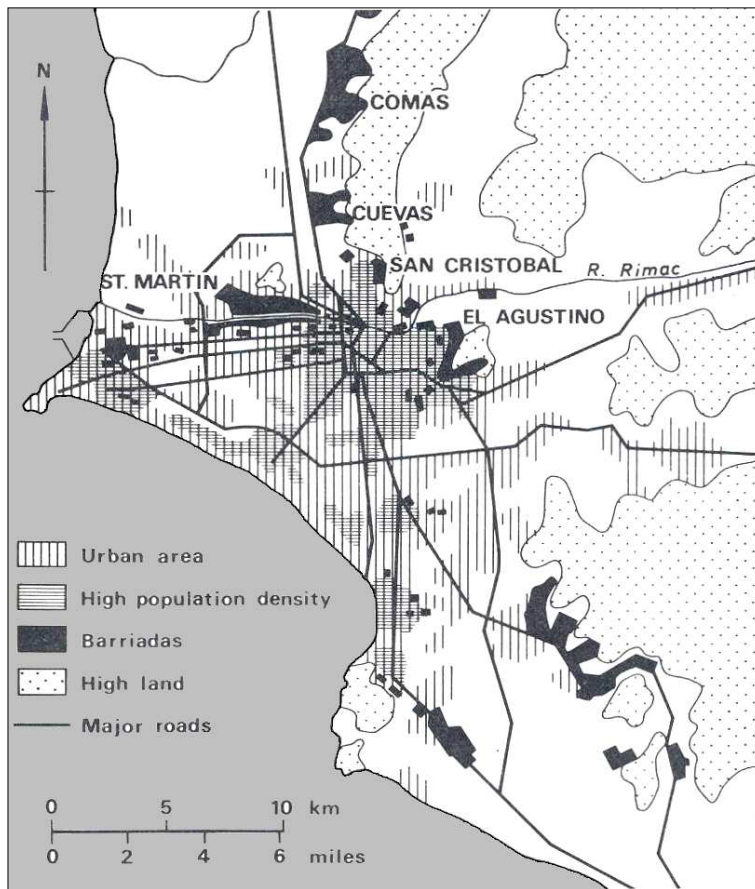


1.1.8
A periurban settlement in Lusaka, Zambia, originated in the 1960's and photographed in 1970

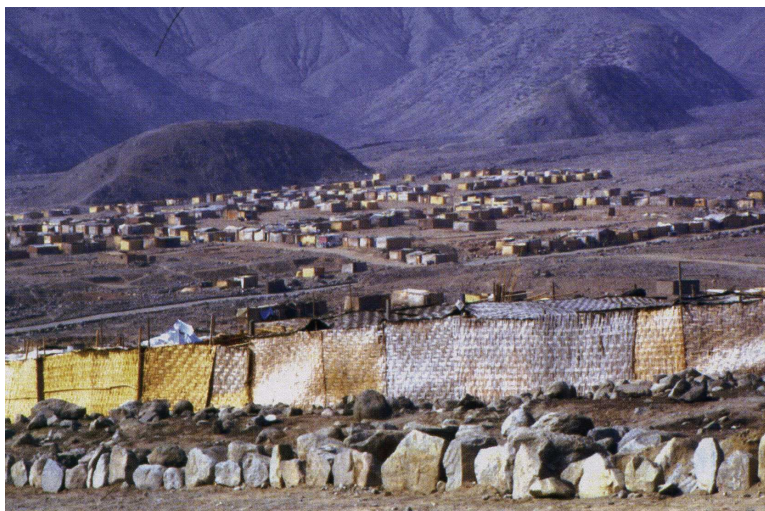
In Latin America, informal settlements appeared mostly as a consequence of the rapid urbanization and industrialization occurring after World War II. In 1930, most of the population still lived in rural areas, whereas by 1980, over half the population lived in urban areas. As in the previous examples, this was due mostly to natural growth and rural-urban migration. In addition to this growth, there was a rapid social polarization that was reflected in the real estate sector. Due to low wages and the precarious nature of economical development in this area, housing for the working class was not a priority. Therefore, the urban poor acquired their housing in their own way, in some cases subdividing mansions abandoned by the wealthy. This was the case in some areas of Mexico City. Alternative low cost dwellings arose, with people building their own squatter dwellings and later on the quasi-legal purchase of land from people who illegally subdivided their property [7, 8].

These settlements are spread throughout the urban area. In many cases, they are located on land that is inadequate for housing due to flood risks or steep hills where building is difficult and infrastructure is costly to provide.

In spite of their informal nature, the limits between formal and informal urbanization have become increasingly unclear through time. During the evolution process of informal settlements, three “generations” can be identified [7]. The first generation was of squatters lacking any sort of organization. Due to the increasing scarcity of land, a second generation of informal settlements arose. These included irregular subdivisions of land, but without any services or urban design. A third generation is characterized by the cooperation between informal developers and planning authorities, offering at least a minimum of land for services and equipment.



1.1.9
Informal settlements
in Lima, Perú



1.1.10
Organized "Invasion" in
Lima, Peru

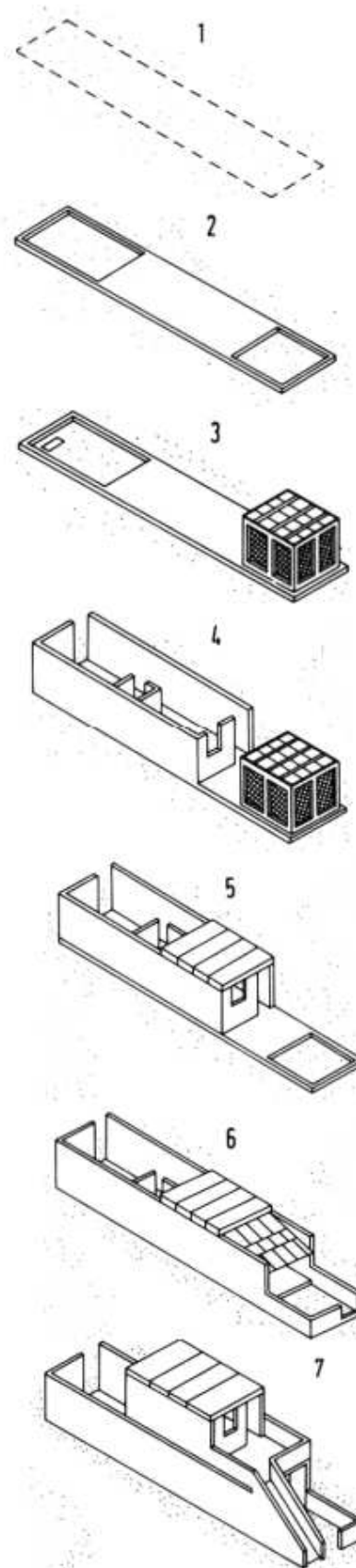
1.2 Informal settlements and housing policy

Along with the informal settlements, unemployment increased and community services became insufficient. This situation gave rise to a series of public actions and reactions related to this type of urbanization. These actions have been identified in terms of some historical stages [9], which are summarized in the following.

The first stage in the historical development of informal settlements falls into the time period following World War II and the following decades. At that time, informal settlements were considered a threat for the formal areas. Therefore, planners didn't try to solve the problem, but rather to protect the well established urban areas. Spontaneous dwellings were demolished and high rise apartments built instead. However, these actions didn't solve the problem because this housing policy was too expensive. However, high rise apartments continued to be built since they were considered as a symbol of modernity and as such were promoted by many politicians. Finally, it became clear that the substitution of spontaneous dwellings was not the solution to the problem, neither economically, nor socially.

From the mid-sixties to the mid-seventies, informal buildings took on alarming proportions in the more populated cities and the concept itself changed. Actions and theories during this stage were strongly influenced by the ideas of Charles Abrams and John Turner, who exposed the positive aspects of informal urbanization. Informal dwellings were then no longer considered a threat but looked upon as communities in the process of improvement; they were seen as supporting the adaptation of migrants into urban areas. Therefore, planning activities should focus on solving the problems of the poor urban population and allow the inhabitants to decide how their needs could be met. Dwellings were no longer built by the government, but by the people themselves with the help of the government. Improvement programs were developed that included core houses and sanitary installations (see Figure 1.2.1). In other cases, a plot was given with utilities like water and drainage, paved streets and lighting. Through these programs people could also get building materials with low interest loans. When spontaneous dwellings had already been established, government programs helped people to legalize their property and to supply basic services. In spite of the efforts, all this was not enough in qualitative terms, also these programs were criticized to force people to extensive self help.

1. Stage One: 10 by 50 foot lots are laid out by the association
2. Stage Two: Foundation walls and plinth are constructed to assure urban control and structural security
3. Stage Three: The hutment association distributes the land and the dwellers move onto their lots
4. Stage Four: Working together with technical assistance, the community builds common walls
5. Stage five: Individually or in groups, one section is covered over. Ownership officially goes to the dweller
6. Stage Six: Porch is covered and front yard enclosed
7. Stage Seven: According to the needs and means of the inhabitants, more sections are added and additional floors are constructed

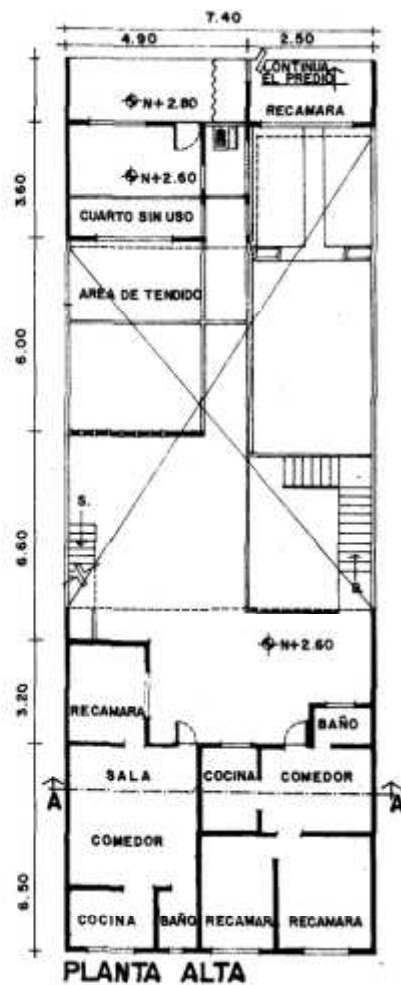
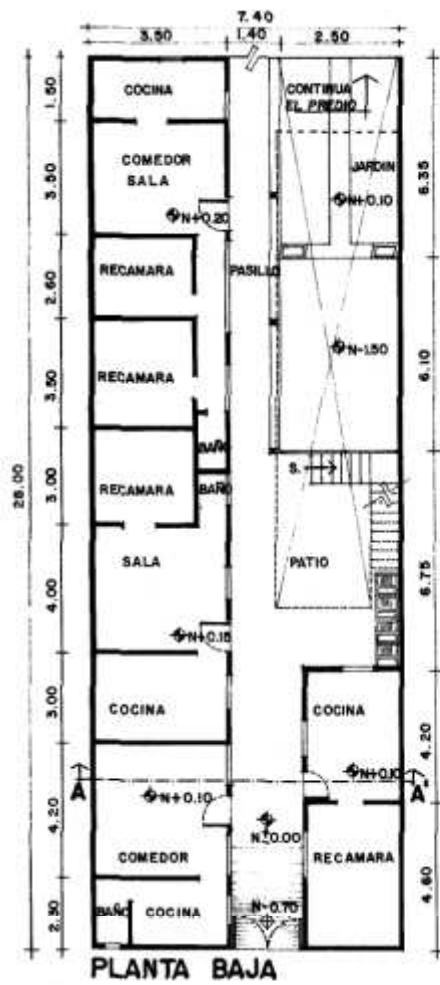


1.2.1

“A housing scheme for Baruda, India”

From the mid-seventies to the mid-eighties there rose a more balanced perspective that offered potential solutions to the problem. New government programs were started, but these created new problems, e.g. large distances to the place of work. This made some of the people to abandon their dwellings or sell them. In general, construction firms pushed aside local suppliers and labourers. On the other hand, the return on investment was difficult, due to the low income of the dwellers. The improvement of low income neighbourhoods also led to a paradoxical effect. Once these improved dwelling became attractive, the owners began renting them out and became landlords (see Figure 1.2.2). This resulted in the enrichment of a few at the expense of the poorest. Another obstacle was the government's reluctance to involve the community in the decision-making process. The final result was an increase in population density, population growth, lack of accessible urban building areas and a large amount of rental properties [9].

From the mid-eighties to the beginning of 1990, most specialists and planners concentrated on large cities, whose population and informal settlements increased every year, mostly in areas that were inadequate for urban development. Building in informal settlements became an attractive option even for the middle class. Many middle class residents in developing nations began to build their own home in unauthorized developments or by invading land. One positive aspect of this social re-arrangement was that the educational levels of the middle class allowed them to participate in the formulation of new housing policies. On the other hand, the prices for properties continued to rise, which caused further subdivisions and high rents. Therefore, the low income population became completely excluded with no access to basic housing [9].



193 **cenvi**

1.2.2

Example of informally built house used as a renting building or “vecindad”. Mexico City

Currently, *Global Urbanization* allows us to foresee Metropolization as one essential characteristic of the twenty-first century [10]. This urbanization trend includes quantitative as well as qualitative aspects, creating an ample spectrum of urban patterns and city types. In this context, informal settlements represent one of the most evident components of “Mega-cities”, “Improvised Metropolis” and “Survival Cities” [11, 12].

Within this urbanization processes, informal settlements have become much more complex than two or three decades ago. Comparative studies worldwide show that social groupings and spatial arrangements of informal settlements are now more and more heterogeneous and it is no longer the poorest social class that inhabit these areas. Economically, the income of informal dwellers stems mostly from informal activities within and outside of the settlements [2]. The economic impact of these activities is such that these informal businesses are often not limited to the area, but permeate throughout the city through a complex network that makes the distinction between the informal and formal economy difficult. Older settlements show notable differences in living conditions and infrastructure compared with newer ones. Therefore, authorities take younger developments more into consideration than consolidated ones [7]. A situation which is particularly problematic. In some cases like Mexico City much more attention should be paid to the improvement and revitalization of former illegal settlements to avoid that these might evolve towards *slum* areas [13].

After half a century it is clear today that the best practice to improve informal settlements would be a comprehensive approach, i.e. an “holistic” participatory neighbourhood improvement which takes into account health, education, housing, livelihood and gender [2]. So far, this approach has been mostly used on a small scale or as demonstration projects [ibid: 132]. A positive change can be seen in the appearance of Non-Government Organizations (NGO’s) who work together with local authorities and residents to promote housing improvement for the urban poor.

Within the neo-liberal caused by increasingly *Globalization*, the role of informal settlements has not been explored yet; there is evidence however, that cities and Megacities in developing regions are increasingly characterized by *Informalization* rather than by *Globalization* [14]. In addition, there is evidence that the population of informal settlements in some cases has been neglected in urban development planning because they are considered not compatible with the globalized economy [15].

In contrast to this, new policies are aiming at a “Sustainable Development”. This is based on the premise, that the present development needs¹ must be satisfied without compromising future generations [17]. In this concept, it is discussed if informal settlements compact city could be considered to be sustainable or not [18].

¹ The objectives of Development could be resumed as the „realization of the political, social and cultural human rights, or the production of „human security“ [16].

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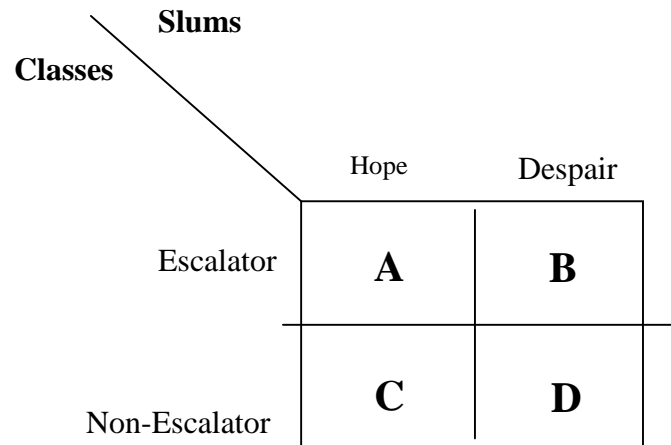
1.3 The character of informal settlements

The existing explanations regarding informal settlements have been formulated from different perspectives: social, spatial, economic, and more recently from the natural sciences perspective. In the following, the main assumptions will be described in order to provide the methodological framework for the empirical analysis of informal settlements.

In the 1960's, the informal settlements were considered a kind of *social threat* (see previous section). In this context, there was an urgent need to evaluate the improvements of such settlements in the long run. The result was a theoretical framework developed by Charles Stokes by 1962 [1].

According to Stokes, two variables were essential to determine the long term improvement potentials of informal settlements (see Figure 1.3.1). The first variable was the motivation of the "slum dweller" in regard to social and economic change, defined as *escalation*. The second variable was the capacity and ability of the dweller (i. e. education and working skills), to be integrated into the economic and social life of the city. The concrete formula proposed by Stokes was a numerical correlation between the job demand and the existing supply of labor force, in a context of economic underdevelopment.

According to Stokes, a group of slum dwellers with a psychological attitude of "hope" and with the necessary skills to "escalate", could be eventually be integrated into the economic activities of the city. As a consequence, these dwellers would be in position to improve their settlement. In the contrary case, a group with an attitude of "despair", would not be in position to get a job and a salary. Without the economic means to improve the dwelling, the whole environment would eventually turn into an undesirable environment and a *social threat*.



Where:

Hope. Psychological attitude of the inhabitant which means that the dwellers intend to improve themselves.

Despair. Psychological attitude of the inhabitant which means that the dwellers do not intend to improve themselves.

Escalator. Inhabitants with the abilities and capability required to improve the dwellers themselves.

Non escalator. Inhabitants who do not possess the abilities and capability required to improve their conditions.

1.3.1

“A theory of slums”, by Charles Stokes, 1962

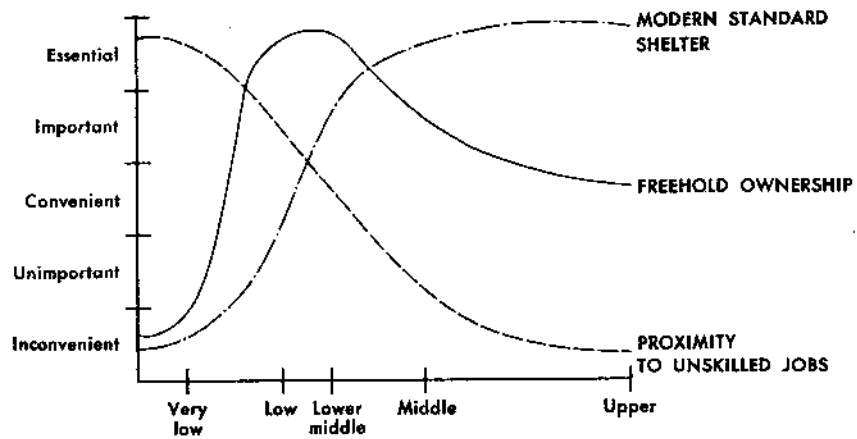
Around 1960 John Turner [2] argued that the social and economic escalation of the low-income dwellers would be possible only if the Government stopped dictating the form and function of such settlements. According to Turner, if no public intervention in the settlement took place, the settlers would have the potential to improve their settlements on their own, in the long run. Turner also argued that the population of low income settlements was not just economically dynamic, but also spatially dynamic (see Figure 1.3.2). Turner based his arguments on the assumption that the individuals have different **priorities** in regard to the location of their dwelling:

- a) The need to **live close to the city center and job opportunities**, giving less importance to the quality of the dwelling
- b) The need for **permanent ownership**, and
- c) The need for **shelter quality and ownership**, giving less importance to living close to job opportunities.

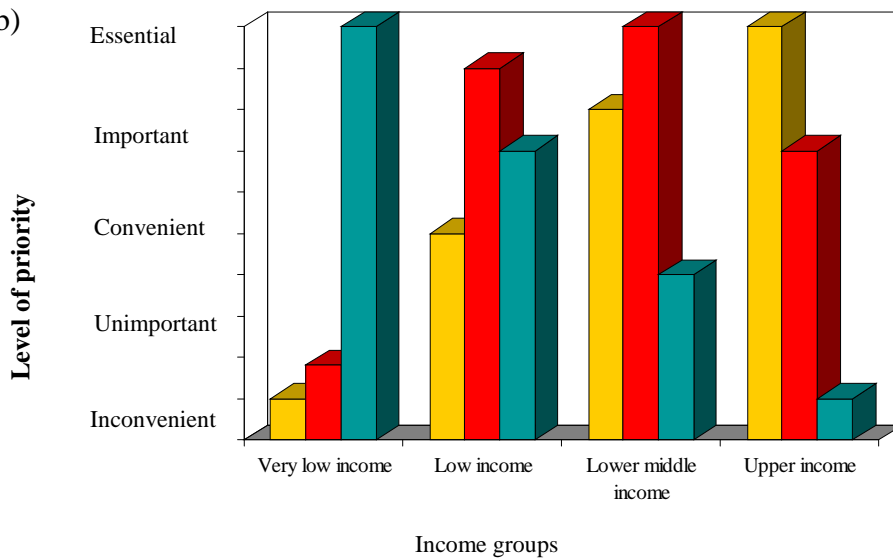
Turner associated these three priorities with a typology of low income settlers: *Very low income settler* (e.g. a poor immigrant), *Low income settler*, *Low middle income settler* and *Upper middle income settler* (e. g. a social and economically integrated immigrant).

Around this decade it was also argued that the informal settlements by no means have the potential for improvement, but rather they are exploited communities by a major economic force. From this perspective, the rules of the economic system are reproduced within the informal settlements, but at a very small scale, e.g. clandestine renting, small money loaners, sellers of junk and so forth [3]. An analytical method would consist of describing the correspondence between formal and informal economy.

a)



b)



Housing Needs

- Modern standard shelter
- Freehold Ownership
- Proximity to unskilled jobs

1.3.2

Priority levels according to income level (John Tuner, 1972)

More recent findings show that informal settlements are not static communities, but dynamic ones and this recognition is essential for the formulation of external interventions [4]. In order to estimate the informal settlements' potential for improvement, at least two things should be taken into account, namely the **ownership** in the settlement and the **upgrading interventions** (see Figure 1.3.3). In this sense, three types of informal settlements can be defined:

- a) *Intervention-led improved “slums”*. These are settlements where some intervention has been made to improve one or more aspects of the settlement, however, they have not been object of a complete upgrading project. As such interventions have been the result of a struggle that has taken time and efforts of the residents, it probably helps to create a greater sense of community.
- b) *Upgraded slums*. These are informal settlements which have been subject to a comprehensive improvement program. Nevertheless, there is no guarantee that improvements are going to last too long. Furthermore, improved conditions can serve to attract more households to the settlement, increasing pressure on the housing and services to create, once again, slum-like conditions.
- c) *Lacking community incentives for improvement*. These are informal settlements where the residents expect to find merely the minimum standards for shelter and therefore they have no incentive to undertake improvements.

Considering the type of ownership, the typology is much more extensive, but considering the topic of this dissertation, of interest are the Settlement *sited illegally on private land*. Such settlements come into existence where there is a powerful patron, political leader or other intermediary to provide protection. For these settlements the security of tenure is the main objective with all the upgrading potential that security of tenure provides.

Type of settlement	Characteristics	Opportunities for upgrading
Communities sited legally on public land mainly owner-occupiers	Situated in the older and more central parts of the city. Standard of provision of infrastructure is moderate, though much of it may be run down and in a poor state of repair. Overcrowded.	Less likely to resort to community-based action if local municipality has provided a certain level of service. However, housing upgrade schemes could be embraced-potential profits to be gained are a driving factor.
Communities sited legally on public land mainly tenants	Occupied by low-and middle income households in walk-up flats. Maintenance and services are the responsibility of local government but are likely to be inadequate due to low-rental income.	Tenants unwilling to pay more in rent to improve conditions. Improvements possible if ownership and responsibility for conditions are transferred-this situation best supports the creation of housing and community associations to manage common areas and coordinate upgrading and repairs.
Communities sited illegally on public land-mainly occupiers of own structures/houses only	Comprises a variety of locations and sizes. Many such communities are able to remain on the land through the intervention of a local self-styled “protector” with appropriate influence.	Communities keen to obtain security of tenure and legal title to their homes. Communities seek recognition for the whole group, with individual scope to buy their own title over time. Usually very keen to upgrade.
Communities sited illegally on public land-mainly renters of structures/houses	Few settlements of this type. Frequently, though not necessarily, made up of people who see themselves as temporary to the city-for example, seasonal workers.	Residents have little incentive to upgrade due to transitory nature and level of tenure insecurity.
Communities sited legally on private land-mainly owner-occupiers	Consisting of middle-income households keen to make an investment.	Forging “community” difficult. Less keen on managing services themselves; prefer to “buy” services.
Communities sited legally on private land –mainly tenants	High demand for security of tenure and willing to invest their time, money and effort into upgrading, in return for a guaranteed period of rent freezes and no eviction.	Landlords benefit from gradual upgrading of their property, though tenants may be apprehensive about resulting rent increase.
Communities sited illegally on private land-mainly occupiers of self-built structures/houses	Such squatter settlements are few but exist where there is a powerful patron, political leader or other intermediary to provide protection.	Securing tenure is the primary objective in these cases with any upgrading possibility that security of tenure provides.
Communities sited illegally on private land-mainly tenants	Less likely to be interested in security of tenure without, correspondingly, more secure economic situation. Distinction to be made between tenants temporary to the city and those unable to acquire their own housing.	Differential pricing required to cater to different characteristics of the tenants.

1.3.3

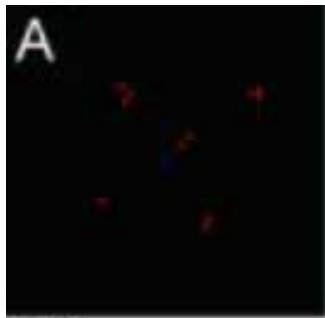
Summary of opportunities for improvement linked to tenure

Traditionally, many of the tools developed to understand and analyze the urban space derive from the natural laws, the analysis of the informal settlements being no exception.

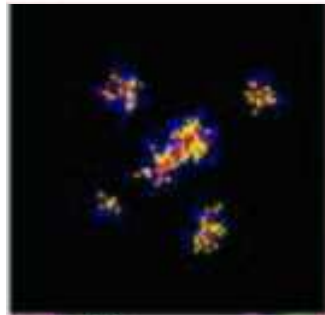
Informal settlements could be understood as *artificial life environments*. Here, the informal settlements are interpreted as artificial living cells or “abstract pockets” whose movements simulate land use changes, physical densification, urban growth or other processes (see Figure 1.3.4). These “cells” change and move on the screen according to “rules”, principles or trends observed in the real Urban World. The movements however, do not respond to linear and simple mathematical functions, but in a non-linear, probabilistic and complex way, which can only be simulated by computers. These simulations have names like “free agents models”, “agent-based models” or “cellular automata models” [5].

Originally, *cellular automata models* were used to simulate and explain natural phenomena (i.e. the movement of gas particles), then they were also used to analyze social phenomena like the spread of viruses in human populations or the flux of pedestrians in emergency cases [6].

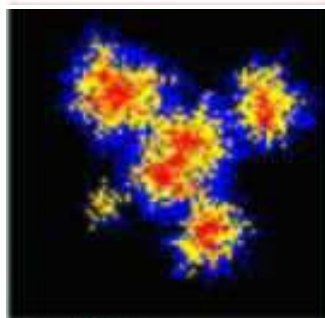
Today, these models are also used in urban studies to simulate urban growth and consolidation of informal settlements. Specifically, the urban development of the Brazilian *favelas* has been explored in the last years [7, 8, 9, 10]. Among others, it was found that informal urbanization begins at spatial frontiers or borders formed by avenues or well delimited spaces, that informal urbanization is not continuous but it occurs in steps, and that consolidation depends on the age of the settlement.



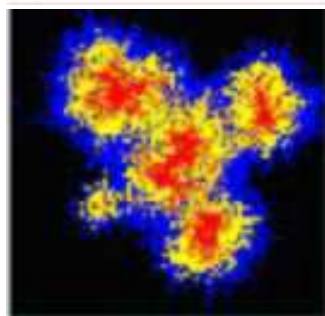
t = 0



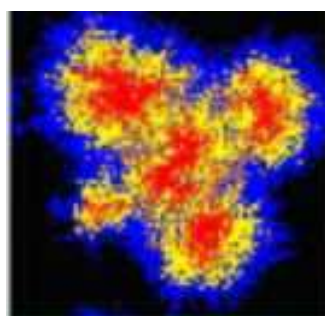
t = 500



t = 1000



t = 1500



t = 2000

Legend

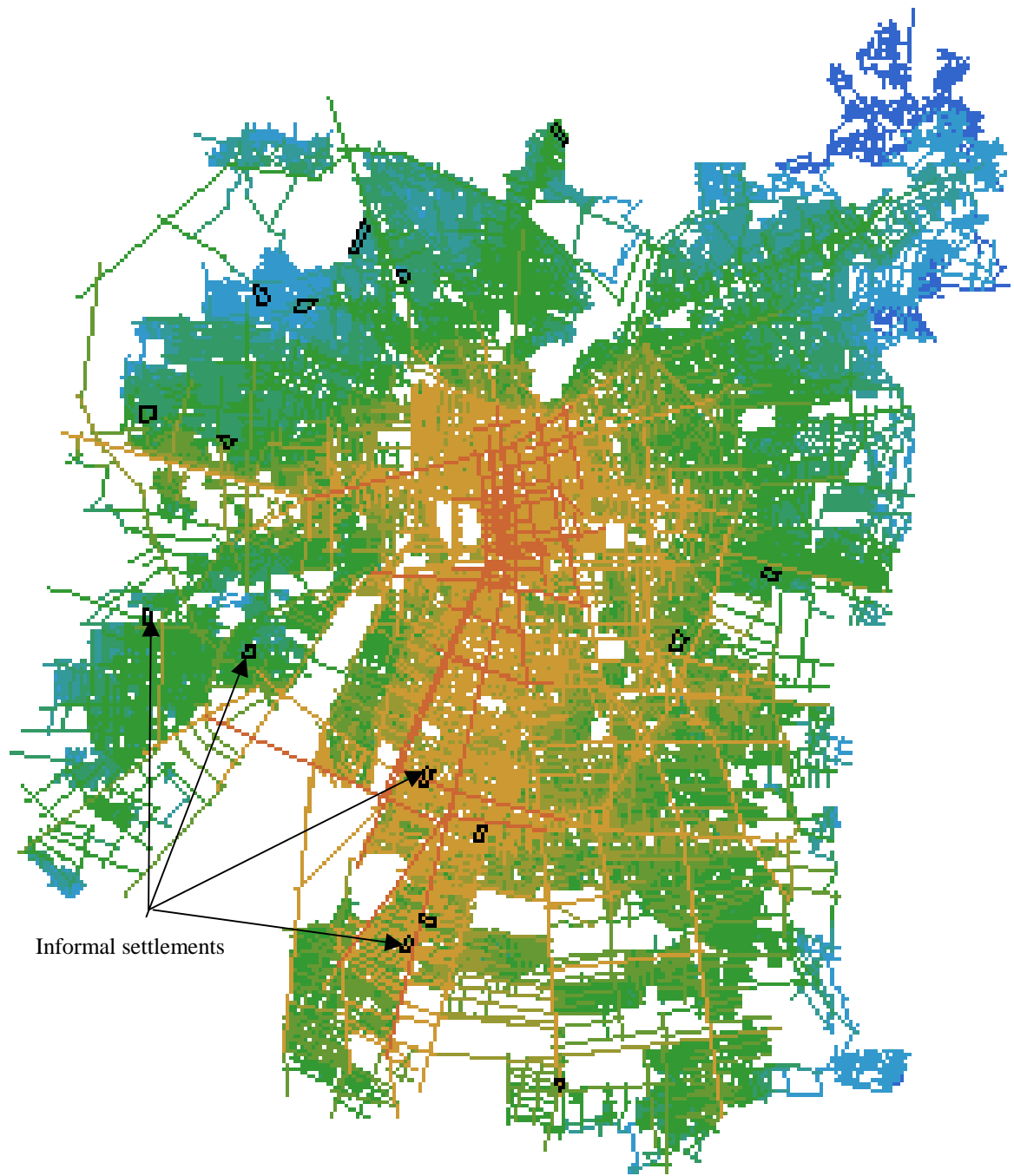
t= Number of cells or agents

1.3.4

Simulation of the growth and consolidation of an informal settlement using Agent Based Models

In another analytic approach it is assumed that individuals organize their lives trying to minimize the distance they have to move. From this point of view, the city can be considered as a network of interconnected straight lines (along the streets) that enables the movement of people or vehicles (see Figure 1.3.5). Based on these assumptions, the space can be analyzed by numerical relationships between the lines which are interconnected with each other. Eventually, the streets which cross the whole city in a straight manner would be those which offer the least friction to move. Following these principles, any city can be analyzed, in morphological quantitative terms [11, 12, 13].

There is no doubt that the consolidation of informal settlements can be partially explained by the spatial configuration of the streets, which in turn influences the movement of vehicles and persons, thus accelerating the commercialization of the informal built areas, supporting the local economy and the physical improvement of the settlement [14].



Informal settlements

1.3.5
Space Syntax Analysis for the city of Santiago de Chile, 2000

Informal settlements have also been interpreted as “urban texture” with the purpose of correlating morphological patterns with poverty [15]. This concept is based on the quantitative analysis of the surface and configuration of the buildings as well as the internal *emptiness* or voids between buildings (see Figure 1.3.6).

Preliminary results based on the use of satellite images argue that the urban texture of informal settlements can be analyzed in terms of *fractality* and *lacunarity*. That is to say, informal settlements contain morphological characteristics which can also be found in the nature, properties which indicate a hidden order. In this sense, an estimation of the population density or the spatial patterns of informal settlements could be obtained from remote images, offering new possibilities for a mapping and classification.

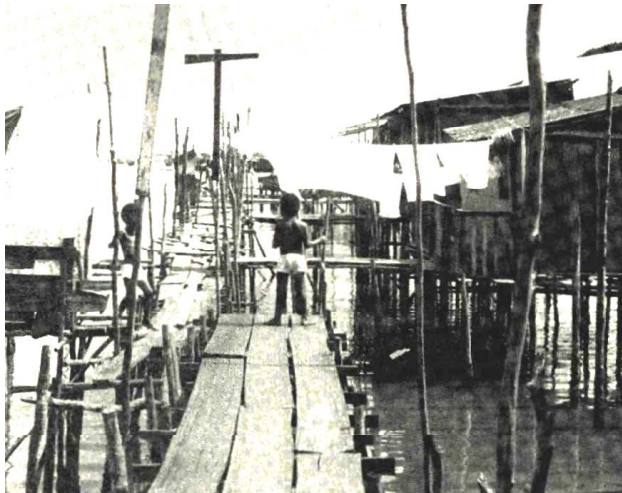


1.3.6
Texture pattern analysis of informal settlements in Brazil

Informal settlements can also be considered as a cultural landscape [16]. That is to say, these settlements are the physical and social result of repeated and collective decisions made by many individuals over a long period of time. Hence, these “multi layered” cultural landscapes could be considered as a whole and as an apprehensible object with its own analytical framework (see Figure 1.3.8). A practical utility of this approach is the recognition of the design qualities of the informal settlements regarding the design solutions for the local environment. Such an analytical framework seems to be feasible, if we think about the informal settlements as a process and product of *vernacular architecture*.

As a vernacular building *process*, the informal settlements could be analyzed in relation to the identity and the creative ideas of the settlers, the harmony between the environment and the lifestyle, among other factors.

Considered as a *product* of vernacular architecture, the physical environment could be described in terms of specific materials, textures, colors, climatic response and relation with the landscape, among others.



1.3.7

„Overwater settlement (Alargado) in Salvador, Bahía, Brazil. Note the response to a specific site, potential open-endedness, and possibility of relating morphology to cultural variables.”

Process Characteristics	Product Characteristics
1. Identity of designers	1. Degree of cultural and place specificity
2. Intentions of designers	2. Specific models, plan forms, and morphologies
3. Anonymity of designers	3. Nature of relationships among elements and the underlying rules
4. Reliance on a model with variations	4. Presence of specific formal qualities
5. Presence of a single model	5. Use of specific materials, textures, and colors
6. Extent of sharing of model	6. Nature of relation to landscape
7. Nature of underlying schemata	7. Effectiveness of response to climate
8. Consistency of use of a single model for different parts of the house-settlement system	8. Efficiency in use of resources
9. Relationships among models used in different environments	9. Complexity due to place specificity
10. Specifics of the choice model of design	10. Complexity due to the use of a single model with variations
11. Congruence of the choice model with ideals of users	11. Clarity of the environment due to the order expressed by the model used
12. Degree of congruence between environment and culture-life style	12. Open-endedness allowing changes
13. Use of implicit vs. explicit design criteria	13. Presence of “stable equilibrium” vs. the “unstable equilibrium” of high style
14. Degree of self-consciousness of the design process	14. Complexity due to variations over time
15. Degree of constancy vs. change of the basic model	15. Open-endedness regarding activities
16. Form of temporal change	16. Degree of multisensory qualities of environment
17. Extent of sharing of knowledge about design and construction	17. Degree of differentiation of settings
	18. Effectiveness of environment as a setting for life style and activity systems
	19. Ability of settings to communicate effectively to users
	20. Relative importance of semifixed features vs. fixed feature elements

1.3.8

Process and Product Characteristics of Spontaneous Settlements

“Informality” has been one of the most common terms associated with this kind of settlement. The term was originally used to refer to settlements built without considering any established norms or rules. However, in the last decades this term has been gradually evolved to acquire a more comprehensive perspective to understand the informal settlements' World.

Traditionally, the term “informal” refers to something that lacks form, something unofficial that is not done or made according to a recognized or prescribed rule. Academics and policy-analysts began to speak about the “informal sector” in the early 1970s [17], but it not would be until the following decade, that the meaning of informality began to be interpreted from a different point of view.

Around the 1980s *Informality* ceased to be viewed as an anarchic or chaotic phenomenon. Instead, it was pronounced as a clear socio-economic system with a specific representation of interests and level of social organization: qualities which are reproduced in every structure, but these structures are not recognized by the State [18, 19]. Therefore, the capital created informally becomes, in a sense, “dead capital”, which is invisible and marginalized by the formal administrative and economic system. The “dead capital” would correspond then to the cost of the buildings informally produced, in comparison to the cost of the building formally produced (see Figure 1.3.9). Departing from these assumptions, informality would therefore be the only possible way for low income individuals to reach an economic goal, something practically impossible in the context of expensive regulated procedures.

Leaving the economic and political sphere aside, the term *Informal* has become also necessary in the field of Urbanism to refer to an urban process with very specific characteristics: the *Informal Urbanization*.

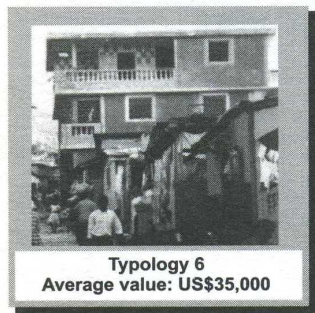
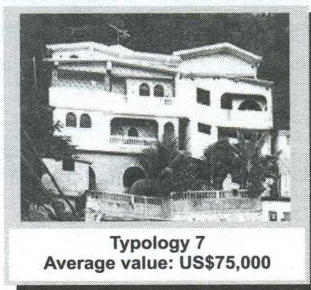
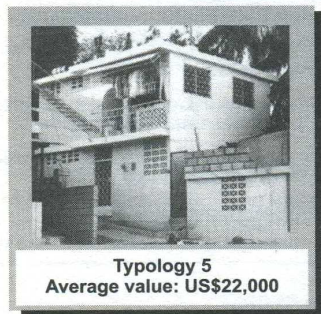
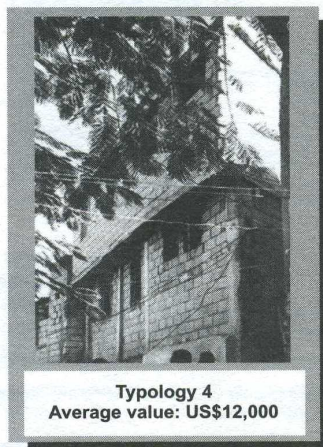
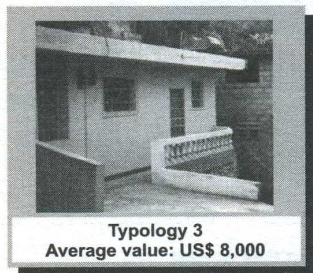
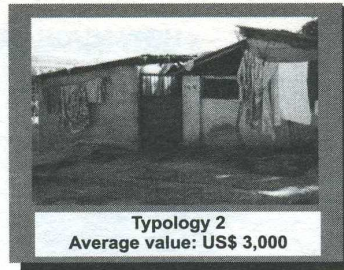
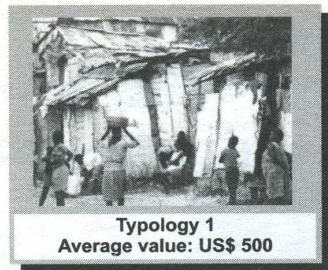


Figure A.5
Types of Urban Informality
in Port-Au-Prince and other
Haitian Cities

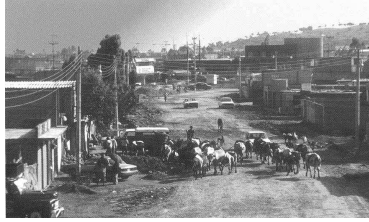
1.3.9
Types of Urban Informality in Port-Au Prince and other
Haitian Cities. Hernando de Soto, 2000

As opposed to “formal” urbanization, which begins with an urban plan, a legal delimitation of property, infrastructure and services necessary to complete the building, informal urbanization begins backwards. First the informal settlers build the dwellings, then bring in the infrastructure and finally define the ownership. At the same time, in the structures as such, a series of constructive stages can be observed [20, 21, 22, 23, 24].

The network of streets in spontaneous urbanization is carried out in an orthogonal manner ensuring a relatively rational distribution of infrastructure. Within this orthogonal scheme, the dwelling is developed with some freedom since there are no formal restrictions that limit or control the growth of the dwelling as such. The building process can be carried out in a fragmented manner but a patio for lighting and ventilation purposes is generally used. The construction is usually based on a minimal concrete structure with modular cells measuring about 4 by 4 meters (about 12 by 12 feet). These are grouped either linearly or serially for a flexible use of space to accommodate: sleeping, living, a room for the children, shop or a storage area. Another use is for business: a small store, a micro-factory, or rooms could be rented out and thus become an important source of income. The continuous construction of cells doesn't follow any design scheme or floor plan; it is rather a cellular kind of growth.

Based on the principles of informal dwellings, a house develops by following a step-by-step growth pattern (see Figure 1.3.10). It generally begins with the use of temporary materials. Growth usually begins in the form of an “I” or “L”, usually with the creation of a multi-use patio. As more and more cells or rooms are added on, the patio usually disappears and is transformed into a hallway. The dwelling begins to grow vertically once about 2/3 of the surface has been built on. As the dwelling grows upward, windows are opened up for lighting and ventilation as the open inner areas have been drastically reduced.

A family's need for space can reach a limit and at that moment the dwelling stops growing or falls into disuse because some family members have moved away. In other cases, the dwelling continues to grow, not for the family, but to be sublet out to other families. In this case, comfort is drastically reduced since per person space has diminished and illumination and ventilation have also decreased. The informal construction cycle stops with the complete substitution of the dwelling. This occurs in older settlements (around 50 years old), although it is also seen sporadically in younger ones when these are located in strategic areas- on main streets or in downtown areas.



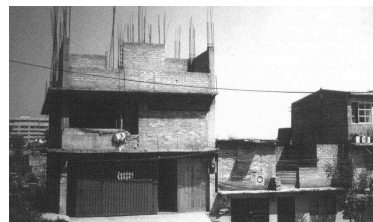
Provisional House



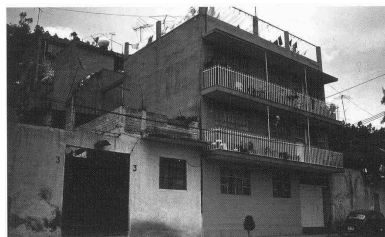
One-Storey House



Saturated House



Multi-Storey House



Speculative Building

1.3.10
Some stages of the informal urbanization

1.4 The need of synthesis: defining a new type of city

As seen above, informal settlements require an interdisciplinary perspective in order to be described and documented. However, the need for such an interdisciplinary perspective gives rise to further question:

- How could be integrated the different approaches to get a better picture of the consolidation and differentiation process of informal settlements?

In this work it is believed, that informal settlements can be better understood if they are considered as a *City*.

Due to the size that some informal settlements reach, a new term that describes these large urban agglomerations is increasingly being used: *the Informal City*, a new type of city characterized by a contradictory logic: “it is at once ephemeral and extensive, irrelevant yet critical, visible yet seldom observed” [17]. Others defined the informal city as one that “comprises the *slums* of the developing megacities, where the informal sector has its base; where services are poor or non-existent; where residents are invisible to legal status systems; and where harassment by authorities is commonplace” [25].

Nevertheless, the urban fabric produced in the informal city is not simple, and improving the lives of the residents living in informal cities is not just a matter of converting the informal into formal [22]. Together with the physical process of informal urbanization other phases or sub-processes take place such as “commodification” or market consolidation, legal consolidation and socio economic consolidation [26]. In addition, the changes taking place in the settlements can occur in a linear sequence or can become stagnated. The process of change can also be accelerated due to a variety of factors such as community organization, attitude of the authorities, availability of improved transportation, attraction of private investment into the area or growth of the city to name just a few. Hence, the resulting urban fabric consists of a functional and social mixture of semi-consolidated low income areas, spontaneous rental quarters and well established commercial centers and neighborhoods [22]. The informal city should thus be recognized as an integral part of the city with a specific urban fabric that must be considered by planners and politicians [26, 27].



1.4.1
Semi consolidated settlements in Mexico City

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