Viewing Urban Expansion from Below: The Complexity of Sustainable Urban Growth

Permerhatian Perkembangan Bandar dari Bawah: Kekompleksan Kelestarian Bandar

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ABSTRAK

Pendekatan yang diambil bertujuan untuk melihat pengaruh-pengaruh perubahan bagi memahami sesuatu fenomena. Satu corak perubahan yang kelihatan sama dan linear pada satu skala kecil mungkin menghasilkan sesuatu yang hanya boleh diterima pada satu skala besar, yang menghampiri kepada ground zero. Pemerhatian terhadap perubahan pada peringkat tempatan boleh menyediakan satu tanda dan peralihan-peralihan kritikal yang tersembunyi di dalam pola umum. Pendekatan tokokan yang terperinci terhadap sistem perbandaran membenarkan seseorang memahami kenapa ia terjadi, lalu memberikan kemudahan di mana terdapat kawasan yang semakin maju sementara ada juga kawasan yang ketinggalan jauh ke belakang. Makalah ini memberi pandangan tentang bagaimana kegiatan tempatan dapat menyumbang kepada perkembangan bandar yang kompleks. Pengembangan bandar di Malaysia dapat dikesani seawal tahun 1890 dan isu-isu peralihan dalam perbandaran Malaysia termasuk fasa-fasa pengalaman perbandaran, kenaikan kawasan-kawasan bandar mega, dan keperluan cara baru untuk melihat proses tersebut melalui keputusan harian yang dibuat oleh setiap individu di bandar berkenaan. Keputusan-keputusan tersebut secara tidak langsung mengeluarkan corak sementara spatial bandar-bandar Malaysia. Hal ini dapat dilihat melalui corak-corak penggunaan tanah, perkembangan kawasan perumahan, pengiklanan dan lain-lain. Corak-coraknya adalah dinamik dan sering berubah-ubah mengikut masa bergantung kepada arus pemerintahan ketika itu. Para pemerintah; bergilir-gilir menawarkan pekerjaan yang melibatkan kapitalisme global dengan orang tempatan, dan memahami adat tempatan sebagai salah satu gaya hidup. Makalah ini membincangkan perancangan perkembangan bandar yang berkesan dengan melihatnya dari pemerhatian setempat. Kepelbagaian senario tempatan telah dibina dan bertambah dengan pesat mengikut ruang dan waktu untuk menjanakan suatu kawasan yang luas sebagai penjelasan untuk kawasan perbandaran. Ini sekali lagi merupakan salah satu alternatif lain untuk analisis pemerhatian kawasan tempatan dengan melihat secara tradisi di mana ia merupakan salah satu komponen di kawasan yang lebih besar. Ia dibezakan melalui kriteria yang berbeza di kawasan tempatan yang telah mewujudkan satu paradigma tempatan yang mewujudkan trend perubahan di kawasan tersebut.

Kata kunci: Kompleksiti; dayahuni perumahan; perubahan kritikal; kelestarian bandar; daya huni bandar

ABSTRACT

The approach taken in looking at change influences the understanding of the phenomenon. A pattern of change that seems smooth and linear at a smaller scale might yield fluctuations that can only be perceived at a larger scale, closer to ground zero. Viewing change at the local level can provide tipping points and critical transitions that are hidden in the more general pattern and such detailed incremental approach to urbanisation allows one to understand why, given the same set of drivers, some areas seem to prosper while others lag far behind. This paper views urban expansion as a culmination of local level activities that emerge into a complex network of urban growth. Daily decison making by individuals in the city about owning a house. These decisions eventually produce the spatial-temporal patterns of life in the Malaysian cities. These are then visualised in the patterns of land use, housing spread, commercial and others. These patterns are the outcome of inter-related workings of global capitalism with local ones and the local 'adat'- the way of life. The article argues that effective planning for the urban expansion needs to be viewed from the local scene. The various local scenarios are then built up incrementally over space and time to produce a region wide explanation of urbanisation. This is, again, an alternate viewing of regional analysis that traditionally looks at the local as merely being a component of the larger region, differentiated by local attributes that create local shifts that skew its share of the regional trend.

Keywords: Complexity; housing livability; critical transition; urban sustainability; urban livability

INTRODUCTION

This article views urban expansion as a culmination of local level activities that emerge into a complex network of urban growth. This article uses housing as an illustration of the urban expansion that can be traced back to as early as 1890. It argues that housing patterns and housing expansion today are the outcome of a combination of thousands of individual and institutional decisions that have been made earlier. The housing pattern is also the reflection of the socio-economic status of urban neighbourhood. The complex relationship and interconnection between the driving forces that formed the housing patterns need to be understood. Therefore, the bottom-up approach is used to understand the housing dynamics and their relationships in the context of urban livability and sustainability. This article discusses the idea of housing and neighbourhood expansion that begins as separate individual local decisions which determine the patterns of flows, sprawl, and emerging land use patterns using Seremban Municipal Council (MPS) as a detailed study area. All of these call for planning concerns at the regional scale, responding to changes due to global conditions. It is argued that in the future, housing development needs to be planned based on this type of complexity.

CRITICAL TRANSITION OF MALAYSIA URBANISATION: MOVING FROM NASCENT, PSEUDO URBANISATION TO LIVABLE MEGA URBAN REGIONS IN MALAYSIA
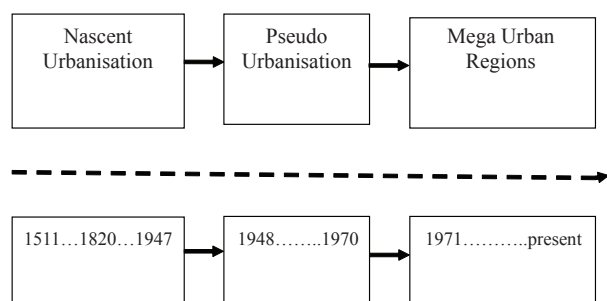

FIGURE 1. Three Phases of Malaysian Urban Experiences
Source: Modified from Abdul Samad Hadi et al. (2009)

At present, the urbanisation process in the country, especially in the Peninsula, is about moving forward towards achieving the first world country status by 2020. It is appropriate to analyse the quality of urban life with all the possible modern trappings befitting the accelerated urban growth along with robust urban economy that has transformed the urban centres almost throughout their hierarchy.

With reference to the overview paper (Abdul Samad et al. 2010), Malaysia has gone through three phases of the urbanisation process (Figure 1). The time-frame used for the urbanisation phases in the Figure may be over generalised and somewhat arbitrary but the three phases remain useful to guide the ensuring discussion. From the figure, the three phases are the nascent, the pseudo and the formative mega urban region, with special reference to the rising Bernam basin to the Linggi basin mega urban region. The nascent urbanisation process is the urbanisation process associated with the early founding and development of urban areas in Malaysia, when migrant workers circulated from poor regions in South China and South India, of which so much has been written about, to come and work largely in tin mines and rubber estates and the public work sector of the British administration. British colonial officers were also involved in circulation from Britain to the Malay Peninsula, Sarawak and the British North Borneo.

The pseudo – urbanisation phase of urban growth and development in the country captured the enduring experience of the post-second world war urban growth due basically to in-migration of people from the relatively impoverished rural villages in Malaya at first and then Malaysia in 1963, characterised by widespread poverty, squatter settlements and short of formal opportunities in the urban market. Limited opportunities were available to the rural to urban migrants as police constables and in the Malay regiment which was founded in the 1930s. A very small percentage of these migrants found higher rung jobs that were reserved for those from higher social birth with skills and English medium education. In these circumstances, squatter settlements dominated the housing landscape, and it persisted for decades after Independence partly in response to lack of affordable housing stocks and limited new housing estates, as well as widespread poverty among the urban dwellers. Had it not been for the *kampungs* in close proximity to the town centres, the squatter settlements conditions in the city centres could have been more severe.

In post 1970 Malaysia, several urban conurbations had grown in the main industrial concentration areas such as the Klang Valley where Kuala Lumpur-the national capital is located, in Penang and Johor Bahru areas. In each of these major urban conurbations, small urban centres, small towns, large municipalities and cities have grown outwards of their original individual boundaries to merge into each other and forming a huge conurbation of urban centres. Minor conurbations have also grown based on other capital towns and cities in the rest of the countries in recent years. The main urban conurbations have also grown to produce extended mega urban regions but their population size and commercial and industrial as well social life are not as complex as the really mega, that is extended mega urban regions of Southeast Asia, such as those centred in Jakarta, Indonesia and Bangkok in Thailand.

As articulated in the first paper (Abdul Samad Hadi et al. 2010), the changes from nascent to pseudo, from pseudo to mega urban region involve, in our view,

examples of critical transitions because of the changing overlapping drivers including development policy from one phase to another. This article draws on the housing neighbourhood as an illustration to show urban expansion in the study area.

COMPLEXITY THEORY AS A FRAMEWORK

The complexity theory refers to a body of knowledge which assimilates contributions from many disciplines such as natural sciences and social sciences (Chettiparamb 2006). Figure 2 below shows the interrelationship between the complexity theory and academic disciplines that have applied the theory. A comprehensive and universal definition of complexity is still lacking, however; it is possible to choose from this broad (but not at all exhaustive) choices: computational, statistical, structural, functional, hierarchical, sequential, informational, effective, and physical complexity (Rosser 2001). However, apparently emerging as one of the most prominent characteristics of this concept and common to several systems (physical, biological, political, social, or economic) is the interaction between the different components (or agents) of a whole (Arthur 1994).

Complexity theory is an exciting yet contested concept (Manson and O'Sullivan 2006). It is growing in acceptance, as evidenced by recent coverage in the journal Science (1999) and lay scientific books (for example, Kauffman (1995); Wolfram (2002). At the same time, detractors are rightly wary of exaggeration, seeing complexity alternately as a harmless fad (Sardar and Ravetz (1994); others view it as an interesting but overreaching field of research (Horgan 1995), or as an inappropriate transfer of physical science concepts into the social realm (Lo Presti 1996).

Complexity is the science of possibilities. Moving away from determinacy to indeterminacy, c*omplex (adaptive) systems* consist of agents interacting continuously, resulting in non-linear aggregate behaviour (Holland 1994). The major concepts used in the complexity theory are self-organising and path dependence. These indeterminate complex systems are the result of a history of interaction in the system, an attribute of *path dependence*, argued by Arthur (1994). Agents act and respond differently, fulfilling different functions, based on rules or keys (reminding us of Goffman's extended form of rules) with imperfect knowledge about the strategies of other agents and the system as a whole (Holland 1994; Langton 1992). Agents *coevolve*, mutually adjusting to each other's behaviours, resulting in an *evolving fitness landscape* – seeking the most advantageous characteristics for survival (Kauffman 1995). Rapid, unanticipated change is an attribute of complex systems even after long periods of stability. Yet, the system as a whole exhibits *emergent properties*, that is structures or patterns of interaction which are unpredictable from the known parameters of the system.

Complexity theory provides a new insight into the elusive goal of sustainability and suggests that many popular ways of thinking about this have been moving in the wrong direction – a direction that would make sense if the world were like a machine rather than like a growing, evolving organism. Essentially, a sustainable complex system is one that is adaptive and self-organising, with its components free to co-evolve in response to changes in each other and, as a whole, changing in response to external conditions. It learns from the feedback it gets, as it randomly or deliberately experiments with new actions. It develops the actions and path ways in its network of agents that work most effectively. In doing so, the system grows and evolves. The character and quality of its results may change, and its productivity could eventually increase, even when the external change is one that at first appears damaging. There is unlikely to be any end point for an adaptive system or any ideal form; its adaptations are not pre-determined but are the product of distributed intelligence and of experiments or even random events that open up new ways of doing things.
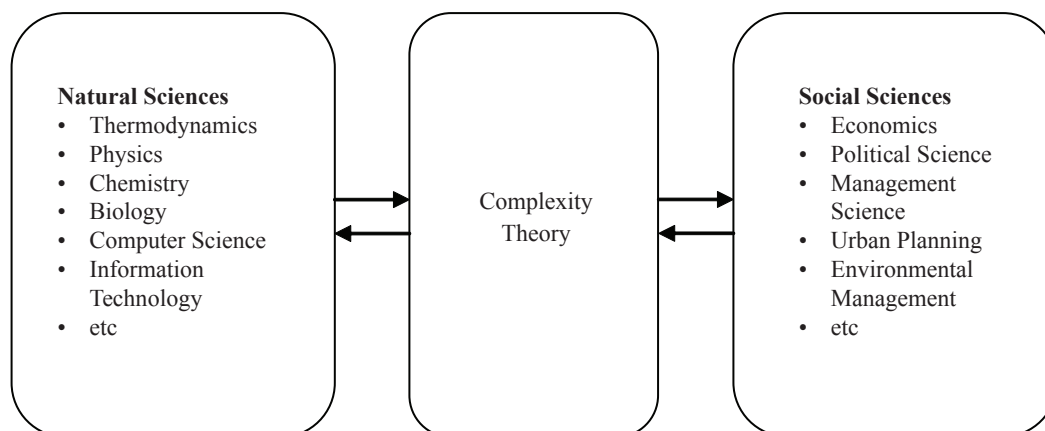
FIGURE 2. Complexity Framework of Analysis

The sustainable complex system not only survives but also continuously undergoes transformation.

This research presents an attempt to integrate the methodology from the sciences within a social scientific study of the city. Using ideas from complexity science, the research aims to evaluate the sustainability of urbanisation in the Seremban Municipality Council (MPS) that is located in Negeri Sembilan, Malaysia (Figure 2). The research also attempts at developing a new approach in urban analysis, at least for the Malaysian social science scene, which is often marked by sectoral descriptions of the city. In this article, we use housing as a representation of urban development and expansion. In the study, the complexity theory focuses on the inter-relationship of the decisions made by the homeowners, individuals, institutions and governments to build their houses in residential locations.

Pierson (2000) argues that it has become increasingly common for social scientists to describe political processes as 'path dependent.' The problem, however, is that there isn't always clear definition as to what it means. In a broader version of path dependence, it refers to the "causal relevance of preceding stages in a temporal sequence." He suggests that this understanding in which preceding steps in a particular direction effectively reduce further movement in the same direction is captured by the idea of increasing returns. Economic growth generates the positive feedback that defines increasing returns processes. Path dependence processes, however, are most powerful at the macro-level involving organisations and institutions. Path dependence in short can be defined as the observation that our future is determined in large part by the legacy of the past, at both policy and institutional levels. A policy step in one direction is likely to encourage the next policy step in the same direction. In terms of policy-makers, they are likely related to social norms, values and ways of working, that constitute an institution. Kay (2005) suggests that path dependency is an empirical category – an organising concept – that can be used to label a certain type of temporal process. It is a particularly appealing concept for understanding public policy because in essence it maintains that policy-makers do not really have much room to make free choices.

Historical data to study the housing development and its expansion in Malaysia especially at local level were lacking, not in good keeping order and poorly updated especially in terms of housing (building) age; and land use records for the past 200 years or earlier. In this study, the data were derived from several official documents and records, surveys and in-depth interviews within the study area to unravel the progress of housing development and neighbourhood expansion for the past 200 years. The data gathered from the Seremban Municipality Council (MPS) are used to represent the housing development.

In this study, a few parameters, which were divided into four categories, were used:

1. religious institutions such as mosques, churches
2. academic institutions such as schools, *madrasah* (religious school)
3. housing estates and settlements
4. housing estates boundaries were demarcated based on the edge of the area in the map of the MPS and from the Survey Department of Malaysia

These parameters were used with the assumption that these religious and academic institutions must have human settlements in the surrounding areas which form the relevant communities based on the type of religion and academic institutions.

POPULATION AND SPATIAL PATTERNS OF HOUSING DYNAMIC IN SEREMBAN MUNICIPALITY AREA

The Seremban Municipality area is located in the State of Negeri Sembilan in Peninsula Malaysia (Figure 3), and currently experiencing vibrant economic, social and physical developments. All contribute to the modification of the local urbanites' lifestyle that began from pre-industrial urban Malaysia. Like other state capitals in Malaysia, Seremban has grown out of its 'sleepy hollow' image of yesteryears and the original municipal boundaries have been extended outwards to accommodate these developments.

Seremban is an intermediate city with an estimated current population (2010) around 565,000 (Majlis Perbandaran Seremban 2002). The population of Seremban has increased steadily over the last hundred and thirty years. In 1881 the total population was estimated about 1,500 and increased to 2,250 in 1891 and increased to 383,530 by the year 2000. Based on the Population and Housing Census 2000, the Malays and other local indigenous groups (Bumiputeras) were the majority with 44 percent of the total population followed by the Chinese about 37.6 percent and the Indians 18.5 percent and others 1.0 percent. The total population is expected to increase to about 847,124 by the year 2020 (Majlis Perbandaran Seremban 2002).

The Seremban town was founded by the British colonial administration in the closing years of the 19th century and served as the capital of Negeri Sembilan State within the Federated Malay States (FMS) over the 1895-1947 periods and thereafter the state capital in Malaysia. For over a century Seremban, like any other town with bustling economic activities, grew in area following adjustments to its administrative boundary that took place in the decades after Independence in the year 1957 to accommodate the demand of jurisdiction over the growing urbanized areas taking place on the urban fringes. Seremban is located about 70 kilometers
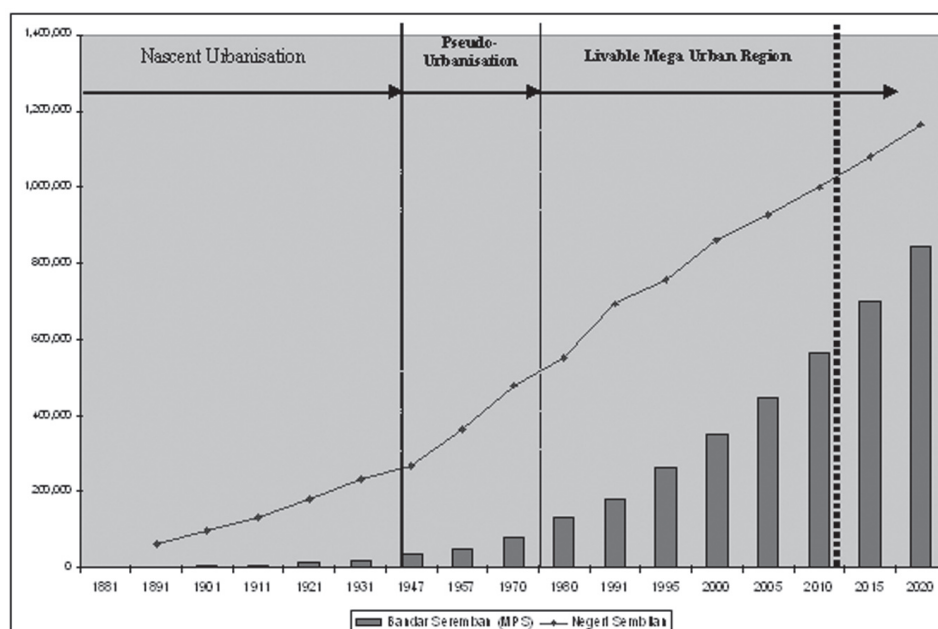
FIGURE 3. Population Dynamic of the Seremban Municipal Council, According to the Phases Urbanisation
Source: Prepared by the author from a range of data on historical population, and derived by numerous Population and Housing Census

south of the Malaysian conurbation hub, Kuala Lumpur. For decades the municipality has been a commanding southernmost commuting boundary of workers to the Klang Valley.

Utilising data derived from 13 population censuses that had been conducted from 1881 until the year 2000 the population growth of the Seremban Municipal Council area is traced according to the three phases of the Malaysian urbanisation experience, mentioned above. Figure 4 below shows the trend and the population growth in Seremban Municipal Council area.

In the Nascent Urbanisation phase, the population growth was slow with an average of 1.8 percent over the period. During the period the towns were more of 'sleepy hollows,' therefore not that attractive to the people . In the Pseudo-urbanisation phase, the growth was faster. But the number of people increased much higher after the 1970s coinciding with the rising extended Mega Urban Region phase. The population is expected to grow faster in the next few decades, judging from the increasing vibrancy of the newer parts of Seremban, that are attractive to people from the Klang valley to own homes.

From Figures 4a, 4b and 4c below show the population age structures of the Seremban Municipal Council in 1921 and 1947 (Nascent Urbanisation phase) and in 1957 and 1970 (Pseudo-Urbanisation phase) and in 1991 and 2000 (Extended Mega Urban Region phase). The population, sex, and age structures during the three phases of urbanisation provide an indication of the transition between the phases of urbanisation towards the livable city.

HOUSING EXPANSION AND URBAN PLANNING IN SEREMBAN FOR THE FUTURE

From the analyses above, housing development and expansion for the past almost 200 years (Figure 5) was not as linear as we had expected. The interrelationship and interconnection between the components need to be well understood. Therefore, the bottom-up approach offers help to understand the housing dynamic in this Municipal Council area as well as in Malaysia as a whole. Although, longer time series information is needed to understand the dynamics of the housing development, the information to date is still beneficial for future urban development and urban sustainability and urban livability in the Seremban municipal Council area and in the country.

The vibrant housing development is most important to generate the needed economic development for the developers, the owners and buyers, and the government as well as the financial and legal institutions. A new approach of governance is needed to govern the dynamics of housing development in the area. The need for effective housing planning using ecological and complexity perspective or approach will worth a try.

That the population of the urban areas grew and went to influence the physical expansion of housing that in turn indicates the expansion of the urban areas to go beyond their legal administrative boundaries engulfing the once isolated kampungs into a huge extended urbanised region is there on the landscape for all to view. There is a need to look into the role of the individuals, the families and the local urban communities in shaping the housing growth patterns in the urban region, specifically looking into how the people at the local housing level influence the
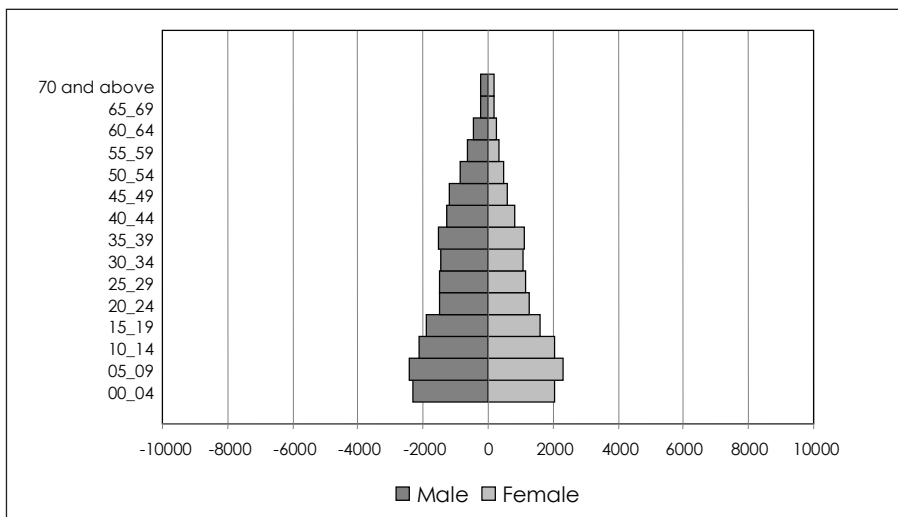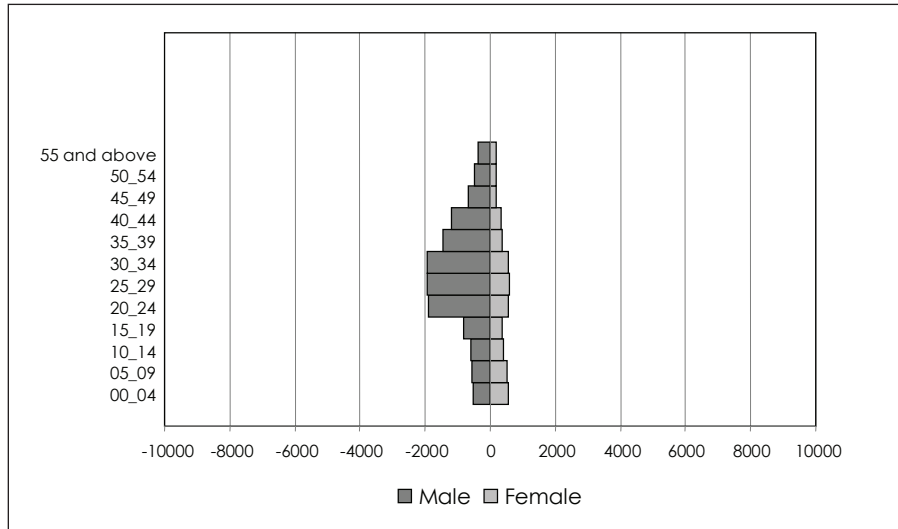
FIGURE 4a. Population Age-Structure During Nascent Urbanisation (1921- left) and
(1947 - right) in the Seremban Municipality Area
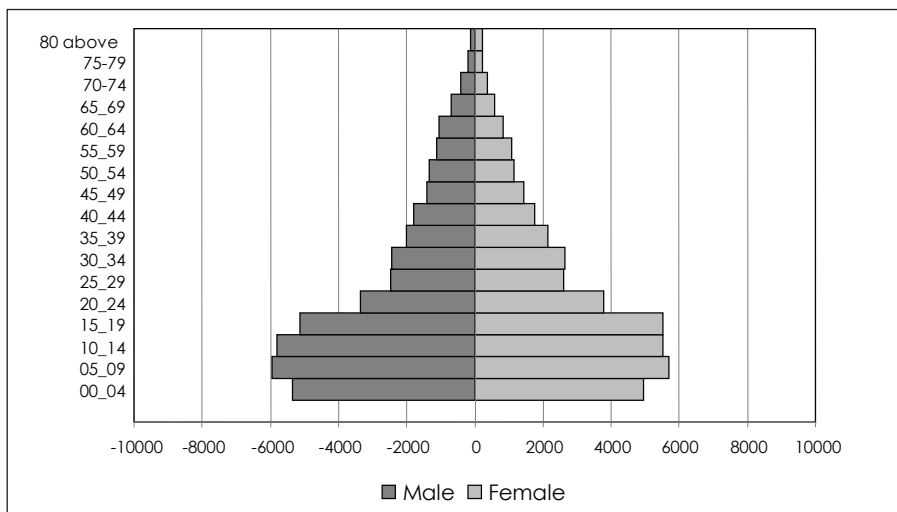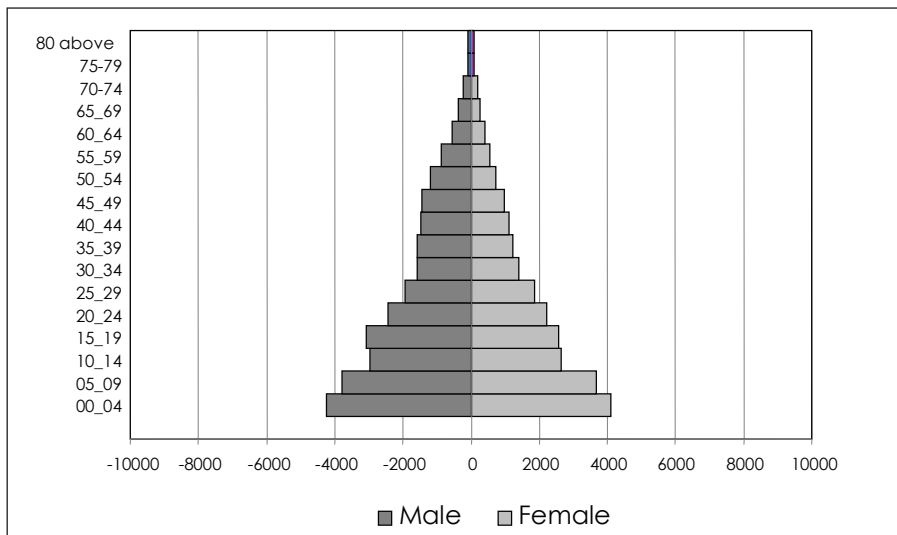*Source*: Analysis of 1921 and 1947 Population Census data fro this study

FIGURE 4b. Population Age-Structure During Pseudo-urbanisation (1957 – left)
and (1970 - right) in the Seremban Municipality area
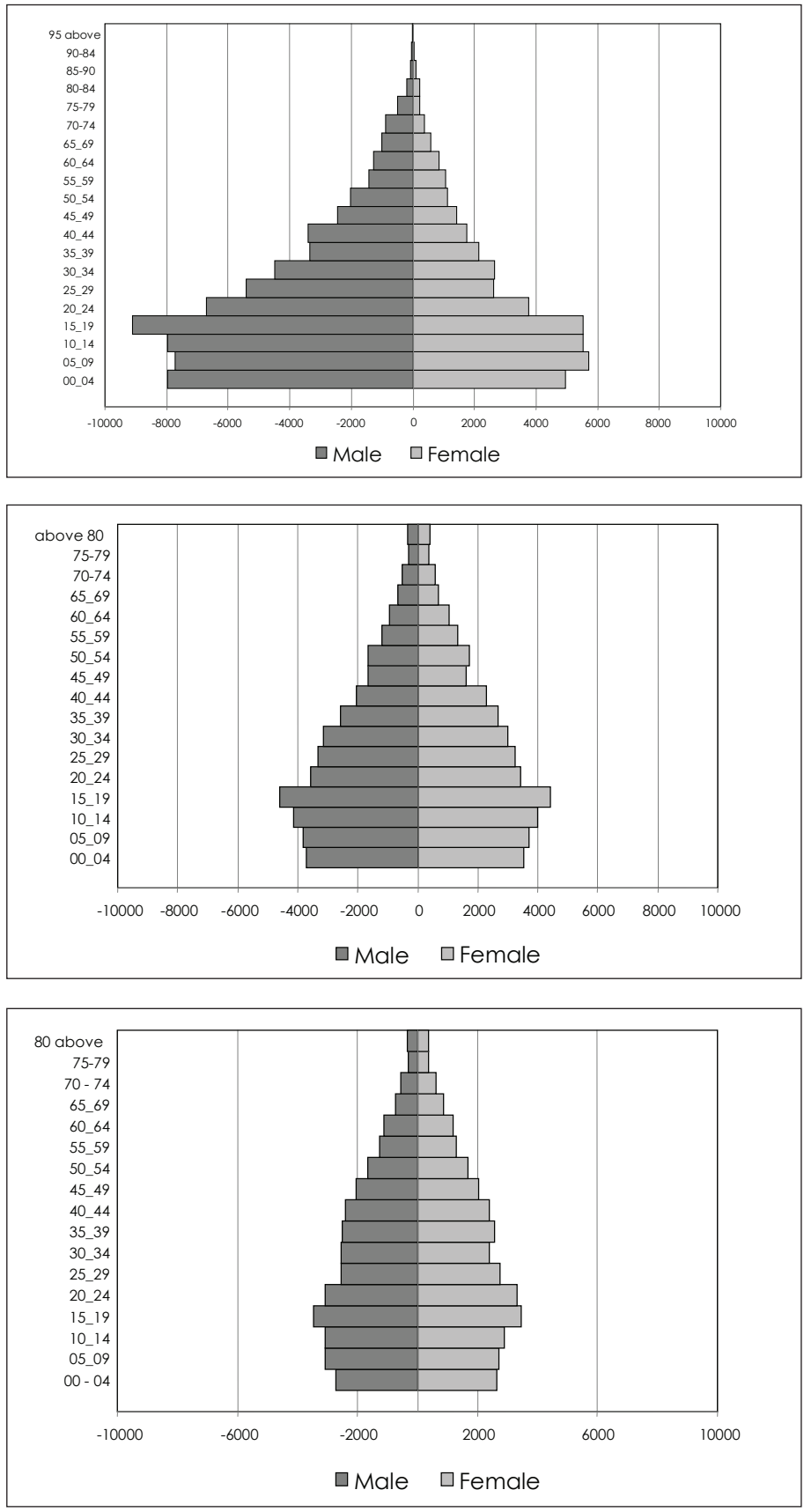*Source*: Analysis of 1957 and 1970 Population Census data fro this study

FIGURE 4c. Population Age-Structure During Livable Mega Urban Region (1980 – upper left),
(1991 – upper right) and (2000- bottom) in the Seremban Municipality Area
Source: Analysis of 1991 and 2000 Population Census data from this study
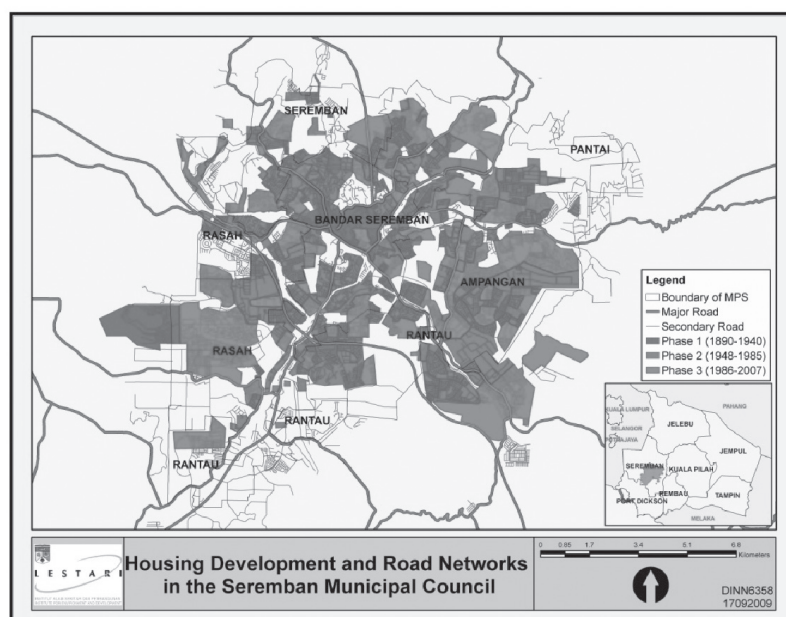
FIGURE 5. Three Phases of Housing Development in the Seremban Municipality Area

physical growth and expansion of the urban area within the established planning requirements of the country.

This study is an attempt to look at the urbanisation process from below, that is the local community. Embedded in this is the idea of city complexity that our study group sets to examine: that city complexity will determine the nature of city livability and its sustainability, influencing its governance and planning for the coming years.

CONCLUSION

There is still much to say about how housing neighbourhoods are formed and then evolve, how we might best understand and then simulate them, and most importantly, how we should design plans which enable them to function in more efficient and sustainable ways. This article has introduced the idea that housing evolves into an unknowable future that is always uncertain. Housing expansion is a major phenomenon of urbanisation in the Seremban Municipal Council area. Seeing the expansion at the overall pattern shows an outwardly movement over the years with infilling occurring in between during the difference urbanisation phases. Rapid housing expansion and growth coincides with economic growth and changing government policies. Yet, some specific areas were favoured for housing development, rather than others. Therefore, any goals that we might have for the future city are contingent on the present, hence continually subject to revision and compromise. In the past, housing had been designed in a timeless future where sets of objectives had been defined to be achievable as if the city were cast in timeless web, and it is of little surprise that few

cities have ever achieved the aspirations set out in their plans. Complexity theory brings up the problem of the unknowable future and the way housing evolves from the bottom up, incrementally as the products of decisions that might be optimal at any one time but always subject to changing circumstances at another.

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