North American-type Smart Growth and the Japanese Suburb: A Case Study

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Abstract
This paper offers a preliminary examination of similarities between the Japanese suburb and many of the concepts promoted by the anti-sprawl movement in North America, commonly referred to as smart growth (also known as New Urbanism or Pedestrian oriented Development). As the first phase of a larger project, the research focused on a case study suburb in the city of Toyama, Japan. A mid-sized city, with a population of approximately 420,000, Toyama's suburbs are less influenced by population and land pressures common to a large metropolis such as Tokyo. Typological similarities with Smart Growth concepts, in the form of mixed land use, connectivity between neighbourhoods, and access to open space were nonetheless found. More interesting, a similarity with the radical New Urbanist concept of "form-based zoning" was also found. This is significant as it appears to have allowed a process of nearly continuous small-scale change in the case-study suburb extending back for at least 23 years. Though the extent to which the findings can be generalised for all of Japan's suburbs remains uncertain, implications are briefly considered for both Japan and North America.

Keywords: Japan suburb; smart growth; form-based zoning; suburban change

1. Introduction
A few researchers have discussed in passing the idea that Japanese urbanism, and to some extent its suburban forms, bear a resemblance to the ideals of the anti-sprawl movement in North America (Grant, 2001. Sorenson, 2004). More detailed research was not found through a literature review however, and so this project attempts, firstly to determine how far the resemblance goes, and secondly to consider its implications for the debate regarding sprawl and suburbia in both North America and in Japan. Focus is placed on measuring adaptability of the Japanese suburb as a result of the inclusive zoning laws which govern them.

1.1 Suburbia revised
Over the past decade a series of books and articles, written for the most part by urban historians, have offered serious challenges to many commonly held conceptions of suburbia and of sprawl. The causeeffect relationship between suburbs and the automobile (Bruegmann, 2005), the validity of the antisprawl/New Urbanist movement (Krieger, 1998), and the homogeneity of North American suburbs (Kruse, 2006) have all been questioned according to a sceptical and critical reinterpretation. The intention of this work is not to whitewash the problems of sprawl or suburbia, but to show that suburbs are complex structures that can neither be understood nor usefully responded to with a simplistic approach. The authors promote an objective study of existing conditions in order to develop realistic solutions that avoid dogma.

In the case of the Japanese suburb it seems there may be a possibility to do just that. Not only to understand the existing situation in Japan, but also to gain insight in to the North American context. It is proposed here that the Japanese version of suburbia is similar enough to North American Smart Growth to make a comparison possible, but different enough to provide an alternative point of view, and to highlight specific aspects of the movement. In particular the degree to which an open-ended zoning system will encourage mixed land use, and how much it might contribute to an adaptive process is considered.

1.2 Smart Growth
Smart Growth, also commonly referred to as New Urbanism, or Pedestrian Oriented Developments, developed over the past 15 years as an antidote to the problems of suburbia. It was expressly designed to reduce the isolation of typical suburban development, to reduce car-dependency, and to create distinct communities that are both walkable and sustainable. The sustainable aspect most often refers to reductions in auto-dependency, but also is promised as a result of an open-ended zoning system that allows a community to evolve and change over time. To achieve this, six ideas are promoted, namely the creation of:
- mixed income and mixed housing types/density
- accessible public open space
-public transportation (rail or bus)
-connected roads and pedestrian friendly routes
-mixed land use
-a hierarchy of streets and typologies

There is an implicit argument that these elements are best applied through mimicry of traditional designs culled from the towns of turn of the century North America. The authors of Smart Growth further argue that if these conditions are met a number of social benefits could also follow. These include personal autonomy for all age groups, less segregation by race and income, and the development of a sense of community. However, as Lee and Ahn have pointed out with their research in Kentlands, Maryland (perhaps the most extensive of the New Urbanist suburbs in North America) that these benefits do in fact follow remains uncertain. Still, the idea that suburban form can impact on the personal autonomy of the elderly may be very important to Japan in light of its ageing society. This research will attempt to show the degree to which flexibility can emerge from an open-ended zoning system, and whether this might have an impact on personal autonomy.

A long-standing critique of Smart Growth lays with the suspicion that without broader regional control it can not offer a substantial departure from typical suburbia beyond superficial appearance (Southworth, 1997). While some research has been done to test the effect of completed Smart Growth/New Urbanist communities in North America (Lund, 2003; Lee & Ahn, 2003) the findings remain inconclusive, in part because of the complexity of the issues, but also because built examples are still too rare, with populations possibly self-selecting, and not representative. If the normal Japanese example is in fact similar enough to make a comparison then it could be used to isolate some of the forms and processes of Smart Growth in a setting where they are not unusual.

1.3 Suburbia in Japan

This research is ultimately about Japan and the Japanese situation; in which, to be clear, there is not a New Urbanist or Smart Growth movement at work. Nor is there a stylistic similarity between the Japanese suburb and Smart Growth communities, especially of the New Urbanist persuasion. Although there are certainly cultural differences that make a direct comparison problematic, the idea being posited here is that a similarity exists at the abstract level, and that this abstraction makes possible a consideration of some of the ideas of Smart Growth without confusing the issue with aesthetic or polemic concerns.

While the debate over suburbia is not as energetic in Japan as in North America and Europe, there is nonetheless a very real concern about their effect on Japanese cities. This is perhaps best illustrated by a recent national law that bans large scale retail stores from being built in suburbia (Kyodo World News Service, May 2006). This is apparently an attempt to prevent suburbs from gaining too much independence from their nominal centres, and to artificially maintain a strong hierarchy of city form. The efficacy of such a move is beyond the scope of this paper, but it is also worth noting that the city of Toyama, where the casestudy suburb is located, has recently dedicated millions of dollars to subsidise new housing in its centre, in an attempt to draw people back from its still-growing suburbs (Kyodo World News Service, April 2006). Clearly suburbia and its decentralising tendencies are a concern at many levels of the Japanese government. Apart from the immediate issues of tax loss and the hollowing of old centres the decentralised city may also exacerbate a serious problem that is expected to emerge in the coming decades. It is expected that Japan's population will shrink by some 25% by 2050, while simultaneously the proportion of its population over 65 years old will also increase from one-fifth to one-third. How liveable suburbs will be in that context is an open question that needs to be considered. In that light, if there is a mechanism or structure already present in existing Japanese suburbs, then uncovering it and learning to use it could help ameliorate the effects of the upcoming demographic shift.

1.4 Similarities with Smart Growth

Many suburbs in Japan bear a striking resemblance to the sprawling patterns found in North America, including strip malls, 8 lane highways, and BIG BOX shopping centres set down amongst fields of unattached houses. More, as Sorenson has shown (Sorenson, 2000), in spite of regulations designed specifically to prevent it, development often follows a leapfrog-type pattern (in which development moves beyond the built-up edge of the city to take advantage of low costs and fewer regulations). This is an unplanned process that does not allow much control of the final form of the suburbs on a regional level, and causes problems with efficiency and basic provision of services. On the other hand, it is not uncommon for even new suburbs to be located near to commuter rail lines, and the national zoning law is structured to allow a relatively wide range of land uses to take place in residential areas (see note 1), so there is at least a possibility for mixed land use, and even a limited amount of walkability in the most isolated and car-oriented developments.

2. Case Study: Fuchu-machi, Toyama

This account attempts to identify the extent to which "Smart Growth" -like characteristics can be found in Japanese suburbs by describing their presence in Fuchu-machi, a suburb of Toyama City, Japan. Found on the coast of the Japan Sea, Toyama has a population of about 420,000 and is the capital of Toyama Prefecture. Like many smaller Japanese cities it is currently reconsidering the role of its suburbs, as its
centre hollows out and its edges continue to grow.

Fuchu-machi is in many ways like the North American version of suburbia, with extensive infrastructure built to support its auto-dependency, and with a large majority of its population (over 90%) living in their own detached homes, rather than apartments, condominiums, or rental housing. The average property and home sizes in Toyama are also the largest in Japan, at 150 m$^2$ (compared to 60 m$^2$ for Tokyo), which is slightly small by recent new-build standards in America, but equal to the national average. While these similarities are all significant, perhaps the most important reason for examining Fuchu-machi is its distance from a large urban core like Tokyo, and the influence of land costs and population pressures which could otherwise account for any "Smart Growth"-like characteristics.

3. Research Method

The purpose of the research is to firstly find similarities with the typological and morphological concepts associated with Smart Growth in North America. Secondly, the research is intended to determine whether these concepts contribute to the creation of an adaptable suburban typology, and to measure its extent. While the methodology was developed in response to the list of 6 key concepts attached to Smart Growth described above, some of them are not addressed here. For example the goal of mixing income groups is not considered as it has been shown by others (Fujita & Hill, 1997) that Japanese neighbourhoods do not tend to be segregated along income or class lines. Similarly, the last component in the list, which describes a hierarchy of streets implicitly tied to the Beaux-Arts tradition of planning, does not exist in the case study area and cannot be considered.

The typological and morphological analyses of Fuchumachi were based on annually published housing/property maps (jutaku-chizu) that are publicly available. These maps indicate the preparation of new properties for development, show land use, and ownership of the properties. When compared from year to year it is possible to reliably describe the location and direction of growth in the suburb over a period of several years. The record of land use embedded in the maps is less reliable as they indicate only the owners name or the name of the business, and so some ambiguities can arise when a business is not officially recorded. This problem was not a large one however, as in most cases the title of the property was labelled clearly. When a property was only labelled with the name of a private person it was assumed that it was used only for residential purposes. In cases where any ambiguity could not be resolved by checking in the field, the data point was removed from consideration.

It was possible to obtain maps for Fuchu-machi extending back to 1980, a period when the community began to emerge as a real suburb for Toyama. The maps were used in direct response to the list above, forming the source for a series of typological studies, showing land use, access to public transportation, and interconnectivity of the neighbourhoods. They were also used to create a timeline animation showing growth of the entire suburb over a 23 year period. The animation showed that growth took place in a leapfrog manner (as described by Sorenson for Tokyo), but that the neighbourhoods have subsequently been connected, or are in the process of being connected, by infill developments. Two smaller areas within the suburb were examined in further detail, in order to understand land use patterns over time more clearly. Study area A was examined through the use of a time based animation showing changes in land use and property size. Study area B was used to examine the extent...
of land use mixing in a new (and still unfinished) development.

3.1 Public Transportation
From a purely polemic point of view the most important similarity between the Fuchu-machi and Smart Growth concepts can be found in the presence of a public rail line, which was used until recently by most residents for commuting to the city centre. Since the rise of the private automobile train use has declined dramatically, although the line still functions on a daily basis. According to the Fuchu-machi government, use of the rail lines has increased along with the recent growth in population. However, anecdotal information suggests the train line is used largely by school age children (up to 18 years old) rather than by adults. As a consequence, new developments in the area do not take into account the presence of the train station in the way that earlier developments did. Interestingly, while recent developments in the suburb are more clearly designed for the automobile, the older homes around the station have almost all been retrofitted to accommodate cars, and in many instances have been replaced with new stock, identical to those in newer areas. The train line, then appears to have little effect on the daily life of adults in the area.

3.2 Interconnectivity
Another similarity with a key Smart Growth concept can be found in the interconnectivity of neighbourhoods (see Fig.2.). Though the various areas were built up over decades and often through a leapfrog pattern that required infill development to connect together, there is no noticeable barrier between one neighbourhood and another. Apart from Primary roads and rail lines, the suburban fabric is continuous, allowing people to easily travel through them. It should be noted that while larger roads have sidewalks many of the interior housing areas do not. The assumption seems to be that pedestrians and vehicles will share the same road when traffic is local. This is very different from North American standards, including those of Smart Growth, which requires a clear separation of cars and people.

3.3 Land use
Land use is mixed throughout the case-study area (see Fig.3.). Surprisingly, while most of the commercial buildings are located along main arteries, a significant portion can be found within the center of housing communities. In the case of the latter, these businesses tend to take the form of service industries, such as beauty salons, small restaurants, or cafes. Significantly, there are also several small specialty medical clinics scattered throughout the communities, and in many cases located without fanfare amongst the houses. This is potentially very important for elderly residents of the area.

3.4 Form-based Zoning
That the inhabitants of the case study area do build
shops and businesses amongst the houses is reminiscent of the claims of New Urbanist founder Andres Duany, and his very radical idea of "form-based zoning". As its name implies, zoning in this system is not defined by land-use and segregation of functions (within reason; a factory for example would not be allowed next to a house), but rather by the shape and size of buildings on a given street.

In practice this is zoning founded on aesthetic principles, however at its core the idea is intended to be open ended, in a way quite similar to the inclusive zoning of the Japanese system. As Avi Friedman has elaborated in his book "Planning the New Suburbia: Flexibility by Design" (Friedman, 2002) this approach to zoning is intended to allow a community to change its character over time, to become more or less dense, to absorb new functions and allow older ones to fade away as they become redundant. The whole community will not lose its designed form, in spite of these changes because of the aesthetic controls placed on roads and buildings. As a method this idea is intended to be responsive to the emptying out of older suburbs as they become less popular. The supposition is that over time a suburb will not become empty but instead change its character in response to new conditions. The question remains as to how much change is actually possible in a suburb when zoning is open-ended, and how much change can be absorbed before the system no longer works.

3.5 Adaptive Suburbia

The Japanese system is not concerned with form, and predictably there is no overall design or rationale to the physical appearance of the Fuchu-machi. Nonetheless, if aesthetic concerns are put aside, it is possible to see a similarity between Japan's inclusive zoning system and the idea of form-based zoning. Since Duany, Friedman and others have suggested that open-ended zoning should create a suburb characterised by change, if not adaptation, it should be possible to test that assertion in the Japanese context. To that end, Study Area A was used as a testing ground to measure change in land use and in property size over a 23 year period. Changes recorded did not include new construction without a change in land use, annexation, or sub-division. While the total number of units (homes or other buildings) in the study area increased by 10% over the 23 year period, this increase was in most instances a result of infill, and does not appear in the data except as a consequence of changes in land use, etc.

Using the property maps from 1981 to the present, an animation was created to measure and highlight instances of change (see Fig.5.). To show the changes, a marker was placed over a property to indicate each instance when it was subdivided, annexed, or when land use was changed. Very often these activities took place simultaneously. For instance there were several examples of homeowners purchasing the land of their neighbours; to build, among other things, a restaurant, an extension to their home, or a private parking lot. More common was the conversion of one part of a property to a small shop; ie, a cafe, a small clothing store, or a beauty salon. More extreme examples were found, such as the conversion of the property of an old fire station to a sushi shop. There was also a single instance of a private clinic in the midst of houses replaced by a new home when the doctor became too old to maintain the practice. The possibility of the opposite also taking place is particularly intriguing. Further, several of the changes recorded were a result of subdivision of large properties to accommodate generational families in older parts of the suburb.

4. Conclusions and Further Research

In the North American suburb, according to Brenda Case Sheer (Kiril, Scheer, 2005) change of this order generally is limited to the commercial strips of suburban areas, and is paid for, so to speak, by a relatively large amount of disorder. In Fuchu-machi the kinds of change were not limited in this way at all, and could instead be found continuously (if not randomly) throughout the test area. As shown in Fig.5., as much as 5 percent of properties in test area A changed either their land use or size during each of the 6 timeframes covered in the 23 year study period. More, there was not a single instance where some change did not occur. It is supposed that the reason for this can be found in the openness of the zoning laws, which allow change to take place on almost any property regardless of location. In this sense, the intentions of the Smart Growth approach to zoning are borne out in practice, at least in the case-study suburb examined here. The evidence indicates that a suburb can in fact change its character quite dramatically at the local scale if the zoning system is free enough.

In comparison with Smart Growth ideals the
Fig. 5. Study Area A: Still from animation showing land use and property size over a 23 year period, and graph showing percent of changes in same period.
casestudy suburb does appear to share a number of significant similarities. More importantly, it also appears to confirm that an open-ended zoning system can lead not only to mixed land use but also to a kind of local adaptability to changing conditions over time. As a tool for dealing with sprawl in North America and in Japan, this idea could have profound implications. Interestingly, the research seems to indicate that Smart Growth zoning concepts can be separated from aesthetic intentions, revealing a tool that can be used not only to create new suburbs but potentially also shows a way to deal with older suburbs that are losing popularity and unable to change because of current zoning practices (in North America).

In the Japanese context, facing an enormous demographic shift of which the consequences cannot be predicted, the presence of an existing process in the suburbs that allows organic change to take place at the small scale is potentially important. Assuming that the city centers will not be restored easily, and that a large part of the population will remain in the suburbs for the near future, a mechanism already in place for changing land use is significant. With the use of incentives it is conceivable that the existing system could be modified to increase density and to improve local conditions for the elderly by encouraging small clinics and shops within walking distance of most homes to be built.

Several questions arise from the research. It is at this point uncertain as to what extent these findings can be generalised as an example for the rest of Japan, and at the same time the patterns uncovered here are not remarkable enough to suggest an example for future best practices. Further, while the zoning laws allow mixed land use, and small scale change to take place, there is no indication as to why the inhabitants of the suburb chose to take advantage of the system. Further research will be directed at answering these questions. Using questionnaires, case studies, and directed interviews the next phase of research will be directed at answering these questions. Using questionnaires, case studies, and directed interviews the next phase of research will attempt to uncover both the formal (legal) and informal (social) processes that lead to the observed results. It is believed that without this depth of understanding it will not be possible to make more substantive conclusions regarding the significance of the observations for either Japan or North America. The results do however show that such research is worth undertaking.

Notes
1) The Building Standard Law (1994) consists of the following 11 categories (from Callies, 1997):
   1. Category I Exclusively Low-Story Residential District
      it allows nursing homes, clinics, apt. houses, dormitories, SOHO
   2. Category II Exclusively Low-Story Residential District
      it allows all in Category I + larger stores and dining facilities
   3. Category I Exclusively Medium-High Residential District
      it allows all in Category I + plus universities, hospitals, welfare centers, child-recreation centers and small garages.
   4. Category II Exclusively Medium-High Residential District
   5. Category I Residential District
   6. Category II Residential District
   7. Quasi-residential District
   8. Neighborhood Commercial District
      A variety of industrial and commercial uses are disallowed
   9. Commercial Districts
   10. Quasi-Industrial Districts
   11. Industrial Districts

References