Understanding Smart Growth savings

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Abstract

Land use patterns affect the costs of providing public infrastructure and services such as roads, water, sewage, garbage collection, school transport and mail delivery. Various studies show that these costs tend to increase with sprawl (dispersed development outside existing urban boundaries), and can be reduced with Smart Growth (compact, planned development within existing urban boundaries).The smart growth theory criticizes the phenomenon of urban sprawl and indeed it focus on optimal utilization of infill urban land to the indiscriminate use of marginal urban areas.

The methodology of this research is analytical and descriptive. THIS PAPER Summarizes estimates of Smart Growth savings. Therefore, first review the definitions of urban growth, sprawl pattern and smart growth theory will be presented and then review the specifics and their position in sustainable urban development. And finally achieve the strategies to remove the municipal casts of sprawl and Implementation Principles and strategies of smart growth theory in order to access the sustainable city.

The results of this study show that cities always must provide the sustainability for ecosystem. With accession of global crisis of energy shortage, rising economic costs of households, Financial and economic crisis of governments and also a huge waste of time and energy in sprawl development, the smart growth pattern is a model that has practical answer to all these factors.

Key words: Urban sprawl, smart growth, urban sustainable development

1. Introduction

Most activities that involve *distribution* (products being delivered to a destination) or *interaction* (people and materials being brought together) are more efficient with compact land use patterns because less travel is required to reach destinations. Although costs per mile tend to increase in denser areas, due to congestion and friction, unit costs tends to decline because each mile serves more destinations. These efficiencies are why people and businesses tend to cluster into cities, towns and business districts.

Over the last several decades many communities have experienced sprawl development patterns, with dispersed, low-density, automobile-dependent urban fringe expansion. These trends have been supported by various public policies and investments, ranging from generous parking requirements to major suburban highway investments. This development pattern exacerbates many problems, ranging from the economic costs to consumers and governments of an automobile-dependent transportation system, to the environmental and aesthetic costs of development that displaces greenspace.

In recent years many individuals and groups have decided that they want to change their community's development pattern based on a set of principles and strategies called *Smart Growth*. These principles increase land use accessibility, reduce per capita land consumption and vehicle travel, and create more complete, mixed use communities. Recently many studies have shown that compact and mixed land use patterns, *Smart Growth*, can reduce various public infrastructure and service costs compared with more dispersed land use patterns, called *sprawl*. These studies have influenced development policies in various ways, in many cases leading to policies that encourage Smart Growth and discourage sprawl. (Litman, 2010)

Although the basic concepts are well accepted by most experts, these relationships are complex and so can be difficult to quantity. Some critics claim that there is no real evidence that Smart Growth provides savings. For example, a study by Cox and Utt (2004) which analyzed the effects of land use density, growth rates and age on certain public expenditures in numerous municipalities. They conclude that Smart Growth savings are trivial. Their analysis contains several critical errors which reflect either inadequate understanding of the concept of Smart Growth, or intent to misrepresent the issue.

This paper reviews the evidence on Smart Growth cost savings, and tries to achieve the strategies to remove the municipal casts of sprawl and Implementation Principles and strategies of smart growth theory in order to access the sustainable city.

2. Defining Smart Growth

Smart Growth is a general term for policies that result in more compact, accessible development within existing urban areas. Smart Growth is an alternative to dispersed, automobile dependent development outside existing urban areas, often called sprawl.

Table 1: compared these land use patterns ("Smart Growth," VTPI 2005; SGN 2001)

	smart growth	Sprawl
Density	Higher-density, clustered activities.	Lower-density, dispersed activities.
Growth pattern	Infill (Brownfield) development.	Urban periphery (Greenfield) development.
Scale	Human scale. Smaller buildings, Blocks and roads. Designed for Pedestrians.	Large scale. Larger buildings, blocks, wide roads. Less detail, since people experience the landscape at a distance, as motorists.
Services (shops, schools, parks)	Local, distributed, smaller. Accommodates walking access.	Regional, consolidated, larger. Requires automobile access.
Transport	Multi-modal transportation and land use patterns that support walking, cycling and public transit.	Automobile-oriented transportation and land use patterns, poorly suited for

		walking, cycling and transit.
Connectivity	Highly connected roads, sidewalks and paths.	Hierarchical road network with numerous loops and dead-end streets, and unconnected sidewalks and paths.
Street design	Streets designed to accommodate a variety of activities. Traffic calming.	Streets designed to maximize motor vehicle traffic volume and speed.
Planning process	Planned and coordinated between jurisdictions and stakeholders.	Unplanned, with little coordination between jurisdictions and stakeholders.
Public space	Emphasis on the public realm (Streetscapes, pedestrian environment, public parks, public facilities).	Emphasis on the private realm (yards, shopping malls, gated communities, private clubs).

Smart Growth refers to development principles and planning practices that create more efficient land use and transport patterns. It includes numerous strategies that result in more accessible land use patterns and multi-modal transport systems. It is an alternative to sprawl.

Figure 1: Smart Growth and Sprawl Illustrated

Smart Growth involves clustered land use, with mixed, medium-density development; and transportation systems that balance walking, cycling, driving and public transit. Sprawl typically involves dispersed land use, with commercial strip development along arterials and lower-density single-family housing; and automobile-oriented transport systems.

Smart Growth is sometimes incorrectly portrayed as a conflict between urban and suburban communities. Smart Growth can be implemented under urban, suburban and rural conditions, as described below.

- Urban: In urban areas it emphasizes redevelopment and infill of existing neighborhoods, improving design features (such as traffic calming of urban streets), and enhancing multimodal transport systems, particularly walking and public transit.
- Suburban: In suburban areas it creates medium-density, mixed-use, multi-modal centers and corridors, either by incrementally developing existing suburban communities or by master plan developments that reflect Smart Growth principles. It encourages more complete suburban communities (more services and employment in suburban jurisdictions), and improved regional travel options such as cycling, rideshare and transit improvements.
- Rural: In rural areas Smart Growth involves policies that help channel development and public services into accessible, mixed-use villages (for example, having schools, stores and affordable housing located close together and well connected by good walking facilities), and rural mobility management strategies such as cycling and rideshare improvements.

Figure2: suburban smart growth example (Suburban Langford)

Langford is a rapidly growing suburb located 10 miles from Victoria, in British Columbia. Once a rural community, during the last half century it grew based on a conventional sprawl land use pattern, with scattered residential tracts and a network of country roads that are now lined with strip commercial development. Langford now wants to grow smarter. In the mid-1990s it established a strategic plan that identifies a central area to be the city's downtown. There it located public offices such as the city hall and police station, built an attractive park complete with a bandstand for public events, landscaped streets, built sidewalks and bike lanes, and is encouraging local businesses and multi-family housing to establish their rather than in outlying areas. The city is working with regional transport agencies to promote walking, cycling, ridesharing and public transit use to help reduce traffic congestion and the need to expand road capacity by widening roads.

This is an example of suburban Smart Growth. These development pattern changes can provide a variety of economic, social and environmental benefits compared with continued sprawl. However, since these changes do not eliminate suburban growth and has little effect on jurisdictional density (they change the location of development, but not the total number of people or businesses in Langford), this type of Smart Growth is essentially invisible to the evaluation methods commonly used by critics

2.1. Smart Growth Strategies ("Smart Growth," VTPI, 2005)

1. Strategic planning. Establish a comprehensive community visions that individual land use and transportation decisions should support.
2. Create more self-contained communities. Locate compatible land uses within proximity of each other. For example, develop schools, shops and recreation facilities in or adjacent to residential areas. Mix land uses at the finest grain feasible.
3. Foster distinctive, attractive communities with a strong sense of place. Encourage urban
4. Development that creates a sense of civic pride and community cohesion, including attractive public spaces, high-quality design and maintenance standards, preservation of special cultural and environmental resources, and activities that highlight a community's unique features.
5. Encourage "village" development. Establish well-defined "urban villages," walkable centers that contain an appropriate mixture of land uses (residential, commercial, institutional, and recreational) with distinct names and characters. Reduce minimum lot sizes, building setbacks, minimum parking requirements, and minimum street size particularly around transit and commercial centers.
6. Concentrate activities. Concentrate commercial activities in these areas. Retain strong
7. Downtowns and central business districts. Use access management to discourage arterial strip commercial development.
8. Encourage infill development. Locate new development within already developed areas.
9. Encourage redevelopment of older facilities and Brownfield.
10. Reform tax and utility rates. Structure property taxes, development fees and utility rates to reflect the lower public service costs of clustered, infill development, and focus economic development incentives to encourage businesses to locate in more accessible locations.
11. Manage parking for efficiency. Encourage shared parking, parking maximums, and other parking management strategies. Reserve the most convenient parking for rideshare vehicles.
12. Avoid overly-restrictive zoning. Reduce excessive and inflexible parking and road capacity requirements. Limit undesirable impacts (noise, smells and traffic) rather than broad categories of activities.
13. Create a network of interconnected streets. Keep streets as narrow as possible, particularly in residential areas and commercial centers. Use traffic management and traffic calming to control vehicle impacts rather than dead ends and cul-de-sacs.
14. Site design and building orientation. Encourage buildings to be oriented toward city streets, rather than set back behind large parking lots. Avoid large areas of parking or other unattractive land uses in commercial areas.
15. Improve no motorized travel conditions. Encourage walking and cycling by improving
16. Sidewalks, paths, crosswalks, protection from fast vehicular traffic, and providing street
17. Amenities (trees, awnings, benches, pedestrian-oriented lighting, etc.).
18. Implement mobility management. Use mobility management to reduce total vehicle traffic and encourage the use of efficient modes.
19. Encourage mixed housing types and prices. Develop affordable housing near employment, commercial and transport centers. Encourage secondary suites, apartments over shops, lofts, location-efficient mortgages and other affordable housing innovations

2.2. Benefits and costs

Smart Growth can provide a variety of economic, social and environmental benefits, as summarized in Table 2. These benefits result from various features of Smart Growth, including reduced per capita land consumption, less dispersed development, and more diverse transportation systems. Of course, the benefits of a particular Smart Growth program depend on its specific features and the conditions in which it is implemented.

The existence of these benefits has been demonstrated in numerous studies and is widely accepted by a diverse range of professions and interest groups, including the American Planning Association, the Institute of Transportation Engineers, the International City/County Management Association, the National Governors Association, the National Trust for Historic Preservation, and various farming and environmental organizations.

Table 2: Smart Growth Benefits (Litman 2002; USEPA 2004; Burchell, et al. 2005)

Economic	Social	Environmental
Reduced development costs. Reduced public service costs. Reduced transportation costs. Economies of agglomeration. More efficient transportation. Supports industries that depend on high quality environments (Tourism, farming, etc.).	Improved transport options and mobility, particularly for non-drivers. Improved housing options. Community cohesion. Preserves unique cultural resources (historic sites, traditional Neighborhoods, etc.) Increased physical exercise and health.	Green space & habitat preservation. Reduced air pollution. Increased energy efficiency. Reduced water pollution. Reduced "heat island" effect.

Although individual Smart Growth strategies have modest impacts, typically reducing per capita vehicle travel and land consumption by just a few percentage points, their impacts are cumulative and synergetic (TRB 2009). For example, increasing density, improving walkability and encouraging alternative commute modes may each only reduce per-capita vehicle travel by 2-4%, but if implemented together their total impacts are much larger.

Comprehensive Smart Growth programs often reduce per capita land use and vehicle travel by 20% or more compared with conventional planning practices ("Land Use Impacts on Travel," VTPI 2005).

3. Evidence of Smart Growth Savings

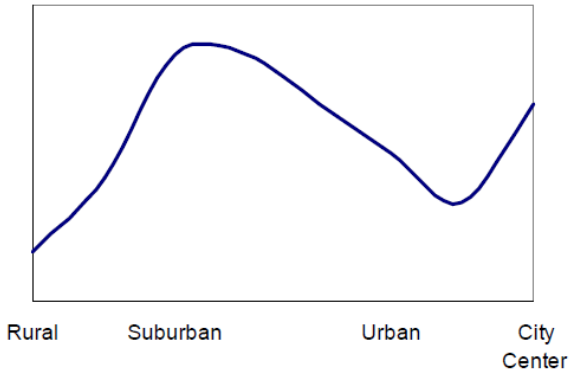
- One of the many Smart Growth benefits is its ability to reduce public infrastructure and service delivery costs. Many studies conclude that Smart Growth can provide significant public cost savings (Burchell, et al. 2000; Muro and Puentes 2004; Burchell, et al. 2005).
- School travel costs are another example of potential smart growth savings. Smart growth includes development of more carefully planned communities, with schools located close to residential neighborhoods, improved walkability, traffic calming and other strategies to control vehicle traffic, and improved public transit bus services. It also includes efforts to redevelop existing urban communities and improve public

services (including public school quality in such areas). Each of these features can help reduce school busing and chauffeuring requirements, providing savings to school districts, families and municipal governments.

- The relationships between density and public costs are, of course, complex. Actual costs depend on the specific location and types of services provided. There are also incremental costs associated with increased density, including increased congestion and friction between activities, special costs for infill development, and often higher design standards. Ewing (1997) concludes that this relationship can be graphed as a tilde (~):
    - Costs are low in rural areas where households provide their own services.
    - Costs increase in suburban areas where services are provided to dispersed development
    - Costs decline with clustering, and as densities increase from low to moderate.
    - Costs are lowest for infill redevelopment in areas with adequate infrastructure capacity.
    - Costs tend to increase at very high densities due to congestion and high land costs.

Figure 3 illustrates this pattern. Note that much of the public savings in rural areas are actually costs shifted from public to private budgets or reductions in service quality. For example, rural residents tend to provide their own water, sewage and garbage collection. They actually spend more in total on these services (SC 1999), although the costs do not show up in public utility budgets. On the other hand, the cost reductions associated with increased density are true resource cost savings, reflecting reductions in total costs per unit.

Figure 3: Land Use Impacts on Public Infrastructure and Service Costs



Public costs tend to be low in rural areas, where most residents provide their own water and sewage, and service standards are relatively low. They increase in suburban areas as more services are publicly supplied to dispersed destinations, decline with increased clustering due to efficiencies, then increase at very high densities due to increased congestion.

Other factors also affect public service costs. Single-use development results in inefficient use of infrastructure, increasing per capita costs:

"Because the home and the workplace are entirely separated from each other, often by a long auto trip, suburban living has grown to mean a complete, well-serviced, self-contained residential or bedroom community and a complete, well-serviced place of work such as an office park. In a sense we are building two communities where we used to have one, known as a town or city. Two communities cost more than one; there is not only the duplication of

infrastructure but also of services, institutions and retail, not to mention parking and garaging large numbers of cars in both places."

Rural residents traditionally accepted lower levels of public services such as roads (often unpaved), emergency response (often voluntary), and limited library and recreation services. Sprawl encourages residents accustomed to urban quality services to move to exurban areas, pressuring governments to provide more services to low-density locations, despite their high costs.

None of the studies described here considers *all* public infrastructure and service costs affected by land use patterns, so total savings of Smart Growth are greater than they indicate. Most only consider a limited set of infrastructure costs borne directly by one level of government. Some ignore costs borne by private utilities, by other levels of government, (such as the post office or school districts), by businesses, and indirectly by consumers. On-going costs are often overlooked. For example, many studies consider the incremental costs of building longer water and sewage lines, but not the incremental costs of maintaining and operating them. Similarly, some studies consider the incremental costs of building more roads, but not the costs of maintaining them, or of providing additional parking at destinations due to more automobile-dependent land use patterns.

In addition, smart growth provides direct transportation cost savings and increased affordability to housing residents, totaling thousands of dollars a year (Litman 2008; Dodson and Sipe 2006). Because these are true savings to home occupants, translate into higher property values, reduced vulnerability to economic downturns and weak housing markets, and more stable communities (Leinberger 2008). More affordable transportation tends to improve households' economic resilience, that is, they are better able to respond to unexpected financial burdens such as fuel price increases, vehicle failures or income losses, and so it reduces housing foreclosures. According to the *Location Efficiency and Mortgage Default* study, the probability of mortgage foreclosure increases as neighborhood vehicle ownership levels rise, after controlling for income (NRDC 2010). These results suggest that public policies that support location efficiency can help to reduce mortgage foreclosures, and that loans are safer for housing in more multi-modal locations.

4. Conclusions

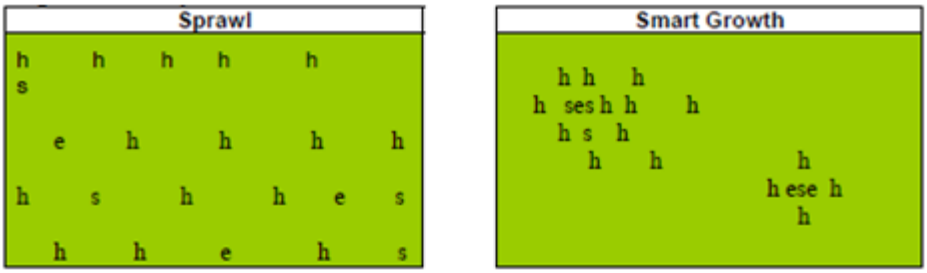
Smart Growth is a set of planning principles intended to increase land use and transportation system efficiency. An effective Smart Growth program includes various integrated strategies, many of which reflect market principles and offer positive rewards for choosing more efficient land use and transportation patterns. Such programs can help address many problems and provide many benefits.

Smart Growth consists of various development features that create more efficient land use patterns. Numerous studies indicate that Smart Growth can reduce public infrastructure and service costs, providing savings on roads, water, sewage, garbage collection, utilities, school transportation, delivery services, and parking facilities.

According to studies, Smart Growth tends to increase more freedoms than it reduces, for example, by allowing more flexible development designs and providing more consumer travel options. Smart Growth also increases accessibility and travel options, and provides incentives to reduce vehicle travel which reduces congestion. Traffic congestion alone is an ineffective indication of transport system quality, it is important to consider the quality of other modes. Empirical data indicate that Smart Growth reduces per-capita congestion delay.

In the other hands, Smart Growth can increase economic efficiency and productivity, and is associated with higher incomes and economic growth.
One of the best examples for benefits of smart growth, as described earlier, is the city of Langford which is shifting from sprawl to Smarter Growth development by creating a clustered, multimodal downtown. Yet, this change is invisible to the quantification methods used by critics, since it occurs in a suburban community and will not significantly increase the city's population or its population density.

Figure 4: Sprawl versus Smart Growth Land Use Patterns



Both boxes contain the same overall density of housing (h), employment (e) and services (s), but on the left they are more dispersed and on the right they are more clustered, creating "villages."

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