

Compact city; dose it create an obligatory context for urban sustainability?

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Abstract

Throughout the early and mid 1990s, there was widespread faith in the compact city model's ability to provide urban sustainability. However, where compact city policies had been implemented, follow-up studies began to show the predicted benefits did not happen as they should be. The article tries to peruse two opposite approaches of "Urban Sprawl" and "Compact City", with an analytical - critical procedure and their consistency with sustainability. It also compares sustainability strategies of the new urban design paradigms (such as New Urbanism, Transit Oriented Development (TOD) and Smart Growth) with compact city considerations. At the end, the article discusses about the question that does the compact city paradigm creates an obligatory context for sustainability? In fact, This article supports the belief that instead of concentrating on one particular solution, there is a need to recognize and accept the fact that a divers urban futures are likely to exist within a city and that urban compaction should only be seen as one way of achieving sustainable urban form. As indicated in the article ,each country should adapted the compact city considerations that best suits the local conditions and makes the best contribution to urban sustainability in a way that is both acceptable and feasible in their local environments. Because of the many challenges that the compact city concept faces, the focus should be on creating a diverse urban forms and sustainabilities that are most likely to 'fit' the area they are to be implemented in. Indeed, there should be a greater focus upon the processes, functions and design of the city and how they contribute to sustainability, rather than just the density dimension of compact city which occupied most of the literature throughout the 1990s. By concentrating on a more micro level scale, urban design can help overcome acceptability and feasibility critiques of the compact city that correctly highlight the radical cultural, political, social and institutional changes that will be required to move away from the sprawl.

Keywords: Compact city, Urban sprawl, Urban design, Sustainability, New urbanism, Transit oriented development (TOD) and smart growth

1. Introduction

The practice of urban planning has a long history, most probably dating back to the earliest cities many thousands of years ago. However, the modern concept of urban planning really began to evolve in Britain during the second half of the nineteenth century. '...as a reaction against the industrialization which had created such great inequalities in living conditions, by exploiting for profit whatever did not have to be paid for directly, such as housing, air, water and workers' health' [1]. Urban planning evolved throughout the twentieth century, leading to a great variety of urban forms, which often had little

regard for their impact upon the environment. In the 'developed world' this disregard is most evident in the rise of 'urban sprawl' as the primary form of urban development, one which has come under increased criticism in recent years because of its negative environmental, social and economic effects [2], [3], [4], [5]. This change has occurred in conjunction with an increasing awareness of human impact on the environment, and the emergence of 'sustainability' as a concept of international significance. 'Sustainable development' has become most popularly understood from its definition in the report by the Brundtland Commission as 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs and aspirations' [6].

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Sustainability has been incorporated in urban planning theory, both, through the promotion of a 'compact city' model for urban growth rather than 'unsustainable urban sprawl', and through a renewed focus on the importance of urban design,

known as 'New Urbanism'.

Seen from this perspective, the search for the 'ideal' land use planning pattern which is to satisfy specific social, economic, and environmental criteria is at risk of simplifying a complex and continually unfolding topic. Therefore, discussions which focus only on the 'compact city' can only represent just one facet of the debate as it stands today.

2. What is Urban Sprawl?

The problems associated with urban sprawl have long been recognized [7], [8], [9], [10], [11]. Sprawl is, normally, conceived as a combination of low-density, scattered, leap-frog and strip development patterns, i.e. strictly urban design characteristics. However, as argued by Ewing (1997), sprawl is characterized by two major indicators: poor accessibility both at the residential and destination places, and a deficiency of functional open spaces [12].

Nelson et.al, (1995) have summarized the various definitions of urban sprawl in the planning literature to create a working definition of the concept as: '...unplanned, uncontrolled, and uncoordinated single use development that does not provide for a functional mix of uses and/or is not functionally related to surrounding land uses and which variously appears as low-density, ribbon or strip, scattered, leapfrog, or isolated development' [13].

Sprawl causes several financial, social and environmental costs, and represent the end of an urban spectrum which tends to be seen as the 'unsustainable archetypal' of a city. As costs of sprawl, one can identify the following: high vehicle kilometers traveled (VKT), high energy consumption and air pollution, high infrastructure and public service costs, loss of resource lands, negative impact on central cities and downtowns, and also psychological and social costs [12].

Critics of sprawl claim that sprawl leads to racial polarization and social injustice [14]. There is considerable evidence of social inequality in the United States that is manifested in the spatial pattern of the urban development [15]. The rich neighborhoods that have high quality services, good schools, cultural facilities and safe environments are primarily occupied by the whites; whereas, the poorer families and minorities inhabit high density and degenerating inner city neighborhoods. Homes in the suburbs are more expensive and the poorer families cannot afford them which results in this form of income and racial disparities in land use.

Cars enable sprawl, and sprawl needs cars [16]. Sprawl exists only because it is an outgrowth of car activities. In turn, this automobile dependency generates urban geometries that accommodate cars first and pedestrians second. The sustainable compact city must be designed for the pedestrian first. Sprawl relies totally on the automobile, and thus, follows the dendritic (treelike) geometry of roads. Sprawl also occurs when buildings are erected with no regard or understanding of connective geometries which encourage walking. Complex urban fabric means condensation, connectivity, and mixing; the opposite of homogeneity. Yet, most postwar planning has deliberately spread a homogeneous, amorphous structure over the earth, replacing healthy urban fabric in existing compact cities. With the wrong codes in place, almost

everywhere today, roads ,in fact, determine the geometry of the urban settlements. A road in the countryside attracts new buildings along its length, thus linking each building with that particular road and with nothing else. But human beings do not link to a road: they link to work, school, church, medical facilities, etc. Clustering is supposed to occur among linked human activities, and not strictly between houses and a road. It's the wrong linking, and it destroys the meaning of a city. The solution is obvious to some of us. Zoning codes should prevent the dendritic growth of buildings along roads. Instead, they should promote an urban geometry that concentrates human connections inward to focus on local urban nodes [16].

2.1. Causes of urban sprawl

Urban sprawl results from the confluence of several factors: [3], [12], [17]

1. Widespread immigration to the cities
2. Increase vehicle property
3. Not paying attention to the old urban entral districts which accelerates their decline by besides increasing growth of the suburban centers, shopping centers and enclosed shopping malls.
4. Citizens' struggle to segregate themselves from others with different social - economical situations.
5. The lure of cheap open land outside the city
6. Capitalist's desire
7. The rise of the real estate developer
8. Mass production of housing
9. The ever - present image of the single family home as some citizen's dreams. In fact, Consumer preferences for single-family detached housing, which trade a central location for a peripheral one to be able to afford that desired typology, once the land prices are lower in suburbs.
10. Technological innovations which led to a decrease of transportation and communication costs, and made the location of businesses less dependent of a central urban location. As Hall (1995) states, the new logic of location of businesses is the access to information, fomenting the development of suburban centers and reinforcing the primacy of the largest cities over the smaller ones.
11. Government intervention, especially, in terms of road building subsidies, and land and house devotion for different reasons (as it can be seen in Governmental Mehr Housing Plan in Iran).
12. Finally, the inability to charge for public and quasi-public goods is also seen as a major cause for urban sprawl. Environmental and residential amenities are examples of this type of goods, which are obtained for free by home buyers as part of their housing bundle. In turn, these goods tend to be under provided by the market, due to that same inability to charge for them, creating a lack of amenities, and especially open space, in the suburban areas of the city.

2.2. Sprawl Characteristics

Sprawl could be defined as a form of urban development that contains most of the following ten elements listed in Table 1.

Table 1: Urban Sprawl Characteristics; Sources: [14], [15], [18]

| Urban Sprawl Characteristics |
|--|
| 1. Low residential density |
| 2. Unlimited outward extension of new development |
| 3. separated and isolated land uses on freestanding parcels of land with no direct connections with each other |
| 4. Walking and biking are severely limited |
| 5. New development along the transportation corridors has led to the destruction of farmlands, open spaces and natural systems |
| 6. More investment in infrastructure for automobiles, such as roads, highways and parking lots |
| 7. Large amount of impervious surfaces which prevent storm water absorption and increase flooding |
| 8. Leapfrog development |
| 9. No centralized ownership of land, or planning of land development |
| 10. Racial polarization and social injustice |
| 11. All transportation dominated by privately owned motor vehicles |
| 12. Fragmentation of governance authority of land uses among many local governments |
| 13. Great variances in the fiscal capacity of local governments |
| 14. Widespread commercial strip development along major roadways |
| 15. Major reliance on a filtering process to provide housing for low-income households |



Fig. 1. An image of a compact city; Source: [44]

integration of land uses, for some degree of "self-containment" [31]. Newman and Kenworthy (1989) also demand more intensive land use, centralized activity and higher densities.

Breheny (in Blowers, 1993) provides an apt summary of the 'compact city' as a high density, mixed use city, where growth is encouraged within the boundaries of the existing urban areas, but with no development beyond its periphery. Burton (2000) also believes that, in general, a compact city is taken to mean a relatively high-density, mixed-use city, based on an efficient public transport system and dimensions that encourage walking and cycling [32].

Salingaros (2006) believes that a compact city is a "low-speed" city. This feature has to be guaranteed by narrow streets and special low-speed geometry. Increasing vehicular traffic flow has diminished the livability of cities and urban regions [16]. A compact city mixes shared civic spaces with concentrated arrangements of structures. It defines a highly-organized complex system, in which each component supports and is connected to the whole. Urban space is supported by the geometry of the surrounding buildings, so buildings should attach themselves to those spaces, not to the road. In a compact city, buildings are connected via a network of paths into clusters. A number of buildings should define a cluster perceived by a pedestrian as accessible (a low-speed setting). By contrast, buildings in a suburban sprawl are outward-looking and connect to nodes in the far distance, but not to each other (a high-speed setting) [16].

Several authors describe the 'compact city' in contrast to other competing settlement patterns. Owens and Rickaby [19] describe two key patterns: centralized and decentralized concentration. Breheny [19] distinguishes between centralists, laissez-faire town crammers, and decentralists. Breheny et al describe five scenarios for accommodating growth: urban infill, urban extensions, key villages, multiple village extensions, and new settlements. With 'urban infill', there is the further distinction between urban intensification (high-density land use), and the reclamation of brownfield sites. The illustration in Figure 2 gives an indication of the form of each of these patterns [25].

Williams et. al (1996) believe that "more compact cities can only be achieved through a process of making existing cities more dense, encouraging more people to live in urban areas

As mentioned above, the main proposed alternative to urban sprawl has been termed the 'compact city model'. This model differs greatly from the conventional urban development (or sprawl) by focusing on urban intensification, creating limits to urban growth, encouraging mixed-use development and placing a greater focus on the role of public transportation and quality urban design.

3. What is 'Compact City'?

The search for a sustainable urban form has created a major academic and political debate since the end of the 1980s [19], [20], [21], [22], [23]. In Europe, a major keystone was the "Green Paper on the Urban Environment" published by the European Commission in 1990 [24], which introduced the concept of the "compact city" as the archetypal sustainable urban form for European cities. Indeed Initial impressions evoke an intense medieval city, whose limits are clearly visible, and where the hubbub of daily activity is confined within the city's walls [25] (Figure. 1). It is the product of a certain form, scale, and mix of activities.

Compactness has been reinterpreted as a high density living [17], [26], [27], sometimes leading to concerns about town cramming [28]), lack of open and green space [29], and increase in housing prices [30].

Few of the supporters of the compact city describe it in ways which are explicit. McLaren (1992) in *Compact or dispersed?* Dilution is no solution, discusses the benefits of high population densities in compact cities. Elkin et al. (1991) promote the 'intensification of the use of space in the city' [31] with higher residential densities and centralization, and they write that 'planners should aim for compactness and

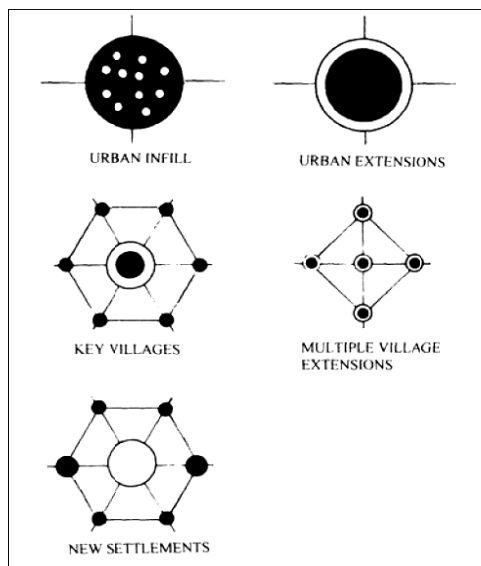


Fig. 2. Five development growth scenarios; Source: [25].

and building at higher densities: intensifying cities" [33].

For Breheny the case for the compact city as the solution to settlement ills and environmental imperatives is most clearly, provocatively and significantly articulated in The Commission of the European Communities Green Paper on the Urban Environment [24]. "Its advocacy of the compact city rests not just on strictly environmental criteria of energy consumption and emissions, but also on quality of life grounds" [29]. The aim is to 'avoid escaping the problems of the city, by extending its periphery; to solve its problems within existing boundaries' [24].

Barton et al. (1995) have described the case for or against the compact city as being fought between the supporters of the CEC and the Town and Country Planning Association, who invoke the high-rise horrors of postwar urban Britain and the congested squalor of the Victorian Britain, in doubting the attractions of the compact city. Within this article, it is not our intention to present a review of the research data currently available, against which it might be possible to 'measure' the compact city, so that we could present an unbiased view of its merits. The intention, instead, is to provide an overview, highlighting circumstances which question the compact city as a desirable target for planners, designers and politicians with green interests [25].

3.1. Compact City Characteristics

The main advocates of the compact city principles [2], [4], [24], [31] defend by claiming that it generates several environmental and social benefits, namely: less car dependency, low emissions, reduced energy consumption, better public transport, increased overall accessibility, re-use of the Infrastructure and of previously developed land, rejuvenation of the existing urban areas and urban vitality, high quality of life, preservation of green space, and a milieu for enhanced business and trading activities [12].

Although there is not a unique and universal definition of

compact development, the major objective is that the city should solve its own problems within its own limits, avoiding the consumption of more land. In addition, and subjacent to this objective, the major intention is to reduce distances between housing, industry and commercial activities, which could only be achieved through the combination of higher densities, more functional and social diversity and redeveloping derelict areas of the city, ultimately creating a multimodal accessible city, based on the proximity of activities and land uses, in which the use of the car becomes an option and not a necessity [12].

Table 2 presents list of the characteristics of a compact city that could be used to guide future research. This preliminary and not exhaustive list suggests variables that can be tested in future research. The characteristics in Table 2 are based on reviews of practice, research, and literature [17], [32], and observation. Note that the listing in this table is intentionally comparable to Table 1, Urban Sprawl Characteristics.

Table 2. Compact city characteristics

| Compact city characteristics |
|--|
| 1. High residential and employment densities |
| 2. Contained growth, demarcated by legible limits |
| 3. Less car dependency; Reduced energy consumption |
| 4. Re-use of Infrastructure and of previously developed land |
| 5. Rejuvenation of existing urban areas and urban vitality |
| 6. High quality of life |
| 7. Preservation of green space |
| 8. A milieu for enhanced business and trading activities |
| 9. Mixed land uses |
| 10. Contiguous development (some parcels or structures may be vacant or abandoned, or surface parking) |
| 11. Multi-modal transportation |
| 12. High degrees of accessibility |
| 13. Sidewalks, curbs, bicycle lanes |
| 14. High degree of impervious surface coverage |
| 15. High open space ratio |
| 16. Population diversity |
| 17. Increased social interaction |
| 18. Unitary control of planning of land development, or closely coordinated control |

4. New Approaches for Urban Sustainability in Parallel with Compact City Vision

New Urbanism, Transit Oriented Development (TOD) and Smart Growth are the main policies and proposals which move on the same way as compact city concept dose.

4.1. New Urbanism

New Urbanism, as a new movement, intends to offer an alternative proposal to the typical low-density suburban pattern of the American cities, emulating historic urban patterns. New Urbanism is constituted by a group of design principles, namely [34]:

- Compact, walkable neighborhoods with clearly defined

edges;

- A clearly defined centre with public spaces, public buildings, a transit stop, and retail businesses;
- An interconnected street network, forming coherent blocks and lined with building fronts rather than parking lots;
- A diverse mix of activities and housing options;
- Civic spaces in prominent places; and
- Open spaces in convenient locations throughout the neighborhoods.

4.2. Transit Oriented Development (TOD)

This movement is one of the main proposal of the New Urbanism, and consists of "a mixed-use community within an average 609.6 meters (2000 feet) walking distance of a public transportation stop and core commercial area. TODs mix residential, retail, office, open space, and public uses in a walkable environment, making it convenient for residents and employees to commute by transit, bicycle, foot or a car" [35] (Figure 3).

4.3. Smart Growth

The concept of smart growth emerged during the 1990's as one of the solutions to the challenges posed by the traditional planning policies and zoning techniques [36].

Growth means development. Smart growth means development that accommodates growth in smart ways, which is to say in economically viable, environmentally responsible, and collaboratively determined ways [36]. To achieve that objective, many smart growth strategies encourage development in areas with existing or planned infrastructure.

Within those areas, they also encourage mixed use, pedestrian and transit oriented development; established incentives to enhance investment; lower regulatory barriers to development; and use of, both, the state and local funding to improve infrastructure [37]. In smart growth, 'Good Growth' signposts have replaced those saying 'No Growth' [36]. Smart growth advocates have realized that development will occur somewhere as long as the population is growing; instead of allowing growth to occur in a haphazard and inefficient fashion, it could be encouraged to take place in or adjacent to existing communities [38].

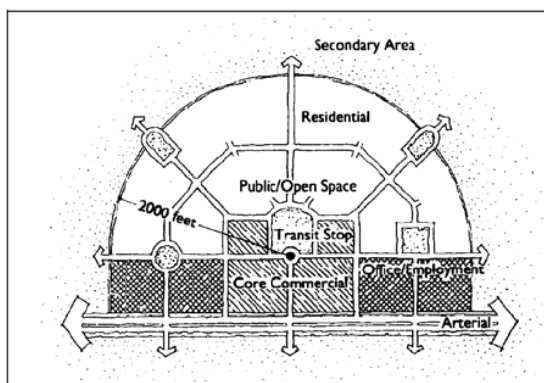


Fig. 3. Transit oriented development; source: [12]

Smart Growth is constituted by a group of design principles which confirm compact city principles in another way (table 3).

5. Compact City's Challenges; Does Compact city Create an Obligatory Context for Sustainability

Throughout the early and mid 1990s, there was a widespread faith in the compact city model's ability to provide urban sustainability. This approach was apparently 'so dominant that it seems inconceivable that anyone would oppose the current tide of opinion towards promoting greater sustainable development and the compact city in particular' [39].

However, where compact city policies had been implemented, follow-up studies began to show that the predicted benefits were not happening as they should have been, and that the claimed benefits of urban compaction '...are at the very least romantic and dangerous, and do not reflect the hard reality of economic demands, environmental sustainability and social expectations' [25].

Furthermore, there was found to be a significant difference between the romantic, vibrant, traditional city and the reality of traffic congestion, poor environmental quality and 'town cramming'. In other words, 'the city was something which many people wished to escape from, through suburbanization and rural living, rather than embrace it [40]. As a result of the increased uncertainty surrounding the compact city concept, a clear critique could be developed, focuses upon on the compact city hypothesis' veracity (whether compaction actually delivers the environmental, social and economic benefits that it is supposed to); feasibility (whether compaction defies the market and can be properly implemented); and acceptability (whether urban compaction will lead to a political backlash from local residents) [41].

In fact, it is known, sustainable development consists of 3 major dimensions which as follows: social sustainability, Environmental sustainability and economic sustainability. When any of the three dimensions cannot be achieved, unsustainable development is faced. Preliminary evidence testing the compact city vis-à-vis sustainability suggests that the relation between compactness and sustainability can be negatively correlated, or weakly related.

For instance, when Burton (2000) in her study of 25 English cities evaluated the social sustainability of a compact city, and indicated that among 9 social justice criteria of the survey, just 4 could be achieved through the compact city concept, she says: "the findings indicate that compactness is likely to be negative for four aspects of social equity. These are listed below in descending order of importance:

- less domestic living space;
- lack of affordable housing;
- increased crime levels; and
- lower levels of walking and cycling.

However, may offer the following benefits (in descending order of importance):

- improved public transportation use;
- reduced social segregation; and
- better access to facilities.

With regard to the other social equity issues, such as "access

Table 3. key principles of smart growth [14]

| | |
|--|---|
| Using Innovative and Compact Design Techniques | <ul style="list-style-type: none"> • Increase awareness amongst community members and offer incentives regarding compact building options through workshops and public meetings • Create appropriate design guidelines to balance efficiency, privacy and accessibility thus creating attractive homes and yards • Support regional efforts to support compact development |
| Mixing Land Uses | <ul style="list-style-type: none"> • Adopt smart growth codes in addition to innovative zoning tools to parallel existing conventional development codes • Provide incentives through state funds to encourage residents to live near their places of work • Facilitate financing of mixed use properties through incentives to developers, financiers and local communities • Convert declining shopping malls and/or retrofit single use office and retail structures into mixed use developments. |
| Providing Transportation Options | <ul style="list-style-type: none"> • Finance and provide incentives for interconnected multimodal transportation systems • Foster pedestrian supportive land use development patterns. Create effective pedestrian environments through the use of sidewalks, easy street crossings, and local street connectivity • Address parking needs and opportunities in an innovative fashion (avoid large parking lots) • Zone for concentrated activity centers around transit service within communities |
| Strengthening Existing Communities through Infill Development and redevelopment | <ul style="list-style-type: none"> • Strengthen state or local Brownfield programs and locate civic buildings in existing communities rather than greenfield areas • Institute a regional tax base sharing to reduce intra jurisdictional competition and promote development of the region as a whole • Create economic incentives for businesses and home owners to locate in areas with existing infrastructure • Modify average cost-pricing practices in utilities thus accounting for the higher costs of providing infrastructure in outlying areas |
| Conserving Open Space, Farmland and Critical Environmental Areas | <ul style="list-style-type: none"> • Use transfer of development rights (TDR's), purchase of development rights (PDR's) and other market oriented tools to conserve privately owned land and to facilitate open space acquisition and its preservation • Identify critical ecological sites at a regional level and create an inventory prior to development to direct future growth in a planned manner • Create a continuous network of green ways and walking/ biking trails • Partner with nongovernmental organizations and other public entities to acquire and protect land and also increase public awareness |
| Fostering attractive communities with a strong sense of place | <ul style="list-style-type: none"> • Create civic anchors at a community level like neighborhood schools, community centers, health centers etc • Encourage adaptive reuse of historic structures through financial incentives • Create special improvement districts for focused investment |
| Expanding Housing Opportunities and Choices | <ul style="list-style-type: none"> • Revise existing zoning and building codes to permit a variety of housing types and enact an inclusionary zoning ordinance for new housing developments • Prioritize smart growth projects and programs by allocating federal funds, community development block grants and other funding sources • Educate realtors, lenders and home buyers on the use of resource efficient mortgages and provide financial assistance through home ownership subsidies • Require new developments to have a percentage of affordable housing in their plans for residential development |
| Encouraging multi-stakeholder and community collaboration | <ul style="list-style-type: none"> • Develop a public participation process • Use different methods (media, mail, pamphlets, charts, 3D computer simulations) as well as forums to educate and disseminate information to all segments of the population regarding the development and decision making processes on a consistent basis • Incorporate stakeholder opinions at different stages of the development process. The range of policies mentioned above is an attempt to enumerate as far as possible in a feasible manner the tools that communities can use to achieve the objective of vibrant, dynamic and healthy neighborhoods. Communities may adopt other tools as well to achieve their specific objectives not limited to the ones outlined above. |

to green space" and "the incidence of mental illness", it is difficult to determine with certainty their relationship with compactness" [32].

There are a lot of debates if compact city is a healthy city or not? The health of a city is determined by many factors.

Only some factors are affected by density or compactness. In fact, most often, dense cities are unhealthy. Modern urban planning is derived from devastating criticisms of city crowding in the nineteenth century. Industrial cities became less healthy as they became denser. Today, the tables have been turned. Sprawling metropolises are unhealthy. It would seem logical to conclude that sprawl's opposite, compact,

should be more healthy. Furthermore, dense urban centers have dis-economies of scale (pollution and illness) and inefficiencies (increased energy and material costs per square foot in skyscrapers) that ought to be factored into more holistic assessments. Compact settlements with an emphasis on density, pedestrians, and public transportation only address a few of the ills attending modern metropolises [17].

The environmental arguments for the compact city, notably is that it 'saves' the countryside from greenfield development and that the number of car trips per person are reduced, have been questioned by empirical evidence.

Williams (1999) states that 'recent research in three London

Boroughs which had been intensified over a ten year period showed no reductions in car use. Travel patterns were so complex, due to lifestyle shifts such as cross-London commuting and increased journeys for leisure, that no relationship could be found.' Furthermore, the environmental gains made from not developing beyond the urban fringe are often negated by 'the subsequent loss of urban open space [that] may mean a reduction in ecologically important land, and a loss of space for trees and other greenery' [25].

Indeed, although traffic emissions may be reduced by the compact city, there is the potential for more people to experience remaining emissions because of higher population densities. Garcia and Riera [42] also claim that 'taking available studies into account, despite the straightforward intuition behind it, there seems to be no conclusive evidence clearly supporting the view that certain environmental goals are better accomplished by compact cities.

The need to reverse the process of decentralization, which has dominated urban development since the nineteenth century, will be one of the most difficult obstacles for the compact city to overcome. This is not only because of the institutionally entrenched process of urban decentralization, but also due to a widespread cultural preference for '...the cherished high land-consuming, high-mobility lifestyle' that characterizes most developed world cities [43]. Thus, even if urban compaction policies are implemented successfully, they may not be acceptable to large tracts of the population, resulting in the reversal of such policies by locally elected councilors keen to retain their jobs. Breheny [42] claims that 'generally, marketing surveys carried out by house-builders reveal a strong preference for houses with gardens and as much space in both as possible', an urban form that contradicts compaction. Moreover, developments requiring shared drive ways, smaller units, multiple extensions turning detached houses into terraced housing, and other methods used to increase the density of use among the urban environment, have led to an actual and perceived reduction of quality of building stock [33].

These studies among countless scientific surveys and researches show the insufficiency of compact city concept in allegiance from all the urban sustainability criteria. Indeed, many of the characteristics in Table 2 could describe nearly any city. They can also be used to guide the physical design and planning criteria for a new town. These criteria, if applied to a new compact city, will endow it a degree of functionality. Yet, they do not, in and of themselves, make the compact city sustainable.

Neuman (2005) claims that the compact city idea is a fallacy. He questions why planners and policy makers favor models of the city that are centuries old, and argues that this line of thinking is inadequate to accomplish the fundamentally new task of sustainable cities. Neuman (2005) believes that the supporters of the compact city maintain such beliefs, because it constitutes an opposite view to sprawl, and also because there exists a romantic image of the old European towns and cities that is beautiful and seductive. The dense core of many historic European cities have posed as great attractions for architects, planners and countless tourists, viewed upon from the outside as ideal places of urban life; as also has been stated by Jenks, Burton and Williams (1996) to constitute a dangerous romantic vision that tries to recapture a

past golden age through mimicking of an urban form.

He believes that "those cities and towns may have been sustainable, but if they were, it was for reasons other than compactness or density. Their builders used local materials, local labor, and local and appropriately scaled technology. They were more artisanal and built settlements gradually over time. Because they applied local knowledge and resources as craftsmen, these settlements fit their surroundings [17].

Neuman claims that the compact city advocacy is a result of a fundamental problem, the compact city paradox. This paradox is constituted by the notion that the compact city must develop at higher densities in order to be sustainable, but that in order to be livable, it must be more dispersed. However, livability is a matter of personal preference, implying that both, dispersed and dense cities may provide this for its citizens. Thus, urban form is not exclusively relevant with regard to livability. As Numan (2005) says: "Compact city is a pleonasm, two words commonly used together that are redundant. Free gift. Ice cold. Compact city. The fact that we say compact city seems to be occasioned by the existence of sprawl. One cannot overlook the fact that form is both the structure that shapes process and the structure that emerges from a process. Yet, the question that should be asked is, whether the processes of building cities, and the processes of living, consuming, and producing in cities, are sustainable. Indeed, compact city is neither a necessary or sufficient condition for a city to be sustainable, and that the attempt to make cities more sustainable only by using urban form strategies is counterproductive. Instead, conceiving urban form as a processual outcome of urbanization opens the door to a new and dynamic conception of urban planning, based on a reversal of the last century's (not exclusive) focus on urban form governed by the static tools of the plan and zoning" [17].

6. Achieving Sustainable City Visions Through Deeper Focus on Urban Design

In their book, *Achieving Sustainable Urban Form*, Williams, Jenks and Burton (2000) claim that '...until fairly recently there was some consensus that compact urban forms offered the most sustainable future.' However, more recent research has raised important issues surrounding the complexities of the urban environment which may lead to urban intensification policies having consequences far removed from the goal of more sustainable cities. Instead of concentrating on one particular solution, there is a need to recognize that a diversity of urban futures are likely to exist within a city and that urban compaction should only be seen as one way of achieving sustainable urban form. Furthermore, intensification policies are most likely to be successful when adapted to the existing urban landscape of the particular neighborhood where they are being implemented. However, recent literature does not propose a return to the days of urban sprawl. By focusing at a more micro-level scale, urban design can help overcome acceptability and feasibility critiques of the compact city that quite correctly highlight the radical cultural, political, social and institutional changes that will be required to move away from sprawl, a method of urban development that has become fundamentally embedded in society over the past 50 years.

7. Conclusions

The dominant forms of urban development throughout the twentieth century, notably urban sprawl and/or suburbanization, have been almost universally criticized, because they have led to highly unsustainable cities in environmental, social and economic terms. In response to this dire situation, literature in the early-to-mid 1990s proposed a blanket solution, which has been termed 'the compact city': a model of urban intensification that would (supposedly) reduce car-trips, 'save' the countryside from urban expansion, promote social equity, revive derelict downtown areas, and contribute to greater urban vitality and long-term sustainability. However, since the mid 1990s the compact city model has been challenged on three levels: whether it can deliver its supposed benefits towards sustainability, whether it can be feasibly implemented in the urban environment, and whether it is acceptable to the local populations that will be affected by such changes. Form, as biologists and geologists understand it, is an outcome of evolution. Form is a snapshot of process. It is a fixed condition at any point in time. Form, in and of itself, is not measurable in terms of sustainability. The attempt to attain sustainability via physical means alone is nonsensical. Instead, the city ought to be envisioned as the manifestation of many co-evolutionary processes: between the city and its inhabitants and between the city and its environs are two prominent ones. As indicated in the article, each country should adapt the concept of compact city that best suits the local conditions and makes the best contribution to urban sustainability in a way that is both, acceptable and feasible in their local environments. In fact, as a result of the many challenges to the compact city concept, recent literature has focused on creating a diversity of urban forms and sustainability that are most likely to 'fit' in with the area they are to be implemented in.

By focusing on a more micro-level scale, urban design can help overcome acceptability and feasibility critiques of the compact city that quite correctly highlight the radical cultural, political, social and institutional changes that will be required to move away from sprawl, a method of urban development that has become fundamentally embedded in society over the past 50 years. As discussed, the mystery of sustainability of the old European towns might exist for a reason different than their relative compactness; it was because the old towns fit into their surroundings and were built up over time using local labor and local resources. Many of the supporters of the compact city maintain such beliefs, because it constitutes an opposite point of view to sprawl, so the principles and considerations which limit sprawl (that can be compact city's principles too) should be used in real projects' practical implementations.

There should be a greater focus upon the processes, functions and design of the city and how they contribute to sustainability, rather than just the density dimension of the compact city which occupied most of the literature throughout the 1990s. However, the form of the city is still a crucial aspect of its sustainability, and as the negative environmental, economic and social effects of urban sprawl become increasingly visible through traffic congestion, social isolation and the continual loss of important land on the urban fringe, it

becomes clear that continuing this pattern of development into the future will be highly unsustainable. Although it might not be possible to ever really create a perfectly sustainable city, just as it is unlikely for us to know exactly when we have achieved sustainable development, real benefits can be reaped through the process of becoming more sustainable. And as the compact city hypothesis states, there is, at least, the potential for urban areas to operate in a more environmentally friendly, socially equitable and economically viable manner. The only issue remaining relates to the question of how to get there.

Notes

1. The process of achieving urban compactness is usually termed 'intensification', 'consolidation' or 'densification', and involves the re-use of land, more intensive use of urban buildings, sub-divisions and conversions of existing development and an increase in the density of population in urban areas (i.e. re-urbanization) [32].
2. A tract of land that has been developed for industrial purposes, polluted, and then abandoned (Webster Collegiate Dictionary, 2010) (of an urban site) having had previous development on it (Oxford University Press, 2010).

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