Determinants of Social Capital:
Prioritising Issues for Holistic Urban Sustainability Assessments

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ABSTRACT

The concept of social capital is gaining increasing recognition as a concomitant for social and economic development. Robert Putnam's (2000) exposition of the crucial correspondence between the decline of social capital on one hand and the economic lives of American people on the other received wide acclaim at home and abroad. Contemporary literature on development studies is equally replete with references to the World Bank's subscription that social capital has an important role to play fostering sustainable development. There is a general agreement among proponents of social capital that well-governed cities which exhibit strong economic growth do so because of their high stocks of social capital (Portes, 1998). There is also a similar realisation that the design and form of cities, neighbourhoods and individual buildings have significant implications on social capital as they can affect the way people interact and bond with each other and the sense of community among individuals (Dannenberg et al, 2003; Lindström et al, 2003). The fundamental premise is that some urban designs encourage social ties and informal contact among residents while others violate the evolutionary pattern of civicness within the urban existence. The aim of this paper is to identify and examine the key determinants of social capital within an urban development context. This should set the platform for a predictive model of social capital, which will enable the incorporation of the concept in a holistic urban sustainability assessment framework. The paper argues that social capital is a subject of self-organisation, whose evolution to higher levels can be catalysed by the prevalence of a critical balance in the design of the physical urban environment.

Keywords: Social capital, determinants, complexity, sustainability assessment

1.   INTRODUCTION

Social capital is increasingly becoming a dominant paradigm in the quest for social and economic development. The concept is increasingly seen as a powerful instrument towards the achievement of many social goods, including people's health and happiness, levels of economic development, well functioning schools, safe neighbourhoods and responsive governments (Sander and Lowney, 2003). Robert Putnam's (2000) work on the decline of civic life in American communities received wide acclaim at home and abroad. Contemporary literature on development economics is equally heavy with references to the World Bank's perspective of the value of social capital in fostering sustainable economic development. In general terms, there is growing evidence that regions or countries with relatively higher stocks of social capital, in terms of generalised trust and widespread civic engagement, seem to achieve higher levels of growth compared to societies with low trust and low civicness (Brown and Asham, 1996; Knack and Keefer, 1997; Khrishna and Uphoff, 1999). Societies founded on networks of trust and co-operation can help to realise human potential. This significant appreciation of the role of social capital in fostering human progress has been paralleled with equally increasing amounts of effort in the search for environments that facilitate the emergence of social capital. Within the realm of urban development, it has been recognised that the design and form of cities, neighbourhoods and individual buildings have significant implications on social capital as they can affect the way people interact and bond with each other and the sense of community among individuals (Dannenberg et al, 2003; Lindström et al, 2003). The thinking behind this argument is that some urban designs encourage social ties and informal contact among residents while others do not. It is against this background that this paper aims to identify and examine the key determinants of social capital within an urban development context. Such parameters would be a good starting point for derivation of a predictive model of social capital within an urban development context and subsequent inclusion in holistic sustainability assessments. The paper is organised into four key parts, with the first highlighting the nature of the challenges facing urban sustainability assessment undertakings. The second unveils the definitions of social capital with a suggestive note on the working definition for urban sustainability assessment. Consequently, this section also highlights the importance of social capital in sustainability assessment. The third part narrows down to an analysis of those physical elements of the built environment that are perceived to have a bearing on the quantity and quality of social capital. The fourth is a general discussion that champions the notion that social capital is more of a subject of self-organisation than necessarily a designed phenomenon.

2.   THE CHALLENGES OF URBAN SUSTAINABILITY ASSESSMENT

There are many challenges associated with sustainable urban development and its assessment. These mainly revolve around the three key issues of differing perceptions about the concept of sustainable development; the multidimensionality of the concept; and the dynamic nature of the urban environment. The concept of sustainable development has been identified as a relatively nebulous concept with more than seventy definitions having been put forward and used or interpreted by different entities since the World Commission for Environment and Development (WCED) report (Lanston and Ding, 2001). This is largely because development is a

value word, embodied in personal ideals, aspiration and conceptions of what constitutes good for society. However, a number of themes common to all definitions of sustainable urban development have emerged over the years, such as: a change in the quality of growth (Schaller, 1989); the conservation and minimisation of the depletion of non-renewable resources (Sayer and Campbell, 2003); and a merging of economic decisions with those of the environment (WCED, 1987). Along these lines, sustainability assessment is viewed as a framework that enables policy makers integrate their decision making processes into projects, plans, policies and programmes so that they are consistent with sustainability principles taking into consideration economic, environmental and social impacts (Lee, 2002). Therefore, sustainability assessment differs from environmental impact assessment by addressing social and economic as well as environmental outcomes. The need to transparently evaluate all issues (i.e. environmental, economic and social) and develop integrated solutions makes urban sustainability assessment a highly challenging task. This is compounded by the fact that the unit of assessment, the urban environment, is inherently dynamic and complex. Because of their importance as places to live and work, urban environments around the world are under increasing pressure from many sources, including: rapid population growth; aging populations; shortage of decent housing; water and air pollution; traffic congestion; depletion of the green belt; poverty and the need for social justice; crime and perceptions of crime; and other social vices (Carley, et al, 2001). The sheer volume of these issues, the multiplicity of stakeholders and their varying values, the diversity of viewpoints all make urban sustainability assessment an intellectually challenging research domain.

The real challenge facing urban sustainability assessment therefore is that most sustainability issues involve a high degree of complexity. The issues that work together to divert an urban environment from its sustainable self-organising state are a subject of complex processes that are of a multidisciplinary nature. These are issues that can not easily be harmonised by a common language and their assessment approaches are specific to the individual disciplines. The complexity of the environmental, sociocultural and economic systems can, for example, hinder conventional processes of scientific verification (Meppem and Gill, 1998). The issues pertaining to sustainability assessment are deeply rooted in societal structures and institutions, and are closely interwoven with manifold societal processes, such that they cannot be solved in isolation. They are complex because they have multiple causal mechanisms and cover multiple fields, whereas ready-made solutions are practically non-existent (Rotmans, 1998).

The addition of the human dimension further complicates sustainability assessment processes. Human beings are interconnected within a complex web of family, professional organisations, workplaces, community, belief systems and political groupings (Moobela, et al, 2006). These come with different value judgements that are extremely difficult to assess and quantify. To a certain extent, exploring and understanding the social dimension of sustainability often involves the application of fuzzy logic due to the relative elusiveness of the social issues when compared with the physical sciences. As a result, many social sustainability tools and approaches have tended to impose rationality to the subject by employing methods imported from the physical sciences. Therivel (2004) suggested that this treatment of social issues

with techniques and frameworks designed for the natural sciences may lead to inappropriate sustainability results. However, the argument in this paper is that despite the fuzziness of the social issues, clarity in the understanding of urban sustainability assessment can still be achieved through careful analysis of the issues without recourse to bounded rationality. That is why the next section attempts to define the concept of social capital with a view to locating its natural place within urban sustainability assessment.

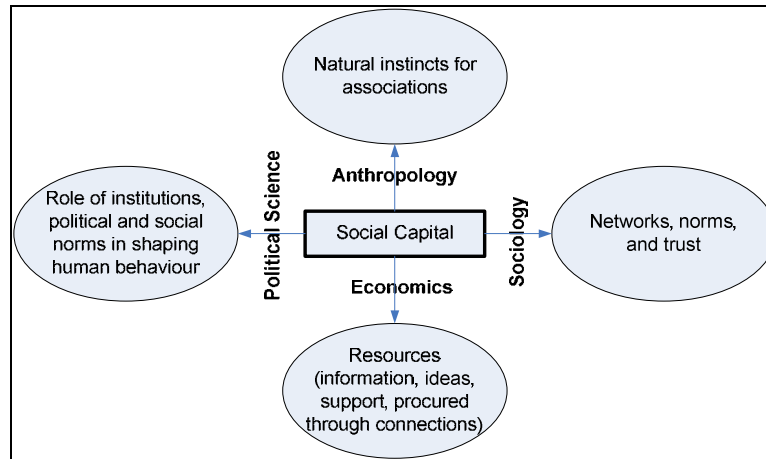## 3.   DEFINITION(S) OF SOCIAL CAPITAL

A useful starting point for defining social capital is to relate it into other forms of capital and determine how these all sit within the sustainable development agenda. Table 1 below shows four kinds of capital as they relate to the concept of sustainable development. The concept of social capital differs from human and physical capital in a number of respects. Unlike physical capital which refers to physical objects and human capital which refers to the properties of individuals, social capital refers to connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them (OECD, 2001). In that sense social capital is closely related to what some have called "civic virtue". The difference is that "social capital" calls attention to the fact that civic virtue is most powerful when embedded in a sense network of reciprocal social relations (Putnam, 2000). That is why a society of many virtuous but isolated individuals is not necessarily rich in social capital.

Table 1: Sustainability and the four capitals
(Adapted from Goodland, 2002)

	Human Capital	Social Capital	Economic Capital	Natural Capital
Definition	Private goods of individuals as opposed to between individuals or societies.	The institutions, relationships and norms that shape the quality and quantity of society's social interactions (World Bank, 1999).	Capital that has to be manufactured and is therefore of a physical nature.	The natural environment, the stocks of natural assets that provide a flow of useful goods or services
Examples / Characteristics	Health, education, skills, knowledge.	Social cohesion, mutual benefits, reciprocity, fellowship, etc.	Financial capital, physical tools such as buildings, vehicles, plant and machinery, etc.	Water, land, air, minerals, natural forests.
How to promote or maintain it	Investment in health, nutrition, education, apprenticeship.	Investment in social infrastructure, and policy instruments, based on appropriate design philosophy.	Investment in capital goods, including policies that encourage economic growth.	Investing in structures (such as technology) that ensures the natural environment retains its self-sustenance.
Importance to sustainability	The very essence of human survival is dependent on good health. Education and skills training is a key factor in determining per capita indices.	Good for governance of cities. Good for stronger and sustainable communities.	The need for economic capital becomes more imminent as the natural capital depletes at an unsustainable rate.	Depletion of the natural environment threatens the survival means of all species on earth.
Main sustainability dimension	**Social**	**Social**	**Economic**	**Environmental**

Social capital is generally perceived as a concept that straddles a range of disciplines. Therefore, it is argued that there is no single definition of social capital but that the many definitions available can be pooled together into the four broad subject areas of anthropology, sociology, economics, and political science, as suggested in Figure 1.
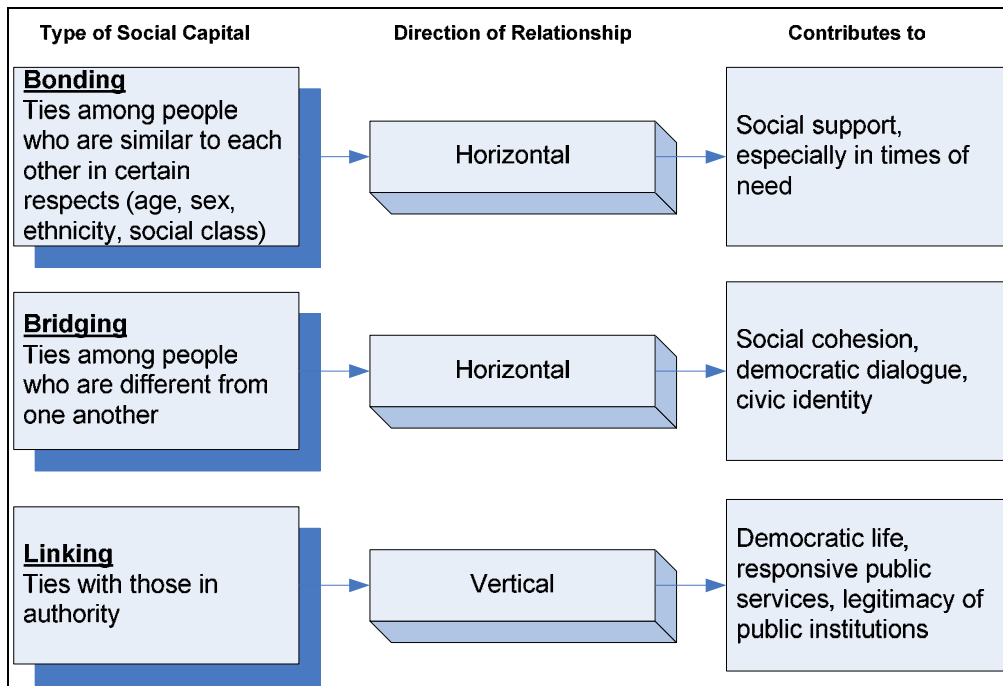

Figure 1: Definitions of social capital
[Source: Adapted from Franklin, 2003]

From an anthropological point of view, the concept of social capital is embedded within the notion that humans are gregarious entities a natural instinct for associations (OECD, 2001). Humans are equipped with predispositions to learn how to: cooperate, discriminate the trustworthy from the treacherous; commit themselves to be trustworthy; earn good reputations; exchange goods and information; and divide labour (Ridley 1997). Fukuyama, (1999) stressed the biological basis for social order and the roots of social capital in human nature.

The sociological definition of social capital pronounces social norms and the sources of human motivation (OECD, 2001). The emphasis is on the features of social organisation such as trust, norms of reciprocity, and networks of civic engagement (Putnam, 2000). The confident expectation that people and institutions will act in a consistent, honest and appropriate way is essential in ensuring that communities flourish. This is closely related to the political science literature which emphasises the role of institutions, political and social norms in shaping human behaviour (OECD, 2001). Recent work by the World Bank on the role of social capital in poverty reduction strategies and promotion of sustainable development has emphasised the role of institutions, social arrangements, trust and networks. The economic literature draws on the assumption that people will maximise their personal utility, deciding to interact with others and draw on social capital resources to conduct various types of group activities (Glaeser, et al, 2002). In this regard, the emphasis is on the investment strategies of individuals in the face of alternative uses of time (OECD, 2001).

Three basic forms of social capital have also been identified: social bonds; bridging, and linkages (Woolcock, 1998).

Type of Social Capital	Direction of Relationship	Contributes to
Bonding Ties among people who are similar to each other in certain respects (age, sex, ethnicity, social class)	Horizontal	Social support, especially in times of need
Bridging Ties among people who are different from one another	Horizontal	Social cohesion, democratic dialogue, civic identity
Linking Ties with those in authority	Vertical	Democratic life, responsive public services, legitimacy of public institutions

Figure 2: Types of social capital
[Adapted from Woolcock, 1999]

Bonding Social Capital is inward looking and reinforces exclusive identities and homogenous groups. It refers typically to relations among members of families and ethnic groups. This form of social capital is effective in sustaining solidarity within the group, which is beneficial in providing support for group members (Jochun, 2005). *Bridging Social Capital* refers to relations with distant friends, associates and colleagues and is therefore more outward looking. This type of social capital is seen as more suitable for public policy realm, because it tends to bring people from different social groupings together, promoting tolerance and cross-cultural understanding (ibid). *Linking Social Capital* refers to relationships between different social strata in a hierarchy where power, social status and wealth are accessed by different groups (OECD, 2001). Positive examples of *Linking Social Capital* include shared habits of participation in civic affairs, and open and accountable relationships between citizens and their representatives (Roberts and Chada, 2005; Halpern, 2005).

In the face of the diversity of perceptions about of social capital, it appears that the definition of the concept remains at the whims of the analyst. In this paper, the definition from the sociological literature is considered more appropriate to the concerns of urban sustainability assessment. Thus: social capital refers to the collective value of all social networks and the inclinations that arise from these networks to do things for each other, i.e. social networks and the norms of reciprocity and trustworthiness that arise from them (Putnam, 2000).

One important term in the above definition that merits explicit pronouncement is collective value. In other words, the utility of social capital lies not in its own right but in the extent to which it adds value to the socio-spatial setting in which it is embedded. It should thus be recognised that social capital is not a lone-standing, isolated concept but that it has to be viewed within the context of its contribution to

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human progress. It is in this light that the following section considers the relevance of social capital in sustainable development in general and sustainability assessment in particular.

4. WHY SOCIAL CAPITAL IN URBAN SUSTAINABILITY ASSESSMENT?

One useful way to discuss the utility of social capital is to reflect on the four schools of anthropology, sociology, economics and political science identified with the definitions of the concept above. Research evidence has demonstrated how social capital affects the well being of individuals, organizations and nations (Portes, 1998). From an economics point of view, studies suggest that social capital makes workers more productive, firms more competitive and nations more prosperous (Putnam, et al, 2004). As a common good, social capital also has positive externalities in that the benefits are not only limited to those within the networks, but also extend to those outside the system. The result is that when social capital increases in a particular community, there is a ripple effect that straddles a wider cross-section of a community, including to those individuals who are not practically participating in the networking game.

Psychological research indicates that high stocks of social capital can make individuals less prone to depression and more inclined to help others, while in the same vein epidemiological reports show that social capital: decreases the rate of suicide, colds, heart attacks, strokes and cancer; and improves individuals' ability to fight or recover from illnesses (Putnam, et al, 2003; Gwillliam, et al 1998, Barton, et al, 2000). In fact, the relationship between social capital and health has been well documented since 1901 when Emile Durkheim identified a connection between suicide rates and the level of social integration (Wasserman, 1984). Studies in the field of sociology suggest that social capital: reduces crime, juvenile delinquency, teen age pregnancy, child abuse, welfare dependency and drug abuse; and increases academic performance among students (Putnam, 2002; Savage, 2001). Political science literature is equally replete with evidence suggesting that extensive social capital makes government agencies more responsive, efficient and innovative (Portes, 1998; Putnam, et al, 2004). It is increasingly becoming clear, therefore, that social capital has an enormous array of practical benefits to individuals and to communities. Its importance should therefore also be given appropriate attention as a concomitant for achieving sustainable urban development.

The World Bank has pointed to the growing body of evidence that the size and density of social networks, institutions and the nature of interpersonal interactions are significant determinants of the sustainability of development projects and initiatives (Simpson, 2005). Pretty (2003) equally upheld this notion by suggesting that the term social capital captures the idea that social bonds and norms are critical for sustainability. The argument is that in places where social capital is high, people will have the confidence to invest in collective action on the understanding that others will do the same.

Another useful way of examining the place of social capital in urban sustainability and its assessment is to look at the UK government sustainable development policy particularly the sustainable communities agenda, which defines sustainable communities as:

"places where people want to live and work, now and in the future. They meet the diverse needs of existing and future residents, are sensitive to their environment, and contribute to a high quality of life. They are safe and inclusive, well planned, built and run, and offer equality of opportunity and good services for all" (ODPM, 2003).

In qualifying the agenda, the UK government indicated that for communities to be sustainable, they must offer: decent and affordable homes; good public transport; schools; hospitals; shops; and a clean and safe environment (ibid). What is discernible from the above definition is a wide range of socio-economic goals: low crime; good health, well-functioning schools; diversity; good environment; transport and communication networks; and many other needs and demands of modern society. Many of these concerns are the very characteristic features of communities that are well-endowed with social capital as suggested in the foregoing discussions.

Recognising the role of social capital towards achieving sustainable urban development is perhaps the easiest part - what is rather more challenging and where research effort should be targeted is in the cultivation of this kind of capital. Can social capital be created? What are the determinants of social capital in an urban development context? How much social capital is appropriate for the achievement of a sustainable urban environment? The next section dwells on these and other related important questions in the relentless quest for solutions to the multifaceted sustainable development question.

5.   SOCIAL CAPITAL AND THE PHYSICAL URBAN ENVIRONMENT

Within an urban context, the physical and social environments are inseparable. Society should not be treated in isolation from its physical environment, while a place has literally no meaning if there are not people associated with it. In other words, the physical environment, as a material setting in which people live, is both a condition for and a consequence of a set of social relations (Hillier and Hanson, 1984). Despite this seemingly obvious symbiotic correspondence, literature on this is relatively scarce as there is very little reference to the relationship between the physical urban environment and levels of social capital. Much of the work on the factors that determine social capital is limited to the 'softer' (social) issues rather than the physical environment (Christoforou, 2005; Glaesier, et al, 2002; Woolcock, et al, 2004). Perhaps the most significant single piece of work in this regard is that of the Saguaro Seminar, an initiative of Professor Robert Putnam at the John F. Kennedy School of Government at the Harvard University. The project focuses on expanding knowledge on social capital and devising strategies and to increase civic engagement (Putnam, et al, 2004). The initiative has so far put together what they call "150 things you can do to build social capital" (Saguaro Seminar, 2000). In this report, called 'Better Together', the Saguaro Seminar examines social capital and makes recommendations on methods to replenish the stock in five categories: the work place; the arts; politics and government; religion; and youth and education. Though robust in terms of depth and breadth of analysis, this research, like many other studies alluded to the above focus on what individuals and groups can do in order to enhance the stocks of social capital. This paper goes a step further than these previous efforts by asking not what the individuals and groups can do, but what

the physical urban environment should be in order to encourage the emergence of social capital.

There are two key points that count as the gateway to an effective analysis of the relationship between urban development and social capital. One is to recognise that some designs of urban development encourage social capital while others do not (Leyden, 2003). The second is that encouraging social capital entails facilitating physical interaction among community members. This is because at the centre of social capital are the relationships between individuals and groups. Building these relationships can occur in a variety of ways ranging from the more intentional ones to serendipitous conversations between two (or more) people talking about their experiences, belief systems, values or concerns (Sander and Lowney, 2003). It is through these (repeated) conversations and interactions that the seeds of social capital grow and the design of the physical urban environment can act as the fertile grounds to facilitate that growth. The table below shows a summary of some of the physical determinants of social capital.

Table 2: Determinants of social capital

Determinants	Explanations
Pedestrian-oriented designs	Decline of daily walking and cycling associated with lower social capital
Mixed-use and clustered developments	Limited household variety and mix discourage social capital. Clustered developments maximise number of people within walking distance (Urban Taskforce, 1999). Social polarisation is identified with large estates in outer suburbs and a particular social class
Proximity to public transport	Increases physical interaction
Effective lighting	Safety and security issues
Public spaces	Increase in social interaction
Houses with front porches	Increases in social interaction
Sidewalks	Increases permeability and therefore interaction
Open space designs	As opposed to gatedness
Proximity to local amenities and infrastructure	Local tavern, local coffee shop, post office, schools, police station, resource centres, etc within waling distance
Mixed use recreational facilities	Recreational facilities meeting the requirements of all social classes have the potential of enhancing interaction
Children's play areas	Both the children and their parents / guardians will have a chance for physical interaction

The above list is not meant to provide a complete inventory of the determinants of social capital in an urban development context. It is rather the starting point for an analytical framework of this nature that has suffered relative paucity of coverage in the rise to prominence of the concept of social capital. It will be recognised that many of the factors identified in the table relate more to residential areas than any other form of the urban existence. This is because much of the social capital is 'built' in places (neighbourhoods) where people live, although work places also account for a considerable amount of the social capital enabling environment. A closer look at some of the above elements should reveal important insights into the auspicious conditions for the evolution of social capital.

5.1   Pedestrian-oriented designs

The single most significant piece of work on the relationship between social capital and the built environment that the authors came across is by Leyden (2003), who conducted a study to examine whether pedestrian-oriented, neighbourhoods encourage enhanced levels of social capital. Using data obtained from a household survey that measured the social capital of citizens living in selected neighbourhoods in Galway, Ireland, the author was able to demonstrate that persons living in walkable neighbourhoods have higher levels of social capital compared with those living in car-dependent suburbs. Dispersed, car-dependent neighbourhoods tend to separate people from each other, putting them in suburbs remote from work, shops and leisure, and are thus partly responsible for breaking up communities (Appleyard, 1981). It was discovered that respondents living in walkable neighbourhoods were more likely to know their neighbours, participate politically, trust others and be socially engaged (ibid). In a well-designed, walkable and neo-traffic-free neighbourhood, the incidences of traffic accidents is relatively mitigated so much that residents (especially the elderly and those with little children) feel safer to walk the streets and in the process establishing informal networks. Such levels of civicness have also been identified with the new urbanism movement (Dutton, 2001) expressed in such design philosophies as mixed use developments.

5.2   Mixed-use and clustered developments

Mixed-use developments can be defined as developments comprising more than one use and value on a single plot or within a single building or an area where site and buildings of different uses and values are grouped together (DFID, 2000). Cluster developments are described by the Urban Task Force (1999) as clear urban districts and distinct neighbourhoods. In this form the design philosophy is to develop a series of inter-related neighbourhoods around a district centre, with the ultimate goal of maximising the number of people within walking distances of the district centres. In this regard, density is a key concern in the design of neighbourhoods and cities in as far as these relate to social capital. Although higher densities may cause psychological tension, they can also foster social interaction (Kang, 2006). Conversely, physically isolated communities tend to be characterised by diminished civicness (Fowler, 1992). Density is not synonymous with crowdedness, which has its own negative consequences, but rather suggests the need for a critical balance of connectivity that encourages social interaction without compromising the health and well-being of communities. This can be achieved, for example, by dividing a large neighbourhood into several mini-neighbourhoods so as to stimulate interaction (Newman, 1996).

There is considerable evidence suggesting that mixed-use developments wherein residents live, shop and work locally increase the levels of social interaction (Leyden, 2003; Sander, 2002; DFID, 2000). It is under such a cocktail of private and public life that residents tend look 'after their streets' and develop networks of trust and confidence (Jacobs, 1969). Zoning (planning) regulations can therefore influence levels of social capital by demarcating the city into different functional areas, which may lead to the separation of working from living, of living from entertainment. Sander (ibid) is, however, quick to point out that the relationship between social capital and the New Urbanism of mixed-use developments may not be as straight

forward as suggested. He argues that many residents of these perceived socially-compliant neighbourhoods do not have employment locally and therefore need to commute. Moreover, he argues, although the developments generally contain retail shops, they are rarely on the scale of the large global brand supermarkets that many residents wish to be associated with as they climb high on the ladder of affluence. However, what this author appears to have neglected to emphasise is that this 'New Urbanism' is not a panacea to the dwindling civicness of communities but a positive contribution to a phenomenon that is essentially a function of multiple interrelated dynamics, many of which lie outside the domain of the built environment. Although the built environment cannot, on its own, predetermine the evolution of social interactions, it can enhance the opportunities for creating social networks and social interactions, which are fundamental building blocks for social capital (Kang, 2006). Thus, although the contribution of mixed-use developments to social capital may not be as flamboyant as many scientists would like to observe things, it certainly is a factor especially if one accepts the hypothesis that social capital is an emergent phenomenon with multiple causal mechanisms where the whole is not equal to the sum of its parts. Similarly, seemingly insignificant factors such as sidewalks play an important role in connecting people.

5.3   Sidewalks, front porches and parks

Emerging research suggests that good community design, including sidewalks, front porches, public meeting places, open space rather than gatedness, and public multi-use parks, may foster social capital by promoting frequent interactions among members of a community. A porch designed in front of housing units and facing the streets leads to increased social interaction (Kim, 2001). All these are factors that help create neighbourhoods that have more opportunities and places for residents to connect: e.g., front porches, sidewalks, and public multi-use parks (Sander and Lowney, 2006; Leyden, 2003). These must be designed in such a way that they encourage walkability through safety and security assuring environments, such as improved lighting. It is therefore increasingly recognised that the design of buildings and housing estates can help reduce anti-social behaviour as well as crime and the fear of crime. When and where there is less crime, people will be able to walk freely within their neighbourhoods, which can have the effect of helping them connect to each other through informal meetings. *Designing Out Crime* has consequently become a popular theme within neighbourhood management circles in local authorities and other public bodies (Crowe, 2000). 1). An overwhelming amount of research suggests that the emerging concept of gated communities poses a potential threat to the evolutionary pattern of social capital by violating the space requirements for social interaction (Moobela, 2003; MacLeod, 2003; MaKenzie, 2003). Parks can play a significant role in establishing and supporting social capital. In a study conducted in 2002 by Australia's Health Promotions International, it was established (rather re-affirmed) that playing with children and walking dogs in parks is one of the effective informal ways of bringing people together (Baum and Palmer, 2002). There are many other urban development design parameters that were identified by interviewees in this study as good practice for social capital, such as height of buildings, public houses, corner shops, service clubs and sporting grounds. The building as the basic physical unit of an urban development can equally influence the

level of social interaction through such parameters as safety, security and belonging (Kang, 2006). Research has shown that within a multi-story building, the number of neighbours an individual knows is inversely proportional to the height of the building, i.e. the number of people one knows decreases as the height of a building increases (Newman, 1972). As suggested earlier in the paper, the work environment is equally increasingly becoming recognised as a factor in encouraging social networks.

5.4   Open space designs for offices

The workplace has become an important source of social capital for many people as more and more people now find their close friends and life partners on the job, serve their communities through work-organised programmes, and use the office environment as a forum for democratic deliberations with people of diverse backgrounds. Many studies demonstrate that a workplace with strong social capital enhances the lives of workers and enhances productivity (Cohen and Prusak, 2001; Putnam, et al, 2004). The design of the office environment is therefore just as important in encouraging social capital as the design of neighbourhoods where people live. Price and Haynes (2004) use complexity theory, in particular the 'edge of chaos', to demonstrate the utility of the auspicious office environment in encouraging social relations among the occupants. The edge of chaos refers to a metaphor that suggests that some physical, biological, economic and social systems operate in a region between order and complete randomness or chaos and that it is in region that maximal innovation occurs in complex systems (Kauffman, 1993). Using this metaphor, Price and Haynes (2004) suggested that formal rectilinear offices may not accord a desirable environment because they are conceived as freezing occupants in a state of connectivity similar to that of traditional cellular designs. They further argue that, on the other hand, offices without minimal acoustic or visual privacy may create chaotic stress and reversion as individuals seek to recreate safety. In between the two extremes (of order and chaos?) are office designs known to have enhanced conversation among occupants, with the resultant effect of maximal innovation (ibid). The next section consolidates the case for a complexity perspective of social capital through a general discussion that also advocates for quantifiable space for social capital in the search for integrated sustainability assessment mechanisms.

6.   DISCUSSION

The first question to address in this section is whether social capital can be created or not. Looking at the key traits of social capital outlined above, such as trust and norms of reciprocity, it immediately becomes apparent that the totality of the concept is not a subject of creation but of something else. As the greatest rival of creation is evolution, it makes sense to look to this theory for an alternative explanation. One of the fascinating things about social capital is that its features (trust, for example) do not need to be imposed upon people. Although people's minds are equipped with selfish genes, they have also been built to be social, trustworthy and cooperative (Ridley, 1997). Thus, the cultivation of social capital is not so much about building external institutions and structures, but creating the conditions for its emergence. The supremacy of interaction over self-interest has also been heavily pronounced by the emerging science of complexity.

Complexity theory looks at certain social and physical systems as complex and adaptive, made up of large numbers of interacting agents. The fundamental

argument is that if there is any coherence (order) in the system, it owes its origin to the interaction among the individual agents themselves (Waldrop, 1992). Interaction is therefore vital to self-organisation of the system as a whole. The process of seeking mutual accommodation and self-consistency allows the entities to transcend themselves, acquiring properties that they might never have possessed in their individual capacities. Similarly, it is argued in this paper that social capital is an emergent phenomenon which is capable of advancing from low to higher levels of complexity in the midst of the enabling socio-spatial environment. One would perhaps not exhaust this topic without mentioning (in fact starting with) Darwinism in the biological world, where order is defined in terms of diversity of entities. In the social realm, Durkheim (1893) similarly defined order as the emergence of social entities. Building on these earlier conceptions, Sommerhoff (1950) and Ashby (1962) defined order not only by reference to entities but also in terms of connections among those entities. Ashby (1962) in particular argued that order exists in the midst of entities if only the enabling environment is availed. This led him to conclude that 'environmental' conditions are the causes of order and that this order does not emerge if the environmental conditions are chaotic. If one accepts the hypothesis that social capital is a subject of emergence rather than design, the immediate questions that arise include, what are the enabling conditions for its emergence, and at what level are they said to be chaotic or out of balance? Tackling the first question impels us to engage in an investigative judgement of the determinants of social capital in an urban development context.

Despite the multidimensionality of the concept of social capital, clarity in the understanding of its role in urban sustainability assessment can still be achieved through careful selection of the key determinants without recourse to bounded rationality. This is supported by Glasson, et al (2005) who argued that although there is a need for holism, the impracticalities of comprehensiveness when dealing with sustainable urban development implies that assessment methods may not be required to address all activity-issue-scale elements. Rather, they argue, it is justifiable to focus on those elements thought to be most significant. From a carefully thought-out shortlist of the determinants of social capital, it would be feasible to derive a predictive model of the concept that can be incorporated within an integrated urban sustainability assessment framework. Although the predictive model of social capital is still a subject of research, the authors feel entitled to suggest the physical factors outlined in the paper as the starting point for the construction of such a model.

7. CONCLUSIONS

Social capital has continued to be pronounced by both the research and policy communities as an important antecedent in the quest for human progress. The relative elusiveness of social capital has, however, historically exposed the concept to a rather poor coverage in many spheres of social enquiry. Its natural place in yet another nebulous concept of sustainable development is only beginning to blossom as the need to embrace more holistic approaches to sustainability assessment becomes inevitable. The recognition that the social, economic and environment dimensions of sustainable development are heavily interwoven demands greater clarity in understanding the connections. It is in this light that the connection between social capital and urban development needs to be given appropriate attention if the former is to be tapped as a crucial element in sustainability assessments. Although

by no means exhaustive, the (physical) determinants of social capital identified in the paper should be seen as a starting point in the search for the enabling physical urban environment for the emergence of social capital. An important theoretical pillar towards this goal is to acknowledge that social capital is a subject of emergence, whose evolution to higher order can be facilitated by the providence of a critical balance in the design of the physical urban environment.

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