CHAPTER 8

Evaluating the Presence of Smart Growth and Sustainability Principles in Integrated Transport Plans: A Case Study of the Tlokwe Local Municipality

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Abstract

The transportation network of a town or city provides the structure around which all other land uses and services are planned. It can thus be logically reasoned that transportation planning provides the best opportunity to improve the sustainability of a settlement. The concept of Smart Growth is the ideal mechanism to guide transportation planning as it closely links to the principles of sustainability. In this chapter, the principles of Smart Growth and sustainable settlement planning are combined to create objectives for a goal achievement matrix (GAM). This GAM was used to evaluate the Integrated Transport Plan and Spatial Development Framework of the Tlokwe Local Municipality in South Africa. Seeing these plans as the guiding mechanisms for land use and transportation planning in a municipality, it stands to reason that if they are aligned according to Smart Growth and sustainability principles, then the function of the entire town or city could be improved and made more sustainable.

Keywords: Goal achievement matrix, Smart Growth, sustainability, integrated transport plan, spatial development framework.

1 Introduction

It is widely acknowledged that the road and transportation network of any town or city is in a way its skeleton, providing structure. It can thus be deduced that for a settlement to function sustainably its transportation network must be planned,

developed and managed accordingly. Smart Growth offers the ideal principles to ensure that the objective of sustainability is promoted.

The concept of Smart Growth stemmed forth as a response to the adverse features of continuing growth through urban sprawl. The resulting urban sprawl led to the conversion of open space to urban land, higher transportation costs, longer commuting distances and a lack of regeneration in older neighbourhoods. Tregoning *et al.* [1] state that the Smart Growth concept was established in the mid-1990s to alter the way in which we plan regarding better linking of the environment, economy and daily life concerns. It is especially this objective that so closely links Smart Growth and sustainability. Farr [2] argues that Smart Growth values the long-term and regional consideration of sustainability over a short-term focus. Smart Growth is instrumental in the creation of sustainable settlements as it embodies the planning principles of such settlements.

2 Smart Growth and Sustainability Principles for Settlement Planning

It is common knowledge that some generic ways of arranging the primary structure of the city, that is to say its street network, are more sustainable than others. Hillier [3] argues that the concept of structure needs to be brought to bear on sustainability since structures are already considered products of interactions between the three primary realms of sustainability. The definition of sustainability, which seems most appropriate when applied to the integration between land use and transport, is the one given by Early [4], which states that ‘sustainability integrates natural systems with human patterns and celebrates continuity, uniqueness and place making’.

Sustainable settlement planning relies on defining the planning principles that are needed to promote integration and sustainability and then apply them in planning. These principles are:

- Poverty alleviation and the satisfaction of basic needs;
- Focus on special needs groups;
- Gender equality and equity;
- The environment – physical, social and economic;
- Participation and democratic process;
- Local economic development;
- Accessibility – public transport and pedestrian focus;
- Mixed-use development;
- Corridor development;
- Safety and security;
- Variation and flexibility;
- Densification;
- Reducing urban sprawl [5–7].

These principles already exist, and are implemented, in international arenas as good practice and are also reflected in the development legislation and policy of

South Africa. All the principles are interrelated and should be applied as a whole in the planning process to enhance the overall sustainability and integration of developments [5].

Farr [2] explains Smart Growth as an urban planning and transportation theory, which concentrates growth in the centre of the city to avoid urban sprawl. Smart Growth has evolved swiftly since its foundation in the mid-1990s as an effort to recast the policy debate over sprawl in a way that more directly links the environment, the economy and social concerns, i.e. in a more sustainable manner. According to Downs [8], the general principles of Smart Growth are:

- Compacting settlements
- Raising densities in residential areas
- Encouraging mixed land uses and pedestrian friendly layouts
- Levying the cost of new developments onto its consumers through impact fees rather than having the community carry the costs
- Promoting public transport and
- Revitalising older neighbourhoods

These principles are similar to the principles for sustainable settlement planning principles. Tregoning *et al.* [1] are of the opinion that Smart Growth shares many of the goals of sustainability with the key difference being that Smart Growth centres on the basic quality of life issues as opposed to environmental sensibilities. Tregoning *et al.* [1] further state that the Smart Growth concept is not a reformulation of sustainability but rather a new iteration of it.

All the core principles of sustainable settlement planning are encapsulated in the concept of Smart Growth as illustrated in Table 1. Through the correlation matrix, the principles can be encapsulated into the following six objectives:

- To compact and densify settlements
- To encourage mixed-use development and pedestrian-friendly layouts
- To promote public transport and accessibility
- To revitalise older neighbourhoods and provide variety and flexibility
- To levy the cost of development onto the consumer to aid in poverty alleviation and LED
- To focus on special-needs groups and gender equality

3 Sectoral Plans for Sustainable and Smart Growth Development

Under South African law, all municipalities (local and district) must compile an Integrated Development Plan (IDP) every five years. The IDP is the main strategic instrument that guides all planning, investment development and implementation decisions across all sectors and spheres of government. The IDP is also a cross-departmental instrument, which links physical, social, economic and institutional

Table 1: The correlation between sustainable settlement planning principles and Smart Growth principles.

Smart Growth	Sustainable settlement planning principles												
	Poverty alleviation & basic needs	Focus on special-needs groups	Gender equality	The environment	Participation	LED	Accessibility	Mixed-use development	Corridor development	Safety & security	Variation & flexibility	Densification	Reducing urban sprawl
Compacting settlements		X		X		X	X	X	X	X	X	X	X
Raising densities		X		X			X	X	X	X	X	X	X
Encouraging mixed land use & pedestrian-friendly layouts	X	X	X	X	X	X	X	X	X	X	X	X	X
Levying the cost of the development on the consumer	X	X	X		X	X							X
Promoting public transport	X	X	X	X		X	X						X
Revitalising older neighbourhoods		X		X	X		X	X	X	X	X	X	X

Source: Own creation (2014).

components of planning with the management and development structure. The IDP is informed and supported by several sectoral plans, such as the Spatial Development Framework (SDF), Environmental Management Framework (EMF) and the Integrated Transport Plan (ITP). The directive principles of the spatial rationale for the IDP and sectoral plans include equality, efficiency, integration, sustainability and fair and good governance [9], which correlate well with the principles of Smart Growth and sustainability.

The SDF illustrates how the implementation of the IDP and sectoral plans should occur in space. According to the Department of Rural Development and Land Reform [7], the ultimate goal of the SDF is to achieve the desired spatial form of the municipality as based on the vision for the development of the area and available resources. The SDF of Tlokwe Local Municipality provides the basic structure from which Smart Growth development and sustainability could be implemented.

The ITP acts as the guiding document for all transport development within a municipality. It is also revised every five years, the same as the rest of the sectoral plans. The ITP is meant to be a guiding document for the IDP giving the status quo of the transportation networks within the municipality as well as listing objectives and proposed projects.

The projects and programmes that are encapsulated in the ITP are graphically illustrated in the SDF. It is for this reason that both the ITP and SDF are evaluated to give a holistic appraisal of both land use and transportation.

4 The Goal Achievement Matrix Approach to Evaluate ITPs and SDPs

A goal achievement matrix (GAM) can be used to assess and prioritise projects and programmes as relating to any endeavour. In the case of this study, a GAM was used to measure the degree of achievement of sustainability and Smart Growth objectives from the costs and benefits that have been identified in the Tlokwe Local Municipalities' ITP and SDF. In order to identify, assess and prioritise projects and programmes, specific goals and principles are required against which individual projects could be measured. The goals and principles are defined operationally to be expressed as objectives.

Table 2 shows the GAM based on the principles of sustainability and Smart Growth as discussed in the previous section.

Each project identified in the ITP and SDF will be adjudicated in terms of how well it contributes to the set of objectives in Table 2. The total sum of each project's contribution is referred to as the GAM score and ranked from highest to lowest based on this score. It is recommended that projects be implemented from the highest to the lowest score with the top six highest-ranked projects to be considered crucial. These crucial projects should receive the highest level of effort to ensure their successful implementation. Any project scoring below 16 will not be considered a crucial project since it achieved a score of less than 50% (out of a possible 30).

The implementation of the GAM evaluation tool on the study area's sectoral plans can be seen in Tables 3 and 4.

Table 2: GAM for ITP evaluation based on sustainability and Smart Growth principles.

Sustainability and Smart Growth objectives	Score/Weight		
	1	3	5
1. To compact and densify settlements	Maintaining the status quo	Create a slightly more effective and efficient city	Contribute significantly to lower infrastructure and transportation costs
2. To encourage mixed-use development and pedestrian-friendly layouts	Maintaining the status quo	Provide somewhat better access to services and economic opportunities	Greatly improve mobility and accessibility and reduce transportation costs while maintaining pedestrian safety
3. To promote public transport and accessibility	Maintaining the status quo	Provide a limited improvement in transport linkages and accessibility	Contribute largely to the improvement of linkages and accessibility of transport
4. To revitalise older neighbourhoods and provide variety and flexibility	Maintaining the status quo	Provide a slightly better quality of life in older neighbourhoods	Greatly uplift the living quality in older neighbourhoods
5. To levy the cost of development onto the consumer to aid in poverty alleviation and LED	Maintaining the status quo	Provide some economic and spatial development opportunities	Contribute largely to the facilitation of economic activities and spatial opportunities
6. To focus on special-needs groups and gender equality	Maintaining the status quo	Aid partially in the provision of basic needs for special-needs groups	Greatly increase integration and mobility of special-needs groups while addressing their basic needs

Source: Own construction (2014).

Table 3: ITPs evaluated in terms of a GAM.

Project number	Project category	Project outcome	Goal achievement score						GAM total
			SSGO 1	SSGO 2	SSGO 3	SSGO 4	SSGO 5	SSGO 6	
ITP 1	Public transport projects	Provide public transport facilities at schools	3	1	5	1	1	5	16
ITP 2	Public transport rank facilities	Upgrading & maintenance	1	3	5	3	1	5	18
ITP 3	Public transport projects	Provide walk & bicycle ways to & from schools	3	5	3	1	3	5	20
ITP 4	Public transport projects	Public transport routes and services on special public transport routes	5	5	5	1	1	5	22
ITP 5	New roads & intersections	Access road to Matlwang village	1	3	5	3	3	3	18
ITP 6	Public transport projects	Provide metered taxi facilities	3	3	1	1	3	3	14
ITP 7	New roads & intersections	Govan Mbeki/N12 connection	3	1	3	1	3	1	12
ITP 8	New roads & intersections	Carltonville/N12 connection	3	1	3	1	3	1	12
ITP 9	New roads & intersections	Botha/Parys avenue extension & crossing Mooirivier	1	1	1	1	1	1	6
ITP 10	New roads & intersections	Machavie access road	1	1	1	1	3	1	8
ITP 11	New roads & inter-sections	Plan & build new collector roads	3	3	3	1	1	1	12

(Continued)

Table 3: ITPs evaluated in terms of a GAM (Continued).

Project number	Project category	Project outcome	Goal achievement score						GAM total
			SSGO 1	SSGO 2	SSGO 3	SSGO 4	SSGO 5	SSGO 6	
ITP 12	Planning work	Transportation plan	3	5	5	1	5	1	20
ITP 13	Paving of gravel roads	Upgrading of 200 km of roads	1	3	3	1	3	1	12
ITP 14	Paving of gravel roads	Paving of 124 km urban roads	3	3	5	1	1	3	16
ITP 15	Maintenance	Road maintenance plan	1	5	5	1	1	3	16
ITP 16	Public transport projects	Safety & security measures at main taxi ranks	1	1	3	1	3	1	10
ITP 17	Public transport projects	Develop multi-modal facility at Potch train station	3	3	5	3	3	3	20
ITP 18	Paving of gravel roads	Paving steep gradients	1	1	1	1	1	1	6
ITP 19	New roads & intersections	Sarafina Street & signalised N12 intersection	3	1	3	3	1	3	14
ITP 20	New roads & intersections	Botha avenue/N12 interchange	3	1	3	1	1	1	10
ITP 21	New roads & intersections	New road links in western suburbs	3	1	3	3	1	1	12
ITP 22	New roads & intersections	Ross/Louis le Grange connection	3	1	3	1	1	1	10
ITP 23	Maintenance	Drikus Malan Bridge upgrade	3	1	3	1	1	1	10
ITP 24	Maintenance	Retro-fit traffic lights with LEDs	1	1	1	1	1	1	6

ITP 25	Maintenance	Road signal/signs compliance audit, management plan & replacements	3	1	1	1	1	1	1	8
ITP 26	Planning work	Update roads in GIS format	3	1	1	1	1	1	1	8
ITP 27	Public transport projects	Public transport law enforcement	1	1	1	1	1	1	1	6
ITP 28	Public transport projects	Facilities for persons with special needs – main ranks	3	3	1	1	1	1	5	14
ITP 29	Capacity & safety improvements	Synchronisation & new signals on N12 intersections	3	1	3	1	1	1	1	10
ITP 30	Capacity & safety improvements	Traffic circles study & implementation program	3	1	3	1	1	1	1	10
ITP 31	Public transport projects	Appoint public transport & operating licence officials	3	1	1	1	1	1	1	8
ITP 32	Public transport projects	Demand responsive mini bus taxi pilot service	3	3	1	1	1	3	3	14
ITP 33	Upgrade disaster management centre	Upgrading of disaster management centre	3	1	1	1	1	1	1	8
ITP 34	Manage freight traffic & damage to road infrastructure	Mobile heavy vehicle weight equipment, bylaws, law enforcement implementation	1	1	3	1	1	1	1	8
ITP 35	Public transport projects	Non-motorised facilities to 2010 training stadia	3	3	3	1	1	3	3	14

Source: Own construction (2014) from Potchefstroom City Council [10].

Table 4: SDP evaluated in terms of a GAM.

Project number	Project category	Project outcome	Goal achievement score						GAM total
			SSGO 1	SSGO 2	SSGO 3	SSGO 4	SSGO 5	SSGO 6	
SDF 1	Urban built-up areas	Densification & integration	5	5	5	3	3	5	26
SDF 2	Urban built-up areas	Urban infill	5	5	3	3	3	1	20
SDF 3	Urban built-up areas	Urban renewal	3	3	3	5	5	1	20
SDF 4	Urban built-up areas	Upgrading & proper maintenance of service	3	3	1	3	3	3	16
SDF 5	Urban built-up areas	Protection & rehabilitation of environmentally significant local open spaces as well as cultural heritage resources	1	1	1	3	3	3	12
SDF 6	Peri-urban areas	Planning & provision of bulk infrastructure for new development areas	3	3	1	1	3	3	14
SDF 7	Peri-urban areas	Planning & development of a new township establishment to enhance integration of areas, integrated human settlements development & protection of environmentally sensitive areas	3	3	1	1	3	5	16

Source: Own construction (2014) from Tlokwe City Council [11].

Table 5: Integrated priority project list for the promotion of Smart Growth and sustainability principles.

Project number	Project category	Project outcome	GAM total	Ranking
SDF 1	Urban built-up areas	Densification & integration	26	1
ITP 4	Public transport projects	Public transport routes and services on special public transport routes	22	2
SDF 2	Urban built-up areas	Urban infill	20	3
SDF 3	Urban built-up areas	Urban renewal	20	3
ITP 3	Public transport projects	Provide walk & bicycle ways to & from schools	20	3
ITP 12	Planning work	Transportation plan	20	3
ITP 17	Public transport projects	Develop multi-modal facility at Potch train station	20	3
ITP 2	Public transport rank facilities	Upgrading & maintenance	18	4
ITP 5	New roads & intersec-tions	Access road to Matlwang village	18	4

Source: Own construction (2014).

After scoring the ITP's and SDF's projects according to the GAM, an integrated list is made (Table 5) to show which projects scored the highest and will thus most significantly contribute to Smart Growth and sustainability.

Upon examination of the GAM assessment of the two sectoral plans' projects, certain gaps were identified:

- A pertinent lack of alignment between the two sectoral plans is perceived. It would appear as if each plan was drafted in isolation and without inputs from other departments or stakeholders.
- No project attained a score higher than 26 out of a possible 30, indicating that the objectives of Smart Growth and sustainability were not taken into consideration during the formation of the sectoral plans.
- Certain aspects of Smart Growth and sustainability are poorly addressed or omitted entirely from the plans, projects and strategies.

This prioritisation of projects allows the Tlokwe Municipality to see at a glance which projects are fundamental for Smart Growth and sustainability.

5 Conclusions

A local planning authority can apply planning instruments such as the GAM approach to prioritise projects and strategies. It is to a municipality's own advantage

to assess and prioritise the projects and strategies contained in their sectoral plans as this indicated which projects will contribute the most to achieving the goal of Smart Growth and sustainability. For the purpose of this study, the goal was Smart Growth and sustainability but a GAM is such a versatile tool that any set of objectives can be used. Since every area's views and objectives regarding Smart Growth and sustainability may differ, it is advantageous for each municipality to compile its own GAM to assess projects.

No perfect strategy for sustainable and Smart Growth development exists, but rather a series of best practice guidelines does exist. No plan or strategy can be a blueprint that is valid in all scenarios. A strategy for each unique situation must be tailored to its specific characteristics to be truly successful. The use of a GAM to prioritise projects for sustainability and Smart Growth is seen as a best practice guideline. It is recommended that a GAM assessment of sectoral plans should be conducted as part of the revision and compilation phase to ensure the alignment of objectives, plans, projects and strategies toward the predetermined goal of Smart Growth and sustainability. This will ensure that Smart Growth and sustainability are taken into consideration when planning for communities and not just the need and desirability of the development, as is currently the practice.

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