IMPROVING THE PROBABILITY OF CORRIDOR DEVELOPMENT

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INTRODUCTION

During the 1980s and 1990s, the corridor, as a structuring element has re-emerged as an alternative to the mono-functional and cellular, inwardly focussed, motor car driven and ecologically unfriendly city. This has been prompted by:

- The quest for sustainable cities.
- Shrinking public sector budgets.
- Increased recognition of the actual role of the private sector in urban development.
- The post-modernism condition that blurs the boundaries between the disciplines.

In South Africa, the spatial legacy of the apartheid policies needed to be addressed and the corridor was seen as the method to do so (NDOT, 1996, NDOT, 1998). To this end the National Department of Transport funded a number of corridor demonstration projects; e.g. the Wetton-Lansdowne corridor, the Mabopane Centurion Development Corridor. It was hoped that these demonstration projects would show the ability of the corridor to:

- Restructure, reinvigorate and integrate the fragmented, segregated, dysfunctional and dualistic apartheid city.
- Unlock new economies in the former “townships”.
- Reduce the public transport subsidy bill that presently runs at over R3 billion / year, and
- Ensure a more dynamic and sustainable urban form that provides greater choice to all in the urban area.

While there remains strong support for the corridor form, the lack of visible development in the demonstration corridors raised a number of questions, including:

- Can the corridor induce/create new investment in the region or corridor area?
- Can a corridor be brought into existence through incentives and regulation to reach a critical mass that would be able to counter the market forces attracting development / investment to other parts of the urban area?
- Is the public investment in a corridor the most effective use of public resources?
- Will the public investment proposed by those motivating the corridor produce the expected / planned / desired outcomes?
- How long will it take before a corridor starts running on its own momentum?
- Is there sufficient investment in property in South Africa to allow a redirection of this investment into corridors?
- Are politicians willing to make the hard decisions that are required for the development of a corridor?

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This prompted the study on which this paper is based (NDOT, 2001).

The study was significantly informed by the following concepts:

- The urban area must fulfil a set of publicly / politically determined set of objectives. The performance of the city must be measured in terms of these objectives.
- The city has its own development dynamics. Interventions are required where the present form and the expected future form evolving due to the city's dynamics will not enable it to meet the objectives.
- The corridor is just one technique that can be used to structure the city.
- Any proposal for a project (including a corridor project) needs to be evaluated in terms of:
    - The ability of that project to meet the stated objectives in absolute and relative terms and in comparison with other alternatives, including the "do-nothing" alternative.
    - The probability that the components of the alternative will actually be implemented, by either the public or private sector, within the time frame of the project.

When study was initiated it was hoped to develop a set of corridor types each of which could be related to a specific set of objectives, as well as a set of interventions that would be necessary to change the existing urban structure to that of the selected corridor type. Very early in the project it became apparent that no single corridor typology was sufficient to describe the corridors and that the many stakeholders in a corridor project could have different sets of objectives. Furthermore, the very concept of a corridor implies a variety of land uses and transport services. This prompts the need for a good resource base and an analytical tool to do the evaluations at a strategic level, **rather than a set of fixed guidelines**.

The remainder of the paper covers two aspects; namely:

- A brief overview of the resource material.
- The analytical methodolology that can be used to assess a corridor proposal.

BRIEF OVERVIEW OF CORRIDOR RESOURCE MATERIAL

The following eleven aspects are discussed in the resource material:

- **30 Objectives** were derived form the literature and interviews with stakeholders and at workshops in the major urban areas of South Africa. These are shown, together with related performance measures in Table 1. It is assumed that different stakeholders in a corridor could choose a different set of objectives, and that the corridor assessment would provide information for each stakeholder to decide the degree to which the corridor proposal could be supported.
- The concern existed among the planning team that the corridor might considered to be the only urban form. The resource material discusses **eight alternative urban forms**; namely:
    - Dispersed settlements; with no clear structure where development has taken place at low density.
    - The compact city; with high density mixed use development and growth within the existing urban area.

TABLE 1: OBJECTIVES AND PERFORMANCE MEASURES FOR CORRIDORS

OBJECTIVE	POSSIBLE PERFORMANCE MEASURES
ECONOMIC AND FINANCIAL	
Reduce transport subsidies	Subsidy/year to region Subsidy/person in region/year
Reduce overall expenditure on transport and use of non-renewable resources	Capital cost/passenger Capital cost/passenger km
Reduce transport costs for the poor	Cost/public transport passenger
Attract new investment to a metropolitan area	Spin-off investment
Increase economic opportunities	Number of jobs (excluding relocations) in corridor Number of SMMEs in corridor
Improve the efficiency of infrastructure	Infrastructure operating cost/person in corridor Infrastructure operating cost/person in the region
Linking into the global economy	Number of plants, regional head offices, etc of multi-nationals in corridor Value of exports from corridor
TRANSPORT	
Integrate land-use and transport	Average motorised travel distance/person in the region/day
Increase the use, efficiency and quality of public transport	Modal split in corridor Modal split in the region
Increase/Maximise accessibility	Average travel time in corridor Average travel time in region
Increase/Maximise mobility.	Average travel speed in region
Increase modal choice	Percentage of population with choice of public transport modes
Increase modal integration	Number of interchanges/trip in and to and from corridor
Shorter, fewer and safer trips	Number of non motorised trips/day
Achieve peak travel times equal to off-peak travel times	Ratio of average peak hour /average off-peak hour travel times in corridor Ratio of average peak hour /average off-peak hour travel times in region
SOCIAL	
Alleviate poverty and reduce inequality and social exclusion	Number of jobs in corridor for designated groups Average travel costs for designated groups in corridor
Provide for the transport needs of special groups, such as the disabled and the elderly	
Improve security	
Improve the quality of life	Education indicators of designated groups in corridor
Improve access to social services	Average travel time for designated groups to specified basket of social services Average travel costs for designated groups to specified basket of social services
PHYSICAL/URBAN FORM	
Restructure the Apartheid landscape through spatial integration	Area of non-residential land within 1 hour travel distance for designated group Number of jobs for designated group within 1hour travel distance
Redevelop blighted areas	Vacancy ratios in corridor Private spend/ha in corridor
Steer urban development	Ratio of development in corridor to region
Create “urbanity”.	Residential density in corridor Ratio of residential/non-residential land use in corridor
Improve legibility and the aesthetic quality of the urban landscape	
INSTITUTIONAL	
Improve inter-governmental co-operation	Spheres in stakeholder group in corridor initiative
Build partnerships	Number of participating stakeholders in corridor initiative
ENVIRONMENTAL	
Reduce the need for motorised transport and ensure more sustainable urban development	Veh-km travelled/person in corridor Veh-km travelled/person in region
Reduce pollution	Quantity of particulates, SO2, Cox, etc
Contain urban development/sprawl	Ratio of residential density in corridor to region Area of non-urban land converted to urban uses

    - The super-grid; with settlements within self contained “neighbourhood blocks”.
    - Interconnected nodes; with development concentrated at spatially separated but linked high density nodes.
    - Satellite towns; with settlements that are satellites of the dominant central core.
    - Linear city; with development, usually at high density nodes, located along a transportation spine.
    - Radial or star; where corridors radiate from the central core.
    - Circular linear form; with development on a circumferential corridor and the central area at low density.
- A literature review of **13 international and South African corridor examples** or settlement policies; Which provided information on the corridor case studies and also indicated that the evolution of a corridor:
    - Takes a long time, i.e. periods longer than 20 years
    - Takes sustained political will to invest in public sector interventions in a focussed way and to restrain private sector investment that do not support the corridor
    - Takes a significant investment by the private sector.
- The literature review produced the following **nine corridor types**:
    - Dominant land use.
    - Dominant transport mode.
    - Shape or form.
    - Function in terms of mobility or accessibility.
    - Qualitative aspects.
    - Scale / Quantitative aspects.
    - The dynamics of the forces of (trip) attraction.
    - Linkages to the urban area.
    - Socio-economic status of the population.

From this list it becomes obvious that a single type / classification is not adequate to describe a corridor; and that in designing a corridor it should be considered in terms of a number of the types listed above. However, it is recognised that for marketing purposes, it could advantageous to use a catch phrase that conjures up some specific aspect of the corridor.

- A corridor is a specific arrangement of land uses that attempts to best meet the objectives. In the study, **14 land use types** were developed to summarise the residential, commercial, retail and industrial land uses. Other aspects discussed included the physical expression of density, clustering of facilities, commercial catchments and thresholds, and open space.
- While the study was focussed at the strategic level, it is always useful to have examples of micro level elements as these reflect the liveability of the elements of a corridor. Eleven **urban design principles** were discussed.

  The assessment of a corridor proposal would be simplified if the proposal for a corridor was prepared in a **standardised format;** even though it is recognised that each corridor is different.

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- Because a corridor proposal needs to be considered in the context of the region, the following **regional information** would be required and examples of these are given in the resource material (although using local information is preferable):
    - GGP generation rates for appropriate types of land use.
    - Trip making characteristics for each type of land use.
    - Capital and operating costs rates for municipal services for each type of land use.
    - Capital and operating costs of community facilities for each type of land use.
    - Nett municipal income from services for each type of land use.
    - Cost of public transport services.
    - Public transport fare structures.
- As mentioned earlier, an urban area has its own development / change dynamics. The reason for a corridor project is to intervene in this "natural" process to achieve the objectives set for the region (and the corridor) better. **41 Interventions** were identified and are listed in Table 2.

- The evolution of a corridor requires the commitment by the public sector. This commitment requires that when approving a corridor proposal the authority recognises the extent of the commitment required on its part in terms of institutional and financial resources.

  However, without a sizeable investment by the private sector, the corridor will not come into being. Unfortunately, the enthusiasm of public sector planners and of decision makers in support of political and social objectives often (usually) does not consider the objectives / needs that drive the private sector to invest. Considering the fact that a corridor project is usually prompted by the fact that investment is not being made in a specific area, it is surprising that the proponents of a corridor do not recognise the difficulty that will be encountered to attract investment. The resource material is not able to answer this problem, although it quotes from a number of sources that describe the concerns of private sector investors. It also suggests the need to research the **private sector investment logic**.

- The last aspect included in the resource material is a review of the **legislation** and institutional **aspects** that can affect the implementation of a corridor. This review is fairly exhaustive; except in the case of provincial legislation where examples of legislation are included rather than all the pieces of legislation of each province.

  The **institutional requirements** to develop a corridor should not be taken lightly. The following outlines five arrangements that can be considered:
    - The municipal council regards the corridor project as a part of normal municipal activity and tasks "regular officials" in the municipal administration with overseeing its planning and implementation.
    - The municipal council appoints a dedicated Project Manager in Council: and allocates appropriate resources for this purpose.
    - The municipal council establishes a Section 21 Company: to attend to the planning and management of the corridor proposal..
    - The municipal council puts the corridor project up for private tender and awards the project to the successful company subject to a set of performance requirements.
    - National government sets up a body, such as an Urban Development Corporation, through an Act of Parliament with wide-ranging powers that outstrip those of the municipal council with the explicit aim of getting the corridor implemented.

TABLE 2: INTERVENTIONS

Road infrastructure • Construct a link/connector road to prominent nodes (like the CBD) and/or major roads that are not in the corridor. • Construct or upgrade a mobility or activity spine (by for instance adding more lanes). • Construct a service road. • Limit the supply of parking places in the corridor. • Improve traffic systems management: Provide proper signalling and traffic lights. • Construct an interchange. • Road access management: Close streets where they meet mobility routes. • Freight vehicle management: Limit freight movement to certain hours of the day/week. • Provide/Improve facilities for non-motorised movement (walking and cycling) on and along roads in the corridor (e.g. raised movement areas, cycling paths, etc).	Public transport • Make public transport more affordable, safer, more efficient, more comfortable, more accommodating of special groups (the elderly, the youth and the disabled), more reliable and improve its image inter alia through marketing. • Provide dedicated public transport (bus/minibus-taxi) lanes and/or bus-activated traffic lights that automatically give buses the green light.. • Construct/Upgrade minibus taxi-ranks in the corridor with proper minibus-holding facilities. • Construct pedestrian over-bridges. • Improve the policing at stations and nodes in the corridor, as well as on buses, trains and taxis. • Landscape sidewalks. • Construct medians/walkways for public transport users. • Locate social/public facilities at stations/modal interchanges and/or in nodes in the corridor.
Land / property development • Develop new high-density/intensity nodes in the corridor. • Install the necessary infrastructure (including telecommunication networks) in the corridor. • Expropriate/"take" land in the corridor, install infrastructure and sell/lease it to selected investors. • Release strategically located public land for development in the corridor. • Rejuvenate existing nodes through for example the institution of City Improvement Districts (CIDs). • Institute or facilitate mixed land-use infill projects in the corridor.	Spaces and places • Develop pedestrian-friendly, human scale environments with a "sense of place" by making use of urban design principles and landscaping (e.g. street furniture, street lighting, unique signage, etc.), which will attract people. • Make provision for informal trade at nodes/stations. • Have regular late night shopping and theme events in nodes in the corridor. • Brand and market nodes or precincts in the corridor as unique places.
• Develop a phased spatial framework for the development of the corridor, communicate its existence and adhere to it. • Offer incentives that will attract new investment/s, especially in the shape of SMEs, to the corridor. • Change land-use regulations and land development procedures so as to favour higher density and more intense, mixed land-use development in the corridor. Provide incentives for the upgrading and/or maintenance of buildings in the corridor	Institutional arrangements (cont) • Fund and implement programmes to develop human resources (e.g. adult education, skills-development and vocational training). • Appoint a corridor-manager. • Develop and maintain public-private networks and partnerships. • Secure and maintain political will and the support from officials, councillors, affected communities and other spheres of government for the corridor. Market the corridor.
External roads infrastructure • Toll roads in the non-corridor area. • Limit the number of parking places in the non-corridor areas.	External institutional arrangements • Limit the supply of development/land in the non-corridor segment of the metropolitan area, as well as in neighbouring local government areas where it could impact negatively on the corridor. • Levy higher company and/or property tax rates on new companies/developers that do not settle in the corridor areas

ASSESSMENT OF A CORRIDOR PROPOSAL

This section of the paper describes the evaluation of a corridor proposal in terms of:

- The evaluation of the end state.
- The evaluation of the probability that the end state will be achieved.
- The analytical work required to do these evaluations; i.e. a computer model.

Evaluation of the end state

The fundamental tenet of the project was that any corridor proposal needs to be evaluated in terms of the set of specified goals. It is proposed that the objectives and performance measures be defined and that the performance of the "do-nothing" alternative, the corridor proposal and alternatives be evaluated for Year-0, Year-5 and Year-20 in terms of the set of objectives. This evaluation can be done in relative and / or absolute terms by comparing the proposal with the other alternatives and also be comparing the conditions achieved in the corridor with those in the region.

Evaluation of the evolution of the corridor as proposed

With regard to assessing the probability of the corridor materialising, it is important that it be understood that the development of a corridor is an evolutionary process. It takes time for the development in the corridor to become visible because initiating development requires a period for planning, approval and fund raising. Furthermore, vacant space might be available within the region that needs to be taken up before there is the demand for the space that is being provided in the corridor. The lack of visible development in the short, and even the medium term, should not be summarily judged to reflect an unsuccessful corridor project. However, in the plan for a corridor, the rate at which development is expected, especially over the short term, must be explained to ensure that political and institutional support is not withdrawn when expectations are not met.

Aspects that must be used to assess the probability of development occurring in the corridor relate primarily to the regional trends and secondly to the attractiveness of the corridor itself relative to other locations for investment in property. While the second aspect will be considered in terms of the private sector investment logic, the first can be based on historical data and projections of population, employment, GGP, zoned area for each land use type, floor space that has been taken up and public and private sector investment.

The analytical model

Figure 1 shows that the analytical model has four components; namely:

- The input of regional data.
- The input of corridor specific data.
- The calculation component.
- The report/output component.

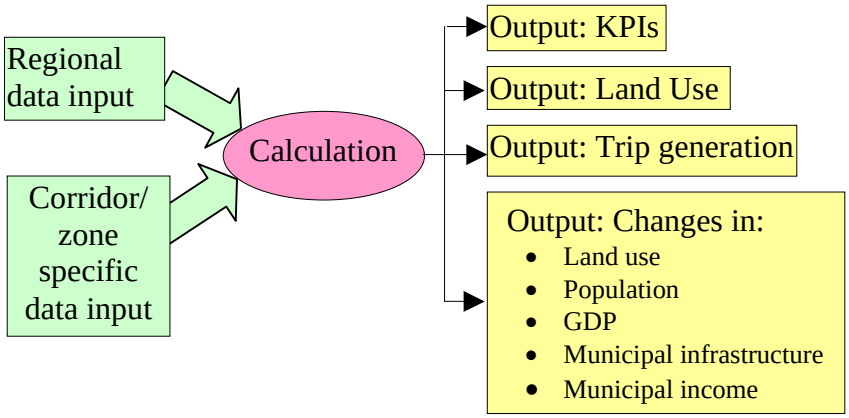

FIGURE 1: STRUCTURE OF THE ANALYTICAL MODEL

The regional input data includes historical population, employment and GGP information; residential and worker densities, GGP generation rates, municipal infrastructure costs and incomes, and trip generation rates applicable to 14 land use types (Tables 3 and 4); as well as trip distribution and fare structure information.

TABLE 3: LAND USE AND RELATED FACTORS

Land use description	Municipal infrastructure cost (R/ha)	Resident and worker density (Persons/ha)[1]	Nett annual municipal income (R/ha/year) [2]	GDP/ha (Rmill/ha/year)[1]
Residential - very low density (10 DU/ha)	506000	40	-13330	0
Residential - low density (20 DU/ha)	954000	80	-26660	0
Residential - medium density (40 DU/ha)	1792000	160	-53320	0
Residential - high density (80 DU/ha)	3356000	320	-106640	0
Residential - very high density (160 DU/ha)	6256000	640	-213280	0
Offices - low density FAR 0.4	240000	400	66000	23.25
Offices - medium density FAR 0.8	307500	800	116000	46.5
Offices - high density FAR 1.6	375000	1600	200000	93
Industrial - low density FAR 0.2	240000	125	10000	7.3
Industrial - medium density FAR 0.4	307500	250	15000	14.6
Industrial - high density FAR 0.8	375000	500	20000	29.2
Commercial - low density FAR 0.4	240000	200	46000	14.4
Commercial - medium density FAR 0.8	307500	400	66000	28.8
Commercial - high density FAR 1.2	375000	600	86000	43.2

TABLE 4: TRIP GENERATION RATES

	Unit		Person trip generation/ha							% AM production
			Very low density	Low density	Medium density	High density	Very high density			
		DU/ha	10	20	40	80	160			
Low income	Dwelling unit	1.3	**13**	**26**	**52**	**104**	**208**			55
Middle income	Dwelling unit	2.7	**27**	**54**	**108**	**216**	**432**			80
High income	Dwelling unit	2.7	**27**	**54**	**108**	**216**	**432**			75
			Person trip generation/ha (for a range of FAR)							
		FAR	0.1	0.2	0.4	0.8	1.2	1.6	3.2	
Offices: CBD	/100GLA m^2	3.3	33	66	**132**	**264**	396	**528**	1056	20
Industrial	/100GLA m^2	1.6	16	**32**	**64**	**128**	192	256	512	20
Warehousing/retailing	/100GLA m^2	2.3	23	46	**92**	**184**	**276**	368	736	20

Figure 2 shows the simplified spatial structure used by the model to represent the corridor being planned. This consists of 42 internal zones and the external zone located symetrically about the transport spine.

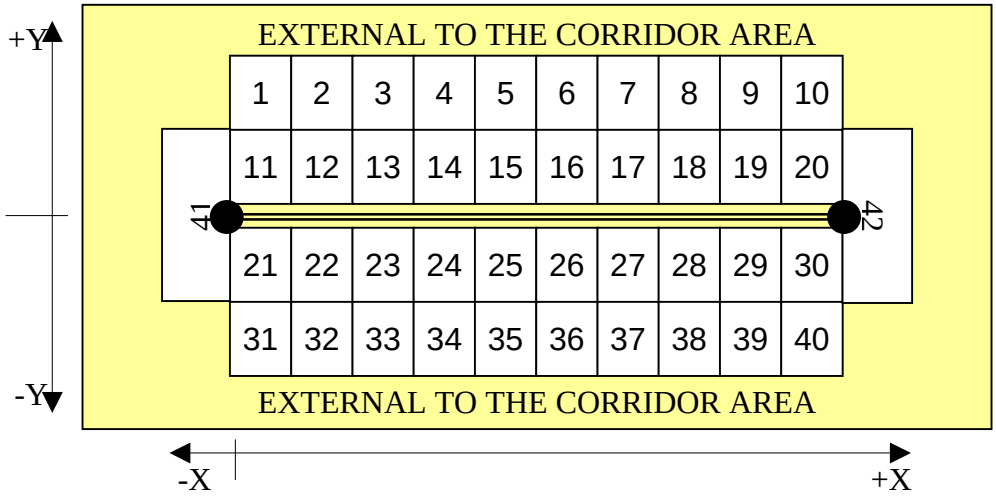

FIGURE 2: SPATIAL STRUCTURE USED IN THE CORRIDOR MODEL

Zone specific information that is input to the model includes the co-ordinates of the zone centroid, the area of each of the 14 land use types and the proportion of this area that is serviced and occupied; as well as the proportion of the population that is in the low, middle and high income groups.

The model calculates the trip making patterns, and related public transport cost and income; as well as the total cost of municipal infrastructure and the net municipal income derived from it, the resident and worker population and the resultant GGP.

The model produces the following reports that will be useful in preparing the corridor proposal:

- Peak hour trips along the segments of the central spine (Table 5).
- Trip length distribution for public transport trips in the corridor (Table 6), which is used to calculate fare income.
- Public transport costs. These are derived from a modified version of the public transport cost model developed for Durban (Durban, 1999).
- Public transport fare income; which is determined from the distribution of the lengths of public transport trips and the fare structure.
- Land use distribution and changes over time in terms of serviced land (Table 7).
- Population and changes in this value over time.
- GGP and changes in this value over time.
- The value and change in the value of municipal infrastructure (Figure 3). This is derived from the information on the change in serviced land and the cost of servicing each land use type. It estimates the funds required for municipal infrastructure and can be used to assess whether, in the context of the history of capital expenditure by the authority, the authority has the capacity to implement the necessary infrastructure investment programme.
- The value and change in the value of municipal services income.
- The values of 23 performance indicators; that relate to the objectives that could have been selected for the corridor (Table 8).

All these values are calculated so that a comparison can be made between the “do-nothing” alternative in Year-0 Year-5 and Year-20 and for up to three alternatives in Year-5 and Year-20.

TABLE 5: OUTPUT: PEAK HOUR TRIPS ALONG CENTRAL SPINE

		Segment of transport spine									
		1	2	3	4	5	6	7	8	9	10
Corridor: Year 0	41-42	59059	60794	112558	109615	112272	112509	99254	158372	156431	102200
	42-41	7452	11988	26003	17237	19928	24243	28282	35015	30801	55945
Input matrix: Year 0	41-42										
	42-41										
Corridor: Year 5	41-42	46706	49479	90896	89152	92107	93336	80839	133918	133592	100349
	42-41	4245	7330	19547	12635	14362	17920	19846	20715	19064	43562
Input matrix: Year 5	41-42										
	42-41										
Alternative A: Year 5	41-42	59059	60794	112558	109615	112272	112509	99254	158372	156431	102200
	42-41	7452	11988	26003	17237	19928	24243	28282	35015	30801	55945
Alternative B: Year 5	41-42	59059	60794	112558	109615	112272	112509	99254	158372	156431	102200
	42-41	7452	11988	24380	17237	19928	24243	28282	35015	30801	55945
Alternative C: Year 5	41-42	59059	60794	112558	109615	112272	112509	99254	158372	156431	102200
	42-41	7452	11988	26003	17237	19928	24243	28282	35015	30801	55945
Corridor: Year 20	41-42	97037	100959	188444	185362	190265	191518	170437	274841	273252	185697
	42-41	7626	12309	28861	19950	23402	28913	33199	40786	41061	89763
Input matrix: Year 20	41-42										
	42-41										
Alternative A: Year 20	41-42	59059	60794	112558	109615	112272	112509	99254	158372	156431	102200
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Alternative C: Year 20	41-42	59059	60794	112558	109615	112272	112509	99254	158372	156431	102200
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TABLE 6: OUTPUT: DISTRIBUTION OF PUBLIC TRANSPORT TRIP LENGTHS

	Trip length (km)									
	0-5	5-10	10-15	15-20	20-25	25-30	30-40	40-50	50-75	>75
Corridor: Year 0	83790	230672	57218	2835	1345	192	116	0	0	0
Input matrix: Year 0										
Corridor: Year 5	72971	200582	49757	2466	1169	43	101	0	0	0
Input matrix: Year 5										
Alternative A: Year 5	83790	230672	57218	2835	1345	192	116	0	0	0
Alternative B: Year 5	83790	230672	57218	2835	1345	192	116	0	0	0
Alternative C: Year 5	83790	230672	57218	2835	1345	192	116	0	0	0
Corridor: Year 20	138423	378214	91410	6472	1493	207	125	0	0	0
Input matrix: Year 20										
Alternative A: Year 20	83790	230672	57218	2835	1345	192	116	0	0	0
Alternative B: Year 20	48873	134548	33374	1654	784	112	68	0	0	0
Alternative C: Year 20	83790	230672	57218	2835	1345	192	116	0	0	0

FIGURE 3: OUTPUT: CHANGE IN VALUE OF MUNICIPAL INFRASTRUCTURE

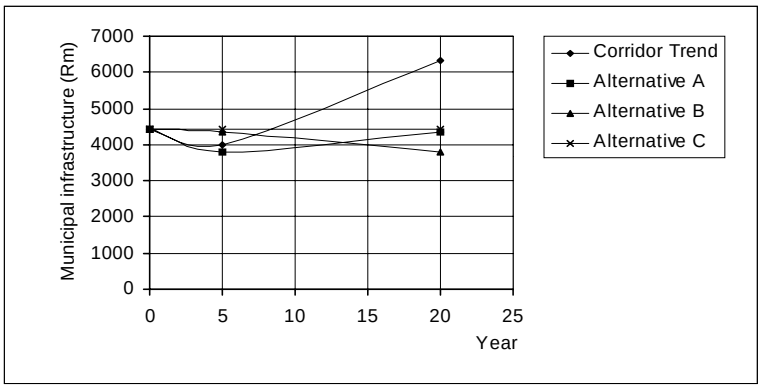

TABLE 7: OUTPUT: CHANGES IN LAND USE

Corridor Trend		SERVICED LAND (ha)			%Annual change		Annual change ((ha)	
	Year	0	5	20	0 to 5	5 to 20	0 to 5	5 to 20
Residential (du/ha =	10	1239	350	899	-14.4	10.5	-177.94	36.61
Residential (du/ha =	20	1367	1367	2999	0.0	8.0	0.00	108.79
Residential (du/ha =	40	96	96	85	0.0	-0.8	0.00	-0.73
Residential (du/ha =	80	176	176	176	0.0	0.0	0.00	0.00
Residential (du/ha =	160	129	129	129	0.0	0.0	0.00	0.00
Offices (FAR =	0.4	1	1	4	0.0	28.6	0.00	0.20
Offices (FAR =	0.8	190	190	318	0.0	4.5	0.00	8.53
Offices (FAR =	1.6	918	918	1500	0.0	4.2	0.00	38.80
Industrial (FAR=	0.2	300	300	300	0.0	0.0	0.00	0.00
Industrial (FAR=	0.4	604	610	604	0.2	-0.1	1.12	-0.37
Industrial (FAR=	0.8	0	0	0	#DIV/0!	#DIV/0!	0.00	0.00
Commercial (FAR=	0.4	18	18	36	0.0	6.7	0.00	1.20
Commercial (FAR=	0.8	283	283	565	0.0	6.7	0.00	18.84
Commercial (FAR=	1.2	459	459	918	0.0	6.7	0.00	30.60

TABLE 8: OUTPUT: KEY PERFORMANCE INDICATORS

	0	Year-5				Year-20			
		Trend	Alt A	Alt B	Alt C	Trend	Alt A	Alt B	Alt C
Population in region									
Population in corridor	1852800	1853663	1886816	1852800	1956825	2972076	1852800	1852800	1778608
Residential population in corridor	341088	341088	341088	341088	445113	452884	341088	341088	266784
Worker population in corridor	1511713	1512575	1545729	1511713	1511713	2519193	1511713	1511713	1511825
Area of corridor (ha)									
Gross density (persons/ha)									
Utilised residential area in corridor (ha)	3304	3304	3304	3304	5904	4626	3304	3304	3188
Residential density in corridor (persons/ha)	103	103	103	103	135	98	74	74	58
Commercial area in corridor (ha)	1742	1745	1827	1742	1742	2798	1742	1742	1742
Worker density in corridor (workers/ha)	868	867	886	866	866	900	540	540	540
GGP (Rmillion/year)	92096	92146	94545	92096	92096	154858	92096	92096	92102
GGP/person (R/person/year)	49706	49710	50108	49706	47064	52104	49706	49706	51783
Cost of municipal infrastructure in corridor (Rmillion)	4425	3976	3798	4366	4425	6311	4366	3798	4425
Cost of municipal infrastructure/resident (R/resident)	12972	11658	11134	12801	9941	13935	12801	11134	16585
Nett mun. income from corridor (Rmillion/year)	78.6	78.7	84.2	78.6	44.0	175.9	78.6	78.6	103.4
Number of Public Transport trips in peak hour	158372	133918	158372	158372	158372	274841	158372	158372	158372
Number of Private Transport trips in peak hour	151341	152177	151127	151127	151127	261400	151127	151127	151127
Modal split (% public)	51.1%	46.8%	51.2%	51.2%	51.2%	51.3%	51.2%	51.2%	51.2%
Total travel in public transport/year (km)	6686	5807	6686	6686	6686	10923	6686	3900	6686
Total travel by private transport/year (km)									
Average length of Public Transport trip (km)	7	7	7	7	7	7	7	7	7
Annual cost of Public Transport services (Rmillion)	1889.1	1670.3	1889.1	1889.1	1889.1	3285.5	1889.1	1889.1	1889.1
Annual fare revenue from P T services (Rmillion)	2708.40	2355.05	2708.40	2708.40	2708.40	4437.68	2708.40	1579.78	2708.40
Public Transport subsidy required (Rmillion)	-819.26	-684.72	-819.26	-819.26	-819.26	-1152.14	-819.26	309.37	-819.26

CONCLUSIONS

From the discussion in the paper, the following conclusions can be drawn:

- The study was successful in providing a source document with information on potential objectives for corridors and related performance measures; alternative urban forms, examples and experiences of corridors, corridor typologies, land use, urban design principles, examples of regional information that is required to develop a corridor plan, default values for the costs of municipal infrastructure and nett municipal income, GGP, and resident and worker densities; types of interventions; a discussion on the available information on private sector investment criteria; a review of relevant legislation; a methodology whereby the corridor can be evaluated in respect of end-state objectives and the probability of it materialising.
- The study did not produce a set of rigid guidelines as corridors vary too much for this to be appropriate. It has however produced a set of topics that need to considered and discussed in the preparation of a corridor proposal.
- The evaluation of a corridor is an essential component of the preparation of a proposal for a corridor. This must be done in terms of the **probability of the corridor evolving as planned** and in terms of the performance of the corridor **in relation to a set of objectives** selected for the corridor when compared to the "do-nothing" and other alternatives.

The following **recommendations** can also be made:

- That the methodology developed in the study needs to be applied so that its shortcomings can be identified and the methodology improved.
- That the following areas be considered for future study to improve the country's ability to plan corridors:
    - Develop a model of the logic that prompts private sector investment.
    - Develop a national data base for the default values necessary for desk top planning of corridors at a strategic level.
    - Refine the computer software so that it can accept GIS information directly, and produce output in a format that is more useful to the planner and more appropriate to the decision maker.

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