

KNOWLEDGE MANAGEMENT AND ECONOMIC INTEGRATION IN SOUTHERN AFRICA: UNPACKING THE CONTRIBUTION OF A REGIONAL SPATIAL PERSPECTIVE IN BUILDING REGIONAL COMPETITIVENESS AND PROSPERITY

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Abstract

This paper reviews the southern African region's economic integration and knowledge management terrain from a spatial perspective. Its purpose is to generate insights relating to the role that space and spatial structure play in determining equity and efficiency outcomes with a view to fostering sustainable growth and pro-poor development in the Southern African Development Community (SADC) region. It is also intended to spark debate within the region that seeks to critically question the regional body's assumptions as they relate to the current regional development trajectory in the context of a globalised world. The paper interrogates SADC spatial development frameworks and initiatives with a view to speculating on their capacity to respond to regional integration. The overwhelming view is that SADC is far from being spatially integrated, and necessarily, development outcomes and impacts are therefore not uniform throughout the SADC regional terrain. The paper thus calls for the establishment of a SADC spatial planning office under-girded by a southern African spatial development perspective protocol. The office could become a fountain of enhanced spatial knowledge management and a platform for generating economic integration intervention levers for multi-level governance, multi-level investment and funding. The paper argues that the implementation of such a recommendation could indeed assist in leveraging and unlocking SADC's substantial endowments with a view to realizing its full development potential and agenda.

Key words:

Regional integration, spatial development, sustainable development, SADC protocol, knowledge management

1. INTRODUCTION

1.1 Background

This paper presents study findings relating to an initial indicative perspective on spatial development in the southern African region. The purpose of the scoping study was to generate insights on the role that space and spatial structure play in determining equity and efficiency outcomes with a view to fostering sustainable growth and pro-poor development in the Southern Africa Development Community (SADC) region. In addition to feeding into policy dialogue, the envisaged regional spatial perspective would also serve to inform regional investment options for development finance institutions (DFIs) such as the Development Bank of Southern Africa (DBSA).

The southern African region is characterized by spatial inequalities and discontinuities, for example, the World Bank (2005) asserts that SADC transport infrastructure indicators confirm regional spatial inequalities within and between member states. Highly accessible and high economic opportunity areas such as urban areas, rich agricultural areas, mining corridors and enclaves are better developed compared to remote and isolated resource-poor peripheral rural areas (Fair, 2007). Development outcomes and impacts are therefore not uniform throughout the SADC regional terrain (Chakwizira et al, 2008). The paper thus interrogates spatial development frameworks in SADC with a view to speculating on their capacity to respond to regional integration.

The study, which relied on creatively analysing extensive secondary data and key stakeholder interviews, adopted the following key points of departure:

- The unit of analysis is SADC – a region consisting of 14 member states.
- There are contrasting and sometimes contradictory approaches to spatial development in SADC member states which lead to different and potentially divergent outcomes.
- The regional spatial development research was approached from a developmental perspective. The study therefore sought to illustrate the spatial dimensions of poverty and inequality, infrastructure provision, regional integration and development impact.

The main study hypothesis revolved around questioning the contribution of the current regional spatial development approaches to positively responding to contemporary growth and development issues besetting the SADC region. The major study proposition has been to argue fervently that a regional spatial development perspective protocol/act operationalised through an office at the secretariat would contribute immensely towards deepening regional spatial integration and stimulating further socio-economic development in the region. Without such a bold measure, regional spatial development disparities, growth and socio-economic development inequalities and bottlenecks are bound to accentuate rather than decrease.

1.2 Structure of the paper

This paper is organised in four sections. The first section covers the introduction, discusses the concept of 'regionalism' situating the debate in the context of major regional spatial and economic development theories. The second section discusses the study findings and their implications to regional spatial knowledge management and economic integration. In the third section, study recommendations are crafted in the context of regional development finance institutions' development agenda. The last section presents some concluding remarks aimed at stimulating further dialogue and debate on this seminal topic.

1.3 Situating the research problem

Approximately 40 percent of the estimated 190 million people in the 14 SADC countries live in absolute poverty, 30 – 40 percent are unemployed or depend on subsistence agriculture which is constantly threatened by recurrent droughts and flooding (AfDB, 2006). The poverty situation is largely reflected in the low levels of income and high levels of human deprivation. Average gross domestic product (GDP) per person for the region stood at US\$932 in 2000, with considerable variation between countries, for example, the GDP of Botswana, the highest ranked country, was 33 times larger than that of the Democratic Republic of Congo (DRC). About 40 percent of SADC's population lives below the poverty line of US\$1 a day, and about 70 percent below US\$2 a day (UNDP, 2006). Poverty is particularly acute among vulnerable groups such as households headed by the elderly, women or children. Income disparities are enormous with the region's Gini coefficient hovering above 0.5 (AfDB, 2006). Recent research also indicates that inequality between rural and urban areas is persisting unchecked, with average living standards in rural areas far below those in urban areas, in addition to the considerable inequalities within and between both rural and urban areas (World Bank, 2005).

While NEPAD has set an Africa-wide goal of achieving a 7 percent GDP growth for 15 years, only three countries achieved this in 2005, namely, Angola, Mozambique and Tanzania (the first two being in a post conflict surge) (UNECA, 2006). Overall, the GDP growth rate for SADC was 5 percent. The average GDP per capita was US\$1373 with a high of US\$4559 in Botswana and a low of US\$91 in the DRC (World Bank, 2006). The location and size of some of the states are a real handicap to development in terms of the size of the market and the distances that have to be traversed in transport and logistics (AfDB, 2006). Regional integration would mean a single economic unit of 242.6 million people and a land area of 2.3 million square meters. This means a consumer and production base which is 82 percent of the United States of America (USA) population and 79 percent of the European Union (EU) population. SADC is 2 percent larger than the USA and almost four times the land area of the EU (UNECA, 2006). Clearly, an integrated SADC would provide sufficient scope for specialization and

economies of scale. Africa is the most fragmented continent in the World – a position confirmed by Kritzinger-van Niekerk's (2002) study which argues that in fact sub-Saharan Africa has 48 small economies whose economic contribution and significance is only equal to the Belgian economy. As graphically indicated in Figure 1 below, even at a regional level, Africa is still extremely fragmented, which no doubt has spawned some of the developmental challenges enumerated in this paper.

Internationally, spatial imbalances in development are common within and between both developed and developing countries, between rich and poor regions and between rich and poor people. These inequalities have always been regarded as central issues in development (DBSA, 1998, Stubbs, 2005, World Bank, 2005). Seeking to understand regional spatial development processes and impacts is thus important to realize sustainable development. This paper is therefore intended to spark debate and dialogue within SADC which seeks to critically question the regional body's assumptions as they relate to the current regional development trajectory in the context of a globalised world.

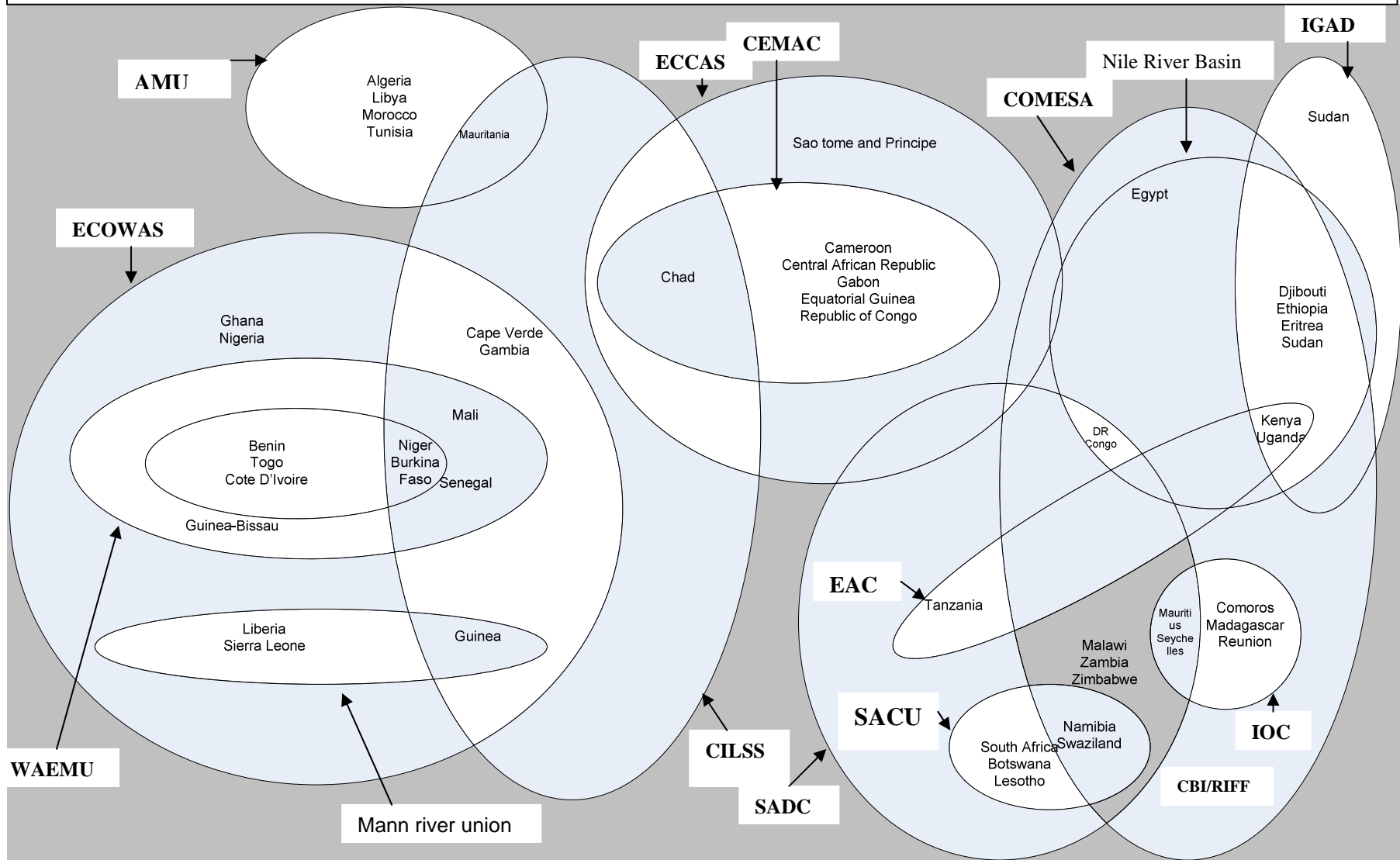
While the foregoing section located the regional spatial development perspective problem in SADC, the section that follows provides succinct summary literature reviews of regionalism, spatial development frameworks, knowledge management and economic integration in the region.

2 CONCEPTUALIZING 'REGIONALISM', SPATIAL DEVELOPMENT FRAMEWORK, KNOWLEDGE MANAGEMENT AND ECONOMIC INTEGRATION IN SADC

The departure point is to conceive regions beyond the state-based formal notions of regions and regionalism (Agnew, 2000). Such a departure entails seeking new ways of stretching the conceptualisation of regionalisation in contemporary southern Africa.

Regions and regionalism in the broadest sense of the term is a form of advocacy, an actively practiced belief that regions are useful tools for achieving a wide variety of objectives (Stubbs, 2005). A region may be defined as an institutional framework for regional planning (Chakwizira et al, 2008).

Figure 1: Main regional arrangements in Africa



A region may also refer to an organizational unit which although physical is man-made (Agnew, 2000). A region therefore can relate to a series of historically cultivated socio-institutional infrastructures like networks, norms, conventions, trust-based (often face-to-face) interactions and horizontal relations of reciprocity, which are seen to enhance the benefits of investments in physical and human capital (Storper, 2005). High technology mode of flexible specialization in regions continue to be acclaimed as post-Fordist examples of economic success whose routes to prosperity were founded on agglomerations of small and medium firms in high technology (Silicon Valley), engineering (Baden-Wu"rttemberg) and design-intensive traditional craft sectors (the Italian districts) (Soderbaum & Shaw, 2007).

By and large, regional studies have tended to focus on formal and inter-state regional frameworks in Europe and more recently, in North America and Asia-Pacific (Soderbaum & Shaw, 2007). Southern Africa is to a large extent, neglected in the general debate on regions and regionalism. Mainstream perspectives tend to claim that if there is any regionalism at all in Africa, it is primitive and characterised mainly by failed or weak regional organisations and a superficial degree of regional economic integration (Agnew, 2000). While this is not altogether inaccurate, it obscures and downplays the intense and multi-dimensional processes of regionalisation such as typified in southern Africa.

Figure 2 presents a conceptual framework derived from the foregoing synthesis of literature and adopted in unpacking regional spatial knowledge management, economic integration and development in southern Africa. Intrinsic in the framework is the view that any form of intervention on space differentiates and polarizes spaces, places and people. The challenge for regional planning then is to stimulate, promote and entrench sustainable development interventions on space, places and people that minimize negative externalities.

3 FINDINGS AND DISCUSSIONS

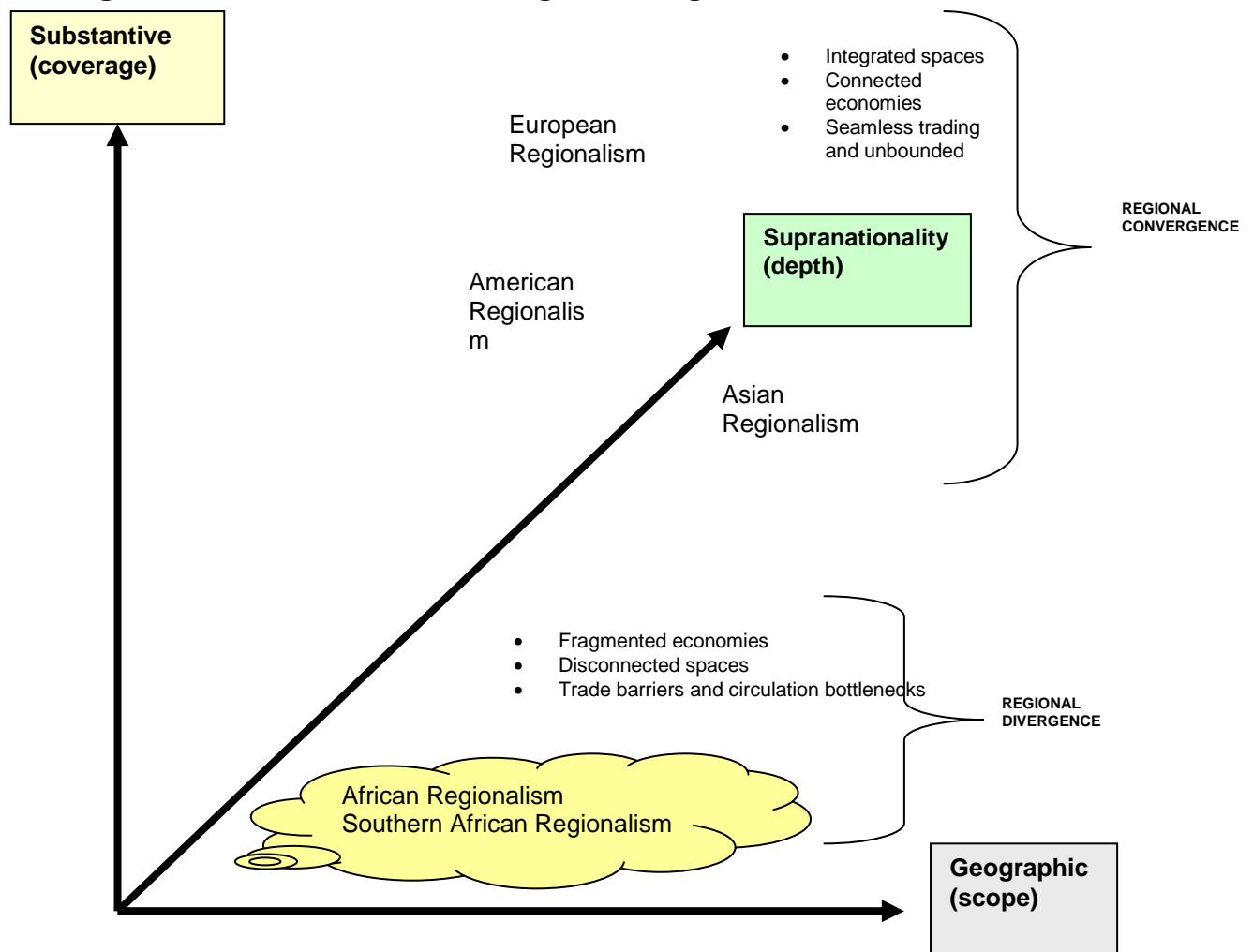
3.1 Overview

This section pays attention to creatively analysing alternative strategies that policy makers and planners have recommended and/or put into practice to promote the deepening of regional development in southern Africa. It also discusses the impact of regional growth and development in SADC. Areas for deepening dialogue are presented and analysed.

3.2 Southern African regional development strategies

In the context of southern Africa, it would appear that attempts to rectify spatial imbalances that manifest themselves through regional spatial knowledge management and economic integration gaps could form the basis for wider regional cooperation. The crux of unbalanced development in southern Africa is epitomised by the fact that while the vast

Figure 2: Three dimensions of regional integration



majority of its people live in rural areas, it is these areas which are the least developed in terms of the level and quality of life (refer to Map 1).

SADC regional development strategies implemented to date have been largely concerned with three major strategic issues which constitute the pivot upon which they are framed and by extension, could accordingly be classified, namely, intra-territorial development, territorial maintenance, and territorial agglomeration. Intra-territorial development strategies assume the territorial unit as given and are directed at promoting development through acceleration of economic output and the provision of better services delivery to inhabitants. States and their intra-state territorial/spatial units are mostly, but not exclusively, amenable to the implementation and practice of this strategic task. Some of the common intra-territorial development strategies used in the SADC region include, among others:

- Agriculture First Strategy
- Industry-led Growth Pole Strategy
- Rural Services Centre Strategy
- Agropolitan Strategy
- City-region Development Strategies
- Multi-level Planning Strategy

- (Free) Economic Zones
- Political Zones
- Bio-sphere Reserves
- Spatial Development Initiatives, and
- Millennium Development Goals (MDGs).

These strategies are spatially transformed and translated into interventions through the medium of physical/spatial development frameworks referred to by different names in the region (Chakwizira *et al*, 2008). The variety in the jargon could perhaps reflect different conceptualisations and might indeed underline the nature of spatial development challenges that individual member countries face, for example, in a country where the ‘master planning concept’ is strong, the likelihood of rigidity and inflexibility in implementing plans, cumbersome procedures that may frustrate investment promotion and social mobility, are certainly high. This is unlikely to obtain in a country where the emphasis is on ‘spatial frameworks’ as guidelines for investment and decision-making in space use, allocation and distribution of resources. In the same vein, even the crafting of enabling legislation could provide pointers to some of the border headline space economy issues, for example, a development planning act may suggest a more permissive and developmental spatial planning approach as contrasted with a town and country planning act.

3.2 Regional spatial development dialogue

The study findings strongly suggest that better understanding and appreciation of the regional spatial development knowledge management and economic integration perspective can be developed on the basis of a more comprehensive regional study.

This paper argues that the current physical integration approaches (based on protocols) as currently defined by SADC are not only inadequate, but fall far too short in seeking to address regional spatial development knowledge management and economic integration issues, opportunities and challenges. The fact that there is no directorate or sub-unit that deals specifically with human settlements and urbanisation (which partly explains the non-existence of protocols in this regard) located at the SADC organ constitutes a significant impediment (Chakwizira *et al*, 2008). Notwithstanding the existence of spatial development initiatives (SDIs) and the Regional Indicative Strategic Development Plan (RISDP) (which provides a comprehensive development agenda on social and economic policies), the regional spatial development component is under-represented.

Thus, the area of regional spatial development integration is largely left as research fodder for any interested player such as research institutions, universities and international development agencies with interest and focus in human settlements, development planning and urbanisation to undertake experimentation. Often, this area is inadvertently ceded to international organs such as the United Nation Human Settlement Programme to assist with defining and developing the agenda and capacity for urban and

settlement planning. It can thus be legitimately argued that SADC has not thoroughly conceptualized human settlements and urbanisation as a priority requiring focused attention and predetermined outcomes. And yet, a cursory observation would reveal that SADC is a fast urbanising region, which phenomenon is exerting substantial pressure on existing infrastructure, services and resources.

This paper further posits that a holistic planning approach (as opposed to the currently practised sectoral approaches with a heavy emphasis on independent agricultural, infrastructural, or industrial projects) can be realised were a protocol/act relating to sustainable human settlements and urbanisation in SADC to be adopted. While it could be argued that the human settlement and urbanisation perspective is assumed in the current approach, the point is that this should not be treated as an appendage of another activity as it is important enough to warrant undivided and indivisible attention.

Clearly, the nexus between knowledge management, economic integration, regional spatial/physical development planning, regional integration and sustainable development in the SADC needs to be adequately researched. Recently, a new initiative on the development of the SADC Regional Infrastructure Development Master Plan has been set in motion aimed at facilitating enhanced infrastructure development and implementation in the region. One key criticism that observers have levelled is that perhaps the SADC region does not lack solid ideas for implementation – far from it, what the region lacks is the political will to follow through solid ideas to implementation (Southern Africa Trust, 2008). This gap has been partly explained by the observation that SADC does not have a functional financial implementation plan and mechanism to assist in transforming ideas into the tangible projects.

As an example, this very lack of financial capacity to invest in construction, rehabilitation and maintenance of regional infrastructure in SADC was echoed during the 2007 SADC summit in Lusaka (www.sadc.int.org). To date, SADC has not succeeded in developing innovative financing mechanisms for regional spatial development planning let alone infrastructure development (Chakwizira et al, 2008). This is despite the existence of various funds such as the SADC Development Fund, SADC Project Preparatory and Development Facility, SADC Regional HIV and AIDS Fund, SADC Culture Fund, etc. Perhaps, the greatest weakness implied by such funding vehicles is that being donor driven the question of capitalising and sustaining them beyond donor support remains largely unresolved (World Bank, 2006). This in no way is intended to undermine the current role that the SADC Protocol on Finance and Investment provides for creative and innovative regional spatial, climate change and infrastructure financing initiatives. In this regard, a SADC bond market initiative could be a sustainable way of providing guaranteed financing for regional growth and development issues (Southern Africa Trust, 2008). This may contribute to the development of a regional capital market that can facilitate better use of regional savings for investment purposes. Such a move could perhaps mirror the creation of the Asian Bond Markets in South East Asia to promote savings for capital investments.

Furthermore, the SADC Secretariat has neither legal borrowing authority nor creditworthiness preventing it borrowing from the domestic and/or international markets. Fortunately, multilateral development finance institutions have narrowed this gap by playing crucial roles in facilitating and financing of regional infrastructure development initiatives and projects (DBSA, 2004, 2005; World Bank, 2005; AfDB, 2006).

Table 1, presents some of the major challenges that SADC member states face. The issues range from political, economic, human to organisational. Any proposed interventions to addressing SADC regional spatial knowledge management and economic integration challenges will need to take full cognisance of these factors.

Table 1: SADC regional integration challenges

Political	Economic	Human	Technical	Organisational
Political & economic difficulties e.g. Zimbabwe, Mozambique, Angola, Namibia & DRC	Lack of uniform economic growth	Lack of a "critical mass" of qualified cadres in science, engineering & technology disciplines to push regional integration in Southern Africa	Scarcity of regional spatial data	SADC Secretariat has neither legal borrowing authority nor creditworthiness
Post-conflict construction, growth & development appropriate interventions	No consensus on adopting a single regional currency as an option	SADC skilled manpower emigrating	Where regional spatial data is available it is costly to acquire or not correctly packaged	Multiple membership (SACU, SADC, COMESA etc)
	Lack of dedicated financial budget & provision for construction, rehabilitation & maintenance of regional infrastructure	Tapping from Southern Africans in the diaspora	Lack of a single SADC spatial planning database warehouse	Lack/absence of an office & or protocol/act on spatial planning at SADC Secretariat

Source: Chakwizira et al, 2008

Table 2 presents the envisaged advantages and challenges for development actors and partners in southern Africa if the proposed spatial development perspective protocol/act were to be adopted.

Table 2: Merits of the proposed SADC spatial development protocol

Advantages	Challenges (disadvantages)	Opportunity	Growth & Development Quantum/Multiplier/Catalyst Integrator Southern Africa Regional Spatial Development Perspective Office/Directorate & or Protocol/act
Enhanced spatial manifestation impact implementation, generation, monitoring & evaluation	An outward territorial spatial emphasis bias Lack of knowledge, information, operational solutions and successful experiences	Capacity Building & Training SADC spatial terrain no longer research fodder for researchers & practitioners Regional research Alliances such as the CSIR, BOTEC & SIRDC model	
Regional Bond Market which funds infrastructure & spatial transformation initiatives among other considerations	Multi-level Financing & Governance Seed Capital Innovation Incubators Technopoles	Pilot SADC Human Spatial development perspective development office e.g. DBSA could kick-start the initiative & SADC Secretariat can later take over	
Multi-level spatial investment & funding	Member states inward looking territorial spatial orientation & philosophy Project integration Marketing & Investment Promotion Regional stakeholders co-ordination challenges	Innovative Funding Mechanisms and Streams SADC Infrastructure Master Plan Spatial Development Corridor Initiatives Regional Strategic Indicative Development Plan	
Spatial integration & datasets adaptation & standardization	Regional Resource mobilization Regional Spatial Technology datasets Standardization such as	SADC Urban & Rural Mobility Project Funds SADC Urban Renewal Projects	

	CSIR-developed GAP CD	Fund SADC Depressed Regions Fund	
Balanced spatial & climate change growth & development that tackles the head-line issues at the core of poverty reduction endeavours	Growth & Development Differentials Human Population Attrition from HIV & AIDs Deepening & promoting Rural Development Lack of political cohesion & shared priorities Insufficient awareness	SADC Stock Bond Market Maximizing the use & potential of existing infrastructure & development banks in SADC region such as Development Bank of Southern Africa, Zimbabwe Infrastructure Development Bank etc	

Source: Chakwizira et al, 2008

The foregoing section has outlined why the SADC region is not spatially integrated, and argues strongly for the development of a mechanism for addressing the identified bottlenecks in the form of a spatial development protocol giving effect to the establishment of an office at the secretariat.

4 CONCLUDING REMARKS AND RECOMMENDATIONS

4.1 Concluding remarks

The summation of contestations in regional conceptualisations gives pointers to both theoretical and practical challenges. A strand of thought that runs through the paper is that the character and functions of regions reflect continuous metamorphosis in terms of, for example, social, economic, spatial, political, environmental, and ecological restructuring, reconfiguration, transformation and re-theorisation. At one level, regions represent the focal point for knowledge creation, learning, and innovation. At another level, they are deemed a crucial site for promoting a plural society centred on participatory democracy, active citizenship and civic pride. The need to foster integration is thus paramount. As proposed elsewhere in the paper, and as graphically represented in Figures 3 and four below, one sure way of beginning to do that is to set up a well-funded office at the secretariat dedicated to undertaking these integrative tasks supported by a protocol.

4.2 Major recommendations

4.2.1 *Strengthening the SADC Secretariat in Gaborone*

From a regional spatial development perspective, this paper argues and strongly recommends the strengthening of the SADC secretariat in Gaborone by creating and adopting a spatial development perspective protocol/act which is calculated to address regional spatial development in SADC with a singleness of purpose.

4.2.2 *Strengthening the roles of development and research institutions*

Regional development finance and research institutions that double up as knowledge generation, development and dissemination institutions such as the DBSA and the CSIR could play significant roles in stimulating and contributing towards SADC regional spatial information management and entrenching economic integration. In this regard, for example, the DBSA could anchor and fast-track the realisation of the proposal by bankrolling the

concept, including the establishment funds for the office (were the idea to gain currency among member states).

Involvement of such organisations could also be in the form of leading and/or funding regional spatial development research, training and capacity building at the SADC level. This could be done through secondment, attachment or exchange programmes (including establishing working framework agreements with tertiary institutions engaged in regional spatial planning in the region). In this regard, the DBSA's Intellectual Capital Unit, for example, could organise Summer Schools on regional spatial development knowledge generation and economic integration through its Vulindlela Academy, while the CSIR could do the same using its Technology Transfer Centre. This could be strengthened by the establishment of a SADC spatial regional knowledge management and economic integration Planning Observatory Network which could act as a clearing house for resources persons and generating priority thematic areas for training and capacity building.

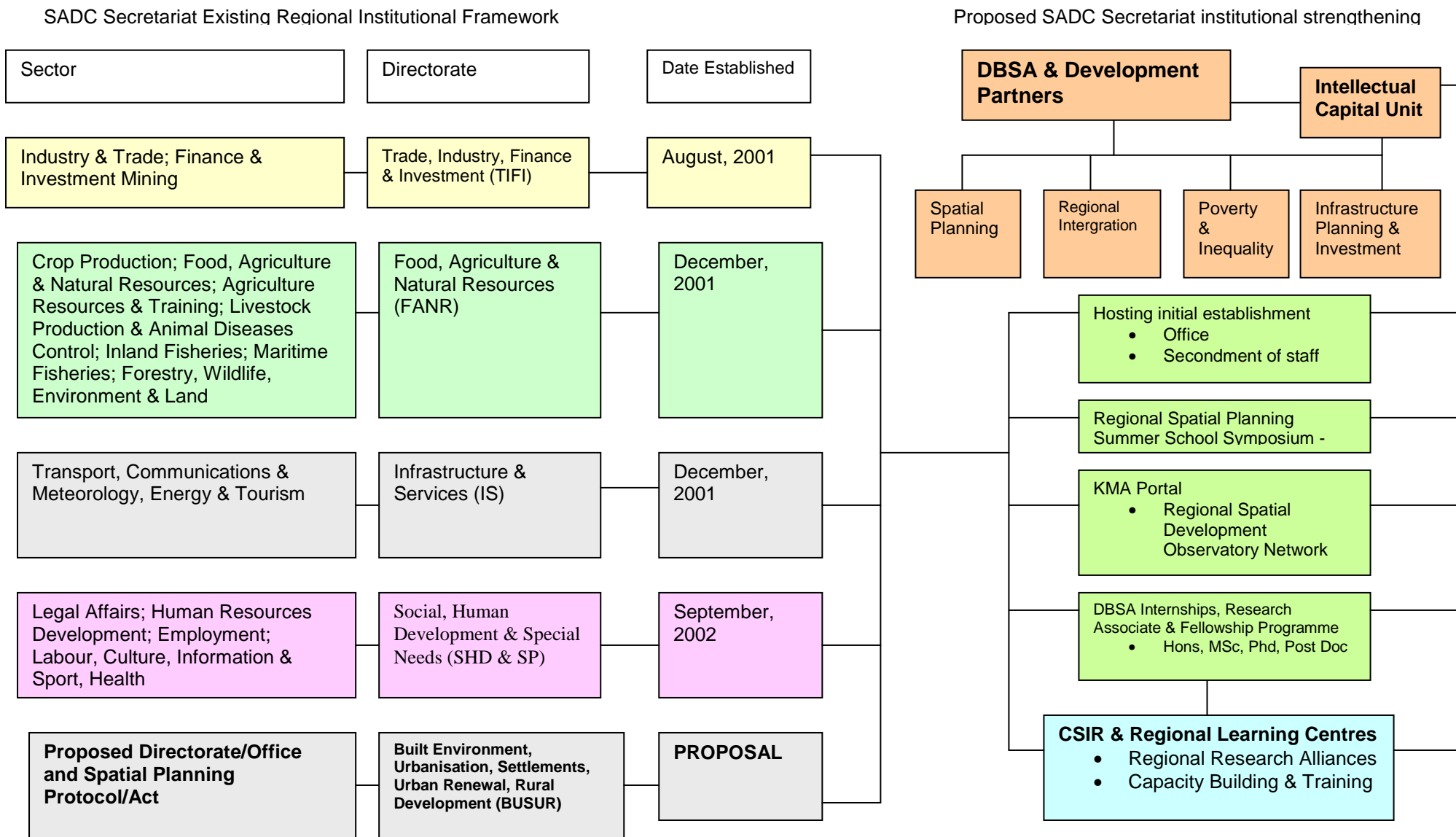
4.2.3 'Oiling' SADC regional spatial development planning capacity building efforts

Strengthening capacity building efforts could be approached from many fronts. One such front is to identify and build the capacity of key persons in local governments who are actively engaged in spatial planning work from each SADC member state. A SADC spatial member states peer reference system (including the planning observatory network) could then be established providing for after training care, mentorship and monitoring of the regional spatial development programme for enhanced benefits.

4.2.4 Building on existing initiatives

In order to make visible progress towards achieving the recommendations, it will be crucial to seek to build on existing initiatives around which current interventions could be anchored with a view to resolutely moving forward. In this regard, for example, the Knowledge Management Portal at DBSA is an existing initiative that can be used in further strengthening the concept of regional spatial knowledge and economic integration planning in the SADC region. This can be done in terms of launching an on-line discussion and regional spatial perspective planning chart rooms and forums. The proposed southern Africa regional spatial knowledge management and economic integration development observatory network could use this as a rallying point in tackling challenges in the region.

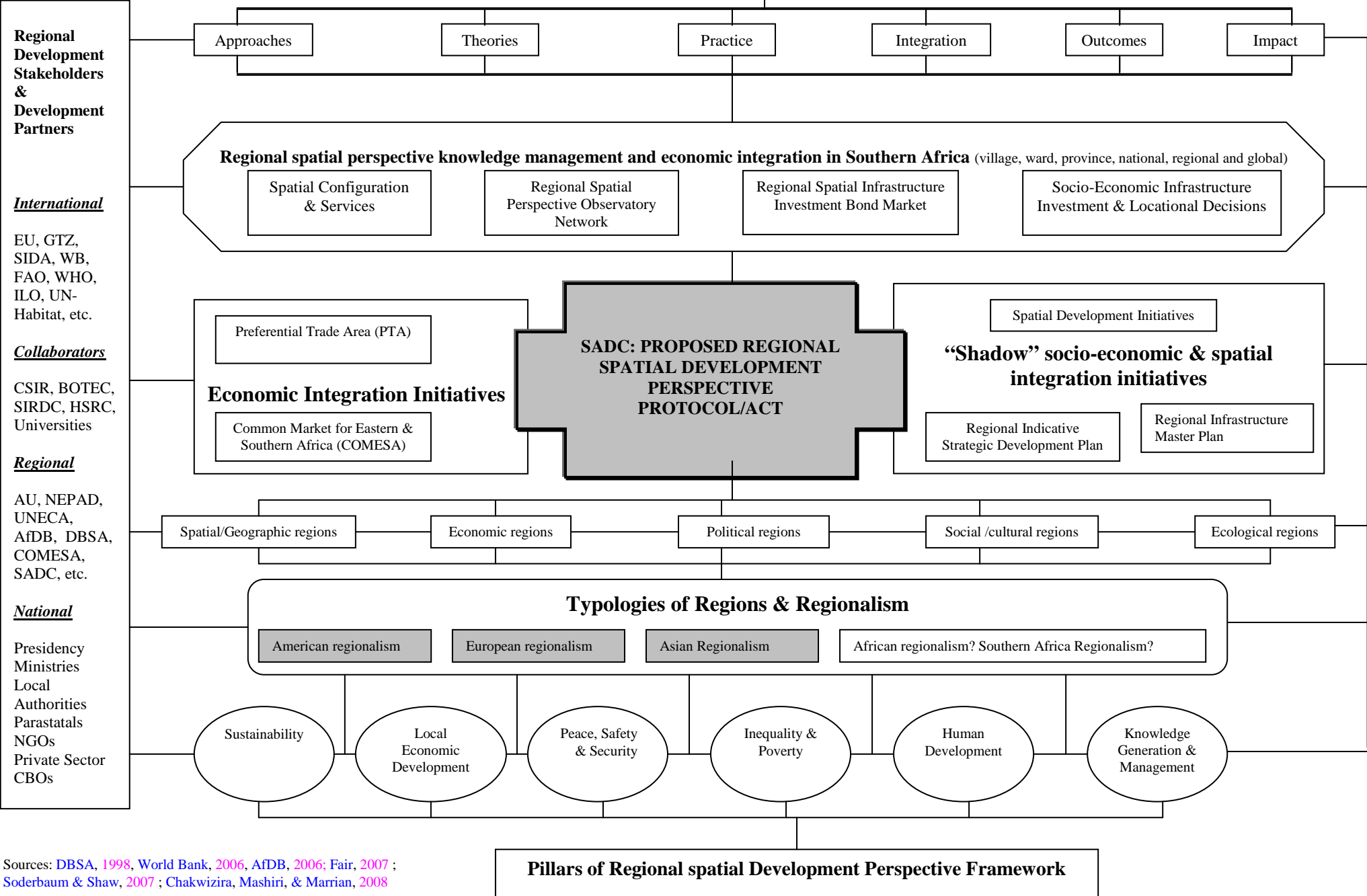
Figure 3: Schematic representation of the proposed SADC Spatial Development Perspective Protocol/Act and or Office



REFERENCES

- AfDB (2006) **African Development Bank Report**
- Agnew, J. (2000) **From the Political Economy of Regions to Regional Political Economy** Progress in Human Geography, 24 pages, 101-110
- Chakwizira J., Mashiri M. & Marrian B. (2008) Southern Africa Regional Spatial Development Perspective, DBSA, Midrand
- DBSA (1998) **Infrastructure: a foundation for development.** DBSA, Midrand
- DBSA (2004) **Annual Reports**, DBSA, Midrand.
- DBSA (2005) **Annual Reports**, DBSA, Midrand.
- Fair T. J. D. (2007) **Towards Balanced Spatial Development** downloaded CSIR at 16:31 14 December 2007
- Kritzinger – van Niekerk L (2002) **World Bank Development Cooperation for Poverty Reduction in the SADC Region**, SADC, Gaborone
- Soderbaum, F. & Shaw, T. (2007) (eds) **Theories of New Regionalisms**, A Pelgrave Reader, Basingstoke, Pelgrave
- Southern Africa Trust (2008) **Building Bridges out of Poverty – How can infrastructure development strengthen regional integration to overcome poverty in Southern Africa**, Policy Briefing No.2 January 2008
- Storper, M. (2007) **"The new argonauts: regional advantage in a global economy Anna Lee Saxenian,"** Journal of Economic Geography, Oxford University Press, vol. 7(1), pages 113-117, January.
- Stubbs, P. (2005) **Stretching Concepts Too Far? Multi-level Governance, Policy Transfer and Politics of Scale in South East Europe**, Southeast European Politics, Volume VI, No. 2, November 2005, (66-87)
- UNDP (2003) **United Nations Development Report**
- UNDP (2006) **United Nations Development Report**
- UNECA (2006) **Africa Development Report**
- www.sadc.int.org accessed 23 February 2008
- World Bank (2005), **Human Development Report**
- World Bank (2006), **Human Development Report 2006**
- WHO (2006) **World Health Report**

Figure 4: Dialogues in regional spatial development perspective knowledge management and economic integration in SADC



Sources: DBSA, 1998, World Bank, 2006, AfDB, 2006; Fair, 2007 ; Soderbaum & Shaw, 2007 ; Chakwizira, Mashiri, & Marrian, 2008

Map 1: SADC road accessibility to ports – approximate time in hours

