

INDICATIVE PLANNING PERSPECTIVES FOR DEVELOPMENT OF BLOEMFONTEIN AS A SMART CITY IN SOUTH AFRICA

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Abstract

In this paper an evaluation of smart socioeconomic, physical and environmental characteristics of Bloemfontein city of South Africa was done to understand the current scenario of the city and evolve perspective indicative planning guidelines for transforming the city into a smart city. The evaluation was done based on 74 smart indicators, and 30 factors under six characteristics, such as, smart economy, smart people, smart governance, smart mobility, smart environment and smart living. For this purpose, survey research methodology with analysis of primary and secondary data and review of the current Integrated Development Plan of the city was followed. The investigation of the various indicators revealed that although the city is lagging behind in most of the characteristics, yet provides ample opportunity to develop it as a smart city, if smart city concept and smart growth principles are employed in city development process.

Keywords: Smart city; Smart growth, Smart economy; Smart people; Smart governance; Smart environment; Smart mobility; Smart living

1. INTRODUCTION

The changed scenario of globalisation, market economy and technological developments has brought obvious economic, social and infrastructural advantages offering potential to combine safe and healthy living conditions, enjoyable lifestyles with remarkably low levels of energy consumption, resource-use, wastes, etc., (Moussiopoulos, Achillas, Vlachokostas, Spyridi, Nikolaou, 2010: 377-384). However, on the other hand, the technological advances and their influence on city functions, influx of people to city and their civic requirements in the wake of the scarce availability of resources make the cities face physical and environmental ailments (Moussiopoulos, et al, 2010: 377-384; Saavedra and Budd, 2009). Many South African cities are not far away from this burgeoning phenomenon and warrant a change in planning perspectives (De Swardt, Puoane, Chopra, & du Toit, 2005: 101-112; McGillivray, 2005: 337-364; Naude, Rossouw, Krugell, 2009:319-326; Ramutsindela, 2002: 49-56; Saff, 2001:87-107) and move from normal planning process (Horn, 2002: 247-284; Kotze & Donaldson, 1998: 467-477; Lotter, 2002:347-368; Nomdo & Coetzee, 2002; Prinsloo & Cloete, 2002:264-277; Saff, 1995:782-88; Turok, 2001:2349-2377; Visser, 2001:1673-1699) towards smart growth and development process based on smart city concept (Farmer, Frojmovic, Hague, Harridge, Narang, Shishido, 2006; Giffinger, Fertne, Kramar, Kalasek, Pichler Milanović, Evert, 2007:1-25; UN- Habitat, 2009).

A Smart City is a well performing forward-looking middle size city built on the smart combination of endowments and activities of self-decisive, independent and participative responsive citizens (Giffinger, 2007). Smart City concept is not considered in a holistic manner rather with reference to various aspects which range from Information and Communication Technologies (Digital) districts to smart populace in terms of educational level. Use of modern technology in everyday urban life, which includes innovative transport systems, infrastructures and logistics as well as green and efficient energy systems are often integral part of a Smart City. Further, there is a strong relationship between city government and citizens in terms of good governance. Additionally, certain other factors of urban life associated with Smart city are participation, security/safety, and cultural heritage (Giffinger et al., 2007; Komminos, 2002; Lombardi 2011: 8-10; Shapiro, 2008: 324-335). As per the policy vision of European Union for developing Smart cities in Europe, it is derived from the combination of concepts of the Connected City (smart logistics and sustainable mobility), the Entrepreneurial City (economic vitality), the Pioneer City (social participation and social capital), and the Liveable City (ecological sustainability) (Nijkamp, and Kourtik, 2011). However, there is no agreement on the exact definition of a Smart City, although a number of important dimensions of a Smart City are identified, which includes Smart Economy (related to competitiveness), Smart Mobility (related to accessibility and connectivity); Smart Environment (related to natural resources); Smart Human Capital (related to people); Smart Living (related to the quality of life) and Smart Governance (related to participation) (Giffinger et al., 2007; Komminos, 2002; Lombardi 2011: 8-10; Shapiro, 2008: 324-335; Van Soom, 2009). Thus, a middle-sized city is considered to be a Smart City if it demonstrates forward-looking development in these six important characteristics of the city on the basis of a combination of local circumstances and activities carried out by politics, business, and the inhabitants. These dimensions are connected with traditional regional and neoclassical theories of urban growth and economic development, particularly the six dimensions are based on theories of regional competitiveness, transport and ICT economics, natural resources, human and social capital, quality of life, and participation of citizens in the governance of cities (Lombardi, 2011: 8-10; Komminos, 2002; Giffinger et al., 2007: 1-25; Shapiro, 2008: 324-335; Van Soom, 2009). A few examples of such cities are Luxembourg, Aarhus (Denmark), Turku (Finland), Aalborg and Odense (Denmark).

Therefore, a Smart city is developed based on predominantly six characteristics, such as, Smart economy, Smart people, Smart governance, Smart environment, Smart mobility and Smart living (Giffinger, et al 2007:1-25). Smart economy refers to parameters around economic competitiveness such as, innovation, entrepreneurship, trademarks, productivity and flexibility of the labour market as well as integration in the national and international market. Smart people are essentially described by the level of qualification or education of the citizens as well as by the quality of social interactions and integration, participation in public life and the receptive attitude and openness towards the outer world.

Smart Governance encompasses facets of political participation, services for citizens and the functioning of the administration. Local and international accessibility in the form of sustainable physical transportation system and information and communication technologies refer to smart mobility. Smart environment is expressed by attractive natural conditions - climate, green open space, level of pollution, resource management and efforts towards environmental protection. Smart living includes various indicators of quality of life such as, culture, health, safety, housing, tourism, etc. (Giffinger, et al 2007:1-25).

Further, the smart growth principles advocate that the growth of city is to weave together the various discourses of physical and spatial issues into a rational sustainable development that integrates economic, environmental and social equity issues. It also incorporates the micro level design aspects, such as, neighbourhood patterns, streets, public spaces, and pedestrian zones, etc., that are traditionally not dealt at the macro level, which invokes the notions of urbanity, where density, proximity and the visual and physical integrity of cityscapes create a sense of coherent community (Calthorpe and Fulton, 2000; Kunstler, 2001; Turner, 2007: 21-44). It is a strategy that targets the physical development of urban regions having strong social, economic and political components with public participation and inclusive multi-actor planning processes (Jailly, 2008: 375-388; Scot, 2007: 15-35).

Therefore, the planning for transforming a city into a Smart City needs to be based on the analysis of performance of these characteristics of a city and application of smart city concept and smart growth principles. In the wake of such a challenge, an effort was made to analyse the performance of the factors and indicators under the above said six characteristics for Bloemfontein city of South Africa and evaluate the current scenario and propose a set of plausible perspective guidelines in order to transform it into a smart city in a foreseeable future. In this regard the scope of the research was limited to evaluate the city based on smart city indicators and identify the strength and weaknesses of the city in order to develop as a smart city considering the current spatial, socio-economic, environmental characteristics of the city and evolving of plausible indicative planning guidelines for transforming the city into a smart city.

For this purpose survey research methodology was followed, i.e., household surveys through stratified random sampling process were conducted followed by both qualitative and quantitative analysis of the data collected. In addition to this above review of the current Integrated Development Plan 2012 of the city was also conducted. The analysis was conducted based on 74 indicators which were grouped into 30 factors under the six smart characteristics of the city in a scale of indices -3 to + 3. The investigation revealed that several indicators under each characteristics provide negative or lower positive indices manifesting that the city is lagging behind in most of the characteristics, however, certain indicators with relatively higher positive indices point towards opportunities to develop Bloemfontein as a smart city, if smart city growth principles are employed in city development process.

2. MATERIALS AND METHODS

2.1 Study area and justification of its choice

The study area considered for this investigation was Bloemfontein city of Free state, South Africa. It is located at the latitude of 29.133 and longitude of 26.214 and almost at the centre of the country. It is the fifth largest city and part of the newest Mangaung Metropolitan Municipality in South Africa. It functions as the provincial capital of Free State province as well as the judicial capital of the country because of the location of judicial Appellate and Supreme Court of the country in the city. Besides, it is well known for its educational and health facilities in the central region of the country. The city is well connected to the each parts of the country by all the three modes of communication such as road, rail and air. One of the International airports of the country is also located in the city facilitating connecting flights to major cities of South Africa and abroad. Also, it houses a number of regional centres of business corporate houses and professional institutions. Further, because of the availability of adequate basic urban infrastructure facilities including existence of transport and communication services, the presence of skilled manpower and its proximity Johannesburg- the largest city of South Africa and Pretoria- the capital city of the country, it has attracted a number of domestic and multinational industrial companies. The presence of Information and communication sector and internet is well felt in the city as most of the area in the city are well connected through Information Communication Technology (ICT) and a number of ICT companies are involved in the development process. However, the growth of industrial activities, influx of population and enhancement of tertiary (service related) functions are increasingly creating pressure on the urban infrastructures, and other facilities and services. On the other hand, the locational advantage, the new status as Metropolitan Municipality, and availability of other facilities, such as, higher education, health, etc., offer opportunities to the city to develop as a competitive and smart city. Therefore, the city was chosen as the study area for this investigation.

2.2 Methodology, data and analysis

Data relating to socio-economic, physical, infrastructural, institutional, ecological and environmental conditions of the city were collected from both primary sources and secondary sources. Primary data was collected through systematic stratified random sampling survey method by using pre-tested schedules at household level in selected areas of city. Sample household survey schedules constituting questions relating to relevant variables under various sectors such as, demographic, economic, transportation and communication, governance, environment, and living conditions of the city, which would enable to evaluate the performance of the sectors were prepared and pretested in the study area. The household survey was conducted in the year 2011 from a total number of 120 selected households in four selected sub urban areas of the city by using the pretested schedules and employing unstructured direct interview method.

Secondary data (statistical and time series data) were collected from authentic published and unpublished literatures, reports in addition to the review of Integrated Development Plan 2012 for the Mangaung Metropolitan Municipality, which is the Metropolitan administrative authority of Bloemfontein city. The data collected were analysed by relevant statistical analysis by using SPSS software to observe the various influential parameters assessing the smartness of each sector and the city.

Based the data collected and analysis mathematical equations for development of indices in each parameter were established. The mathematical indices are as follows:

Smart Index of each indicator: Smart index of each indicator is defined as a function of points assigned to the indicator by the people and percentage of people assigned a particular value. It is presented by

$$SII = \frac{\sum(P \cdot X)}{\sum X}, \text{ Where } SII = \text{Smart index of individual indicators,}$$

P= Points assigned to each indicator by people
X = Percentage of people favoured a value.

Smart Factor index: Smart factor index is a function of cumulative Smart indices of each indicator under a particular factor and the weightages of each indicator under each factor and is presented mathematically by

$$SFI = \frac{\sum(SII \cdot C)}{\sum C}, \text{ Where } SFI = \text{Smart factor index}$$

SII = Smart index of individual indicators,
C= Weightage of each Indicator in each factor

Smart Characteristics index: Smart characteristics index is a function of cumulative Smart factor indices of each factor under each characteristic and the weightages of each factor under each characteristic. It is presented mathematically by

$$SCI = \frac{\sum(SFI \cdot W)}{\sum W}, \text{ Where } SCI = \text{Smart characteristics index}$$

SFI= Smart factor index
W= Weightage of each factor in each characteristics

The above three indices were employed to evaluate the performance of each indicator, each factor and each characteristics in a scale – 3 to + 3 to observe the performance of Bloemfontein as a smart city.

3. FINDINGS AND DISCUSSIONS

The results of smart indices of all the 74 indicators of the study area are presented in figure 1. Figure 2 and figure 3 present the smart factor indices and smart characteristics indices of the city respectively.

The performance of indicators and factors under each smart city characteristics are discussed as below.

3.1 Economy

The economic conditions of the city were evaluated based on eleven indicators which were grouped under six factors. It was observed that while indicators such as, employment rate in knowledge intensive sectors, un-employability rate productivity GDP per employee have higher values, innovative spirit - patent applications per inhabitant have high negative values. The other indicators such as, self-employment rate, new businesses registered in proportion of existing companies, economic image and trademarks, importance as decision-making centre, proportion in part-time employment, air transport of passengers and freight have low to moderate positive values. Thus, the performance of the six factors based on the performance of the indicators observed to vary from low negative zone (-0.615) to high positive (2.0) values (fig 2a). Of the six factors, while productivity (2.0) and flexibility of labour market (1.75) have relatively higher positive values, factors like innovative spirit (0.51), entrepreneurship (1.2) and economic linkage and trademarks (1.5) are in the moderate positive range. On the other hand the performance of international embeddedness is negative (-0.615). Thus the index Smart index value of Economy of the city was found to be 1.037 (fig 3), which is observed to be low although falls in the positive zone indicating lower performance in this sector of development.

3.2 People

There were 14 indicators and seven factors employed to measure the performance of the Smart people index of the city. Out of 14 indicators 10 indicators were found to be in positive zone where as 4 are in the negative zone and the index values vary largely from -2.4 to +2.6 (fig 1). Indicators such as, importance of the city as knowledge centre, basic qualification of the people, participation in public life like voter turnout have high positive indices, while social and ethnic plurality, share of nationals born abroad, immigration friendly environment and participation in lifelong learning have high negative values. The indicators like, flexibility and perception getting a new job, knowledge about country and province, affinity towards lifelong learning, creative people- people working in creative industries perform moderately (have low to moderate positive values). Based on the performance of indicators, it was found that except two of the seven factors, i.e., level of qualifications (2.08), and flexibility (1.5), which have moderate to high values, all the other five factors performs poorly (fig 2b). The factors such as affinity to lifelong learning (0.36), creativity (1.0), participation in public life (0.65) and cosmopolitanism/ open mindedness (0.8) have low positive indices and social and ethnic plurality (-1.95) has high negative values. The performances of these factors lead to a very low Smart people index (fig 3) of the city (0.516) indicating poor performance in this sector.

3.3 Governance

The governance system of the city was assessed on ten indicators and three factors. The indicator city representative per resident under participation in decision making has higher index value (2.5). Six of the ten indicators have indices varying between moderately to relatively high positive values, i.e., female city representatives (2.0), expenditure of municipality per resident (2.0), quality of schools (2.0), children day care (1.5), perception of transparency of bureaucracy (1.5) and perception of fighting against corruption (1.5). However, indicators such as participation in voluntary work (-1.2), political activities of inhabitants (-1.5) and importance of politics for inhabitants (-1.5) have negative values (fig 1). These indicators lead to three factors which signify the performance of the governance sector. Of these the factors, public and social services (1.825), and transparent governance (1.5) have moderate values, participation in decision making (0.75) has low values and all the factor are confined to positive zones (fig 2c) leading to Smart governance index of 1.36 (fig 3), which indicates that this sector performs moderately in the development process.

3.4 Mobility

Smart mobility of the city was evaluated based on nine indicators, which were further grouped into four factors. It was observed that five of the indicators, i.e., local accessibility public transport network per inhabitant (-1.5), access to public transport (-1.5), quality of public transport (-2.0), sustainable, innovative and safe transport systems green mobility share (-2.0), and use of economical cars (-1.5) have moderate to high negative values. On the other hand, (inter-) national accessibility international accessibility (1.5), traffic safety (1.5) and availability of ICT-infrastructure computers in households (2.0) have moderate to relatively high positive values although broadband internet access in households (0.5) has low index value (fig 1). Consequently out of the four factors two of them i.e., local accessibility through public transport network per inhabitant (-1.675) and sustainable, innovative and safe transport systems Green mobility share (-0.45) have negative indices, whereas (Inter-) national accessibility (1.5) and availability of ICT-infrastructure (1.25) have low to moderate to moderate values (fig 2d), leading to a very low (0.15) smart characteristics index (fig 3) of this sector.

3.5 Environment

Under environment sector except two indicators, such as, green space share and individual efforts on protecting environment which have equal low index values (0.5), all other 7 indicators - fatal chronic lower respiratory diseases (1.5), use of electricity per GDP (1.5), use of water per GDP (2.0), pollution summer smog (2.5), opinion on nature protection (2.7) and sunshine (2.75) have moderate to high positive indices.

Thus, it was observed that except environmental protection factor (1.065), other three factors such as, attractiveness of natural conditions (1.675), Pollution (2.025), Sustainable resource management (1.75) have moderate to high positive index values (fig 2e). The characteristic index found to be 1.625 (fig 3) indicating that this sector performs relatively better than other sectors of the city.

3.6 Living

A smart living condition of the city was evaluated based on 20 indicators, which were grouped into six factors. Of all the indicators, three indicators such as, museum visits (-2.5), overnights stay per resident per year (-2.0) and importance of tourist locations (-1.75) have high negative indices. Theatre attendance (1.0), hospital beds per inhabitant (1.0), doctors per inhabitant (1.0), individual safety crime rate (1.0), perception on personal safety (1.0), perception on personal risk of poverty (1.0), satisfaction with personal housing situation (1.2), perception on personal risk of poverty (1.0), poverty rate (1.2) have lower positive index values. However housing quality share of housing fulfilling minimal standards, average living area per person, education facilities students per inhabitant, death rate by assault have moderate index values of 1.5 each. On the other hand perception o quality of health system (2.5), access to educational system (2.5), quality of educational system (2.5) and cultural facilities such as cinema attendance (2.0) have higher positive indices (fig 1). These indicators lead to six factors such as, cultural facilities, health conditions, individual safety, housing quality, educational facilities, touristic attractiveness and social cohesion. It was observed that the educational facilities (2.2) has relatively high positive index value; health conditions (1.625) and housing quality (1.47) have moderate positive indices, individual safety (1.15), social cohesion (1.1) and cultural facilities (0.475) have lower positive index values, whereas touristic attractiveness (-1.875) has relatively high negative index value (fig 2f). Overall the smart living characteristics index comes to 0.904 (fig 3), which is on the lower sides of the scale although still falls in the positive zone.

In summary, it was observed that indicators like employment rate in knowledge intensive sectors, flexibility in labour market under economy; level of qualification, importance as knowledge centre, voters turn out in elections under people, participation in decision making in city, female city representatives, expenditure of municipality per suburbs under governance; attractiveness of natural conditions, opinion on nature protection and pollution under environment, perception on quality on health systems under living conditions have relatively higher index values in comparison to other indicators with positive indices. It is noteworthy to mention that there are no indicators having higher positive indices under mobility sector. On the other hand international embeddedness, social ethnic plurality, local accessibility by public transportation, sustainable innovation in safe transportation for green mobility, economy in car use, museum visits, tourist activity- importance of tourist locations are the aspects which are in the negative zone.

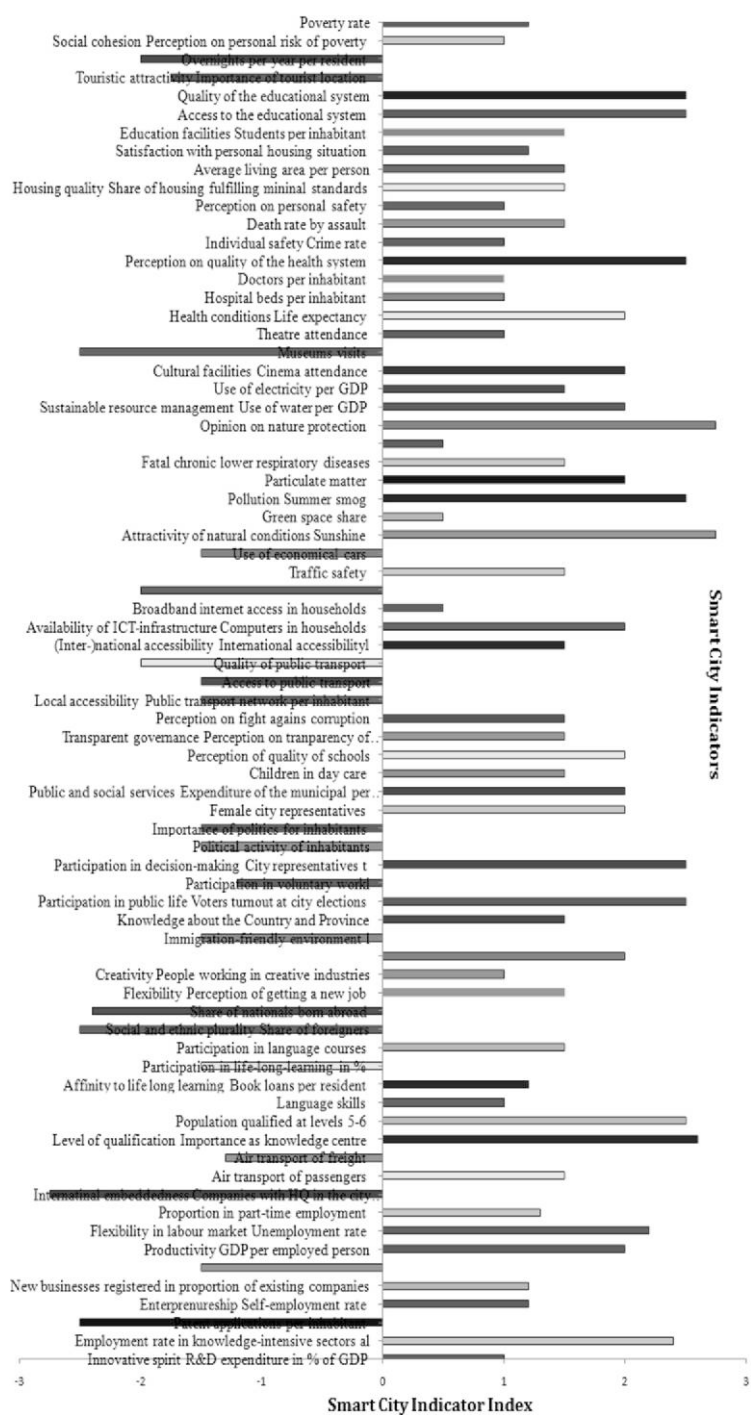
Innovative spirit, creativity, affinity to lifelong learning, cosmopolitanism, participation in public life, participation in decision making, individual effort in environmental protection, personal perception of risk of poverty, etc., have lower positive indices and need special attention.

Similarly, it was found that although most of the factors have positive indices, none of them except education facilities have values higher than 2. In addition, factors particularly under economy and mobility have relatively lower values. Further, factors such as, international embeddedness, social ethnic plurality, local accessibility and public transportation, safe transportation and green mobility, and touristic attractivity have negative indices and are cause of major concern.

The index values of the six smart characteristics of the city revealed that although none of the characteristics have negative indices, and range between minimum of 0.15 to maximum of 1.6, which are on the lower side of the index value, with the performance of mobility and people are at the lowest and governance and environment sector at the highest level; and living and economy perform at the intermediate level.

Thus, the city is lagging behind almost all the smart characteristics particularly in mobility, people, living and economy although environment followed by governance perform relatively better. However, the analysis revealed that despite being a few indicators and factors lie in the negative zone, yet majority of them are in the positive zone, although fall short of the maximum index points (+3), indicating that the city has potential to become a smart city if plausible actions are taken.

Figure 1 Smart city indicators indices of Bloemfontein city (primary survey)



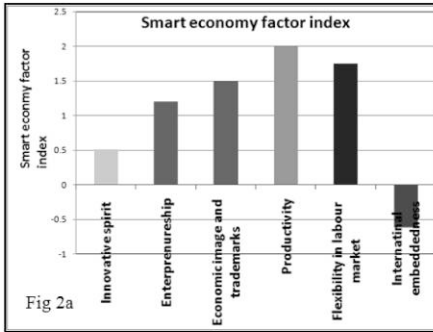


Fig 2a

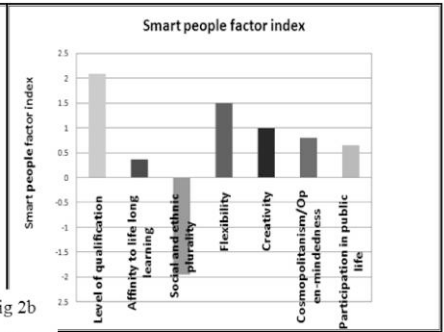


Fig 2b

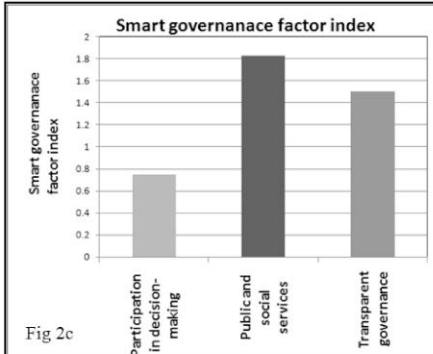


Fig 2c

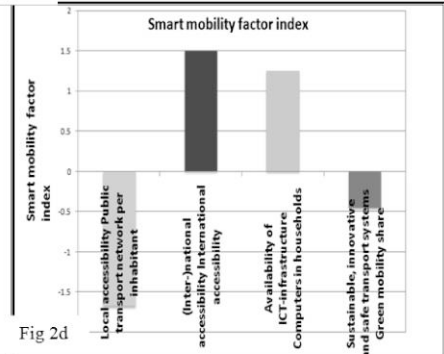


Fig 2d

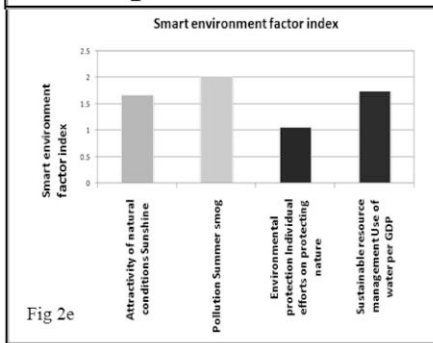


Fig 2e

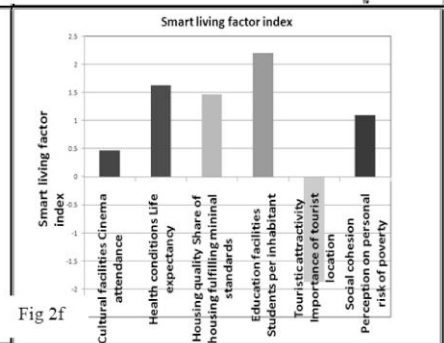


Fig 2f

Figure 2 Smart factor indices of Bloemfontein city (primary survey 2011)

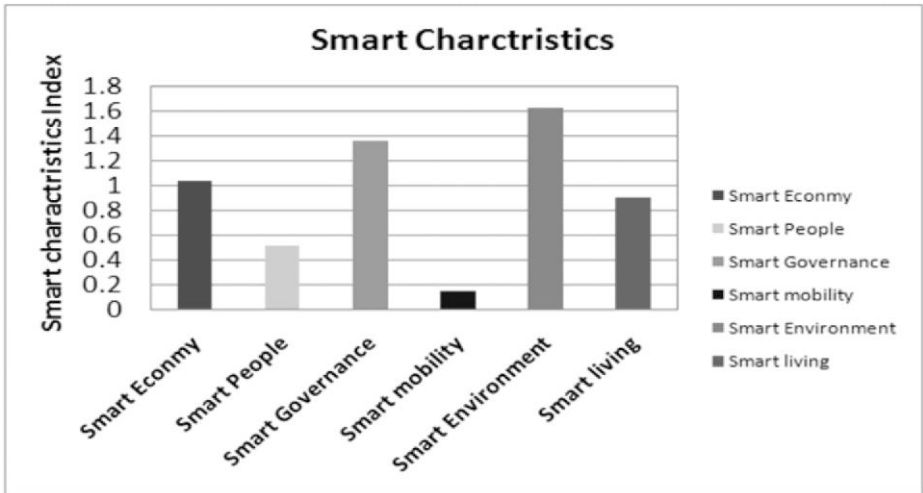


Figure 3 Smart characteristics indices of Bloemfontein city (primary survey 2011)

4. INDICATIVE PLANNING GUIDELINES

Bloemfontein city is a part of Mangaung Metropolitan Municipality which has acquired its new status in the year 2011 to become the sixth Metropolitan area of South Africa. The development process of the city and erstwhile Mnagaung municipality was being carried out according to the Integrated Development Plan (IDP 2008). According to Metropolitan Municipality authorities the development process will be carried out as per the newly prepared Integrated Development Plan (IDP) 2012. The Metropolitan authorities envisioned that Mangaung Metropolitan Municipality shall become a globally safe and attractive municipality to live, work and invest with a mission to improve social and economic livelihoods through public participation, effective and efficient integrated governance systems and programs by the year 2030. Accordingly a few important future guiding principles have been stressed upon such as, economic growth and jobs creation, building community resilience and self-resilience, services excellence and sustainability, civic leadership common purpose, etc. The strategies developed to achieve the objectives are through stimulating integrated and sustainable economic development prospects, improving and sustaining financial, human resource excellence and management excellence, evolving institutional excellence through a thoroughgoing institutional re-engineering process, effective leadership and effective long range development planning (IDP, 2012), etc.

However, it was observed that although the Managaung municipality of which the city is a part has been upgraded to a Metropolitan Municipality, the development process has been reviewed, proactive measures and strategies have been developed and a new IDP has been in place, yet status of its various

development indicators to develop the city as a smart city indicate that the principles of the development need further review. The essential change that needs to be augmented in development concept is to see the city as a national city with international embeddedness and economic activity generation point in the future than its current status as a provincial administrative centre and residential city. The focus should be on prioritized indicator driven development process while micro level development compliments the macro level development. At the macro level, International embeddedness such as, facilitating for FDI and setting up of corporate offices may be considered and accordingly adequate policy measures at the provincial and national level may be initiated and adequate built infrastructure may be augmented. At micro level, the strengths of the city such as, educational and health facilities, its natural and environmental conditions, potential for knowledge based enterprising activities need to be harnessed and strengthened further. On the other hand, the weaknesses such as, public transportation, green mobility, social and ethnic plurality, cosmopolitanism, etc., are required to be addressed. For this purpose, national, regional and local transportation system should be upgraded through road transportation facilities and revitalising the railway system. The international transportation systems may be strengthened by providing more exposure to international flights to the existing international airport of the city. At the local level large scale effective public transportation system is the most important aspect to be dwelled upon in immediate future. Further, the city development process must also include the green city development concept to its development and enable every citizen to make effort towards achieving this. Enhancement of tourist activities, giving importance to tourist locations, strengthening of social plurality and cultural developments are of high importance and needs to be attended to. Most importantly the city development governance process must be done based on smart growth principles in which the strategy should target the physical development of the urban region having strong social, economic and political components with public participation and inclusive multi-actor planning processes, i.e., participative decision making by participation of all the stakeholders (people, merchants, academicians, entrepreneurs, students, professional, local political leaders, etc.), which in effect will aid the decision makers to plan, implement and manage according to the requirement of city and its gentry.

5. CONCLUSION

A smart city is essentially regarded as a well performing city in all its characteristics and the development is based on self decisive and citizen participation. The purpose of developing such a city is to enhance the capability of the potentials of the city and judicious resource management for optimal development of the city. The analysis of the current scenario of Bloemfontein city based on the indices of smart indicators, consequent development factors and characteristics manifested that the city is lagging behind in almost all aspects. At the same time it was also observed that although some of the indicators are in the

negative zone, yet majority of them have positive indices, thus indicating that the city has ample potential to become a smart city. With a democratic set up, strong history, availability of educational facilities and potential for knowledge based professional enterprising activities, advanced health facilities and forward looking and proactive initiatives by the decision makers and the people as a whole, the city can follow the smart growth principles and has a definitive ability to develop as a smart city. On the other hand, there are severe constraints in the form of cultural rigidity, lack of social flexibility and ethnic plurality, handicap in international embeddedness, etc., which may stand on the way of its development towards a smart city, and need to be addressed with proactive planning efforts.

The current investigation has its limitations such as, access to pertinent secondary data and thus relied basically on the primary survey and people's judgement. It is also acknowledged that the sample size used in analysis is relatively small. It may be noted that although the sample size is relatively small, since systematic stratified random sampling method was employed in the survey, the sample is fairly representing the study area. Therefore, the small sample size may not influence the results largely (it may influence marginally) in comparison to a relatively larger sample size, if employed. However, analysis of structured secondary statistical data would provide better insight to certain issues related to Smart City development particularly in the Smart Economy characteristics. Further, it is well recognized that some of the indicators need to be customised to South African or African conditions in general and followed by thorough investigation of each smart characteristic for evolving of detailed planning guidelines and development strategies for Smart City development, which require further research. However, this investigation revealed that although the Bloemfontein city at its current state has a long way to go in order to become a Smart City, yet the city can be transformed to a Smart City if proper and plausible development planning efforts are made.

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