

An approach towards skills transfer of urban and regional planning practices and principles for related professions within the built environment

I Jansen van Rensburg
22184325

Dissertation submitted in fulfilment of the requirements for the degree *Magister Artium et Scientiae* in **Urban and Regional Planning** at the Potchefstroom Campus of the North-West University

Supervisor: Prof CB Schoeman

May 2016

PREFACE

This dissertation is submitted in fulfilment of the requirements of the degree *Magister Artium et Scientiae* in Urban and Regional Planning at the Potchefstroom Campus of the North-West University. The research was conducted under the supervision of Professor CB Schoeman in the Faculty of Natural Science, School of Geo- and Spatial Sciences, of the abovementioned university between March 2014 and October 2015. All the work presented is original to the best of my knowledge and a declaration is included, which states as much. Sources used are referenced in terms of the NWU Harvard Reference Style of 2012.

Parts of this work have previously been published in the IMESA Magazine and will be published as part of an article presented at the Institute of Municipal Engineers of Southern Africa (IMESA) 2015 conference. The following references apply:

Jansen van Rensburg, I. 2015. Capacity building guidelines in urban and regional planning for municipal engineers and engineering staff within municipalities. *IMESA*, 40(1):39-41.

Jansen van Rensburg, I. & Schoeman, C.B. 2015. Capacity building guidelines in urban and regional planning for municipal engineers and engineering staff within municipalities. (*In 79th Annual IMESA Conference: Changing the face of the Municipal Engineer, Cape Town, 28-30 October 2015*).

Jansen van Rensburg, I. & Schoeman, C.B. 2015. Capacity building guidelines in urban and regional planning for municipal engineers and engineering staff within municipalities: Executive Summary. (Unpublished).

ACKNOWLEDGEMENTS

I would like to express my sincere appreciation and gratitude for my supervisor, Prof. CB Schoeman, for his patient guidance, mentorship and continued support throughout the dissertation, for his patience, motivation, enthusiasm and inputs. It has been a privilege working with him throughout this process.

Secondly, I would like to thank Prof. HS Steyn for his assistance and immense contribution with the survey forms and the analysis of the statistical data obtained throughout the dissertation. His patient guidance, mentorship and continued support were invaluable to the results presented.

Thirdly, I would like to thank the participants of the IMESA Conference 2014 survey and the SACPLAN 2015 Survey for their participation and enthusiastic comments and questions. The knowledge gained from them is invaluable to the study and resulted in the successful evaluation of the need at hand. I would also like to express my sincere appreciation to Mr. M Lewis (CEO of SACPLAN) for his assistance in distributing the SACPLAN 2015 Survey.

To my editor, Mr. N. Baines, I would like to say thanks for his patience and assistance in rounding of the dissertation and getting it to the quality it is. I would like to express my sincere appreciation to Me. L. Downes-Webb, whom assisted with my questions without hesitation, her kind words motivated me in times of need.

Finally, to my family, especially my parents, Bertie and his family, and to my friends, I would like to express my greatest appreciation and gratitude for the emotional support, motivation and patience during this time. They were my support structure through the most stressful of times.

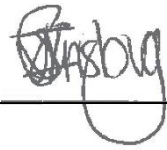
DECLARATION BY RESEARCHER

Name & Surname: Ilana Jansen van Rensburg

Student Number: 22184325

I hereby declare that **An approach towards skills transfer of urban and regional planning practices and principles for related professions within the built environment**, is wholly my own work and that all sources used or quoted have been fully referenced and acknowledged by means of complete references.

Signature:

A handwritten signature in black ink, appearing to read 'Ilana Jansen van Rensburg', written over a horizontal line.

Date:

A handwritten date '29/03/2016' in black ink, written over a horizontal line.

ABSTRACT

Urban and regional planning responsibilities have been assumed by newly established and existing local municipalities. Of these municipalities, many do not have the financial means to employ full-time urban and regional planners to manage these responsibilities. A programme was developed in an attempt to cater for and recognise the need for capacity building in physical development planning at all levels, including all local, district and national authorities. It is proposed to equip the relevant persons with a user-friendly and comprehensive user guideline in order to guide them in understanding their role in Urban and Regional Planning. This dissertation includes a comprehensive literature review with references made to existing policy and legislative frameworks, skills transfer and capacity building and a brief analysis of the professions included in the built environment. It further evaluates the proposed programme through conducting a needs assessment. This includes a review of existing qualifications presented at tertiary institutions in South Africa and the results from both quantitative and qualitative data collected from two surveys, circulated to professionals in the built environment and urban and regional planners. The dissertation uses outcomes-based evaluation which further includes an evaluability assessment, through the use of a strengths, weaknesses, opportunities and threats (SWOT) analysis and balanced scorecard, as well as programme monitoring, through the use of a logic model. The resulting recommendations will provide an approach to skills transfer applicable to the professions included in the built environment.

Key terms:

- Urban and regional planning practices and principles;
- Professions included in the built environment;
- Evaluation research;
- Approach to skills transfer.

OPSOMMING

Stads- en Streekbeplanning verantwoordelikhede word uitgevoer deur nuutgestigte en bestaande plaaslike munisipaliteite. Sommige van hierdie munisipaliteite het nie die finansiële vermoë om voltyds Stads- en Streekbeplanners aan te stel om hierdie verantwoordelikhede op te neem nie. 'n Program is ontwikkel in 'n poging om die erkende behoefte vir kapasiteitsbou in fisiese ontwikkelingsbeplanning op alle vlakke, insluitend plaaslike-, distriks- en nasionale owerhede, aan te spreek. Dit poog om die betrokke persone met 'n gebruikers vriendelike en omvattende gebruiker riglyn toe te rus om sodoende, leiding te bied in die begryping van hul rol in Stads- en Streekbeplanning. Die verhandeling sluit 'n omvattende literatuuroorsig in, met verwysings na bestaande beleid en wetgewende raamwerke, die oordrag van vaardighede en kapasiteitsbou en 'n kort ontleding van die beroepe ingesluit in die bou omgewing. Dit beoog verder om die voorgestelde program te evalueer deur die uitvoering van 'n behoefte bepaling. Dit sluit 'n hersiening van bestaande kwalifikasies wat by tersiêre instellings in Suid-Afrika aangebied word en die resultate van beide kwantitatiewe en kwalitatiewe data ingesamel tydens twee (2) opnames, gesirkuleer tussen beide beroepe in die bou-omgewing en Stedelike en Streekbeplanners. Die verhandeling gebruik Uitkomsgebaseerde Evaluering (UGO) wat verder 'n evalueerbaarheids assessering, deur die gebruik van 'n sterkpunte, swakpunte, geleenthede en bedreigings (SWOT) -analise en gebalanseerde telkaart, sowel as program monitering, deur die gebruik van 'n logika model. Die gevolglike aanbevelings sal 'n benadering tot die oordrag van vaardighede, van toepassing op die beroepe in die bou omgewing, voorsien.

Sleuteltermes:

- Stads- en Streekbeplanning praktyk en beginsels;
- Professies ingesluit in die bou omgewing;
- Evaluasie navorsing;
- Benadering tot die oordrag van vaardighede.

CONTENTS

PREFACE	II
ABSTRACT	V
OPSOMMING	VI
CHAPTER 1 INTRODUCTION AND BACKGROUND	1
1.1 Problem statement and substantiation	2
1.2 Purpose and aims of the research	3
1.3 Research questions and central theoretical statement	4
1.3.1 Research questions	4
1.3.2 Central theoretical statement	4
1.4 Research context	4
1.5 Research approach and methodology	8
1.6 Data analysis	16
1.7 Ethical considerations and trustworthiness	18
1.7.1 Ethical consideration	18
1.7.2 Trustworthiness	19
CHAPTER 2 LITERATURE REVIEW	21
2.1 Introduction	21
2.2 Theoretical review of evaluation research	21
2.2.1 Needs assessment	25
2.2.2 Evaluability assessment	27

2.2.3	Programme monitoring	36
2.3	Conceptualisation of skills transfer and professions in the built environment.....	42
2.3.1	Skills transfer	43
2.3.2	Professions included in the built environment	45
2.4	Review of policy and legislative framework with regard to skills transfer in the built environment.....	62
2.4.1	Understanding BRICS and IBSA.....	62
2.4.2	Existing studies.....	64
CHAPTER 3 EMPIRICAL RESEARCH.....		76
3.1	Introduction	76
3.2	Needs assessment	76
3.2.1	Review of current tertiary education provided to professions in the built environment.....	76
3.2.2	Statistical methods used for the interpretation of data.....	84
3.2.3	IMESA Conference 2014 survey results	85
3.2.4	SACPLAN Survey 2015 results	115
3.3	Evaluability assessment	158
3.3.1	SWOT analysis.....	159
3.3.2	Balanced scorecard	161
3.4	Programme monitoring	164
3.4.1	Logic modelling.....	164
CHAPTER 4 FINDINGS AND CONCLUSION.....		167
4.1	Introduction	167

4.2	Alignment with literature review.....	167
4.3	Discussion and interpretation of findings	168
4.3.1	Needs assessment	168
4.3.2	Evaluability assessment	170
4.3.3	Programme monitoring	170
4.4	Conclusion.....	171
	CHAPTER 5 LIMITATIONS SUMMARY AND RECOMMENDATIONS.....	172
5.1	Research limitations.....	172
5.2	Summary	173
5.3	Recommendations.....	173
5.3.1	Proposed implementation plan	174
5.3.2	Proposed programme monitoring.....	175
5.3.3	Future research	176
	REFERENCES.....	177
	ANNEXURES	200

LIST OF TABLES

Table 1-1:	Some professional focuses of urban and regional planning as per interpretation on a national and international level.....	5
Table 2-1:	Differentiation between internal and external evaluators.	23
Table 2-2:	Example of a 2 x 2 SWOT matrix.	35
Table 2-3:	Advantages and limitations of a SWOT analysis.	35
Table 2-4:	Advantages and limitations of a logic model.....	42
Table 2-5:	Scarce and critical skills list for some of the professions in the built environment.	45
Table 2-6:	Proposed amendments to categories of planners with qualification and experience requirements.....	48
Table 2-7:	Typical work conducted by urban and regional planners.	50
Table 2-8:	Explanation of professions in the built environment and their interaction with urban and regional planners.	59
Table 2-9:	Relevant professions viewed in context of BRICS and IBSA.....	65
Table 2-10:	International policy framework.....	67
Table 2-11:	National legislative framework.....	68
Table 2-12:	National policy framework.	70
Table 2-13:	Existing studies done on education, training and skills transfer of urban and regional planning knowledge in South Africa.	73
Table 3-1:	Accredited qualifications presented at various tertiary institutions for professions included in the built environment.	77
Table 3-2:	Matrix of tertiary qualifications presented in Urban and Regional Planning and Civil Engineering courses at various accredited tertiary institutions.....	79

Table 3-3:	Matrix of modules presented in Urban and Regional Planning and Civil Engineering courses at various accredited tertiary institutions.	82
Table 3-4:	IMESA Conference 2014 - Question (a) thematic analysis	94
Table 3-5:	IMESA Conference 2014 - Question (b) thematic analysis.	102
Table 3-6:	Reliability statistics - total knowledge	108
Table 3-7:	KMO and Bartlett's Test	109
Table 3-8:	Communalities	109
Table 3-9:	Total Variance Explained	109
Table 3-10:	Total Variance Explained - Rotation sums.....	110
Table 3-11:	Component Matrix.....	111
Table 3-12:	Rotated Component Matrix	111
Table 3-13:	Reliability statistics - Baseline knowledge	112
Table 3-14:	Item-Total statistics	112
Table 3-15:	Scale statistics	112
Table 3-16:	Reliability statistics - Output driven knowledge	112
Table 3-17:	Item-Total statistics	113
Table 3-18:	Scale statistics	113
Table 3-19:	SACPLAN 2015 Survey - Question (a) thematic analysis.....	126
Table 3-20:	SACPLAN 2015 Survey - Question (b) thematic analysis.....	133
Table 3-21:	SACPLAN 2015 Survey - Question (c) thematic analysis	140
Table 3-22:	SACPLAN 2015 Survey - Question (d) thematic analysis.....	147
Table 3-23:	Reliability statistics - total knowledge	152
Table 3-24:	KMO and Bartlett's Test	152
Table 3-25:	Communalities	153

Table 3-26:	Total Variance Explained	153
Table 3-27:	Total Variance Explained - Rotation sums.....	154
Table 3-28:	Component Matrix.....	155
Table 3-29:	Rotated Component Matrix	155
Table 3-30:	Reliability statistics - Baseline knowledge	155
Table 3-31:	Item-Total statistics	155
Table 3-32:	Scale statistics	156
Table 3-33:	Reliability statistics - Output driven knowledge.....	156
Table 3-34:	Item-Total statistics	156
Table 3-35:	Scale statistics	156
Table 3-36:	SWOT analysis of the programme.	160
Table 3-37:	2x2 SWOT framework.....	161
Table 3-38:	Balanced scorecard of the programme.....	162

LIST OF FIGURES

Figure 1-1:	Dissertation contents.....	2
Figure 1-2:	Micro and macro interface relationships between Urban and Regional Planning and other disciplines.....	7
Figure 1-3:	Stakeholders in sustainable development.	7
Figure 1-4:	Exploratory mixed-method design.	9
Figure 1-5:	Explanatory mixed-method design.	9
Figure 2-1:	Phases included in evaluation research.	24
Figure 2-2:	Perspectives included in cause-and-effect progression of a balanced scorecard.	31
Figure 2-3:	Perspectives included in cause-and-effect progression of a balanced scorecard for non-profit organisations.	31
Figure 2-4:	Components of a logic model.	41
Figure 2-5:	Interaction between private and public sector and associated policies and legislation.	57
Figure 3-1:	Representatives from each province.	86
Figure 3-2:	Private sector vs public sector / parastatal representatives per province.	87
Figure 3-3:	Age groups per gender.	87
Figure 3-4:	Verbal presentation of the guidelines.	88
Figure 3-5:	Physical presentation of the guidelines.	88
Figure 3-6:	Open ended questions - Section B.....	90
Figure 3-7:	IMESA Conference 2014 – flowchart of question (a) thematic analysis.	91
Figure 3-8:	Responses for sub-themes received for each theme identified.....	92
Figure 3-9:	IMESA Conference 2014 - flow chart of question (b) thematic analysis.....	99

Figure 3-10:	Responses for sub-themes received for each theme identified.....	100
Figure 3-11:	Qualifications obtained per tertiary institution.	106
Figure 3-12:	Total level of knowledge per topic on a scale 1-5.	108
Figure 3-13:	Scree Plot	110
Figure 3-14:	Average level of knowledge for private vs public sectors on a scale 1-5....	114
Figure 3-15:	Level of knowledge for years' experience on a scale 1-5.....	115
Figure 3-16:	Representatives from each province.	116
Figure 3-17:	Private sector vs public sector / parastatal representatives per province...	117
Figure 3-18:	Age groups per gender	117
Figure 3-19:	SACPLAN Registration categories of participants for years' experience....	118
Figure 3-20:	Verbal presentation of the guidelines.	119
Figure 3-21:	Physical presentation of the guidelines.	119
Figure 3-22:	Open ended Questions - Section B.	122
Figure 3-23:	SACPLAN 2015 Survey - flow chart of question (a) thematic analysis.....	123
Figure 3-24:	Responses for sub-themes received for each theme identified.....	123
Figure 3-25:	SACPLAN 2015 Survey – flow chart of question (b) thematic analysis.....	131
Figure 3-26:	Responses for sub-themes received for each theme identified.....	131
Figure 3-27:	SACPLAN 2015 Survey - flow chart of question (c) thematic analysis.....	137
Figure 3-28:	Responses for sub-themes received for each theme identified	138
Figure 3-29:	SACPLAN 2015 Survey - flow chart of question (d) thematic analysis.....	144
Figure 3-30:	Responses for sub-themes received for each theme identified.....	144
Figure 3-31:	Qualifications obtained per tertiary institution.	150
Figure 3-32:	Total level of knowledge per topic on a scale 1-5.	152

Figure 3-33:	Scree Plot	154
Figure 3-34:	Average level of knowledge for private vs public sectors on a scale 1-5....	157
Figure 3-35:	Level of knowledge for years' experience on a scale 1-5.....	158
Figure 3-36:	Programme contents - Capacity building guidelines.	159
Figure 3-37:	Logic model of programme.....	165

TABLE OF ABBREVIATIONS

ABCE	Brazilian Engineering Consultants Association
BRIC	Brazil, Russia, India and China
BRICS	Brazil, Russia, China and South Africa
CBE	Council for the built environment
CBPR	Community-based participatory research
CDC	Centres for Disease Control and Prevention
CETA	Construction Education and Training Authority
CPD	Continuing professional development
CPUT	Cape Peninsula University of Technology
DHET	Department of Higher Education and Training
ECI	Engineering Council of India
ECSA	Engineering Council of South Africa
FAR	Floor area ratio
IBSA	India, Brazil and South Africa
IMESA	Institute of Municipal Engineers of Southern Africa
ISE	Institution of Structural Engineers
ITPI	Institute of Town Planners, India
JRSA	Justice Research and Statistics Association
KMO	Kaiser-Meyer-Olkin
KPI	Key performance indicators
NCRPB	National Capital Region Planning Board
NDP	National Development Plan
NGP	New Growth Path
NQF	National Qualifications Framework
NSDS	National Skills Development Strategy
NWU	North-West University
SAACPP	South African Association of Consulting Professional Planners
SACAP	South African Council for the Architectural Profession
SAGI	South African Geomatics Institute
SAIA	South African Institute of Architects
SAICE	South African Institute of Civil Engineering
SAPI	South African Planning Institute
SARJ	State of Rio de Janeiro
SETA	Sector Education Training Authorities
STEP	Standardized technology evaluation process
SWOT	Strengths, weaknesses, opportunities and threats

TCPO	Town and Country Planning Organisation
TUT	Tshwane University of Technology
TVET	Technical and vocational education and training
UJ	University of Johannesburg
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNISA	University of South Africa
Wits	University of the Witwatersrand

CHAPTER 1 INTRODUCTION AND BACKGROUND

Urban and regional planning, together with its interface with the disciplines included in the built environment, can be seen as a major component in sustainable development (Ahmadi & Toghyani, 2011; Schoeman, 2010:2). This is enhanced through the relationship between the relevant disciplines, and the understanding of the discipline's role in handling certain responsibilities.

With the democratisation of South Africa in 1994, the new government inherited the long list of spatial planning and development problems that were the result of failed attempts to address possible spatial planning problems and development regulations in the past. These problems included segregation, fragmented and spatial systems and other problems with regard not only to spatial problems but also to economic factors (Forbes, 2011:6; van Wyk, 2012:25 & 50-52).

As a result of the implementation of "wall-to-wall" municipalities after the 1994 elections in South Africa, a large number of new local and district municipalities were developed. This was guided by the Municipal Structures Act 117 of 1998 and implemented by the Municipal Demarcation Board in 1996. (Forbes, 2011:12; van Wyk, 2012:101-127 & 182). This development resulted in urban and regional planning responsibilities being assumed by newly established and existing local municipalities. Of these municipalities, many do not have the financial means to employ full-time urban and regional planners to manage these responsibilities (IMESA, 2009).

IMESA foresaw the need for capacity building in physical development planning at all levels, including all local, district and national authorities. They aimed at equipping them with a user-friendly and comprehensive capacity building guideline ("the programme"). The programme is proposed to assist in carrying out their urban and regional planning duties and associated responsibilities by municipal engineers, among others (IMESA, 2009). No formal needs assessment was conducted in order to confirm the presumed need and to establish whether or not the programme will be adequate and sufficient in providing sufficient information to enable the urban and regional planning duties to be assumed.

The programme was further described by Schoeman (2014) as follows:

*The project consists of **capacity building guidelines** to empower municipal engineers and engineering staff to have a basic understanding of the theory, concepts, definitions, practices and procedures underpinning the Profession of Planning. The point of departure is **not to train** engineering staff to be urban and regional planners **but to enable** such members of staff to be able to engage with planning specialists and related applications such as spatial plans, land development applications etc. [Authors' emphases].*

The dissertation focuses on the evaluation of the programme as proposed by IMESA (Annexure A). This includes conducting a needs assessment in order to confirm the existence of the

assumed need for the programme as well as an evaluability assessment and programme monitoring. This consists of an evaluation of the programme through the use of balanced scorecards and development evaluation methods followed by proposals of outcomes-based evaluation, as the programme has not been implemented. These proposals are provided in order to serve as an approach towards skills transfer of urban and regional planning practices and principles for related professions within the built environment.

The needs assessment aims to establish the need for capacity building in urban and regional planning practice in order to enhance knowledge, effectiveness and efficiency of municipal engineers and engineering staff in, among other things, engagement, participation and contribution in statutory land development applications, spatial planning and related development processes within municipalities.

The following diagram illustrates the content of the dissertation:

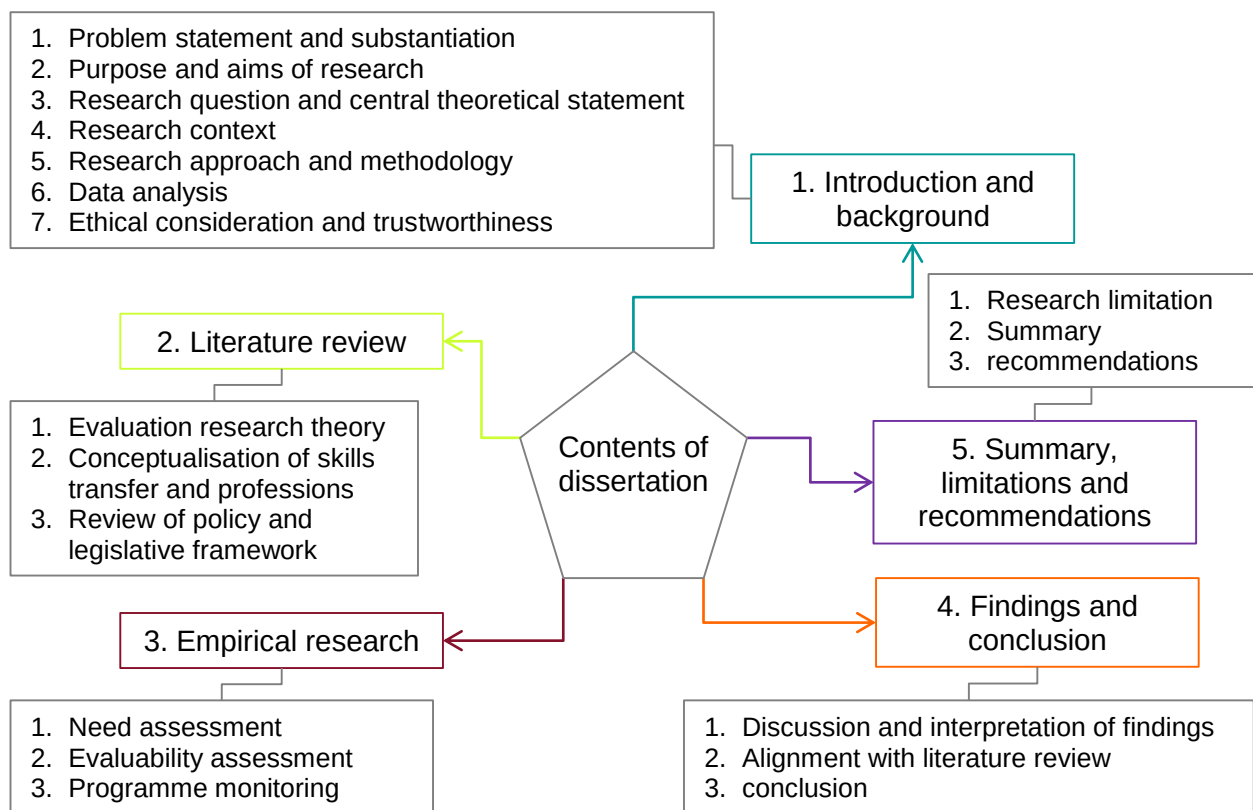


Figure 1-1: Dissertation contents.

Source: Own synthesis

1.1 Problem statement and substantiation

Urban planning forms part of a vast range of professions, resulting in its inclusion in a multidisciplinary web of professions contained in the comprehensive built environment. Many of the professions in the built environment either work directly with urban planning (i.e. land

surveyors are permitted to carry out the some of the statutory urban planning activities such as consolidations and subdivisions), or work in close association with urban planning (i.e. traffic engineers approached to consult about certain sections within an application that is being done by the relevant planner). It is important to note the interface between urban and regional planning and other professions. Furthermore, it is also important to understand what the several professions are expected to know and understand when dealing with the broad spectrum of knowledge included in urban and regional planning and how this compares with what they do know in practice. For the purpose of the dissertation, the focuses of engineering will specifically be looked at within the context of the public sector and its interaction with urban and regional planning. This determination will support the probable need for the proposed programme as well as its content.

1.2 Purpose and aims of the research

The primary aim of this study is to evaluate the programme, as proposed by IMESA (Annexure A), to be implemented regarding skills transfer between urban and regional planning and engineering and to provide plausible proposals regarding the improvement of the programme to the multidisciplinary professions involved in the built environment.

The secondary aims will include:

- To identify a programme approach and evaluation strategy;
- To identify and evaluate the provision of training for multidisciplinary professions;
- To review the legislative and policy framework relevant to the study (national and international);
- To review the existing education provided at tertiary institutions regarding engineering and urban and regional planning and the correlation with each other and interaction with other institutions;
- To interpret the data collected through surveys in order to determine the need for the programme;
- To determine the additional urban and regional planning information to be included for each discipline;
- To conduct an evaluability assessment and programme monitoring through balanced scorecards, strengths, weaknesses, opportunities and threats (SWOT) analysis and a logic model; and
- To present recommendations and outcomes-based programme evaluation proposals.

The following objectives will be completed in accordance with the aim and sub-aims:

- To explore relevant professions and their interface with urban planning;

- To circulate questionnaires to representatives of the relevant professions and identify the expectations between them;
- To evaluate the programme intended for implementation; and
- To provide proposals regarding the improvement of the guidelines for an urban planning training manual (based on the abovementioned), for all relevant multidisciplinary professions.

The aim, sub-aims and objectives can be achieved by means of posing various research questions and a central theoretical statement.

1.3 Research questions and central theoretical statement

1.3.1 Research questions

This dissertation will attempt to answer the following research question:

How can urban and regional planning practices and principles be transferred to related professions within the built environment, through the evaluation of a proposed programme?

This is further supported by secondary research questions:

- Is there a need for the transferring of urban and regional planning practices and principles to related professions in the built environment?
- Will the proposed programme sufficiently fulfil this need by means of including the required information?
- How will the proposed framework for programme monitoring assist in the transfer of urban and regional planning practices and principles to related professions in the built environment?

1.3.2 Central theoretical statement

This dissertation evaluates the proposed “Capacity Building Guidelines in Urban And Regional Planning For Municipal Engineers And Engineering Staff Within Municipalities’ programme, in order to determine the possibility of skills transfer of urban and regional planning practices and principles to related professions in the built environment. The evaluation includes a literature review, needs assessment and an evaluability assessment, which will include the use of a balanced scorecard, and programme monitoring, including outcomes-based evaluation through the development of proposed assessment tools to be applied after implementation of the programme. The latter will be applicable to other professions in the built environment and will finally determine whether or not skills transfer will be possible.

1.4 Research context

Urban and regional planning forms part of an interconnected web of several disciplines. This includes the spheres of, among others, natural science, engineering, research and development,

biological science, law and legislation, mathematics and computer science, and economics. Urban and regional planning also forms part of the built environment which in turn includes the disciplines such as architecture, land surveying, urban design, and so forth (Akbar & Rasul, 2012; Pinson, 2004; Rahmaan, 2011:182-184).

Table 1-1 illustrates the grouping of the urban and regional planning domain on a national and international level, into several relevant sections of core professional focuses (Schoeman, 2010:8) meaning that several subsections (domains) are provided under each of the identified sections (Akbar & Rasul, 2012; Pinson, 2004; Rahmaan, 2011:182-184). These sections also illustrate the wide applicability and knowledge contained in urban and regional planning.

Table 1-1: Some professional focuses of urban and regional planning as per interpretation on a national and international level.

Sections of core professional focuses	Domain as per interpretation on a national and international level
Spatial planning	Planning systems; practices in regional spaces; role of places; strategic frameworks; forward planning; scale of regional planning; impact of migration; regional corridor and nodal development.
Urban planning	Anticipating development; scale of urban planning; urban regeneration and development; urban design; site planning; neighbourhood development.
Policy and strategy formulation	Policy interventions; multi-perspective approaches; disaster preparedness plans; input in draft of policy legislation.
Land use management	Land use management and control; regulating development; legal issues related to land use and building codes and environmental regulations.
Built environment	Style of buildings; conservation of historic buildings; development of public spaces and places, location, design and layout of buildings.
Land availability	Land reservation; identification of land for development.
Transportation planning	Accessibility between places of residence, work and amenities; traffic congestion management; air pollution management; transport and land use models; transportation frameworks.
Environmental management	Relationship with the built environment; negative impacts on natural environment; natural impacts on communities; standards of environmental quality and sustainability; landscape development; legal issues related to environmental management.
Socio-economic and spatial development	Social and economic status quo and forecasting; community regeneration; regional and economic development; smart growth strategies; economic development plans; development resources.

Facilitation and communications	Lead public consultation processes; education, training and capacity building; identification of community needs; community goals and vision compilation.
Human settlement development	Housing development and strategies.
Rural development	Community-based development and area based planning.
Feasibility studies	Appreciation of spatial complexities; deeper underlying causes; integrated analysis.
Implementation	Infrastructure needs; general management; implementation and enforcement strategies; determination of infrastructure and amenities capacity.
Project management	Management of programmes for planning and implementation; quality management.
Management and analysis support systems	GIS applications and techniques, modelling and system analysis.

Source: Adapted from Akbar & Rasul (2012); Greshman (2011) and Schoeman (2010:9).

The interactive disciplinary approach promoting urban and regional planning and other professions in the built environment is also important for the stakeholder involvement to be taken into consideration as this may influence the resulting sustainable development (Rahmaan, 2011:182-184; Schoeman, 2010:15). This includes the responsibilities of professions such as engineering which deals in general with the transportation and traffic systems and utilities such as water, storm water, sewage and electricity, to name only a few (Greshman, 2011; Lovelace, 1965). It is known that engineers in general deal with individual projects related to infrastructure while planners deal with these projects in their bigger application to the local planning structure and proposed development principles (Greshman, 2011).

The domain of urban and regional planning can be viewed from an interface perspective with the inclusion of other disciplines (Akbar & Rasul, 2012; Pinson, 2004; Rahmaan, 2011:182-184) such as engineering, architecture, environmental management, among others. It is stated that the planning education and the interfaces within the academic and research environment, are used to form the basis for developments such as residential development (Schoeman 2013).

Urban and regional planning and its associated policy and legislative framework, serves as the foundation and integration between other disciplines. There are also several challenges faced by the current urban and regional planning domain in promoting the interfaces between professions in human settlement development (Razaghi & Finger, 2013:2; Schoeman, 2015:1-2).

Figure 1-22 illustrates not only the macro context (Schoeman, 2010:25) in which urban and regional planning is included within a multidisciplinary system, but also the close proximity of engineering and in particular “Engineering Planning”. These figures clearly indicates that engineering is a fundamental and vital aspect to urban and regional planning. It is also clear that

engineering will not be able to stand on its own, with no support from other disciplines. This results in an interdependent relationship between not only the two fields in question but also within the fields indicated as “Fields fundamental to urban and regional planning” (Schoeman, 2010:25).

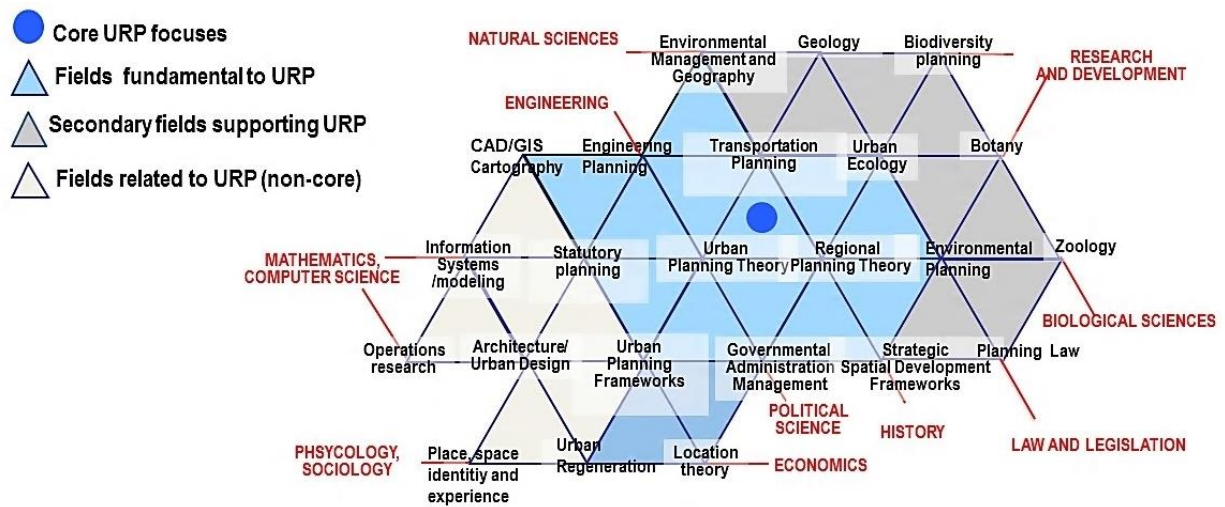


Figure 1-3: Micro and macro interface relationships between Urban and Regional Planning and other disciplines.

Source: Adapted from Schoeman (2010:25).



Figure 1-2: Stakeholders in sustainable development.

Source: Adapted from ITPI (2015) and Schoeman (2013).

In view of the above it is clear that engineering plays an integral and vital role in urban and regional planning and its associated practices. It is thus important that an understanding of this profession is generated in the endeavours of those persons in engineering and associated professions, so that they have an understanding of what the implications of urban and regional planning procedures entail and what their impact on it is.

This dissertation will thus serve to determine the need for such a programme and will also evaluate the programme to be implemented, in order to evaluate whether it meets the expectations set out by the participants in this study and if it is a sufficient answer to the need identified. Further research will be conducted on the interdisciplinary interaction between urban and regional planning and the professions included in the built environment with specific focus on that of engineering. To conclude the dissertation, proposals will be made on the evaluation of the programme's effectiveness and efficiency after implementation and its possible rollout to the built environment.

1.5 Research approach and methodology

This study makes use of a mixed research approach, utilising both quantitative and qualitative research approaches. Ward (2007:1) states that it is important to provide a qualitative component to quantitative research as this will generate data that can provide insight into what the numbers mean and broaden the theoretical conceptualisation regarding the institutional research. Ward (2007:1) further states that this is important as it will enable a better understanding and implementation regarding the provision of research for policy decision making.

As a result, the general approach to this project is qualitative, but is quantified through the data analysis, thus making it a mixed-method research design as previously mentioned. The evaluation of a proposed programme for skills transfer in the built environment is the main reason for the focus being placed on the qualitative approach of this research. A qualitative approach focuses on the subjective assessment of, among other factors, the opinions of others (Sivasubramaniyan, 2012:5).

Both exploratory and explanatory mixed-methods design will be used in this regard, as certain parts of the data are analysed using exploratory mixed methods while the remainder are best suited to the use of explanatory mixed methods.

Exploratory mixed method design implies that the qualitative data will be analysed prior to the measurement thereof in a quantitative manner, making the quantitative data dependent on the outcome of the qualitative data (Delpont & Fouché, 2011:441). Creswell and Plano Clark (2011:86, 122 & 151) state that this method is successful when planning to develop and test data which is not yet available, when variables are unknown, and in cases where it is desired to evaluate the phenomenon in depth prior to the measurement of its implementation. During the use of this exploratory method, qualitative themes are identified, which can then be used to compose subsequent quantitative examination of the initial qualitative results (Hsee & Zhang, 2010; Ivankova *et al.* 2007:265). Figure 1-4 illustrates the process that will be followed for exploratory mixed method design.

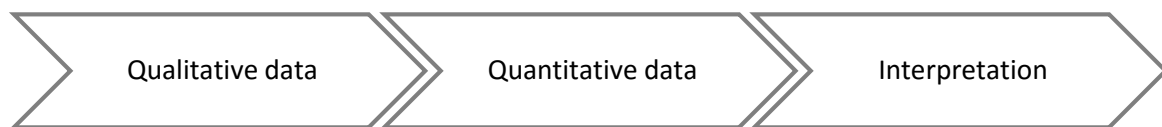


Figure 1-4: Exploratory mixed-method design.

Source: Adapted from Delpont & Fouché (2011:441).

Explanatory mixed method design implies that the quantitative data will be analysed prior to the explanation thereof in a qualitative manner, thus making the qualitative data dependent on the outcome of the quantitative data (Delpont & Fouché, 2011:441). Creswell & Plano Clark (2011:151 & 256) suggest that the reason for this design is to explain or contribute to the initial quantitative result collected in the first phase of the study (Hsee & Zhang, 2010).

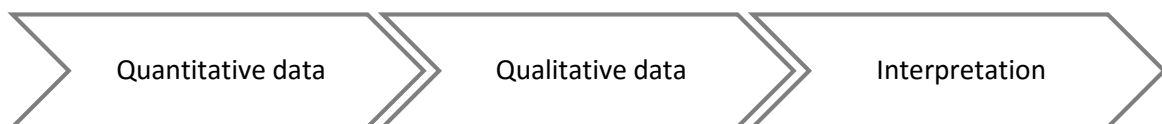


Figure 1-5: Explanatory mixed-method design.

Source: Adapted from Delpont & Fouché (2011:442).

According to Leedy and Ormrod (2005:22) qualitative research will also include the approach to the “setting” with an open mind which will allow the understanding of the complexity of the situation and also promote the interaction with the participants of the study. Qualitative research is further described by Kumar (as cited by Fouché & Delpont, 2011:65) as describing a situation, problem, etc. This is substantiated by Creswell (2007:36-37) who stated that qualitative research focuses on learning the meaning behind the participants’ opinions regarding certain problems.

As a result, the theory in qualitative research will provide an overarching perspective, assisting in attempts to integrate various diverse findings and thoughts (Delpont, *et al.*, 2011:299) while being approached through the usage of theory minimisation. This means that the minimum interpretation of data will be required while it will be displayed in as optimal a position as possible

in order to assist the reader in getting “as close to the participant’s experiences and make their own decisions based on their own life experiences” (Grbich, 2007:186).

Community-based participatory research (CBPR) is described by Israel *et al.* (2005) as a “partnership approach to research the involved community members, organisational representatives and researchers”. It is used to increase the knowledge and understanding of the phenomenon and provide a manner of integrating knowledge obtained from the community members with the interventions and policy changes. This approach focuses on the strengths and resources of the community while facilitating collaborative and equitable partnerships in all phases of the research (Israel *et al.*, 2005; Rabinowitz, 2005). It focuses on the role of the community members’ participation in the research (Wallerstein & Duran, 2003:27).

This research approach will contribute to the evaluation research methodology which plays a major role in the main focus of this dissertation. Fouché (2005:465) states that formative and process evaluation will utilise both quantitative and qualitative research with the focus being placed on exploratory and descriptive research designs. Fouché (2005:465) further states that the participant’s perception and experience form an invaluable part in the evaluation process.

The use of qualitative and quantitative data will be largely used to substantiate the evaluation of the proposed programme (Caracelli & Greene, 1997), developed specifically for capacity building in municipal engineers. This will include a needs assessment which will establish the possible lack of training in the professions such urban and regional planning and engineering. This, however, will also contribute to the programme monitoring, which will include the proposal of outcomes-based evaluation strategies to be implemented not only to the recipients of the programme, but also to the other professions included in the built environment in both the public and private sectors.

After this, evaluation research is utilised in conjunction with exploratory and explanatory mixed-method designs, which enhances the significance of the data in both the qualitative and quantitative forms. This then substantiates the evaluation methodology and as a result is the main methodology used in this dissertation. The qualitative and quantitative study were done through the use of questionnaires of which the qualitative data is quantified in order to provide the best supportive results for the study and the quantitative data are then interpreted in a qualitative manner.

Quantitative data can be defined as the presentation of data or information in a numeric form. It can thus be counted or used in order to compare numerical scales. It is also known as being deductive, outcome orientated, reliable (as technology is used for analysis), generalisable and measurements tend to be objective (CDC, 2009b:1-2; Steckler *et al.*, 1992:2).

Qualitative data can be defined as the presentation of information in a non-numerical form, provided in texts or narratives obtained during interviews. Data analysis for qualitative data can include processes such as thematic evaluations, which is also known as being inductive, discovery and outcome orientated and valid, as the researcher is responsible for analysis of the data by using a detailed methodology, which is not generalisable, and measurement tends to be subjective (CDC, 2009a:1-2; Steckler *et al.*, 1992:2).

Weinbach (2005:2) defined evaluation research as “the systematic use of research methods to make judgements about the effectiveness and the overall merit, worth, or value of some form of ... practice”. This is corroborated by the OECD (2002:21). The purpose of collecting information is aimed at improving the design, development, formation and the implementation of a programme which will, in turn, enable the provision of skills transfer in the built environment (Duignan in Lunt *et al.*, 2003). As a result the comprehensive process of formative evaluation was considered as the most appropriate research method for this project (Adamson & Burgess, 2012:7; Greene *et al.*, 1989; OECD, 2002:23; McNamara, 2002).

Fouché (2011:469) states that the function of the evaluation is to provide the decision makers of the programme with the facts and correct information. A further aim is to answer questions like the effectiveness and efficiency of the programme and its proposed implementation (Adamson & Burgess, 2012:6-7; Greene *et al.*, 1989; McNamara, 2002).

Needs, evaluability assessment and programme monitoring form part of the focus of the assessment of the programme (Fouché, 2011:454). The effectiveness of the planned programme is evaluated, in order to provide appropriate recommendations for the implementation of improvements on the programme (Adamson & Burgess, 2012:7-8; Greene *et al.*, 1989; McNamara, 2002).

The use of a formative design is appropriate as this focuses on the improvement of the programme’s design, planning and implementation (Fouché, 2011:453). The use of a formative design also contributes to the improvement of the areas in the programme where it either does not meet the criteria originally intended or foreseen in the expectations of the programme initiators.

Although a need for the proposed programme has been assumed by the initiators of the programme, a more focused and informed need assessment is done with the inclusion of questionnaires utilising both open- and closed-ended questions. The data collected from the questionnaires has been used to create a better understanding regarding the need and expectations of the programme (Fouché, 2011:453).

Questionnaires were circulated during the IMESA Conference 2014, with subsequent circulations made to several South African Council of Planners (SACPLAN) registered urban and regional planners (SACPLAN Survey 2015) during which the recipients were requested to complete the questionnaires, on a voluntary basis. The specific details of the surveys are provided in Chapter 3. These questionnaires were delivered by hand or electronically to the participants. The responses to the questionnaires were used to determine the need for this study and the programme proposed for skills transfer through capacity building, including the determination of the expectations from several of the professions concerned. Trustworthiness and reliability were ensured through the composition and the pilot testing of the questionnaires. (Delpont & Roostenburg, 2011:171-195).

Monette *et al.* (cited by Fouché, 2011:455) state that a needs assessment refers to the collection of data in a particular community in order to make a determination regarding the need for the programme to be implemented. This does include the determination of the existing resources similar to the programme planned for implementation as well as the need for this particular programme in the appropriate fields. One of the main reasons for needs assessment is to determine, by the use of objective methods, the need for the programme considered for implementation.

Weinbach (2005) states that the needs assessment of a proposed programme can be relatively easy although this is a crucial part in determining the design of the programme in order to amplify the potential for success. Kreuger and Neuman (2006:425) cite Bradshaw, stating that normative need refers to circumstances, situations or conditions that have been identified through recognising a gap in the services related to the needs in the community of municipal civil engineers. As a result a programme was proposed and compiled in order to address the gap and needs identified.

Further needs assessment is also be determined by means of evaluation of the programmes included in the tertiary education provided to the engineers concerned and urban and regional planners, with reference made to several other professions included in the built environment. However, these courses are not offered with the same level of detail as those related to civil engineering and urban and regional planners. The reason for this is the specific use of the proposed programme. The determination includes the cross-referencing of certain subjects between the professions.

Evaluability assessment is used in order to determine the “readiness for evaluation” of the programme (Kreuger & Neuman, 2006:395). Rossi *et al.* (2004:168) define evaluability assessment as “negotiation and investigation undertaken jointly by the evaluator, the evaluation sponsor, and possible other stakeholders to determine whether a programme meets the

preconditions for evaluation and, if so, how the evaluation should be designed to ensure maximum utility". This coincides with the definition provided by the OECD (2002:21) stating that evaluability is the "extent to which an activity or programme can be evaluated in a reliable and credible fashion".

Furthermore, Fouché (2011:457) states that it will be possible for the evaluability assessment to be completed at the end of the programme cycle; as a result it can also be referred to as a summative evaluation of the programme (Adamson & Burgess, 2012:1; Hsee & Zhang, 2010), whereas the OECD (2002:21) recommends that the evaluability assessment should take place throughout the course of the process in order to evaluate if the objectives are adequately defined and have verifiable results. The search for what is missing or inadequate leads to the completion of the evaluability assessment.

In order to substantiate the evaluability assessment a balanced scorecard was used as the evaluation tool. This was used to monitor the progress of the programme with relation to the strategy and communications to internal and external stakeholders. The balanced scorecard illustrates the programme's past and current performance across certain domains or criteria, also providing real-time feedback on the progress of the programme and allowing for the ongoing improvement of the programme (thereof). However this tool cannot be used to measure the long-term outcome of the programme (Bielavitz, 2010; Brown, 2007:20; Harger-Forde, 2012:25-26; Jones, 2011:4-5; Tayler, 2007:6-7).

Finally, the methodology includes programme monitoring. This is an ongoing process for the duration of this document and thus focuses on programme improvement (Weinbach, 2005). The process of programme monitoring contributes to the identification of problems resulting in subsequent improvements. Fouché (2011:458) states that the use of programme monitoring ensures the programme is maintained and that necessary modifications are made, and is as a result a very important part of the formulation of the programme.

Weinbach (2005) suggests that programme monitoring should be undertaken by "those managers and individuals involved in the delivery of the programme", as is the case of the particular programme under question. The integrity and the function of the programme should always be kept in mind regarding the collection of data.

OBE was used as the evaluation tool for programme monitoring, as the proposed programme has not yet been implemented. OBE is based on the assessment of the programme as an end result, with the evaluation and identification of activities that will result in specific outcomes and the measurement of these activities and their impact on the specific outcomes. OBE and planning for outcomes use the need and desired results as the foundation for the development of the

programme. The result is the development of a diagram in order to illustrate the linkages between programme aims, outcomes and activities. It further uses a specific and identified criterion in order to assess outcomes and their performance (Harger-Forde, 2012:21; Kryder-Reid *et al.*, 2006; McNamara, 2002; McNamara, 2008; Othieno, 2011; Penna & Phillips, 2005).

Programme logic illustrates the correlation between the need or goal identified and the requirements for improvement of the programme, and illustrates specific outputs for the need identified and develops ways in which these outputs can be met (Harger-Forde, 2012:22; Kryder-Reid *et al.*, 2006; OECD, 2002:27; Penna & Phillips, 2005).

In order to formulate the appropriate and sufficient research methodology, stakeholder consultation should take place together with the inclusion of secondary information, literature reviews, document analysis, questionnaires and focus groups (sampling) (Lunt *et al.*, 2003).

Two specific sample groups were identified in order to obtain specific knowledge. As previously mentioned, these groups included engineers and urban and regional planners as these professions are the specific focus of the proposed programme. Questionnaires were circulated to these groups with the inclusion of an array of formulated questions in order to obtain as much and as detailed information as possible for the research.

Sampling is defined as the process in which units (e.g. people) are selected from a population of interest in order to fairly generalise the results of the sample back to the population from which they were chosen (Marshall, 1996; Trochim, 2006). Strydom and Delport (2011:392) also define purposive sampling as sampling where particular participants are chosen because they demonstrate some characteristics of concern for a particular study. The use of sampling will increase the feasibility of the study (Sarantakos, 2012:193). Vaterlaus and Higginbotham (2011) further state that quota sampling can lessen the effect of sampling bias as this provides data that is representative of the entire population as opposed to random sampling (Business Dictionary, 2015). Participants are thus chosen on the basis of compliance with a certain pre-set criterion.

The sample was completed through convenience sampling as the participants completed the questionnaires at the annual IMESA Conference 2014. Convenience sampling is described as the selection of people based on their availability or ease of access (Business Dictionary, 2014a). The use of the access provided to the conference by IMESA proved convenient as the subject programme evaluation has been done on their behalf, thus leading to the identification of the most prominent role-players for the implementation of the programme.

Group-administered questionnaires were proposed for the circulation of the questionnaires to two different sources, including the IMESA Conference 2014, and to several SACPLAN-registered urban and regional planners. The questionnaires delivered at the IMESA Conference 2014 were

circulated by hand while those circulated to the remaining sources were circulated as electronic questionnaires, where the invitations to participate in the survey were delivered by email and the questionnaire itself made available as a web-based survey (Delpont & Roestenburg, 2011:188-189).

Hand-delivered questionnaires give the participant the opportunity to complete them in their own time with a set submission date. This increases the interaction between the participants and the researcher as it enables participant to contact the researcher if any uncertainty arises regarding the questionnaires (Delpont & Roestenburg, 2011:188) or if they want to give some clarity on their answers.

A set of criteria was developed for both the participants of the IMESA Conference 2014 and the SACPLAN Survey 2015. For the former the criteria included:

- (a) Participants needed to attend the IMESA Conference hosted in Durban as a delegate.
- (b) They needed to be engineers registered with IMESA in order for the questionnaires to be accepted.
- (c) They needed to submit the completed or partially completed questionnaire before the deadline indicated on the brochure provided with the questionnaire.

Criterion (b) was not enforceable, and this is discussed under restrictive conditions.

Although the abovementioned were the desired criteria, the criteria needed to be changed in order to allow the final participants to be part of the study as they did not necessarily comply with all of the criteria. As a result criterion (b) for the IMESA Conference 2014 was not applicable nor enforceable for all participants, the reason being that the delegates of the conference consisted of a large variety of professionals, not all members of IMESA, nor were all participants engineers. This, however, created virtually no restrictions to the obtaining of willing participants, due to so many voicing their interest in the study and the topic at hand.

The urban and regional planners were included in the in a web-based survey because of their registration with the SACPLAN. A web-based survey is the collection of data through a self-administered set of questions placed on the web (Archer, 2003), which requires the respondent to complete the questionnaires online provided on a website (Delpont & Roestenburg, 2011:189), in this case the services of SoGo Survey! were used. An invitation was sent by email to the planners with the assistance of SACPLAN. More detail on this is given in Chapter 3.

The criteria for the SACPLAN Survey 2015 included:

- (a) Participants needed to be registered to any category of SACPLAN.
- (b) They needed to have provided the correct email address to SACPLAN in order to receive the invitation.
- (c) They needed to be able to complete the online questionnaire before the deadline date. Representatives from SACPLAN requested that they personally do the circulation of the questionnaires in order to protect members' information.

This presented some restrictions as the researcher could not ensure delivery, resulting in minimal responses.

1.6 Data analysis

Rossi *et al.* (as cited by Fouché, 2011:454) state that it is crucial to identify and formulate the questions to be addressed by the evaluation. These questions should be reasonable and appropriate as well as answerable. They further recommend that these questions should be formulated while interacting and negotiating with either the stakeholders in the programme or key persons related to the programme's decision making.

Several types of questions are used in the questionnaire including open and closed questions (see Annexure B, C, D & E). Open questions are described by Kreuger and Neuman (2006:287) as permitting an unlimited number of probable answers. This allows the provision of adequate answers to complex issues, allows creativity, self-expression and richness of detail. It also enables the participants to provide their own meaning to the questions asked. In contrast, a closed question will provide the participant with a few answers to choose from (Delpont & Roestenburg, 2011:198).

Schurink *et al.* (2011) state that data should be analysed through the preparation and the organisation of the data (planning for recording of data, data collection and preliminary analysis, managing the data, etc.); reducing the data (generation of categories and the coding of the data, testing of emerging understandings and the search for alternative explanations, typologies to be developed and interpreted); and the visualisation, representation and the displaying of data (presenting the data). The latter will include the preparation of charts and tables illustrating the information gathered through the questionnaires.

The data analysis is divided into several sections in order to include the answers obtained from the open and closed questions in the questionnaires provided at the IMESA Conference 2014 (Annexure B & C) and the circulation of the online survey to urban and regional planners

(Annexure D & E) in the private and public sectors. The responses received were evaluated and the data subsequently categorised as qualitative (open questions) and quantitative (closed questions).

The quantitative data (closed questions) were processed and statistically evaluated with the assistance of the Statistical Consultation Services and Prof. HS Steyn of the North-West University (Potchefstroom Campus). Subsequently the data were confirmed as reliable by use of data statistic methods described in Chapter 3. The analysis contributes to the reduction of the data, thus making it intelligible and interpretable (Fouché & Bartley, 2011:249). The quantification of data is defined as the assignment of a number to a subjective aspect of a phenomenon; thus creating an arbitrary scale to measure the attributes and characteristics exhibited in the phenomenon (Business Dictionary, 2014b; Law Dictionary, 2014).

The qualitative data is analysed by means of sorting, organising and the reducing it to more manageable portions (Schurink *et al.*, 2011:399). This contributes to the identification of themes and patterns thus generating categories enabling the data analysis to take place. The open questions have been reviewed in detail, and patterns, themes and sub-themes identified which led to the re-organising of the data (Vaterlaus & Higginbotham, 2011).

It is stated that the findings and recommendations of the evaluation research may be more effective if the data is quantified, thus making it easier to understand among other things (United for Sight, 2011). The following processes were followed in the quantification of the data (United for Sight, 2011; Ward, 2007:9-10):

- (a) Data are organised in particular groups according to areas of interest.
- (b) Groups are categorised and then provided with a code correlating to the predetermined coding system.
- (c) Data are presented and interpreted (see Chapter 3).

Coding can be done by using several schemes or techniques, including a “free coding” technique in order to allow the better interpretation of the data. This is supported by Niglas’ scheme (cited by Bryman, 2006) which will enhance the “enhancement” of the research and allows the better interpretation and understanding of data as well as the identification of multiple themes (Ward, 2007:7).

As a result enhancement will take place where a qualitative research approach has been the main focus and with the addition of the quantitative data analysis, the evaluation of the programme is enhanced (Bryman, 2006).

1.7 Ethical considerations and trustworthiness

1.7.1 Ethical consideration

Some ethical aspects, such as the consideration of conducting research that includes human participants, require important elements such as informed consent and confidentiality agreements (Rodriguez et al., 2008:4).

Although questionnaires are used as the main method of data collection, there are still some ethical considerations that should be taken into account, which can also be seen as good research practice in general (Boddy et al., 2011). These considerations include the clarity, understandability, necessity, length and language of the questions. The responses to these considerations can improve the quality of data although it plays a vital part of the questionnaire as it may have an influence on the participant (Boddy et al., 2011).

The use of questionnaires as the main form of data collection does not require the use of written consent as a part of ethical considerations, although it could be made available to any participant who may feel it is necessary as these questionnaires included a section for the voluntary provision of personal information. A disclaimer of privacy was also included on the questionnaires as to not force the participant to complete the specific sections in the questionnaire. These forms included the information needed to properly inform the participants, including information to explain procedures; audio and video recordings; risks and discomforts; benefits; withdrawal without prejudice; costs or payments; questions; voluntary participation; honesty; debriefing; professional conduct and agreement (University of Michigan, 2011:1-3). These consent forms also applied to the interviews.

The following ethical requirements were observed when conducting the study:

- **Confidentiality:** A comprehensive explanation was provided to the participants regarding the application of confidentiality, as acknowledgement of understanding the terms provided in the confidentiality agreement. The participants were thus aware of the fact that reports would be written after completion of the interviews.
- **Voluntary participation:** Voluntary participation was required – no participants were forced to take part in any activities and all were free to withdraw at any given point (Strydom, 2011:116).
- **Honesty:** Participants were not misled in any manner throughout the study regarding its purpose or goals – thus they were aware of the purpose of their participation throughout the conducting of the interviews.
- **Professional conduct:** It was also important that the researcher acted professionally at all times regarding dress code, self-disclosure and objectivity towards the participants (Krishnan, 2006:10-15). If the researcher conducted herself in an unethical way during the course of the study, her supervisor had the permission to address it and decide what appropriate steps needed to be taken (Strydom, 2011:123).

1.7.2 Trustworthiness

Trustworthiness is defined in the *Collins English Dictionary* (2013) as “the condition of being worthy of being trusted”. This is also supported by Struwig and Stread (2007:130) who state that trustworthiness will be enhanced through the maintenance of high credibility and objectivity. Trustworthiness should demonstrate that the evidence for the results reported is sound and that a strong argument is based on the results. This will be dependent on validity of the research defined by Mishler (cited in Struwig & Stead, 2007:143) as “the degree to which we can rely on the concepts, methods and inferences of a study or tradition of inquiry, as the basis for our own theorising and empirical research”.

In order to ensure trustworthiness, Guba’s model (as cited by Krefting, 1991; Shenton, 2004) relevant to both the quantitative and especially the qualitative aspects of this document, is used. This model consists of four criteria including credibility, transferability, dependability and conformability.

Of the abovementioned criteria, transferability is used to ensure the trustworthiness of this research project. External validity is the main focus of transferability, according to Merriam (as cited by Shenton, 2004) and can be enabled by means of the applicability of one study’s findings to other situations. Shenton (2004) further describes transferability as the application of the work at hand to either other situations or to a wider population. Zang and Wildemuth (2009:6-9) state that it should enable other researchers to make their own judgements on the research and determine its transferability. As a result it is important to provide a proper context for the study in order to enable the transfer to take place, especially with regard to the results and the conclusion (Firestone, 1993; Lincoln & Guba, 1985:242).

Furthermore, the specific boundaries of the study should be taken into careful consideration, as this may influence the transferability of the research (Marchiononi & Teague, 1987; Pitts, 1994). These boundaries include:

- The number of organisations taking part in the study as well as their location;
- Any restriction in the type of people who contributed data;
- The number of participants involved;
- The data collection method;
- The number and length of data collection sessions; and
- The period and time over which the data were collected.

The specific members of the study group ensure that data are trustworthy, as they can be seen as experts in the fields of engineering in the public sector and also urban and regional planning

in both the private and the public sector (Krefting, 1991). As a result transferability of this study will apply to the subject project.

Data saturation was also used to further enhance trustworthiness of the data. It can be described as a tool for the collection of adequate and quality data in order to enable the provision of the necessary support for the study (Walker, 2012). Data saturation is further described by Saumure & Given (2008) as the point where no new or relevant data emerges, which leads to the understanding that no more data needs to be collected. Data saturation is reached after the completion of the questionnaire process.

Further detail regarding the evaluation research methodology and its components are discussed in greater detail in Chapter 2 with the inclusion of a further literature review on urban and regional planning, engineering and other professions included in the built environment with the focus on both national and international applications and policy and legislative frameworks in relation to the BRICS countries. Details of tertiary education for specifically urban and regional planning and civil engineering are provided with references made to the other professions included in the built environment.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

In order to develop an approach to skills transfer of urban and regional planning practices and principles to other professions in the built environment, the theoretical framework relevant to specifically the transfer of skills as well as the various professions included in the built environment is considered. Among the professions specific reference is made to civil engineering, to give a better understanding to the profession and substantiate the evaluation of the proposed programme.

Secondly, the detailed theoretical framework of the proposed evaluation research is described. This provides an understanding of the use of not only the specific tools, as proposed in Chapter 1. However, this will also illustrate the applicability of evaluation research to the approach to skills transfer, mentioned above.

This is followed by an overview of both national and international policy and legislative frameworks and their relation to skills transfer in the built environment. Reference is made to BRICS and more specifically to India, Brazil and South Africa (IBSA), in order to provide focus to the international review, and describe the requirements of the professional bodies related to each profession.

Finally, a review of the existing tertiary education relevant to the professions included in the Built Environment, is provided. However, specific reference will again be made to urban and regional planning and civil engineering, in order to provide a better understanding of the evaluation research in Chapter 3.

2.2 Theoretical review of evaluation research

Chapter 1 provided a clear description of the process, methodology and analysis for this dissertation. However, this section of Chapter 2 provides a more detailed understanding of the theory and processes involved with evaluation research.

Evaluation research has become synonymous with an understanding of the effects and impacts certain programmes have on their intended communities, including the assessment of the efficiency and effectiveness of the programme. As a result, evaluation research aims at informing the design and finalisation of the proposed programme as well as determining the impact of a programme through monitoring (Adamson & Burgess, 2012:7; Harger-Forde, 2012:5; Sera & Beaudry, 2007:1; Shapiro, 2001:3).

Efficiency and effectiveness of a programme refers to the measurement of the performance of the programme (Mouzas, 2006:2). This results in efficiency and effectiveness being used as

interdependent concepts (Schneider & Leslie, 2011:1). These concepts also form part of the proposed criteria for evaluation provided by the OECD (2011).

Efficiency is defined by the OECD (2002:21) as “a measure of how economically resources/inputs are converted to results”, Goh (2013) agrees with this definition by stating that “efficient” refers to performing or functioning in the best possible manner with the least waste of time and effort.

Effectiveness is defined by the OECD (2002:20) as “the extent to which the development intervention’s objectives were achieved, or are expected to be achieved, taking into account their relative importance”. Goh (2013) supports this definition by stating that effective refers to adequately accomplishing a purpose or producing the intended or expected results. Effectiveness is usually measured in terms of a numerical scale, which can be either norm based or criterion based (Reigeluth & Frick, 1999:3). The latter measurement is used in this dissertation.

The efficiency and effectiveness of a programme is thus achieved by pursuing the right goals and being efficient through the use of the most appropriate tools such as the use of technological advances and not wasting time (Goh, 2013). By managing the efficiency and effectiveness of the programme it is possible to achieve sustainability (Mouzas, 2006:2-3), due to increased efficiency leading to the undertaking of the same amount of work with the use of fewer resources, while an improved effectiveness leads to the generation of higher outputs, independent of the resources available (Schneider & Leslie, 2011:1). This illustrates the importance that efficiency and effectiveness play in programme evaluation.

Bamberger and Hewitt (1986:53) state that evaluation “can assess the extent to which the project produced the intended impact ... and the distribution of the benefits between different groups”. It is further proposed that monitoring and other information collected, should be used to be able to make judgements on the programme, which will result in the improvement of the programme (Adamson & Burgess, 2012:7).

McNamara (2002) states that programme evaluation is frequently used, among other things, to understand, verify or increase the impact of the programme on its intended community, improve delivery mechanisms in order to improve efficiency and cost-effectiveness and facilitate programme initiators’ perceptions of how the programme will meet its goals or not.

Formative evaluation is used as the evaluation research approach, most applicable to the research included in this dissertation. This is the result of the regular application of formative evaluation at the development stage of a programme, which is the case of the proposed programme (Glasgow & Linnan, 2008:489; Harger-Forde, 2012:8).

Formative evaluation or design can present key findings, successes and failures of a programme, as it is an ongoing process, and it will then result in the improvement of the strategy and functioning proposed for the implementation of the programme (Adamson & Burgess, 2012:7; Reigeluth & Frick, 1999:4-5; JRSA, 2003:4; Shapiro, 2001:3). This allows for the identification of any discrepancies between the expected direction and outputs of the programme and its physical progress, together with the identification of strengths, weaknesses, obstacles and unexpected opportunities, resulting in the better implementation of the programme (EVALSED, 2013:1). It is recommended that formative evaluation should include information gathering from members of the intended community, in the form of CBPR, such as qualitative and quantitative data collection methods in the form of surveys (Glasgow & Linnan, 2008:489; Shapiro, 2001:3).

Evaluation can either be conducted by an internal evaluator or an external evaluator, both having their advantages and disadvantages. Table 2-1 illustrates these advantages and disadvantages with the reason for using an internal evaluator's perspective for the purpose of this dissertation.

Table 2-1: Differentiation between internal and external evaluators.

	Advantages	Disadvantages
Internal evaluator	• Is familiar with the programme, goals and objectives and the organisational culture; • Has a vested interest in the programme; • Can be used as a management tool, which is much less threatening to the programme initiators resulting in better acceptance of results, criticism and findings; • Participants may be more willing to speak to an insider; and • Is much more cost-effective.	• May have a vested interest in the programme and can thus be inclined to reach positive conclusions, – stakeholders and donors may thus prefer and external evaluator; • May lack the experience and skills in conducting evaluations; and • The evaluation will likely take up a lot of time, which can result in higher indirect costs.
External evaluator	• Is likely to be more objective due to distance from the programme; • Will have better experience and skills in conducting evaluations; • Participants may be more willing to speak to an outsider; and • Can result in greater credibility of findings, especially positive findings.	• May not be familiar with the programme, goals and objectives and the organisational culture; • Persons directly involved in the programme may perceive the outsider as threatening, resulting in less cooperation; • It is possible that an external evaluator can misunderstand the expectation from the evaluation; and • Tend to be much more costly.

Source: Own synthesis from Department of Water Affairs & Forestry (2005:6-7) and Shapiro (2001:7).

The use of an internal evaluator is usually built into the design of a project in order to ensure that the programme achieves its objective, outputs and impacts. It is thus important to conduct programme monitoring in order to ensure the implementation of a well-managed programme (Department of Water Affairs & Forestry, 2005:6).

Evaluation research consists of three phases (Figure 2-1) known as the needs assessment, evaluability assessment and programme monitoring, the following subsections will provide the theoretical analysis together with the different methods included in each phase.

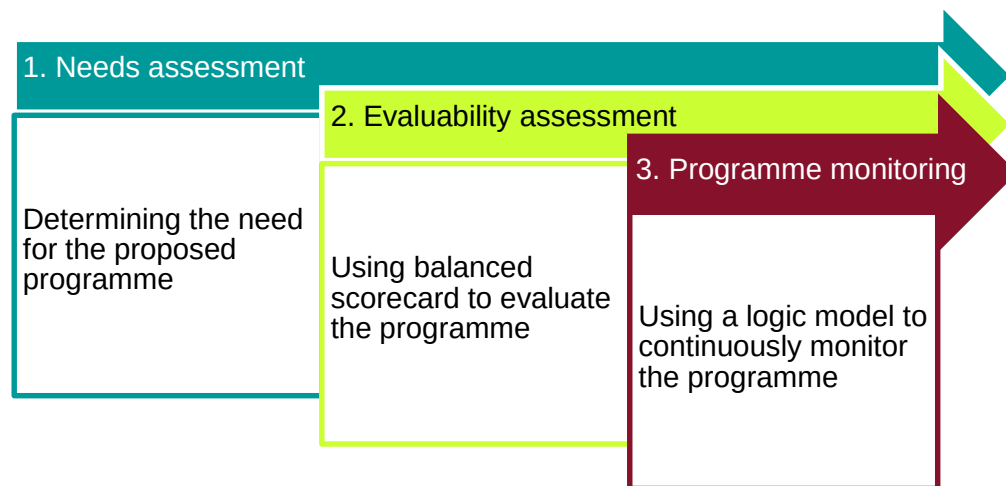


Figure 2-1: Phases included in evaluation research.

Source: Own Synthesis.

OBE is a tool linked to both monitoring and evaluation, briefly described in Chapter 1. OBE refers to evaluation with an outcome focus and is aimed at determining whether or not the programme activities achieve the intended goals and objectives; it is not focused on determining the outputs or units of services. OBE is usually applied in enhanced learning, such as knowledge or skills, or conditions such as increased literacy and self-reliance. As a result it is focused on the impact that a programme had or might have on the intended community during and after their participation in the programme (Kryder-Reid *et al.*, 2006; McNamara, 2002; McNamara, 2008; Othieno, 2011; Poister, 2010:103-104).

McNamara (2002; 2008) identified seven steps included in OBE, Voelker-Morris (2004) also mentioned some of these steps when he identified the categories of reporting OBE findings:

- (a) **Identify major outcomes to be measured:** This may include the goal, where the question might arise of what the impact of the programme will be on the intended community.
- (b) **Define and prioritise outcomes:** If time and resources are limited, only a few outcomes with high priorities can be chosen to be evaluated.

- (c) **Determine the indicators for each outcome:** These indicators will assist in determining if the outcomes have indeed been successful in reaching their intended goals. Due to the specificity added by these indicators, to elusive concepts, this can often be seen as the most important step in OBE and may be the most challenging step.
- (d) **Specify an intended number of participants needed:** This provides the number, usually a percentage, of the intended community, required to participate in the OBE, in order to obtain a reliable response.
- (e) **Determine the required information for each indicator:** This includes information such as the total size of the intended community and the process through which the programme went.
- (f) **Establish an effective and realistic method of gathering the information:** It can include the observation of the programme, questionnaires or interviews of the participants' experience of the programme and the expected benefits of the programme.
- (g) **Analysing and reporting findings:** This may include the evaluation goals, the basic analysis of quantitative and/or qualitative data, the interpretation of the data and the reporting of findings including an executive summary and recommendations.

Several programme planning or management tools are included in OBE. Balanced scorecards can be used to conduct the evaluability assessment, while a logic model can be applied to programme monitoring.

2.2.1 Needs assessment

Chapter 1 provided a brief description and definitions of a needs assessment. This section provides a more detailed description of a needs assessment, including, among others, the processes that can be followed when conducting a needs assessment.

Other than the definition given in the previous chapter, a needs assessment can be seen as the difference between the departure point or current achievements and the intended goals or desired accomplishments. These differences can thus be seen as discrepancies, gaps or deficits between ambitions and the anticipated results of current performances (Altschuld *et al.*, 2010; OME, 2001:5-6; Watkins *et al.*, 2012:20-21).

A needs assessment is often conducted for a specific organisation, resulting in the overlapping of expectations as the assessment objectives usually relate to the objectives of the organisations (McCawley, 2009:4). It is recommended that a needs assessment should be conducted in a systematic process in order to guide decision making (OME, 2001:7; Watkins *et al.*, 2012:25).

Davidson (2005) identified two main reasons for a needs assessment, namely:

- **Programme design:** Enabling the design of a programme that will address the true needs of the community it is intended for; and
- **Evaluation of an existing programme:** Ensuring that the existing needs are or can be met through the identification of a departure point and development of programme outcome criteria.

Davidson (2005) and the OME (2001:7-20) identified three overarching phases to be included in a needs assessment. However, it should be noted that the first phase can also be divided into two sections, as stated by Grimsley (2015) and Shapiro (2001:14-15):

(a) **Identification of existing information and identification of needs:**

- **Identification of existing information:** Determine the existing knowledge of the presumed need, including additional resources and new technologies, this will also include departure points, the setting of goals and the focusing of further research required. Other needs may come to light which will require prioritisation.
- **Data gathering, analysis and identification of needs:** Collecting information to form a better understanding of the needs at hand, including the identification and comprehending the difference between the departure point and the intended goals; this can include the collection of data by means of surveys followed by analysis of the organisation.

(b) **Utilisation and identification of underlying causes:** Generate a plan of action by using the analysed data, which will include the prioritisation of the work that needs to be completed, together with the evaluation of proposed solutions and the implementation of the solution best suited to the determined need.

(c) **Evaluation and determining the nature and extent of needs:** Evaluate the results of the action plan, in order to determine whether or not it meets the intended goals; this will provide a better understanding of the source of successes or flaws in the plan and/or needs assessment.

It is important to differentiate between performance and instrumental needs, as this can greatly influence the inclusion of “logical leaps” from the identified problem to the intended solution, question underlying assumptions and ensure that all the important causes of the need are addressed and not only the obvious cause. Performance needs can be seen as outcomes, while instrumental needs are viewed as parts of the intervention in order to address the needs identified (Davidson, 2005). The performance and instrumental needs can be presented in the form of a logic model (see Section 2.2.3.1).

Generating a baseline, in cases where the programme is in its developmental stages, can be identified through the use of surveys, which will include qualitative and quantitative aspects

including open-ended explorations of met and/or unmet, conscious and/or unconscious needs as well as the causes to each need (Davidson, 2005). Krueger (2005?) states that it is important to include the intended community in the needs assessment, as they will be more apt to be involved in obtaining solutions to the needs identified.

Needs assessment can either include the determination of the current situation of a specific group or of a target population. Objectives of a needs assessment for this specific group or target population will thus not be limited to only the assessment of their current skills and existing knowledge, but will also include an investigation into their perceived solutions, priorities and preferences (McCawley, 2009:4-5).

Berkowitz and Nagy (2005) recommend that a needs assessment survey should include a pre-set list of questions, a predetermined sample of the number and types of participants that will be included in the survey, and that the results of the survey should be tabulated, summarised, coded and used (Altschuld *et al.*, 2010; Berkowitz & Nagy, 2005; Guy, 2008:7; OVC, 2010).

By conducting a needs assessment through the use of a survey, an objective description of the needs at hand can be obtained, needs that might not be clear can become evident, and a survey can also ensure the alignment of proposed interventions with the needs in the intended community (Berkowitz & Nagy, 2005; Guy, 2008:7; OVC, 2010). Once the needs have been identified, interventions should be recommended together with the implementation of these recommendation.

2.2.2 Evaluability assessment

Chapter 1 provides a brief description and definitions of evaluability assessments This section will provide a more detailed description of evaluability assessments, with the inclusion of aspects such as the processes that can be followed when conducting an evaluability assessment.

Evaluability assessment was developed by Joseph Wholey in 1979 and has undergone numerous changes and adaptations in the following years (Trevisan & Walser, 2014:2). Van Voorhins and Brown (1996:1-2) stated that evaluability assessments were originally designed to precede an outcome or comprehensive evaluation and focused on determining the evaluability of a programme, as described in Chapter 1. In essence, an evaluability assessment determines whether or not a programme has been sufficiently planned in order for it to be evaluated (Trevisan & Huang, 2003).

Should the result of an evaluability assessment indicate that the programme is evaluable, it will include parameters for evaluation such as criteria to measure effectiveness. If the contrary is true,

recommendations for areas of improvement in the programme will be included in the results (JRSA, 2003:4; Trevisan & Huang, 2003; Van Voorhins & Brown, 1996:4).

JRSA (2003:5) and Trevisan and Huang (2003) state that the undertaking of programme evaluation prior to its commencement or implementation, can assist in ensuring that the resources are used at the most appropriate time, which can also contribute to the improvement of the programme.

It is important to determine the population for whom the programme is intended, ensuring that the programme has the required resources, determining whether the programme is implemented as intended, and determining if the programme allows for data collection in order to conduct an evaluability assessment (JRSA, 2003:6; Trevisan & Huang, 2003).

A programme will be deemed un-evaluable if (JRSA, 2003:7):

- **No formal programme design or model is in place:** If the objectives and goals of the programme are not in place, this will result in the ineffective evaluation of the programme. A model for the programme should be in place allowing for the comparison of the development of the programme can be evaluated against its intended purpose.
- **The programme design or model is unsound:** The objectives and goals of the programme should be realistic and achievable; the development of the programme should be in line with these as well. If the objectives and goals of the programme is unattainable or unrealistic, it cannot be accurately evaluated.

Several recommendations can be included in the results of an evaluability assessment, such as that a comprehensive outcome evaluation of the programme should be conducted; the programme should be changed; no further effort is needed; the programme should be stopped; or the evaluability assessment should be ignored. This can result in the fear of failure of the programme among the initiators and funders (Trevisan & Huang, 2003; Van Voorhins & Brown, 1996:4).

Reasons for an evaluability assessment can include (JRSA, 2003:7-9; Trevisan & Huang, 2003; Van Voorhins & Brown, 1996:5):

- The clarification, prioritisation and assessment of the feasibility of programme goals and objectives;
- The identification of strengths and weaknesses of the programme;
- The improvement of the performance of the programme;
- Determination on whether the interventions recommended and used in the programme comply with the knowledge base of the disciplines;
- Determination on the requirement for further evaluation such as outcome-evaluation; and

- Aiding the programme and its initiators to accurately develop and plan the programme.

Van Voorhins and Brown (1996:13) identified three overarching steps that should be followed during an evaluability assessment. However, it should be noted that phases (b) and (c) can also be divided into two sections, as mentioned by the JRSA (2003:10-12), while the recommendation made by Trevisan and Huang (2003) indicates that phase (a) and (c) can be divided into three sections while phase (b) can be divided into four sections (Trevisan & Walser, 2014:6-7):

- (a) **Evaluate the programme history, design and operation:** It is important to collect all relevant documentation and information on the programme, prior to starting the evaluation. Answers to initial questions such as the purpose of the evaluability assessment, the orientation of the programme within the larger organisational structure, the nature and role of stakeholders in the programme and evaluability assessment should be determined, together with the identification of participants to take place in the surveys. Other important questions include the history or reason for the development of the program, the design, including the objectives and goal, of the programme and the proposed operation of the programme.
- (b) **Evaluate the programme in operation:** This includes the determination of the actual needs of the intended community and how these correspond to the services provided. The intended implementation of the programme should be evaluated as there can be discrepancies between the actual programme on paper and the final implementation of the programme, so it is important to determine whether or not there is an implementation plan for the programme.
- (c) **Determination of the likelihood for future evaluation of the programme:** This establishes the readiness for evaluation of the programme, with reference to its goals and objectives and the need for a more detailed programme evaluation, as previously mentioned also indicates whether or not the evaluation of the programme will provide useful information to the initiators.

The JRSA (2003:13-14) and Trevisan and Huang (2003) recommend that a programme should have a model (logic model) that is clearly structured and which includes the goals and objectives of the programme (see Section 2.2.3.1). They further state that the goals and objectives should be measured so that the degree to which they have been achieved can be easily assessable. This can be done by means of a balanced scorecard (see Section 2.2.2.2). Balanced scorecards can be used to assist in the evaluability assessment of a programme.

2.2.2.1 Balanced scorecard

Chapter 1 gave a brief description and definition of balanced scorecards. This section will provide a more detailed description of balanced scorecards, with the inclusion of aspects such as the processes that can be followed when conducting a developmental evaluation and its relation to evaluability assessment and the role it plays in evaluation research.

The balanced scorecard technique was developed in 1992 by David Kaplan and Robert Norton during their research into the tendency of corporations to primarily focus on financial data as a measurement of success. The problem was that this only indicated past success, but did not assist in predicting future success. The evaluation model was adapted in order to include financial, customer and internal business processes, and learning and growth, to generate a more balanced view of the company, including an understanding of the interdependencies and interaction between these perspectives (Agarwal, 2012; Bielavitz, 2010; Jones, 2011:4-5; Kaplan, 2010:3; Marr, 2010:3-6; Poureisa *et al.*, 2013; Tayler, 2007:6).

Matrices and objectives should be created for each of the perspectives mentioned above, in order to obtain a balanced view of the programme. The intention is to identify measurable elements, which can result in the improvement and advancement of the objectives (Bielavitz, 2010; Marr, 2010:6). The abovementioned perspectives can be described as follows (Agarwal, 2012; Bielavitz, 2010; Jones, 2011; Kaplan, 2010:4-5; McCarthy & Chapman, 2013; Marr, 2010:6-7; Marr, 2015?; Molloy *et al.*, 2007; Tayler, 2007:1):

- **Financial perspective:** The resources required to accomplish objectives and their associated outcomes can be determined by the allocation of any budgetary and human inputs. It can also demonstrate the direct effect of the allocation of inputs, while tracking success and stakeholder value.
- **Consumer perspective:** The programme's performance should be measured against the needs of its consumer (intended community), which can indicate future performance.
- **Internal business process perspective:** Outlines key processes needed to provide for the needs of the consumer (intended community). It also indicates if the operations support the key goals identified. Mission process, focused on the delivery of the identified mission, and support processes, focused on the tasks included in operations, can be included in this perspective.
- **Learning and growth perspective:** This provides the intangible drivers of future success including human capital and informational capital such as skills and training. It also provides indications on areas where improvement may be needed and identify areas where resources should be focused in order to allow their most effective use. It is also an indicator of long-term growth.

Balanced scorecards drive the identification of cause-and-effect relationships generated between key concepts known as inputs, outputs and performance drivers that may impact the outcomes, and should be able to describe strategies through the objectives and pre-set measures (Bielavitz,

2010; Kaplan, 2010:8; Poureisa *et al.*, 2013; Tayler, 2007:24-26). Bielavitz (2010) states that if staff are adequately trained, they can perform higher-level services through the utilisation of new skills resulting in them instructing other persons to a greater degree. The logical cause-and-effect progression (Figure 2-2) related to the addition of value to services and the production of learning outcomes can be interpreted from these perspectives.

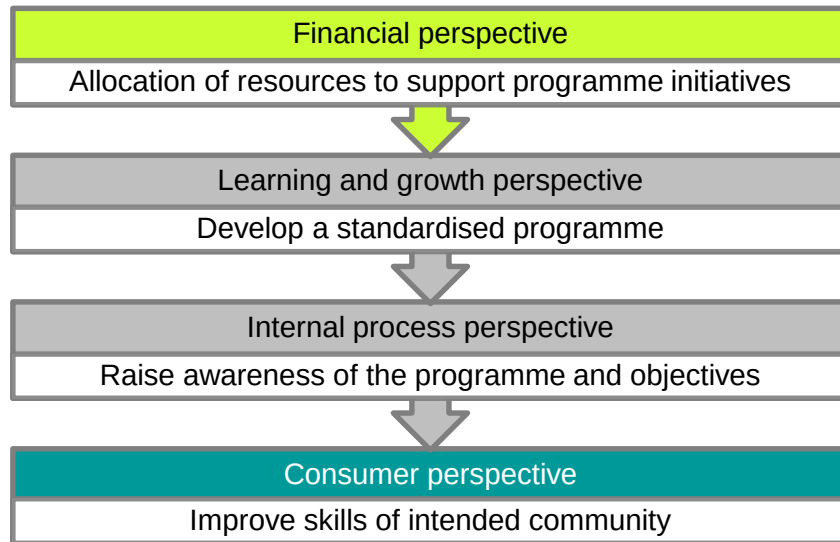


Figure 2-2: Perspectives included in cause-and-effect progression of a balanced scorecard.

Source: Adapted from Bielavitz (2010); Marr (2010:5) and Marr (2015?).

For non-profit organisations the financial perspective can be removed from the cause-and-effect progression, as these organisation are mostly focused on delivering a service or the consumer perspective (Kaplan, 2010:22-23; Marr, 2010:8). Kaplan (2010:23) and Marr (2010:8) recommend that the financial perspective can be moved to the bottom so that the consumer perspective will be placed at the top of the cause-and-effect progression. The resulting in the following strategy map:

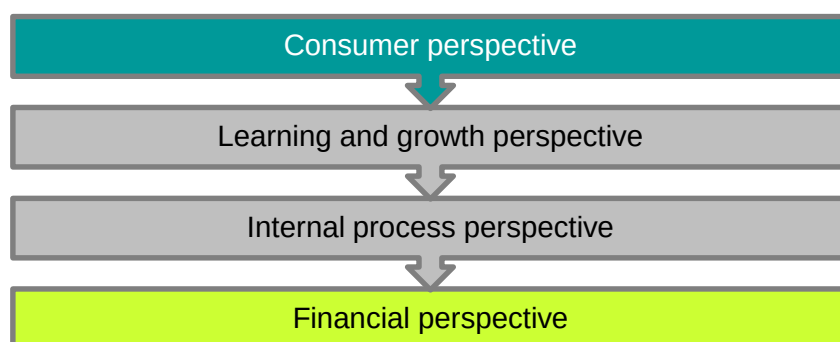


Figure 2-3: Perspectives included in cause-and-effect progression of a balanced scorecard for non-profit organisations.

Source: Adapted from Marr (2010:8) and Marr (2015?).

The key concepts of a balanced scorecard cause-and-effect relationships can be understood as (Bielavitz, 2010; Colbert, 2009; Molloy *et al.*, 2007, OECD, 2002:25-28; Poister, 2010:101-103):

- **Inputs:** The resources required in order to achieve the desired outputs, including financial, human and material resources.
- **Outputs:** The product or result of the development intervention; also refers to the changes that may be relevant to the achievement of the outcomes identified.
- **Performance drivers:** Variables which allow the verification of changes in the development interventions, which also illustrate the results relative to what was planned and can indicate the effects on the results or outcomes.
- **Outcomes:** Short- or long-term effects of outputs, likely to be achieved or the result of an action; they can also be seen as key performance indicators (KPIs) that are the result produced from the performance drivers.

KPIs or indicators can be described as qualitative or quantitative factors or variables that are measurable or tangible means of measuring achievements to reflect the connection to an intervention. KPIs should be meaningful and understandable, balanced and comprehensive, timely and actionable, and should include goal displacement, practical considerations and cost factors (Department of Water Affairs & Forestry, 2005:13-15; OECD, 2002:25; Pierce County, 2009:3-5; Poister, 2010:107-109; Shapiro, 2001:15).

It has been noted that one of the main goals of evaluation is measuring the performance of a specific programme. This can be supported by the introduction of a “balanced” set of measurements seen as appropriate performance criteria developed for a specific programme which will contribute to the provision of suitable results focused on user satisfaction, efficiency and effectiveness improvement of organisational activities (McCarthy & Chapman, 2013; Marr, 2010:10; Poureisa *et al.*, 2013; Tayler, 2007:28).

When a balanced scorecard is implemented, it is important to present a defined mission or purpose, selecting the correct measurements, communicating performance results to all stakeholders and making decisions and recommendations based on the evidence provided in the results of the scorecard (Bielavitz, 2010; Kaplan, 2010:17; Marr, 2010:3-5).

The benefits of using a balanced scorecard can be described as follows (Kaplan, 2010:30-32; Mackay, 2004:1-7; Marr, 2010:7-10; Marr, 2015?):

- **Better strategic planning:** The use of a strategy map forces the evaluator to think about cause-and-effect relationships. This process ensures that consensus is reached for strategic objectives as well as the identification of performance drivers and outcomes in order to create a clear picture of strategy to be followed.
- **Improved strategy communications and execution:** The provision of interdependent objectives in a strategy map ensures that they are easily communicated and understandable

by both internal and external stakeholders, ensuring a better comprehension of the intended goals of the programme.

- **Better management information:** The provision of KPIs for each objective ensures the measurements of “what actually matters”. The result is better quality management and increased benefits of guiding management and decision making.
- **Improve performance reporting:** The use of balanced scorecards ensures the provision of better performance reports, resulting in responding to needs for transparency.
- **Better strategic alignment:** The balanced scorecard can enable a programme to be aligned with the strategic objectives identified, while working to achieve a central goal.
- **Improve organisational alignment:** The result of a well implemented balanced scorecard can be the improvement of risk management and strategic priorities.

By creating a unique strategy and visualising it in a cause-and-effect progression or a strategy map, aligning the programme with the objectives identified in the strategy map, designing meaningful performance indicators and using these indicators to facilitate learning and improving decision making, it can be ensured that the programme will benefit from the evaluation (Kaplan, 2010:32; Marr, 2010:10).

Khorshid and Ranjbar (2015) together with Tayler (2007:11-12 & 28-30) suggest that using a more casual approach to the implementation of a balanced scorecard can ensure the better evaluation of all initiatives and their impact on the direct effect, such as customer satisfaction, as well as the indirect effect, such as the financial satisfaction. This will allow the provision of conclusions consistent with the preferences of the evaluator, thus allowing the strategy to be viewed as successful with the focus placed on the strong direct effects while allowing the de-emphasising or ignoring the lack of theorised indirect effects (Khorshid & Ranjbar, 2015; Tayler, 2007:29).

Brown (2007:12) identified four overarching steps in conducting an evaluation of a programme through the use of a scorecard, also known as an evaluation matrix (Rebernik & Bradač, 2008:32-34). The objectives and performance indicators identified in the balanced scorecard can be used as the criteria for the scorecard, in order to quantify the results obtained. The steps include (Bandor, 2006:7-9; Brown, 2007:12-19):

- (a) **The determination of evaluation criteria:** A set of evaluation criteria should be established, followed by the division thereof among a set of categories. The criteria should be derived from the needs or wants of the intended community and with those of the programme initiators, and should be to the point and easily understandable. These criteria can be derived from the objectives and performance indicators identified.

- (b) **Scoring the programme against the criteria:** Determine how certain components of the programme will be scored against the evaluation criteria. The use of a constructed scale allows the measurement of both quantitative and qualitative criteria; however, the scale should only contain values between 0 and 1, or should be normalised.
- (c) **Calculating the weights for each criterion:** Weights should be assigned to each criterion in order to specify the relative importance of each. The lowest value will be assigned to the least important criterion, while using a paired comparison method.
- (d) **Determining the overall score for each component of the programme:** The sum of the weights calculated for each component of the programme evaluated over a set of criteria, resulting in an overall ranking of the component in relation to the performance of the programme.

The result of a balanced scorecard can be the improvement of processes, motivated or educated employees, enhanced information systems, monitoring progress, greater customer satisfaction and increased financial usage (McCarthy & Chapman, 2013). The use of the additional scorecard provides a quantified illustration of the qualitative components included in the balanced scorecard.

2.2.2.2 SWOT analysis

A SWOT analysis can be used to assist in the first step of developing a balanced scorecard, through determining the KPIs, thus resulting in the provision of a systematic and holistic approach (Jurevicius, 2013; Khorshid & Ranjbar, 2015; Wang, 2007). The goal of a SWOT analysis is to develop strategies that may enhance and maximise the strengths, reduce the weaknesses and turn them into strengths, exploit the opportunities and to minimise the threats (Dyson, 2003; Khorshid & Ranjbar, 2015).

A SWOT analysis can assist with the provision of strengths and weaknesses of the programme or the organisation and may be deduced through internal appraisal, while the opportunities and threats included in the environment in which the programme or organisation operates and are usually determined through external appraisals (Dyson, 2003; Jurevicius, 2013; Khorshid & Ranjbar, 2015; Morrison, 2014).

Internal appraisal reviews the aspects of the organisation or programme focusing on, for example, facilities, staff, location, product and services, while the external appraisal looks at the political, social, economic, technological and competitive elements. SWOT attempts to envisage internal and external factors, in an attempt to stimulate new strategies (Dyson, 2003; Jurevicius, 2013; Khorshid & Ranjbar, 2015; Morrison, 2014).

The goal of a SWOT matrix, also referred to as the TOWS matrix, is a preliminary stage of decision making while substantiating the successful strategy formulation. They further express that the matrix is responsible for providing the organisational goals and indicating the desirable or undesirable intra- and inter-organisational factors required, in order to achieve these goals (Dyson, 2003; Khorshid & Ranjbar, 2015; Morrison, 2014; Wang, 2007).

Table 2-2: Example of a 2 x 2 SWOT matrix.

	External factors		
Internal factors		Opportunities	Threats
	Strengths	Aggressive strategies (SO)	Competitive strategies (ST)
	Weaknesses	Conservative strategies (WO)	Defensive strategies (WT)

Source: Adapted from Dyson (2003); Khorshid & Ranjbar (2015); Morrison (2014) and Wang, (2007).

The four strategies, also known as 2 x 2 frameworks, indicated in Table 2-2, can be understood as follows (Khorshid & Ranjbar, 2015; Wang, 2007):

- **Aggressive strategies (SO):** The ability of an organisation to invest in new environmental opportunities, while using their maximum strengths.
- **Conservative strategies (WO):** The way in which an organisation faces its weaknesses through the maximum use of its strengths.
- **Competitive strategies (ST):** The attempt of an organisation to minimise or eliminate the environmental threats through the use of its strengths.
- **Defensive strategies (WT):** The attempt of an organisation to minimise its weaknesses, while attempting to avoid environmental threats.

The following table provides a brief description of advantages and limitations created during the implementation of a SWOT analysis.

Table 2-3: Advantages and limitations of a SWOT analysis.

Advantages	Limitations
• Very simple and practical to use. • Clearly understandable. • Focused on key internal and external factors that may affect the organisation or programme. • Assist in the identification of future goals and KPIs. • Promotes further analysis/evaluation.	• Analysis can lead to excessive lists of strengths, weaknesses, opportunities and threats. • Broad description of factors. • Factors are often opinions of the evaluator and not facts. • Not always possible to distinguish between strengths, weaknesses, opportunities and threats.

Source: Own synthesis from Jurevicius (2013) and Morrison (2014).

Khorshid and Ranjbar (2015) suggest three steps for the development of KPIs through the use of SWOT analysis:

- (a) **Conduct an analysis of the organisation or programme and its environment:** This is necessary for the provision of the strategies in the SWOT matrix. It includes the analysis of the mission, goals and intended results of the organisation or the programme.
- (b) **Developing strategies through the use of SWOT analysis:** Strategies are developed as indicated above with the consideration of the mission of the organisation or programme and its long-term goals.
- (c) **Translating the developed strategies to KPIs:** This can be seen as the step to be implemented before the first actual step of implementing a balanced scorecard. The step includes the developed strategies as defined and included as KPIs based on their nature.

One of the advantages of a SWOT analysis is its combination of internal and external factors included in the business environment. This allows the development of KPIs which can be applied to the four perspectives of a balanced scorecard. It is thus logical to include the use of a SWOT analysis when determining the foundation of the balanced scorecard, as the use of only a balanced scorecard will allow for the unconscious and instinctive or thorough brainstorming when determining the KPIs (Khorshid & Ranjbar, 2015; Lee & Ko, 2000).

2.2.3 Programme monitoring

The importance and relevance of programme evaluation is clear from the descriptions provided above; however, it is as important to conduct programme monitoring. Chapter 1 provided a short description of what programme monitoring is and the tools used to manage the monitoring of the intended programme. This section provides a more detailed understanding of what programme monitoring is including the use of logic modelling as a tool to assist with conducting the monitoring of the intended programme.

Adamson and Burgess (2012:5) state that, in order to accurately evaluate the impact of a particular intervention, a clear and effective monitoring process should be in place, which will continuously monitor and correct possible variables in the programme.

Programme monitoring is used to measure the outputs and impacts of a programme and its ability to achieve broader development objective or goals. It is also important to consider the inputs, activities and assumptions/risks, as they can potentially affect the outputs of the programme (Adamson & Burgess, 2012:15; Department of Water Affairs & Forestry, 2005:8-9; Saggars & Jacobs, 2011:1; Shapiro, 2001:13). Further, it provides early indications of progress, or the lack thereof, of a programme and its ability to achieve the intended results. It also ensures

accountability and substantiates the evaluability of a programme (Saggers & Jacobs, 2011:1; Sera & Beaudry, 2007:1; Shapiro, 2001:3). The levels of monitoring or basic components can be described as follows (Department of Water Affairs & Forestry, 2005:8-9; Jones, 2011:7; McNamara, 2008; OECD, 2002:15-16 & 25-28; Othieno, 2011; Pierce County, 2009:2-3; Poister, 2010:101-103; Voelker-Morris, 2004):

- **Inputs:** This involves the monitoring of resources, such as the number of days consultants are employed and used for the programme; this information can be gained from progress reports, accounting and management reports.
- **Activities:** This monitors what happens during the implementation of the programme and determines if these activities were carried out. This information can be gained from progress reports. Activities are also described as the processes undertaken in order to meet the needs identified. They do not refer to the impact on the intended community, but rather to the programme itself.
- **Outputs:** This focuses on the activities and the impact they have, and assesses the results or outputs generated by the inputs and activities of a programme. Outputs also focus on the units of service, such as the number of people participating in the programme.
- **Impacts:** This focuses on the analysis objectives of a programme and determines whether these objectives have been met. This is also a process aimed at structuring and supporting the development of a programme, such as the problem at stake and the objectives pursued. It is aimed at determining the main option in order to achieve the objectives and their possible impact as well as their advantages, disadvantages, cooperation and trade-offs. Positive and long term, primary and secondary long-term effects, determined through developmental interventions, can be direct or indirect, intended or unintended.
- **Environment:** This monitors external factors or factors outside the control of the programme.
- **Assumptions/risks:** This refers to the beliefs generated regarding the programme, such as the context and the manner in which the programme is understood.
- **Outcomes:** Section 2.2.2.1. provides a brief description of outcomes; for the purpose of this section, a distinction can be made between the following:
 - **Outcome targets:** Indicates the number and percentage of participants that the programme initiators need to participate in the programme.
 - **Outcome indicators:** Refers to the “measurable” milestones, previously referred to as KPIs.

The Saggers & Jacobs (2011:3-8) identified six overarching steps in programme monitoring; however, it should be noted that step (d) can be divided into two sections, as identified by Robertson (2007):

- (a) **Establish goals for monitoring data:** This is a statement of the desired long-term outcomes, goals that should be set for the use of monitoring data. These goals may be the improvement of the programme and/or reporting activities. The establishment of goals provides a clear understanding of the reason for monitoring the programme and what is

hoped to be learned from the results. A list of questions to be answered through monitoring, should be put in place to achieve the set goals.

- (b) **Describe programme activities:** It is important to determine the activities of the programme that will be implemented. It is thus important to track all relevant activities in order to successfully monitor a programme. The list of activities should include the name of the activity, the participants, frequency of the activity, where and when the activity will take place and how the activity will be implemented. If the activities are developed as the programme is being developed, they can form part of the implementation plan, resulting in them being general enough to capture the possible activities that may be developed.
- (c) **Provide prioritised information for each activity:** It is important to list the information needed for each question and activity developed in the previous steps. First determine what programme activities will produce the information in order to provide an answer to each question. Secondly the information collected for each activity should be listed. The information should then be prioritised.
- (d) **Generate monitoring forms:** Monitoring forms are generally used to obtain information regarding the determined activities and goals, the responses may be numeric in nature. Outcomes-based evaluations can be used for these forms.
 - The advantages include defining important information through data collection. They are easily used for both data collection and analysis, and consistency among all respondents is improved.
 - Practices to follow when using monitoring forms include the constraints of persons trying to complete the forms and the implementation of the activity should be considered. Forms should be transparent and simple, enough space should be ensured for questions with potentially long answers and generating a list of possible responses will assist in data analysis.
- (e) **Define the reporting procedures:** The information obtained through monitoring should be used to inform stakeholders. This step can be divided into two sections:
 - The information or data from the monitoring forms should be transferred into a database. This allows for the data to be simplified, summarised, analysed and organised.
 - The information deduced in step (c) should be applied to the data in order to easily answer the questions and goals identified in step (a). The information should then be provided to the stakeholder(s) concerned.
- (f) **Provide a monitoring implementation plan:** This details the implementation of monitoring through the specification of information that needs to be monitored and reported, the flow of information between the field and the organisation and the roles and responsibilities of stakeholders involved.

Several programme planning/management tools can be used to conduct programme monitoring, these tools are outcome models that assist with the proposal, funding and implementation phases of evaluating programmes. Usually these tools are used to illustrate the logic, theory of change, and anticipated flow of an intervention, and measure the progress of a programme against certain indicators (Penna & Phillips, 2005). Lawton and Brandon (2014:1), support Penna and Phillips (2005), by stating that logic models can be used to conduct programme monitoring. The following section illustrates the utility and application of a logic model.

2.2.3.1 Logic model

A logic model provides a graphic illustration as an overview of a programme, in which the outcomes and the manner in which they are planned to be accomplished, together with key stakeholders, are included. They illustrate the linkage between the situation or problem statement and interventions or activities undertaken, such as inputs and outputs, and the impact on the intended community (outcomes) and partnerships that play a critical role in enhancing the performance of the programme. It is also indicated that programme logic is usually used in the earlier stages of a programme as it provides a broad overview of the programme (Davidson, 2005; Kryder-Reid et al., 2006; Lawton & Brandon, 2014:2; McCawley, 2002:2; Othieno, 2011; Penna & Phillips, 2005; WKKF, 2004:2).

Logic models were originally designed to be used as a tool used for programme evaluation and the identification of performance measures. However, its use during the past two decades has been adapted to a tool for programme planning. This has allowed the communication of the purpose of a programme, its components and the sequence in which activities and accomplishments take place (McCawley, 2002:2; McLaughlin & Jordan, 2010:55; Milstein & Chapel, 2005).

With an understanding of cause-and-effect emphasised through the use of a logic model, it is possible to generate a theory of change. Programme theory or theory of change refers to the assumptions made about inputs or resources and activities and their expected influence on the intended outcomes. It is aimed at proving if the right resources are used to generate the correct activities for specific people, thus leading to the results the programme is expected to achieve. Using a logic model as part of programme planning, can assist with the successful evaluation of the programme at a later stage (McLaughlin & Jordan, 2010:60; Milstein & Chapel, 2005; WKKF, 2004:3-4).

If the focus is placed on what needs to be communicated, the use of a logic model is most valuable. With successful communication of the characteristics included in a programme to others, the relevance, quality and impact thereof will become evident and will generate greater

support from the relevant stakeholders (McCawley, 2002:2; McLaughlin & Jordan, 2010:60; Milstein & Chapel, 2005; WKKF, 2004:5).

Milstein and Chapel (2005) provide eight steps that should be considered when drafting a logic model, while McLaughlin and Jordan (2010:61-72) recommend the combination of steps (c) to (f) and the representation of the information in a table, in order to reach their recommendation of five steps:

- (a) **Collect relevant information in existing documentation:** The collection of information provides an improved comprehension of the development and components of a logic model. The information on the programme, possible interventions and expected outcomes, generally provide sufficient information to identify the components and probable logical links.
- (b) **Determine the scope of the model:** The scope includes the intended users and uses of the model and it is possible to create a family of models if it is developed for multiple users.
- (c) **Verify if the model is complete and flows logically:** This can be obtained through the contributions and verifications of stakeholders. The desired effect plays a significant role in this step. It should be determined if the model shows any measurable results that are hoped to be achieved and if it shows changes through a logical sequence of effects. This includes the determination of short-, medium- and long-term effects as desired by the stakeholders and possibly the intended community.
- (d) **Determine activities and interventions:** Establish methods of overcoming obstacles, determine the responsible parties, possible conflicts and co-operations, the methods that enforce change, and the service or contributions made to the intended community.
- (e) **Determine the inputs needed:** Determine what resources are needed and how they will be used.
- (f) **Provide the setting:** This includes creating the situation including the background information needed as well as the context and conditions under which the programme is or will be implemented. It also includes the provision of the required participating stakeholders and community participation.
- (g) **Drawing the logic model:** The activities and the intended effects should be arranged according to the expected time sequence with the inclusion of feedback loops. It is recommended that the linkage lines should not cross in order to improve readability. The

use of colour coding can clarify the main “storyline”. The model should be kept as simple as possible without leaving out important paths and information.

- (h) **Revisit and revise the model:** The model should be interactive and should undergo continuous changes together with the progression through the activities and interventions. It is necessary to improve, modify and realign the model in order to follow emerging activities and effects. This may also include the elaboration of links, clarification of pathways through activities, effects and outcomes, establishing and revisiting milestones, redefining the boundaries of the programme and the reframing of goals or desired outcomes.

A logic model can either be provided with large amounts of detail, indicating precisely the progress from one activity to the desired change, or it can be very broad, which only indicates chosen routes and their associated interventions (McLaughlin & Jordan, 2010:69; Milstein & Chapel, 2005). The design of a logic model consists of the identified outcomes and the interventions, which are used as the criteria for evaluation (Davidson, 2005; McLaughlin & Jordan, 2010:72). Other components of a logic model should include a problem statement or issue that the programme intends to address, inputs, outputs, assumptions and external factors, such as factors interacting with the programme as a result of the environment within which it is located (McCawley, 2002:4-5; McLaughlin & Jordan, 2010:56 & 66-67; UMEX, 2008; WKKF, 2004:2 & 8). Figure 2-4 illustrates the basic components included in a possible example of a logic model.

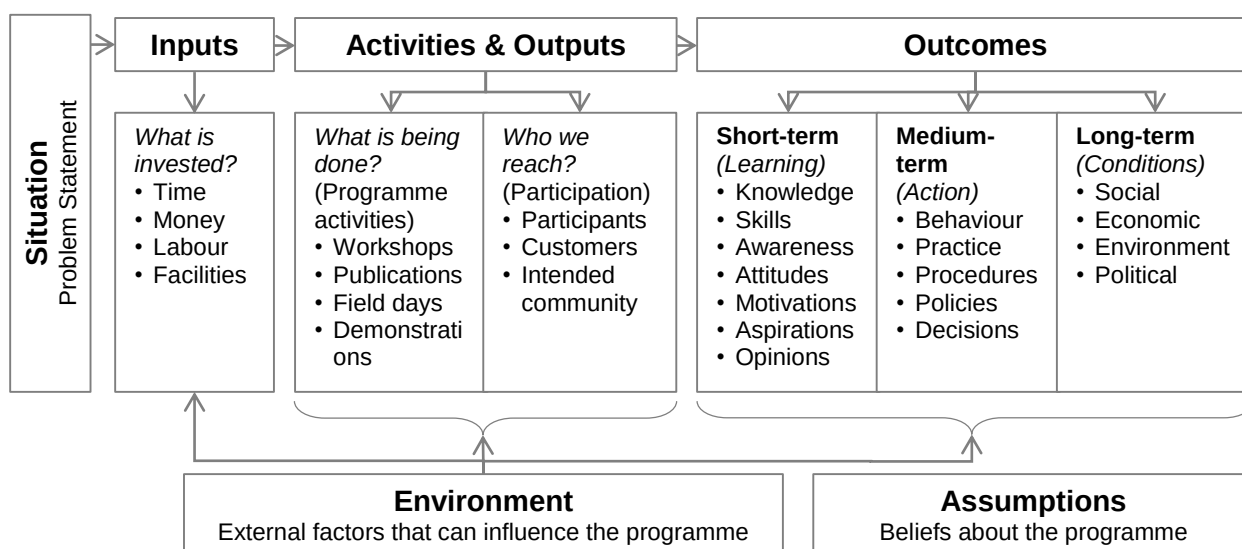


Figure 2-4: Components of a logic model.

Source: Adapted from McCawley (2002:5); UMEX (2008) and WKKF (2004:11 & 34).

The “situation” of a project can be used to express the reason behind the initiative. It can assist in explaining how the programme is proposed to work and why it can succeed. This can also be referred to as the “programme theory” or “rationale” of a logic model. A logic model can either be provided with large amounts of detail, indicating precisely the progress from one activity to the desired change, or it can be very broad, which only indicates chosen routes and their associated interventions (McLaughlin & Jordan, 2010:55; Milstein & Chapel, 2005; WKKF, 2004:8).

Table 2-4 provides a brief description of the advantages and limitations included in using a logic model.

Table 2-4: Advantages and limitations of a logic model.

Advantages	Limitations
• Allows the integration of planning, implementation and evaluation; • Prevents discrepancies between activities and effects; • Emphasises the importance of partnerships; • Ensures accountability through maintaining the focus on outcomes by stakeholders; • Assist in prioritising and allocation of resources; • Reveal data shortages and provide a framework for the interpretation of results; • Enhances understanding through the integration of research findings and practical knowledge; • Ensures the common understanding of the vision for community change.	• Possibility differences between the real effect and the intended effect of interventions; • The model may not be logical due to inconsistency or inaccuracy; • Difficulty in establishing the appropriate boundaries; • Not including enough depth to clarify the organisational context and maintaining the original reason for the development of a logic model; • The development of a logic model can be time consuming with a demand for a high degree of specificity; • Possible to oversimplify complex relationships.

Source: Own synthesis from McLaughlin & Jordan (2010:59) and Milstein & Chapel (2005).

Sections 2.2.1 and 2.2.2 proposed that a logic model should be used in order to accurately represent the identified needs, goals and objectives of the programme. This will ensure the provision of interventions to be able to meet these needs, and this includes the performance and instrumental needs identified in Chapter 3 (Davidson, 2005; JRSA, 2003:13-14; Trevisan & Huang, 2003:4). The inclusion of the results from the needs assessment and the balanced scorecard promotes the applicability of the logic model as an evaluation tool.

2.3 Conceptualisation of skills transfer and professions in the built environment

One of the most efficient ways to increase the knowledge base of a professional, is through the use of skills transfer. This can either be done through the very popular continuing professional development (CPD) programmes implemented by the relevant professional bodies or through the

development of ancillary programmes implemented by the professional bodies and presented to their members. The latter can include either new additions to existing legislation or fill in the gaps identified in the profession and its interaction with associated professions.

In order to conceptualise an approach to skills transfer of urban and regional planning practices and principles for related professions within the built environment, there must first be an understanding of skills transfer as a term. The interaction between urban and regional planning and specifically civil engineering, as well as the other professions in the built environment, should be understood as well as the training requirements of some of these professions.

2.3.1 Skills transfer

Skills are defined by Merriam-Webster (2015?a) as “the ability to use one’s knowledge effectively and readily in execution or performance”. It can thus be understood that skills refer to the ability to undertake a certain task by using the knowledge gained either through training or from experience gained (Cambridge Dictionaries, 2015). Green (2011:5) further states that skills can be seen as a personal quality with three key features including “productive” – using skills results in productivity of higher value; “expandable” – the enhancement of skills through training and development; and “social” – the social determination of skills.

The Department of Higher Education and Training (DHET) (2014a) states that skills refer to the “necessary competencies that can be expertly applied in a particular context for a defined purpose”. Competencies can also be divided into three groups (DHET, 2014a):

- **Practical competence:** The ability to perform a set of tasks.
- **Foundational competence:** The ability of an employee to comprehend what they or others are doing and the reason for it.
- **Reflexive competence:** Demonstrated when an employee is able to integrate or connect with the performance of others and comprehend the performance of others, in order to learn from their actions and be able to adapt to changes and unforeseen circumstances.

Competencies also refer to an employee who can illustrate skills in a certain field on one of three levels, including (Wong, 2011:1-2):

- **Basic:** The fundamental skills necessary for a specific position.
- **Intermediate:** Includes some advanced skills that enable an employee to adapt and meet some complex or non-routine situations.
- **Advanced:** An employee shows highly proficient and specialised skills which enable them to function in situations which are varied, complex and/or non-routine.

The levels of skills as well as the typologies of skills can be distinguished. A variety of skills are included in work, are among others, (Green, 2011:18-20; Wong, 2011:1-2):

- **Interpersonal skills:** The skills related to the interaction between persons.
- **Communicational skills:** The ability to communicate both verbally and in writing with a wide variety of people, thus getting the message across with less chance of misunderstanding.
- **Critical thinking skills:** Skills related to decision making and problem solving, being able to effectively plan and organise tasks.
- **Problem-solving skills:** The ability to solve problems through determining the cause and finding and choosing effective solutions and taking the necessary actions to implement them.

Green (2011:15) states that the reward for skilled labour in a competitive labour market is equal to the value of the extra services generated by the least productive worker that it is still considered profitable to employ. Skills transfer or skills development can contribute to the value of an employee to a specific organisation (Cedefop, 2011; Green, 2011:15-17).

Skills transfer can be seen as a form of skills development. The former refers to the "handover" of a certain skillset from one person or profession to another. It can also be understood as the application of knowledge of one profession in another (Cedefop, 2011; Govender & Bisschoff, 2007). Skills development, on the other hand, refers to the improvement of skills from, for instance, a basic level to an intermediate level, resulting in the improvement of an organisation's efficiency through the improvement of the impact the employee has on their position (Elphick-Moore, 2012, Govender & Bisschoff, 2007). Skills transfer can thus be seen as a form of skills development.

In 1998 the South African Parliament identified a need for the improvement of skills development. In response to this need the Sector Education Training Authorities (SETAs) were established, each with its own clearly defined sector and sub-sectors made up of a variety of related economic activities. SETAs are concerned with learnerships, internships, unit-based skills programmes and apprenticeships. They are also responsible for the collection of skills levies, in terms of the Skills Development Levies Act (1999), from each sector, which is then reused in the specific sector for training purposes in the form of, among others, grants and bursaries (Vocational, 2015).

The professions included in the built environment form part of the Construction Education and Training Authority (CETA) (2013:10). Further detail on SETAs and the related legislation is provided in greater detail in Section 2.3.

Scarce and critical skills refer to the professions which currently, or in the future, have or will have a scarcity of qualified and experienced people. This can be the result of skilled people not being available, known as absolute scarcity, or that there are skilled people available, but they do not meet the employment criteria, known as relative scarcity (DHET, 2014a; EDTP SETA, 2014:7-9).

Several sources are used to identify professions as a scarce and critical skill, including the National Development Plan (2012) and the New Growth Path (2010). The rankings of professions generally related to the built environment on the scarce and critical list of 2014, are as follows (DHET, 2014a):

Table 2-5: Scarce and critical skills list for some of the professions in the built environment.

Ranking	Profession
2	Civil Engineer
4	Quantity Surveyor
6	Physical and Engineering Science Technicians (Civil Engineering Technicians; Surveying or Cartographic Technicians; Town Planning technicians)
48	Land Surveyor
62	Civil Engineering Technologist
72	Architect
80	Urban and Regional Planner

Source: Adapted from DHET (2014a).

It should be noted that the list provided above was finalised by the DHET (2014b), after receiving feedback from the public on its original list. The professions mentioned above are all included in the final list, but there is no ranking allocated to any specific profession.

2.3.2 Professions included in the built environment

The professions mentioned above can be seen as some of the key role players in the built environment. They are also closely related to urban and regional planning and integration between some of these professions takes place on a daily basis. The role of the municipal engineer and its relation to urban and regional planning were described in Chapter 1. This will now be discussed in greater detail, in order to gain a clear understanding of the role and interaction of urban and regional planning in the built environment.

2.3.2.1 Urban and regional planning

The Planning Profession Act (36 of 2002) states that planning together with the planning profession can be seen as areas of expertise focused on the initiation and management of change in both the built and natural environment across a spectrum of areas, including the urban and rural areas defined on various geographic scales such as regions, sub-regions, cities, towns, villages and neighbourhoods.

Specific fields for the management of constant change are needed in order to promote human development and environmental sustainability. This can be obtained through the synthesis and

integration of information assisting in the preparation of strategic, policy, statutory and other development plans included within the South African development context. These fields include (Planning Profession Act 36 of 2002):

- Land use management, allocation and regulation.
- The organisation of service infrastructure, utilities, facilities and housing for human settlement.
- The coordination and integration of social, economic and physical sectors included in human settlement.

Planning should pursue and serve the interests of the public to benefit present and future generations (Planning Profession Act 36 of 2002). This description of planning and the planning profession can also be seen as the definition of sustainable development. The Planning Profession Act (36 of 2002) further provides the definition of a planner as a person exercising skills and competencies in the initiation and management of change in the built and natural environment, in order to promote environmental sustainability and human development, as described above.

The Organising Framework of Occupations (OFO) (SACPLAN, 2014b:5) further describes an urban and regional planner as someone who “develops and implements plans and policies for the controlled use of urban and rural land, and advises on economic, environmental and social needs of land areas”.

The South African Council for Planners (SACPLAN) was established in terms of the Planning Profession Act 36 of 2002, and serves as the regulatory body for urban and regional planners in South Africa. A planner is required to be registered to SACPLAN. Previously the Planning Profession Act (36 of 2002) made provision for three categories including that of a candidate planner, technical planner or professional planner, in terms of Section 13 of the Act. SACPLAN (2014b:6-7) together with Section 13(4) of the act made provision that:

(a) Registration of a candidate planner, the person:

- Should be registered for, or have completed, an accredited planning educational programme at the National Qualifications Framework (NQF) level 5 (National Certificate) or higher.
- Is, in the SACPLAN's opinion, a fit and proper person to engage in planning work under the control and supervision of a technical or a professional planner or such other person or institution as determined by SACPLAN.

(b) Registration of a technical planner, the person:

- Should have completed an accredited planning educational programme at the NQF level 6 (National Certificate or National Diploma) or higher.

- Should have undergone practical training of at least two years or as may be prescribed by SACPLAN.
- Should have passed a competency assessment determined by SACPLAN.

(c) Registration of a professional planner, the person:

- Should have completed an accredited planning education programme at a NQF level 7 (Bachelor's degree) or higher.
- Should have undergone practical training of at least two years or as may be prescribed by SACPLAN.
- Should have passed a competency assessment determined by SACPLAN, or the applicant should possess other qualification as defined in the South African Qualifications Authority Act, 1995, as may be determined for the relevant category from time to time by the South African Qualifications Authority in terms of the Act and by SACPLAN.

A fourth category for registration of Urban and Regional Planning students, who have successfully completed their first year of undergraduate studies, was proposed by SACPLAN in the Government Gazette 37189 on 23 December 2013. This category is generally managed in connection with the “candidate planner” category mentioned above (SACPLAN, 2014c:9).

SACPLAN compiled a “Competency and Standards” project, which will be implemented alongside the amendments made to the Planning Profession Act (36 of 2002), thus leading to the transformation of the planning profession. This includes the proposed amendments that should be made to the Planning Profession Act (36 of 2002), in terms of the registration categories and the allocation of CPD points. The categories, as mentioned above, are to be amended as shown in Table 2-6.

.

Table 2-6: Proposed amendments to categories of planners with qualification and experience requirements.

Current categories of planners	Proposed new categories of planners	Progression to next category	Qualification and experience
Candidate Planner (Student)	Student Planner	Candidate planners	Full-time or part-time student for an accredited planning education programme.
Candidate Planner	Candidate Professional Planner	Professional Planner	Graduates of an accredited planning education programme (NGF level 6-8 or higher).
	Candidate Planner	Planner	
	Candidate Assistant planner	Assistant Planner	
Technical Planner	Assistant Planner	Assistant Planner	Graduates of an accredited planning education programme (NGF level 6 e.g. National Diploma level) with minimum 12 months post-graduation practical training and one year registration as a Candidate Assistant Planner.
	Planner	Professional Planner	Graduates of an accredited planning education programme (NGF level 7 e.g. B.Tech or three year degree level) with minimum 24 months post-graduation practical training and two year registration as a Candidate Planner.
Professional Planner	Remains unchanged as Professional Planner		Graduates of an accredited planning education programme (NGF level 8 or higher e.g. professional four year degree level) with minimum 24 months post-graduation practical training and two year registration as a Candidate Professional Planner.

Source: Adapted from SACPLAN (2014c:11-12).

In addition, SACPLAN (2014c:13) proposes that registered professional planners, planners and assistant planners may apply to be transferred to a “retired” category, if they have reached retirement age.

SACPLAN (2014c:13) further propose that a Fellow and Honorary Award categories be introduced. The former refer to professional planners who have provided a long and outstanding service to the profession and the community, while the latter will be awarded to an individual who is not a registered planner, but has made a significant contribution to the planning profession or in the field of planning. Both of these awards will include a motivation made by a professional planner, supported by at least seven other professional planners and approved by SACPLAN.

Currently, the registered planners are required to submit a “Practical Training Report” to SACPLAN, which is signed off by a registered supervisor. It is proposed that this should be replaced by an assessment and examination in order for the planner to obtain a professional registration and for it to gain international recognition (SACPLAN, 2014c:24).

Additional amendments to the Planning Profession Act (36 of 2002) include the allocation of CPD points to planners in all categories. This will contribute to reaching the requirements set by SACPLAN for the renewal of registration every five years as determined by the council. The participation in CPD activities will contribute to the (SACPLAN, 2015:7):

- Maintenance of competencies and personnel development;
- Retaining and enhancement of the profession;
- Insurance of continuous improvement of acquiring innovation, academic and personal skills, as well as the growth thereof;
- Development of deeper and specialised knowledge and the expansion of knowledge over the wider professional spectrum; and
- Acquisition of international recognition.

The South African Planning Institute (SAPI) and the South African Association of Consulting Professional Planners (SAACPP), are seen as voluntary organisations and provide support to SACPLAN in its duties. SAPI (2015) memberships include the Monthly Corporate, Annual Corporate, Monthly Associate, Annual Associate, Student and Annual Retired members, in their registration categories. The focus of SAACPP (2015) is mainly on the registration of private consultancy firms, while focusing on two main regions known as the Northern Region (Gauteng, Mpumalanga, North-West, Limpopo, Free State and KwaZulu-Natal) and the Southern Region (Western Cape, Eastern Cape. Northern Cape).

Town planners conduct a vast variety of work in both the private and public sectors and deal with an intricate web of policies and legislation on a regular basis. The work conducted by planners can be divided into two categories. A candidate planner should spend at least six of the 24 months in each category, in order to be able to gain the practical training needed for registration as a technical or professional planner. Table 2-7 provides a brief description of the work conducted by planners as provided by SACPLAN (2012:3-10). These categories are also to be amended in light of the amendments made in the registration categories shown in Table 2-7.

Table 2-7: Typical work conducted by urban and regional planners.

Category	Type of work	Description	Work included	Proposed new category
Planning investigation and plan formulation (Strategic planning)	National structure plans	Aimed at achieving determined economic and social objectives by the efficient use of natural and human resources. Priorities on sectoral and regional basis is provided as guidelines for planning on other levels. Focuses on policy formulation and rarely on specific development projects, thus considered as structural or strategic planning.	National traffic and transport systems; human settlements (housing and urbanisation); agricultural development; provision of water and energy; using mineral, marine and other resources; environmental conservation; economic priorities.	B
	Regional structure plans	Takes provincial boundaries (planning regions) into consideration, makes use of the same spatial planning elements as used for structural planning on national level, which will serve as guidelines in preparing plans. More attention detail is given these elements.	Development of frameworks for future population settlement and quantification of human settlements in anticipated urbanisation and requirements for job creation.	B
	Sub-regional structure plans	Focuses on social, economic and physical needs of development and uses the guidelines provided in national and regional plans to change and adapt to specific social, economic and geographic characteristics. These plans need to adapt to constant changes in the need to accommodate the local circumstances generated by the communities and individuals.	Portions of land are specified in order to provide in the social and infrastructure requirements of the local community. Clear projects can be identified for implementation over a shorter period of time.	B
	Urban structure plans	Focuses on the physical planning of a single urban area or the functional interaction of urban centres. Development priorities and the intensity of land uses are important components. Communities need to be included in the process of land development as this will affect the future actions in the development facilitation process.	The main goal is the arrangement and management of land uses, although the associated needs of the community can be identified through these land uses. The provision of adequate form and mode of transportation, education, health, employment opportunities, residential, recreational and other facilities forms the main focus.	B

	Local structure plans	This is seen as the local authority's area of concern. It deals with the same goals as the urban structure plan, however, it is more focused on a specific community, with planning proposals consisting of more detail. These proposals consist of a strong community developmental elements and is driven by the quantified community and individual needs. The process will include active community participation where needs will be emphasised and expressed.	This can be prepared in the form of policy statements and are aimed at solving the specific needs of the local community and its related development problems.	B
	Planning survey, analyses and/or policy formulation	This is the systematic study of any activity that forms the basis of land use or socio-economic planning decisions for the private, public and academic institutions. It is performed in collaboration with communities and makes use of scientific collection, compilation, analysis and evaluation of data. Data can be used to make projections of, among others, population, education, health, housing.	The composition of a report dealing with the aims and objectives of the community and the most important policy aspects. This is then presented together with recommendations for the execution of general or specific town and regional planning policy. Policy formulation focuses on the provision of aims and objectives, policy aspects and recommendations.	A & B
	Layout plans, Township plans and Land development plans	The plans illustrate the detail of the proposed development for the community, to be undertaken by public or private developers. Sufficient detailed information with references to services and design criteria/standards, are included.	Proposed urban layout for housing or industrial uses, land development applications, redevelopment or urban renewal schemes and plans proposing specific land uses are included.	B
	Urban design and site planning	Deals with the design of urban development. The work is mainly three-dimensional in nature and the focus is placed on the relationship between land uses and buildings.	This includes the preparation of site development plans and urban design frameworks and includes the physical form of buildings, the space between buildings, access roads, technical implications of services and infrastructure, questions related to feasibility, design standards and site valuation.	C & D
	Planning research	Includes the detailed study of a particular subject contributing to the knowledge and better understanding of	Generally conducted under commission and/or at an acknowledged research	A

		the conceptual, theoretical or practical elements implemented at the urban or regional levels, such as socio-economic, physical and environmental planning and development.	establishment. However, it should not be seen as the surveying and analysis of other types of work.	
	Academic work	Includes practical research through a recognised planning school, in the conceptual elements of development, socio-economic, physical and environmental planning with the application of appropriate techniques in urban and/or regional planning.	The focus is placed on the education in disciplines related to research in town and regional planning, including, among others, regional economic, urban studies and rural development.	A
	Development evaluation	Focuses on the evaluation of environmental influences as well as the economic and social implications of any public or private development or proposed development. The consequence of evaluation is the proposed feedback of information to future initiatives to accomplish better efficiencies.	This includes the processes contained in evaluating the way in which money is spent on development projects and whether the effort has attained the intended goal.	A
	Local economics	The participatory consultation with communities and the analysis economic phenomena related to land and the use of land in accordance with given town planning and limitations. Includes a statement of the significance of the desirability of the particular land uses and, among others, an analysis of supply and demand, benefit costs and best case scenario.	Compiling a presentation of the analysis of this economic phenomena and the compilation of business plans for the most optimal use and development of land.	B
	Corporate strategic planning	Focuses on the formulation of strategic proposals for the physical utilisation of land, buildings, infrastructure and superstructure of clients.	Compiling business plans including a budget and programme for development and will be based on a physical plan indicating the socio-economic development targets.	D
	Miscellaneous planning work	Includes land use planning work and/or design work.	Includes work that is not included in one of the abovementioned categories, although related to urban and regional planning.	D

Planning administration and implementation (Statutory planning)	Urbanisation	Concerned with the multidisciplinary activities undertaken in order to achieve effective development of urbanisation, including the clear guidance on matters such as land procurement, environmental considerations, social and economic realities such as the most efficient provision of services, employment opportunities, transportation services and local governments. The main focus is the quest for appropriate types of land tenure.	Includes consultation with stakeholders including the intended community and all negotiations leading up to the final decision making. Continuing attention is given to the solution of community problems and follow-ups.	B
	Housing	Considerations will be made to the social and welfare needs such as age, gender, income. In the provision of services and housing, a clear understanding of the needs of the community should be gathered. The results will include affordability and the ability of the community to be involved in the processes. Capacity building will be conducted to enable to community to conduct further similar studies on their own.	Coordination by the planner is essential in ensuring that the numerous activities take place in the most efficient manner and results in the suitable delivery of housing.	B
	Development planning	Focuses on the process planned to be implemented within well-defined timeframes. It has a more definite impact and is usually accustomed to the development of specified areas for specific communities. The stakeholders should provide clear expectations of the programme and their roles should be clearly defined.	The development of a time scale and a budget are two of the most important elements. Surveying is done with the participating community. This also includes the compilation of a report stating the aims, objectives, time sale and financial implications. The plan can be diagrammatic or detailed and should allow flexibility in interpretation and execution.	B & C
	Statutory town planning & zoning schemes	Includes defining and demarcation specified use zones and the regulations applicable to permissible density, coverage, height, floor area ratio (FAR), parking and building lines. Legal provisions such as the protection for objection and appeal is essential, although the continuous amendment of the planning schemes should be ensured.	The focus is on policy matters relating to the search for more appropriate and flexible town planning scheme measures.	C
	Development control & appeals	Focuses on the professional control over statutory town and regional planning documents such as structure plans, zoning schemes, town planning schemes, building	Includes the administration and covers the rules or procedures for town and regional planning. Appearing before any court as a	C

		regulations, health regulations and other statutory control measures in terms of legislation provisions aimed at controlling the use or development of land and includes the administration of documents possibly in progress or completed. The role the planner plays in acting as a representative of a group, community or client in and adversary capacity before a court, tribunal, board or council of appeal, created in terms of any legislation, is also included.	member of or counsel for a tribunal or board of appeal established in terms of any legislation to control any statutory instruments or regulations relating to the use of development land is also included.	
	Consent use & amendment to title restrictions	The provision of motivated applications for the approval and amendment of land uses in terms of specific legislation are included.	The compilation of applications and the motivation thereof for submission to the relevant local authority.	C
	Project management	Includes the management of a multidisciplinary team, assembled to guide development projects from inception, through approval and to completion. This will include various professions whose actions will be coordinated in to a programme to effectively implement the client's needs. This includes the management of schemes to promote the optimal development of land for communities.	This includes development in urban areas, including development facilitation in rural areas, including small-scale farming and community upgrade schemes. Can also include property development and allocation of land for formal development.	D
	Development coordination	Ensures that the responsibilities and activities of functional line departments and other service providers are coordinated. This should take place at specific service levels to ensure efficient and optimal supply of services and activities in development.	Focuses on the coordination provided by the planner in a multidisciplinary development activity.	C
	Planning law	The presentation of draft planning legislation, regulations or other statutory instruments, includes the preparation of comments on proposed legislation relating to planning law and related law such as environmental and transport legislation at central, regional or local levels.	Includes the presentation of proactive changes and inputs where needed. This can take place in the form of amendments to existing legislation or refer to new legislation.	C
	Plan evaluation	Evaluation proposed plans in light of possible limitations such as the proposed site for development, available finances and social parameters.	Includes the evaluation of proposed plans in order to determine the best solution to possible problems.	C

	Transport & land use planning	Consist of transport planning within an integrated transportation plan.	The provision of land use planning portion of transportation planning.	B & D
	Property development	Recommendations for a specific property are made in accordance with a land use plan, and is done through direct investment or active coordination of investment by private or public co-operations.	Focused on the submission of recommendations for the economic use of land for various land uses and the development of a specific property.	D
	Integrated environmental management	Includes the participation in the process of integrated environmental management considerations at all stages of a particular development in order to obtain the benefits of the development within the minimal harm done to the environment.	The preparation of integrated environmental studies in accordance with guidelines set by the relevant authorities.	D
	Rural development	Includes community participation in order to obtain a realisation of economic, social and physical aspects of the rural development required. The influence of the community development projects in terms of the broad rural and urbanisation policies, should be taken into consideration.	Focuses on the analysis and the proposals of agricultural and small scale farming development.	B
	Negotiation & mediation	Includes the activities involved in ensuring community participation in the planning process.	Includes the mediation between adversaries in the planning process and that it takes place under circumstances where negotiation skills are needed.	D
Key to proposed new categories: A – Survey and research; B – Plan formulation; C – Planning implementation and administration; D – Other planning work in related fields				

Source: Own synthesis from SACPLAN (2012:3-10) and SACPLAN (2014c:16).

Urban and regional planners deal with a comprehensive web of policies and legislation across all spheres of government, in order to conduct their work. It is thus important to comprehend the interaction of these policies and legislation, as it may have a great influence on the processes used. Figure 2-5 provides an example of the interaction between the private and public sector and the associated policies and legislation frameworks.

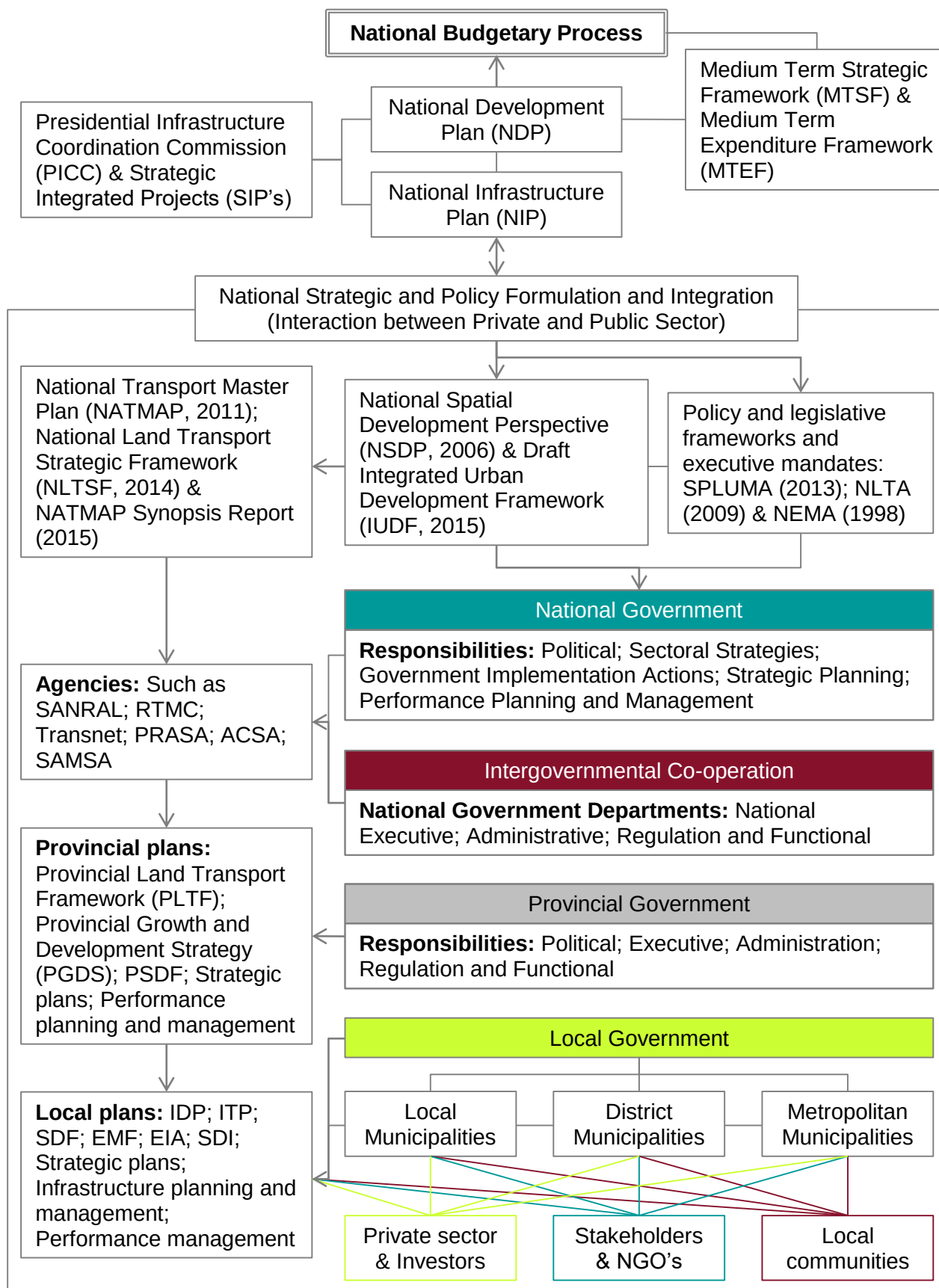


Figure 2-5: Interaction between private and public sector and associated policies and legislation.

Source: Adapted from Schoeman (2015:2).

2.3.2.2 Civil engineering and other professions included in the built environment

It is important to comprehend the interaction of the urban and regional planner with other professions in the built environment. This substantiates the importance of skills transfer of urban and regional planning practices and principles to these professions.

Chapter 1 indicated that there is a close relationship between urban and regional planning and engineering, including a brief description of the correlation and linkages between urban and regional planning and engineering, or specifically civil engineering. However, it is important to gain an understanding of the relationship between urban and regional planning and engineering as they cannot be considered as a stand-alone entity.

Akbar and Rasul (2012) state that civil engineering focuses on the design, construction and maintenance of the built environment, including infrastructure such as roads, bridges, sanitation systems and buildings, while urban and regional planning mostly deals with the planning of infrastructure development, service delivery, land use management, community development and transport and communication planning. These professions are located within the built environment and should be considered as such.

Other professions included in the built environment, such as architecture and land surveying, has been included in the evaluation of professions due to the close relationship they form with urban and regional planners and civil engineers. However, these professions is not scrutinised with the same degree of detail, due to the proposed programme focussing only on urban and regional planners and civil engineers.

As a result, a brief description of some of the professions included in the built environment together with the regulatory body and voluntary association and their registration categories, applicable regulatory legislation, the linkage with urban and regional planning and the role in and towards to municipalities is provided in Table 2-8.

Table 2-8: Explanation of professions in the built environment and their interaction with urban and regional planners.

Profession	Civil Engineer	Land Surveyor	Architect
Description	Civil engineering can be described as the use of science and technology in an attempt to control and use the forces and materials of nature, for the advanced benefit of people. They are responsible for the design, planning, maintenance or servicing and management of projects of a very large scale. Their work includes, among others, buildings, harbours, bridges, roads, the supply of municipal services and large scale housing development. They also verify the structural integrity of buildings and constructions. A civil engineer can focus on, among others: • Structural engineering: The design of bridges, roads, towers and tunnels. • Transportation or traffic engineering: Includes airports, conducting traffic impact assessments, conducting traffic control. • Geotechnical engineering: Includes mining, excavations, foundations, soil investigations & compositions. • Water engineering: Includes the design of pipelines, sewerage systems, water networks. • Environmental engineering: Design of environmentally friendly initiatives.	Surveying is one of the oldest recorded professions and includes projects varying in size. The work of a land surveyor include both field works, such as the measurement of a terrain and pegging of beacons, and office work, including the processing of information. A land surveyor can specialise in: • Geodetic surveying: Focuses on providing a framework of accurately coordinated and heightened beacons, in order to generate linkages with other maps. • Cartography: It is usually done by photogrammetry, where the data is included on a map showing data in an easily understandable form. • Cadastral Surveying: Includes the surveying of land (the development of townships on farms) and buildings (the development of sectional titles) and the determining of property boundaries. • Engineering surveying: The measurement, setting out and monitoring or roads, tunnels, bridges and structures. • Hydrographic/oceanographic surveying: Concerned with mapping the marine environment including inland bodies of water, also includes	Architecture refer to the design of the human environment, including buildings or groups of buildings and the space between buildings. Other activities of architecture include the documentation of design and the inspection of buildings and may also include: • Landscape architecture: The design landscapes on properties and between buildings. • Interior architect: Similar to the work done by interior designers, although this includes, among others, the design of furniture to fit in a room. The size of architectural projects range from large buildings or building complexes to small additions to a single dwelling house.

		the positioning at sea to indicate danger zones.	
Applicable regulatory legislation	Engineering Profession Act No. 46 of 2000	Geomatics Profession Act No. 19 of 2013	Architectural Profession Act No. 44 of 2000
Regulatory body, voluntary association and accreditation	The Engineering Council of South Africa (ECSA) is seen as the regulatory body to which the all engineers should be registered, in order to be able to practice as, among others, a professional engineer. The South African Institute of Civil Engineering (SAICE) and IMESA are the voluntary organisations to which civil engineers and municipal engineers can register, respectively.	The South African Council for Professional and Technical Surveyors (PLATO) is seen as the regulatory body to which all surveyors should be registered, in order to be able to practice as a professional or technical surveyor. The South African Geomatics Institute (SAGI) is the voluntary organisation to which surveyors can register.	The South African Council for the Architectural Profession (SACAP) is seen as the regulatory body to which all Architectural professionals should be registered, in order to be able to practice as a professional architect. The South African Institute of Architects (SAIA) is the voluntary organisation to which architects can register.
Regulatory body and voluntary association registration categories	• ECSA membership: Professional Engineer; Professional Engineer Technologist; Professional Certified Engineer; Professional Engineering Technician; Candidate Engineer • SAICE membership: Honorary Fellow; Fellows; Member; Associate-; Student members • IMESA membership: Professional-; Graduate-; Student-; Associate members.	• PLATO membership: Professionals; Surveyors – Technologists; Technicians; Persons in training. • SAGI membership: Professional; Technologist; Survey Technician; Student.	• SACAP membership: Professional Architect; Professional Senior Architectural Technologist; Professional Architectural Technologist; Professional Draughtsperson; Candidate Architect; Candidate Senior Architectural Technologist; Candidate Architectural Technologist; Candidate Draughtsperson. • SAIA membership: Architect-; Life-; Honorary-; Retired-; Candidate-; Associate member.
Linkage to Urban and Regional Planning	Civil engineers are consulted when large scale town planning developments are proposed such as township establishments and in particular for large	Land surveyors in particular, are able to submit consolidation and subdivision applications to the local authorities. These applications comply with all the	Architects usually provide the site development plans for a rezoning or removal of restrictive title conditions application submitted to the local

	scale residential developments. Geological assessments are requested from civil engineers when a new township development is planned. This includes, among others, the composition of soils and the evaluation of possible drainage problems as a result of the gradient or slope of the proposed site. Other consultations include the assessment of the impact an increased traffic volume may have on the surrounding developments. The provision of sufficient services are also determined.	necessary legislation. Land surveyors are further responsible for the development of sectional schemes. Land surveyors are consultants, often used to identify and peg property boundaries or the gradient, slope and contours of a specific site.	authority by the town planner. These plans include the position of the existing and proposed development on the property. The town planners can also be seen as consultants to the architects, as they are contracted to do the planning applications on a property which will enable a certain project to continue. The collaboration between architects and town planners can result in a more integrated approach to new and continuous development in a city, especially through the use of urban design.
Role in and towards municipalities	Civil engineers can be employed by state departments, provincial administrations, municipalities and parastatals. They are responsible for the design, development and maintenance of transport systems and the provision of adequate and sustainable municipal services to the community. Civil engineers need to provide comments on all town planning applications submitted to the municipalities including an indication of whether the existing or proposed services will be able to provide in the need of the development. They also need to approve the building plans submitted by architects.	Several land surveyors are employed by state departments, provincial administrations, municipalities and parastatals. In these positions, they are responsible for mostly engineering surveying such as the determination and upgrading of roads as well as the pegging of developments such as new townships. Surveyors also manage the subdivision and consolidation applications and the Surveyor General Diagrams involved therein. They may also be required to approve the drawings of new township developments in order for it to be submitted to the Surveyor General of each province.	The building plans drawn by architects, need to be submitted to the local authority relevant to the property. These plans need to be approved by the Municipal Architect, Town Planner and the Engineering department, prior to the commencement of construction. A Municipal Architect or building inspector need to conduct inspections for each phase of construction. This is to ensure that all developments are up to standard and complies with the necessary regulations.

Source: Own synthesis from CareerPlanet (2015); ECSA (2015); PLATO (2015); SACAP (2011:1-6); SACAP (2015:2-10); SAICE (2014); SAGI (2015) and SAIA (2014).

2.4 Review of policy and legislative framework with regard to skills transfer in the built environment

The previous section of this chapter described the applicable regulatory authority for some of the professions included in the built environment. These authorities are responsible for the transfer of skills and training in the relevant professions and to the persons registered to these authorities.

The following section will provide the national and international legislation and policies for education and skills development, transfer and training, with the focus on BRICS (Brazil, Russia, India, China and South Africa) and specifically IBSA, as well as a brief background for some of the international regulatory authorities for the related professions and their requirements. Reference will also be made to the existing research conducted towards skills transfer in the built environment. The focus for the review of international legislation, policies and standards was placed on BRICS and IBSA due to the general similarities between the countries, such as economies and the presence of international regulations regarding education, as discussed later in this section.

2.4.1 Understanding BRICS and IBSA

BRICS was formerly known as BRIC (Brazil, Russia, India and China), which was initially developed in 2001 by Jim O'Neill, of Goldman Sachs, as part of an economic modelling exercise to forecast economic trends over a 50-year period. On 21 September 2010 in New York, the BRIC Foreign Ministers agreed upon the inclusion of South Africa into the organisation, leading to the invitation for South Africa to attend the third BRICS Summit in Sanya on 14 April 2011. BRICS is an international political organisation of leading emerging economies and consists of five member countries, Brazil, Russia, India, China and South Africa (Fifth BRICS Summit, 2013; Gauteng Provincial Treasury, 2013:8-7; VI BRICS Summit, 2014).

The organisation comprises some of the world's highest-ranked emerging economies and aims to achieve peace, security, development and cooperation (Jiabao, 2013). It has two main pillars of focus which include "the coordination in multilateral forums, with a focus on economic and political governance" and "cooperation between members" (VI BRICS Summit, 2014). The collaboration of these countries further aims to meet the economic needs of each country through addressing investment in infrastructure development, consumption and increased trade (Gauteng Provincial Treasury, 2013:5).

As of 2012, the five BRICS countries represented roughly one-third of the world's population, with a combined nominal GDP of US\$13.6 trillion, and an estimated US\$4 trillion in combined foreign reserves. The BRICS group further comprises 41.6% of the world's population (2012 data) (sixth

BRICS Summit, 2014; IBGE, 2014:18). It contributes a total of 19.8% (US\$15,76 trillion) to the World GDP (sixth BRICS Summit, 2014). With the possible exception of Russia and China, the BRICS members are all developing or newly industrialised countries, but they are distinguished by their large economies and significant influence on regional and global affairs. (Gauteng Provincial Treasury, 2013:1).

The IBSA dialogue forum was established on 6 June 2003, during a meeting of the Foreign Ministers of the three countries. The member countries can be identified through their similarities including their condition as developing nations, a common need to address social inequalities and consolidated industries and the similarity of their multi-ethnic, multicultural and democratic emerging economies, focused on the construction of new international architecture, combining their voices on global issues and deepening their ties in various other focus areas (IBSA Trilateral, 2013; Ministry of External Affairs. 2013; Saran & Sharan, 2013; Soule-Kohndou, 2013:3). Although the IBSA countries form a group, they are individually more recognised for their roles in BRICS.

The nations included in IBSA, together with the remainder of the BRICS group, share a particular focus on the improvement of among others, education (Ministry of External Affairs. 2013). Economic objectives such as knowledge changing through capacity building are promoted through the summit declarations made by countries such as IBSA and BRICS (Soule-Kohndou, 2013:8-9).

The BRICS countries participate in the goals and objectives set by the United Nations Educational, Scientific and Cultural Organization (UNESCO), which plays a central role in supporting the actions and initiatives to further and improve education by the BRICS group (UNESCOPRESS, 2013). These countries are committed to mobilising investment and collaboration between the countries in order to improve the quality of higher education provided in each of these countries (Kigotho, 2014; UNESCO, 2014a:2; UNESCO, 2014b:2).

They aim at achieving excellence in higher education through increasing the accessibility of quality higher education for all population groups; and utilising education provided by the private sector and newer technologies in education provision to increase the competency of teachers and efficiently conform to the international standards and qualifications frameworks set by UNESCO (Kigotho, 2014; UNESCO, 2014b:2-4).

UNESCO also focuses on improving skills development through designing and implementing national qualification standards for the development of skills (UNESCO, 2014b:2). BRICS, in collaboration with UNESCO, identified data collection, learning assessment, technical and vocational education and training (TVET) and ICT in education, as priority areas (UNESCO

PRESS, 2013). This enables the generation of policies prescribing certain qualification standards that should be adhered to, in order for the qualified and skilled personnel to be able to provide services of an international standard.

2.4.1.1 Relevant professions viewed in context of BRICS and IBSA

Table 2-9 provides the relevant legislative frameworks for urban and regional planning and civil engineering in context of IBSA, as included in the BRICS group. It includes the differences and similarities between the legislative frameworks, educational requirements, regulatory organisations and registration categories for each profession in the relevant country. The information relevant to South Africa has been provided in Section 2.2.2.2. The education framework for the relevant professions is described in Chapter 3. The policy framework relevant to the BRICS countries is given in Table 2-10. This policy guides the development and promotes the improvement of education in the BRICS countries. South Africa uses this policy to guide its own education system.

2.4.1.2 Legislative framework

The national legislative framework set out in Table 2-11, is given as an overview of the national legislation provided for education and skills development, transfer and training. This attempts to give a general understanding of the transfer of skills including the education and training requirements for the design and implementation of programmes such as the one under evaluation.

2.4.1.3 Policy framework

The national policy framework included in Table 2-12, is provided in order to generate a general understanding of the implementation procedures and content requirements of a proposed skills development programme. This includes strategic documents published on a national level and the policies compiled and implemented by BRICS and the relevant SETA, as the responsibility for implementation of the national policies and legislation lies with both BRICS and SETA.

2.4.2 Existing studies

Table 2-13 lists documents viewed in addition to the policy and legislative frameworks and provides a general understanding of studies conducted on, among others, education in the BRICS group or training in the built environment. The significance of this study will also become more evident, as well as the focus that is placed specifically on urban and regional planning and civil engineering. The table also makes provision for studies done by the private sector but not legally part of policy and legislative documents.

Table 2-9: Relevant professions viewed in context of BRICS and IBSA

		Legislation	Education	Regulatory authority	Registration categories
Brazil	Urban & Regional Planning	Federal Law 5194 of 24 December 1966	Planning courses should be registered at the National Federation of Architects and Town Planners (FNA); no information on specific courses is available at this time.	The FNA is seen as the regulatory authority for all urban and regional planners of Brazil. Several voluntary organisations are registered to the FNA including, among others, the Union of Architects and Town Planners in the state of Rio de Janeiro (SARJ), Union of Architects and Town Planners in the state of Bahai (SINARQ-BA). FNA is also linked to CONFEA.	No specific registration categories are provided.
	Civil Engineering	Federal Law 5194 of 24 December 1966	No information on specific courses is available at this time.	The Federal Council of Engineering, Architecture and Agronomy (CONFEA) is seen as the regulatory authority for all engineers in Brazil. The Brazilian Engineering Consultants Association (ABCE) is a voluntary organisation to which engineering companies, in the private sector, can register.	CONFEA: Student members and Professional members.
India	Urban & Regional Planning	• The Town and Country Planning Act, 1958 • Model Urban and Regional Planning Law, 1996 • Urban and Regional Development Plans Formulation and Implementation Guidelines (URDPFI), 2014	• B.Tech (Urban & Regional) Planning • Bachelor of Planning • M.Tech Town & Country Planning • Masters of Urban/Town & Regional/Country Planning • Masters of Planning (Housing, Transport, Environmental, Urban, Regional, Industrial) • Ph.D. & Research	The Institute of Town Planners, India (ITPI) is seen as the regulatory body for all Urban and Regional Planners of India. The National Capital Region Planning Board (NCRPB) and the Town and Country Planning Organisation (TCPO) are the state appointed board and are responsible for relevant planning to be done and implemented.	ITPI membership: Corporate members (Associates and Fellows); Honorary Fellows; Retired Associates / Fellows.

	Civil Engineering	The Parliamentary Act of Registered Structural Engineers is a proposed legislation, at this time there is no legislation governing Civil Engineering in India, except for standards provided for design.	• B.Tech (Civil) • Bachelor of Engineering (Civil) • Masters of Engineering (Structure, Civil) • The ICE (I) provides several diplomas and courses in Civil Engineering • All engineers are required to take the Graduate Aptitude test after obtaining a qualification	The Engineering Council of India (ECI) is seen as the regulatory body for all Civil Engineers of India, all authorities governing engineering should be registered to them. The Institute of Civil Engineers (India) (ICE(I)) is responsible for the management of diploma and degree level education for aspiring engineers. The Association for Consulting Civil Engineers (India) (ACCE(I)) and Institution of Structural Engineers (ISE) are voluntary organisations.	ICE (I): Honorary Fellows, Fellows, Member, Associate Member, Technical Members. ACCE (I): Student Member, Associate Member, Member, Life Member, Fellow Member, Honorary Fellow Member, Organizational Member. ISE: Chartered (Professional), Confederation of Engineers, Membership of Society of Environmental Science.
--	-------------------	---	---	--	--

Source: Own synthesis from ABCE (2015); CONFEA (2014); ECI (2015); FNA (2011); ICE(I) (2015); ISE (2015); ITPI (2015); NCRPB (2015) and TCPO (2015).

Table 2-10: International policy framework.

	BRICS Building Education for the Future
Brief description	The report, as developed by UNESCO, is aimed at analysing the education and skills development policies within the BRICS countries, while highlighting possible areas for cooperation.
Focus	It compares education systems through the relevant national plans and policies, together with the identification of key strategic indicators, reviews technical and vocational education and training, outlines the engagement of BRICS in development cooperation and reflects on, and make recommendations for cooperation in education between the countries.
Implementation	Chapter 4 of the document provides twelve (12) recommendations for cooperation between the BRICS countries. These recommendations are provided in four (4) overarching groups, including: • Strengthening education systems for quality and equity Sharing knowledge of governance and financing mechanisms, to enhance equity and quality in public schools; comparing experiences in designing and implementing national assessment of student achievements and joining forces to improve the quality of education data. • Aiming for excellence in higher education Managing rapid expansion of higher education and facilitating the mobility of students and teaching personnel in BRICS. • Improving skills development for growth which will benefit all parties Developing labour market information systems and capacity for skills analysis and forecasting; Designing and implementing NQFs and standards for skills; strengthening the linkages between companies and TVET institutions, and facilitating workplace learning, specifically on secondary level and designing policies to meet the training needs of women and disadvantaged groups, and facilitating their transition into the labour market. • Providing support in education for other countries Establishing a hub to share information and data on development cooperation in education; create a joint fund/programme to support education in Africa and engage in joint advocacy for education.
Interface between documents	The report is to be implemented as a collaborative initiative between the BRICS countries, who should utilise the report to adapt and modify the local and national policy frameworks of each country.
Relevance to the study	This report promotes the improvement and provision of education and skills development and makes several references to the engineering and construction industries.
Critique	Even though this an excellent initiative between the BRICS nations, the responsibility to implementation still lies with each country, the successful implementation and execution thereof is thus not a certainty.

Source: Own synthesis from UNESCO (2014a: 2-80) and UNESCO (2014b:2-4).

Table 2-11: National legislative framework.

	The Constitution of the Republic of South Africa (1996)	Skills Development Act 97 of 1998 (SDA)	White Paper for Post-school Education and Training (2013)
Brief description	The topic of education is briefly included in the Bill of Rights, Chapter 2 of the Constitution, Section 29.	Formulated in order to provide an institutional framework for the establishment and implementation of national, sectoral and workplace strategies for the development and improvement of skills.	The document provides a vision of the type of post-school education and training system proposed for achievement by 2030.
Focus	Section 29 (Education) of the Constitution declares that each person has the right to a basic education, including adult basic education as well as the right to further education, which the state, through reasonable measures, must make progressively available and accessible.	Section 2 of the SDA provides the purposes of the act as the development of skills in the South African workforce; improvement of levels of investment in education and training; encouragement of employers to implement skills development; encouragement of employees to participate in skills development; improvement of employment prospects without proper training and education and ensuring quality learning in the workplace.	It is focused on providing strategies for the improvement of the capacity of the post-school education and training system in an attempt to meet the needs of South Africa. This is proposed through the use of several policies such as the improvement of the relationship between education and training institutions and the workplace in both the private and public sector.
Implementation	The Bill of Rights (Section 29) represents each South African's right to education, it is thus unlawful not to provide in this basic right by withholding education from any citizen.	Implemented by the South African Qualification Authority through a collaboration between the DHET and the SETA's. Further implementation is done through the establishment of leaderships, approving workplace skills plans, allocating grants in the prescribed manner to employers, education and training providers and workers and the monitoring of education and training in sectors.	The document is proposed to be implemented by the DHET in collaboration with the existing education institutions such as Further Education Training colleges and SETAs in an attempt to develop a single, coordinated educational system.
Interfaces between	The Constitution forms a key part in all South African documentations including Policy and Legislative frameworks and	The SDA works alongside the NQF and the South African Qualification Authority Act 1995 (SAQA), it further manages the	This will work as part of the SDA, SAQA, NQF and SETA's.

documents / parties concerned	are to be implemented not only by the relevant authorities, but by all citizens of the Country.	SETA's (the CETA) and the levies paid to them. Other policies such as the National Skills Development Strategy (NSDS) is derived from the SDA.	
Relevance to the study	The constitution supports the right of all citizens to gain education and guides the CETA together with the DHET while providing funding and guiding skills development, however, there is no reference made to skills development or the built environment.	The SDA provides regulations for the establishment of skills authorities together with an explanation as to the need for skills development, although no reference is made to the built environment.	Several references are made to the education and training provided to the engineering and construction fields as well as the improvement of the linkage between education and the workplace including the provision of skills development and the assistance of SETAs.
Critique	This section is a small part of the Bill of Rights and is very broad. Several other legislations needed to be implemented to guide education on all levels.	The SDA is the overarching regulation to skills development and relies on various authorities and supporting legislation to be properly implemented.	The document has not yet been accepted into law or implemented, it is thus difficult to determine its impact.

Source: Own synthesis from Constitution (1996); DHET (2013) and Skills Development Act 97 of 1998.

Table 2-12: National policy framework.

	New Growth Path (NGP) (2010)	NSDS III (2011)	Strategic plan for the CETA (2011-2016)	National Development Plan (NDP) (2012)	Council for the built environment (CBE) strategic plan (2013-2017)
Brief description	Drafted as a result of the growing consensus regarding the provision of job opportunities, reducing inequality and poverty. It was implemented during the restructuring of the South African economy to improve the performance thereof in terms of the labour absorption and the composition and rate of growth.	The strategy aims at improving the effectiveness and efficiency of the skills development system, with the purpose of linking skills development to a career path while promoting in-work progress and career development. It encourages the integration between workplace training and theoretical learning while facilitating the transition.	This is a representation of the action plan of CETA aimed at ensuring quality education and training to enhance the construction sector's contribution to national economic growth and development.	This document was developed in order to attempt to reduce the number of households with a minimum monthly income, reduce inequality, create jobs, expand infrastructure, transform urban and rural space, and improve education and training.	This document provides proposed programmes and projects that addresses the issues in the built environment and are proposed to add value to the professions in the built environment, government and the general public.
Focus	Key aspects of the NGP is, prioritising efforts and resources to support employment creation and equality; address inefficiencies and constraints across the economy for the promotion of the creation of decent work opportunities.	Focused on relevance, quality and sustainability of skills training programmes, thus ensuring assistance in poverty and inequality reduction. It focuses on eight (8) specific goals through the use of	The plan is focused on improving the quality of education and addressing the skills needs for designated groups.	The main focus of the plan is to eliminate poverty and reduce inequality by 2030. It also has a specific focus on skills development and using this to reduce unemployment and improve service delivery.	The built environment professional councils are aimed at providing a contribution to, among others, the establishment of structured programmes intended to address the bottlenecks in skills development.

		monitoring and evaluation.			
Implementation	Implemented through the use of 'job drivers', each with specified employment targets, supported by specific measures.	Implementation is a collective responsibility between the stakeholders and partners in skills development.	Implemented directly to the community through the use of levies paid by registered companies.	Implemented to provide a broad strategic framework which will guide key choices and actions (mentioned above).	Implementation of skills development programmes through the use of built environment professional councils.
Interfaces between documents / parties concerned	Requires the state to facilitate national and workplace productivity accords, support community organisations, strengthening existing institutions for social dialogue. Including policy packages included in the micro- and macro- economic development.	This strategy is concerned with the SDA 97 of 1998, and provides in the guidelines for the formulation of the sector plan by CETA.	The plan is concerned with Section 29(1) of the Bill of Rights included in the constitution, is a result of the SDA 97 of 1998, and provides in the objectives of the NGP and NDP.	This document can be used as a guideline for development of policies, legislation and programmes that will contribute to the different aspects of the document, such as the NGP, derived from the NDP. It uses other documents such as the RDP.	This policy is a product of the CBE Act 43 of 2000 and includes makes use of a variety of legislations, including, the Constitution, 1996 and the SDA 97 of 1998.
Relevance to the study	Promotes: education of engineers; improvement of on-the-job skills; the provision of highly skilled labour. Job driver 1: Infrastructure for employment and development specifically refers to the built environment as a whole with references made to housing development and other infrastructure. Job	Reference is made to the provision and promotion of skills development, especially the focus on high level skills, by public sector institutions. These skills include planning, engineering and environmental management. An emphasis is placed on the development of sectoral plans, as the	CETA includes the professions in the construction industry which in turn includes the built environment. Strategic outcomes relevant are: 7 – Increase, through construction-related skills, public sector capacity for improved service delivery and supporting the building of developmental state;	Reference is made to the critical shortages of engineers and planners. It recommends the long-term development of skills through mentoring and close partnerships with universities. It recommends the establishment of graduate programmes with the provision of monitoring, training and	The CBE focuses specifically on professions included in the built environment. Programme 2: Built environment skills development programme which is aimed at facilitating skills and human resource development in the built environment and is linked to the

	driver 5: Spatial Development refers to the improvement of rural areas.	strategy is used to guide and manage them. Professional, vocational, technical and academic learning (PIVOTAL) programmes is promoted.	8 – Building career a vocational guidance for construction.	reflection while formulating long-term skills development strategies for senior managers, technical professionals and local government staff.	strategic goal mentioned above.
Critique	Government focus largely on the improvement of tertiary education, rather than raising the intermediate skill levels for an increase in the level of productivity; the promotion of national skills can't keep up with advances in technology.	Very little reference is made to the professions included in the built environment. The bottom down approach of this strategy can have a big influence on skills development if not monitored and implemented correctly.	No specific reference made to professions included in the areas proposed for skills development.	Even though the document makes provision for addressing major problems, it is not enforceable and no monitoring takes place on the implementation of its proposals.	The policy mentions the implementation of programmes, but makes no mention as to a linked document providing the specifics of the programmes and expected outcomes thereof.

Source: Own synthesis from CBE (2013); CETA (2014); DHET (2011); NPC (2011) and Presidency (2010).

Table 2-13: Existing studies done on education, training and skills transfer of urban and regional planning knowledge in South Africa.

	Review of the nexus between Urban and Regional Planning and Engineering education	Do graduates in SA's built environment meet industry's expectations?	Professional Education in Built Environment and Design: Exploring Stakeholder Roles and Responsibilities
Brief description	This study focuses on the identification of the interdisciplinary relationship between urban and regional planning and civil engineering education. It states that some universities have attempted to develop some form of interdisciplinary courses that should support the need of both professions, however, some of these attempts did not address the complex issues between these disciplines, such as the identification of synergies between the professions, such as, land use management, transportation planning and service delivery. These issues should be addressed through interdisciplinary courses in order to be able to address them in a sustainable manner.	The aim of this study was to determine whether the graduates in the built environment are competent enough to execute what they are trained to do, if the graduates live up to what is expected of them, is the industry providing interventions, if gaps between the education and expectation of graduates can be identified, if there is any planned interventions from the built environment. The study determined that there are some cases in South Africa, where the engineering departments of municipalities are headed by non- or uneducated engineers.	This study is aimed at advancing professional education in the professions included in the built environment including the transdisciplinary spaces between them, through the identification of the changing nature of professional practice in the professions and the impact of changing modes of practice, technology and globalisation has. It identified the role universities, students and the industry play in response to challenges, and how prepared graduates are for the professional practice and possible interventions which can be implemented to improve the graduate's preparedness.
Relevance and results	In many cases it was determined that either there is interdisciplinary course provided to both disciplines or that the planning department receives some form of education in terms of engineering, but that there are not a lot of cases where engineers received training in planning, although this took place many years ago. It is thus determined that it is important to develop potential interdisciplinary courses and to implement them at universities, as both these disciplines are closely related	The study indicated that even though an engineer may have the theoretical knowledge, they do not possess the practical skills and knowledge required, thus not being competent in doing the work. The result is that the graduates do not live up to the expectations of the industry. It is proposed that the gaps should be addressed through the provision of in-house and external training, supervision by senior professional staff and the use of CPD. Existing international models focused on	The results of this study indicated that universities should generate critical thinking and problem-solving skills in their students. Skills such as humility, leadership, interpersonal and communication skills are indicated as important to students. The study further recommends that the transition between university and the practice needs to be a priority by both university and industry.

	when it comes to the delivery of the final product.	addressing gaps have not been implemented in South Africa. It is further proposed that each profession in the built environment is responsible for addressing the gaps identified.	
--	---	--	--

Source: Own synthesis from Akbar & Rasul (2012); CBE (2014:1-5) and Davis (2009:1 & 4).

It is important to gain an understanding of the process used and purpose of the evaluation of a programme and specifically the programme in question. The context for the implementation of the programme is also included in this chapter, as it includes the typical work done by urban and regional planners and the responsibilities of each profession included in the built environment. It is also important to comprehend the legislative and policy framework which guides education, training and skills transfer in the professions involved in urban and regional planning. Chapter 3 provides the empirical research which supports the findings of the existing studies and the correlation between the literature review and the empirical research will be described in Chapter 4.

CHAPTER 3 EMPIRICAL RESEARCH

3.1 Introduction

As previously mentioned quantitative and qualitative data have been collected in order to support the evaluation of the proposed programme developed for capacity building in municipal engineers.

Firstly an review of the current tertiary education provided to the professions included in the built environment was also included in the assessment. This was used to determine the current level of skills in urban and regional planning and related fields and the related professions' expectations and experience of each other. A needs assessment was conducted by means of survey distribution to two significant groups, namely the delegates of the IMESA 2014 conference and the registered candidate, technical, and professional planners of SACPLAN.

Secondly, an evaluability assessment was conducted on the proposed programme after the evaluation of the qualitative and quantitative data collected through the questionnaires have been completed. This will be followed by a proposed guideline for programme monitoring for current and future use of the programme.

3.2 Needs assessment

3.2.1 Review of current tertiary education provided to professions in the built environment

The tertiary education provided at the various universities and colleges in South Africa can be tabulated by distinguishing between institutions providing accredited courses in Urban and Regional Planning according to SACPLAN, and those providing accredited courses in Engineering, and in particular Civil Engineering, according to ECSA and SAICE. An additional column has been added in order to indicate those institutions offering education in other professions included in the built environment such as Land Surveying and Architecture. The universities and courses included in this study are currently accredited by the relevant regulatory bodies.

Table 3-1: Accredited qualifications presented at various tertiary institutions for professions included in the built environment.

Recognised Institutions	Urban and Regional Planning	Engineering	Land Surveying	Architecture
Cape Peninsula University of Technology (CPUT)	✓	✓ (*)	✓	
Durban University of Technology (DUT)	✓	✓ (*)	✓	✓
Mangosuthu University of Technology (MUT)		✓ (*)	✓	
Nelson Mandela Metropolitan University (NMMU)		✓ (*)		✓
North-West University (NWU)	✓	✓		
Tshwane University of Technology (TUT)		✓ (*)	✓	✓
University of Cape Town (UCT)	✓	✓ (*)	✓	✓
University of Free State (UFS)	✓		✓	✓
University of Johannesburg (UJ)	✓	✓ (*)	✓	
University of KwaZulu-Natal (UKZN)	✓	✓ (*)	✓	✓
University of Salzburg (UNIGIS)			✓	
University of South Africa (UNISA)		✓ (*)	✓	
University of Venda (Univen)	✓			
University of Pretoria (UP)	✓	✓ (*)	✓	✓
University of Stellenbosch (US)	✓	✓ (*)	✓	
University of Witwatersrand (Wits)	✓	✓ (*)		
* - Civil Engineering				

Source: Own synthesis from ECSA (2014:1-13); PLATO (2014?); SACPLAN (2014a); SAIA (2014) and SAICE (2014).

The tertiary courses presented at each university and college are shown below. This evidently corresponds with the universities and colleges and indicates which universities and colleges focus on undergraduate courses, postgraduate courses or technical qualifications. Due to the inclusion

of only urban and regional planners in the SACPLAN 2015 Survey and participants from the IMESA Conference 2014 survey, the information for Urban and Regional Planning and Civil Engineering courses will only be provided in the matrices, in order to substantiate the needs assessment conducted.

Table 3-2: Matrix of tertiary qualifications presented in Urban and Regional Planning and Civil Engineering courses at various accredited tertiary institutions.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Cape Peninsula University of Technology (CPUT)	Durban University of Technology (DUT)	Mangosuthu University of Technology (MUT)	Nelson Mandela Metropolitan University (NMMU)	North-West University (NWU)	Tshwane University of Technology (TUT)	University of Cape Town (UCT)	University of Free State (UFS)	University of Johannesburg (UJ)	University of KwaZulu-Natal (UKZN)	University of Pretoria (UP)	University of South Africa (UNISA)	University of Stellenbosch (US)	University of Venda (Univen)	University of Witwatersrand (Wits)
A	B degrees (B.Art et Scien; B.Eng-Civil; B.Urban/Town & Regional Planning; B.Spatial Planning)					✓				✓		✓		✓	✓	
B	B degrees (Hons) (Spatial Planning)								✓							
C	B.Sc (Civil Engineering; Town & Regional Planning)							✓			✓					✓
D	B.Sc Hons (Civil Engineering; Town & Regional Planning)											✓				✓
E	B.Tech (Civil Engineering; Town & Regional Planning)	✓	✓		✓		✓			✓			✓			

F	D degrees (D.Art et Scien; D.Eng-Civil)					✓				✓						
G	D.Tech (Civil Engineering)						✓									
H	M degrees (M.Art et Scien; M.Eng-Civil; M.Urban/Town & Regional Planning)					✓	✓	✓	✓		✓	✓		✓		
I	M.Phil (Civil Engineering; Town & Regional Planning)							✓		✓						
J	M.Sc (Civil Engineering; Town & Regional Planning)															✓
K	M.Tech (Civil Engineering; Town & Regional Planning)	✓					✓									
L	National Diploma (Civil Engineering; Town & Regional Planning)	✓	✓	✓	✓		✓			✓			✓			
M	PhD (Civil Engineering; Town Planning)								✓	✓	✓	✓				
N	Post-Graduate Diploma: Planning															✓

Source: Own synthesis from CPUT (2015a:290-307); CPUT (2015b:107-120); DUT (2015a:12-21); DUT (2015b:11-17); MUT (2015); NMMU (2015); NWU (2015a:72-75 & 88); NWU (2015b:75-77); TUT (2015:1-2); UCT (2014:160-162); UFS (2015:33-84); UJ (2015:26-79); UKZN (2014); UKZN (2015); UP (2015a:59-64); UP (2015b:11-78); UNISA (2015:56-175); US (2014a); US (2014b); Univen (2012); Wits (2015a) and Wits (2015b).

The various qualifications presented at the accredited tertiary institutions are provided in Table 3-2. Of the universities MUT, NMMU, Tshwane University of Technology (TUT) and UNISA provide only courses in Civil Engineering, while North-West University (NWU), UFS and University of Venda (Univen) provide only courses in Urban and Regional Planning; the remaining universities provide courses in both Urban and Regional Planning and Civil Engineering.

Subsequently the yearbooks of the various accredited tertiary courses of the Universities, were collected and the data containing the various subjects per course were compiled. Due to the focus of this research project being placed on urban and regional planning and civil engineering, a comparative matrix was created. In this matrix the 18 most common modules were identified, and the universities presenting these subjects were identified by means of cross-referencing. The results of the cross-referencing, are presented in Table 3-3.

From the above mentioned, and Table 3-3, the presence of correlating modules between urban and regional planning and civil engineering with regard to tertiary education, becomes evident. Even though there are numerous modules that correspond with one another, the contents and outcomes of each module can vary from university to university. These are difficult to measure either because they are not in the public record or because of the constant changes made to them in order to stay up to date.

Several of the urban and regional planning qualifications include modules such as engineering services and transportation studies. However, this does not apply to the engineering courses, as only a few include modules such as an introduction to urban and regional planning (CPUT, 2015a:290-307; CPUT, 2015b:107-120; DUT, 2015a:12-21; DUT, 2015b:11-17; MUT, 2015; NMMU, 2015; NWU, 2015b:75-77; TUT, 2015:1-2; UCT, 2014:12-16 & 28-32; UFS, 2015:33-84; UJ, 2015:26-79; UKZN, 2014; UKZN, 2015; UP, 2015a:59-64; UP, 2015b:11-78; UNISA, 2015:56-175; US, 2014a; US, 2014b; Univen, 2012; Wits, 2015a; Wits 2015b).

Table 3-3: Matrix of modules presented in Urban and Regional Planning and Civil Engineering courses at various accredited tertiary institutions.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Cape Peninsula University of Technology (CPUT)	Durban University of Technology (DUT)	Mangosuthu University of Technology (MUT)	Nelson Mandela Metropolitan University (NMMU)	North-West University (NWU)	Tshwane University of Technology (TUT)	University of Cape Town (UCT)	University of Free State (UFS)	University of Johannesburg (UJ)	University of KwaZulu-Natal (UKZN)	University of Pretoria (UP)	University of South Africa (UNISA)	University of Stellenbosch (US)	University of Venda (Univen)	University of Witwatersrand (Wits)
A	Policy & legislation	✓	✓			✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
B	Transportation & traffic studies	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓
C	Engineering services/infrastructure development	✓	✓			✓		✓		✓				✓	✓	✓
D	Project management	✓	✓		✓	✓	✓			✓			✓	✓	✓	✓
E	Urban planning & Design	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
F	Geology/geography/geotechnical	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓

G	Environmental studies	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
H	Housing & related studies	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
I	Economics	✓				✓		✓	✓	✓	✓	✓		✓		✓
J	Surveying	✓	✓	✓	✓		✓			✓			✓			✓
K	Drawing	✓	✓	✓	✓		✓	✓		✓	✓		✓			
L	Design	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
M	Communication studies/skills	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		
N	Computer studies/skills	✓		✓	✓		✓	✓		✓				✓	✓	✓
O	Mathematics	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
P	Statistics	✓	✓			✓		✓		✓	✓	✓		✓		✓
Q	CAD/GIS	✓	✓			✓		✓	✓	✓	✓			✓		✓
R	Professional practice	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: Own synthesis from CPUT (2015a:290-307); CPUT (2015b:107-120); DUT (2015a:12-21); DUT (2015b:11-17); MUT (2015); NMMU (2015); NWU (2015b:75-77); TUT (2015:1-2); UCT (2014: 12-16 & 28-32); UFS (2015:33-84); UJ (2015:26-79); UKZN (2014); UKZN (2015); UP (2015a:59-64); UP (2015b:11-78); UNISA (2015:56-175); US (2014a); US (2014b); Univen (2012); Wits (2015a) and Wits (2015b).

3.2.2 Statistical methods used for the interpretation of data

Several statistical methods were used in the processing of both the datasets of the IMESA Conference 2014 and SACPLAN Survey 2015. The methods and descriptions provided in this section are applicable to both Section 3.2.3 and 3.2.4.

The Cronbach's Alpha is used to determine the internal consistency of a group of items. It also indicates how closely these items are related to one another. This is then used to determine the scale reliability of the group (OECD, 2002:32; UCLA Statistical Consulting Group, 2015?). The value of the Cronbach's Alpha reliability coefficient ranges between 0 and 1. The closer the coefficient is to 1.0, the greater the internal consistency of the items in the dataset (Gliem & Gliem, 2003; Reynaldo & Santos, 1999).

The Corrected Item-Total Correlation column refers to the correlation between the total score indicated in the survey responses and each item. In the case where the scale is reliable, the items will correlate with the total indicated in the table. If the items do not correlate with the overall score from the scale, they can be interpreted as such (Field, 2006:1; Laerd Statistics, 2013; Griffin, 2005):

- **Less than .3:** the particular item does not sufficiently correlate with the scale overall – may need to be dropped or deleted;
- **More than .3:** the particular item sufficiently correlates with the scale overall, and is deemed to be “encouraging”.

The Cronbach's Alpha “If Item Deleted” column indicates the value of each item if it is to be deleted in the calculations regarding the overall Alpha. As a result the columns' values should be relatively similar to the overall Alpha. Items with a greater Alpha, if deleted, than the overall Alpha suggest that deletion of such an item can increase the Cronbach's Alpha, in which case it can improve the reliability (Field, 2006:1-2; Griffin, 2005).

A factor analysis was conducted using the group of items (level of knowledge) and its adequacy was confirmed through the use of the Kaiser-Meyer-Olkin Measure (KMO) of Sampling Adequacy assessment and the Bartlett's Test of Sphericity. The KMO measure is used to determine whether the partial correlation among items is great enough (Karabatsos, 2002:1). The KMO measure provides an index which ranges between 0 and 1. As a result a KMO measured close to 1.0 supports a factor analysis's adequacy (Lalanne, 2008:1).

Bartlett's test on the other hand, determines whether or not the correlation matrix is an identity matrix. Subsequently this can assist in determining the factor model's unsuitability. A small p-value of a Bartlett's test indicates deviation from an identity correlation matrix, meaning that items have non-zero intercorrelations. Lalanne (2008:1) states that the Bartlett test can be considered

as a “bottom line test” for large samples. A very small p-value (usually below 0.05) can therefore indicate a high probability of a significant relationship between the variables (IBM, 2011).

A Scree Plot illustrates the eigenvalue obtained for each factor (Karabatsos, 2002:1). The eigenvalue can be understood as the total standardised variance associated with the particular factor. The sum of the eigenvalues will not exceed the total number of components (15) included in the analysis, as each item contributes one to the sum of the variances (Karabatsos, 2002:1).

Varimax rotation can be understood as the scaling of the factors followed by the determination of the factor rotation which maximises the variance (Pennsylvania State University, 2004). It is used to simplify the interpretation of data as the original variables (items) will be associated with one of the factors identified, resulting in fewer variables needing to be interpreted (Abdi, 2003:3).

Subsequently an Oblimin rotation was also conducted as a secondary interpretation of the extracted factors. An Oblimin rotation’s result looks very similar to that of the Varimax rotation, although the factors are oblique. Generally the negative values “decrease” the factor correlations, while the positive values “permit” additional factor correlation (UNL, s.a.:1-3; IBM, 2014).

3.2.3 IMESA Conference 2014 survey results

Questionnaires were handed out during the IMESA Conference 2014 using group-administered and hand-delivered methods. A total of 817 delegates were registered to attend the conference from whom 140 responses were received during the conference period from 28 to 31 October 2014. The questionnaires contained three sections, including quantitative and qualitative questions as discussed in Section 1.7 above (see Annexure B).

An incentive was provided to encourage feedback from the conference delegates. The lucky draw for the competition was held on 30 October 2014, although feedback was still accepted until the conference closed on 31 October 2014. A brochure was circulated together with the questionnaires in which the purpose, goal, background and competition details were explained. A description of the topics included in Section B of the survey is provided in Annexure C.

The following sections illustrate the data collected during this survey.

3.2.3.1 Quantitative data analysis

3.2.3.1.1 Demographic data

Demographic data is described by Merriam-Webster (2015?b) and Webster's New World College Dictionary (2010) as the demographic characteristics of a specific group of people, including age, gender, income, etc. The following figure illustrates the demographic distribution for the IMESA

Conference 2014. The greatest number of representatives at the conference came from KwaZulu-Natal (37%), followed by the Western Cape (17%) and Gauteng (16%).

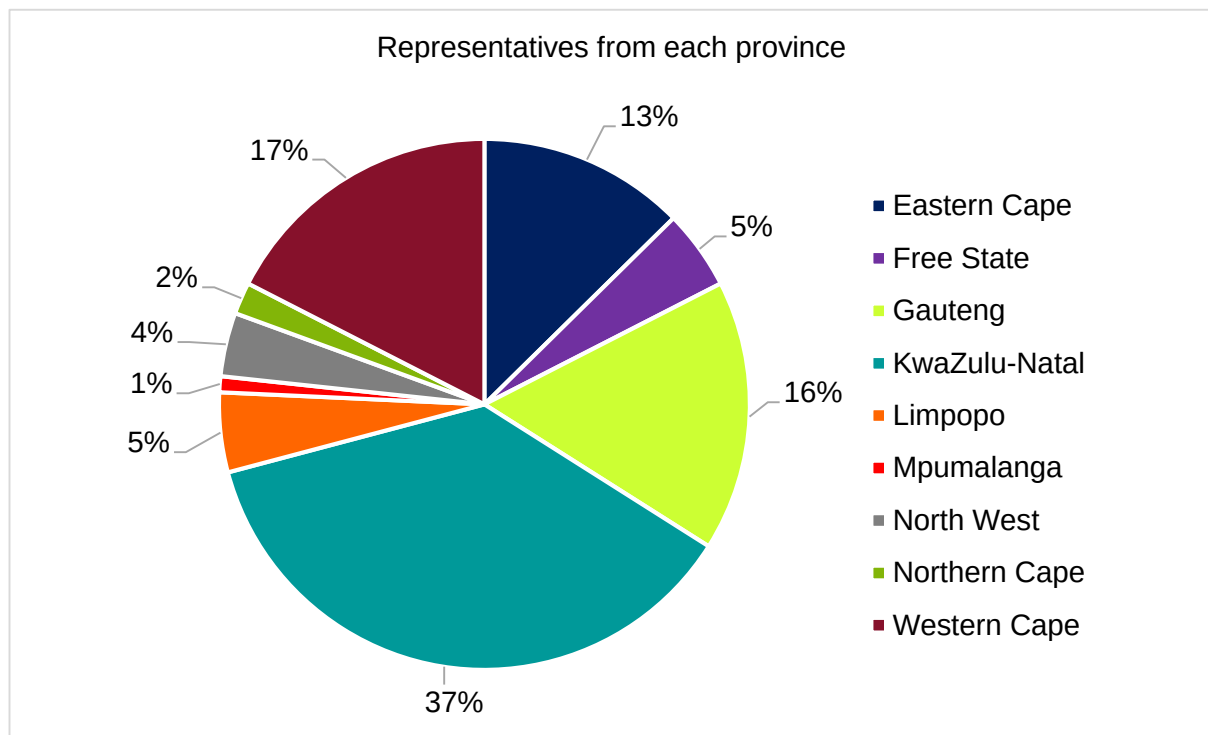


Figure 3-1: Representatives from each province.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

Subsequently the number of representative practising in the private sector and public sector respectively was determined for each province. In Figure 3-2 it is clear that the majority of delegates represented the public sector. This is expected as IMESA focuses primarily on municipal engineers and engineering staff. Some of the delegates also represented parastatal companies. These were included in the public sector category. The high representation of KwaZulu-Natal can be attributed to the conference being held in Durban, making it accessible to the local council.

Figure 3-3 illustrates the age groups relevant to each gender. From this it is evident that the field of engineering, in particular the delegates of the IMESA Conference 2014, is largely dominated by men. The women were largely represented by persons in the age group 31 to 40 while men were represented by persons in the age group 41 to 50. The data included under “Missing” on the horizontal axes (x-axes), are representatives who included their age group and not their gender, while the “Missing” group (indicated in grey), indicated their gender (male), but neglected to indicate their age groups.

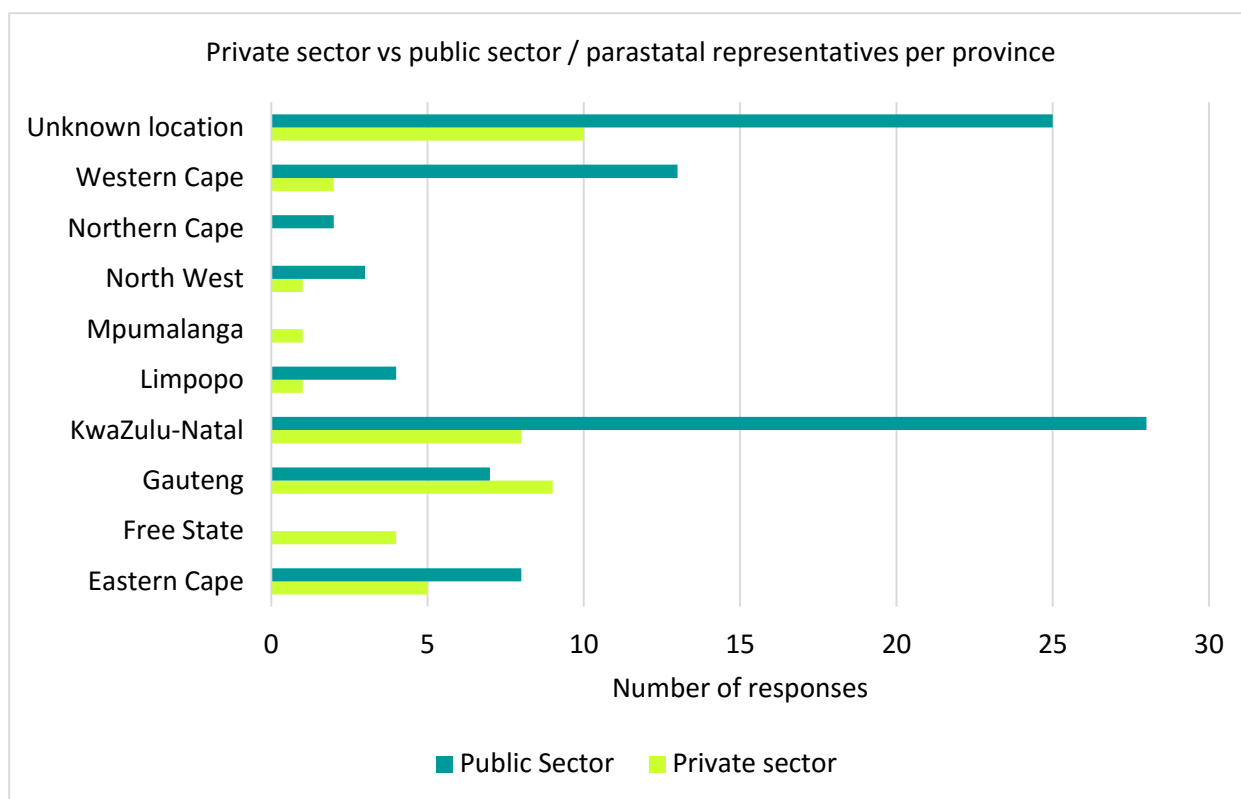


Figure 3-2: Private sector vs public sector / parastatal representatives per province.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

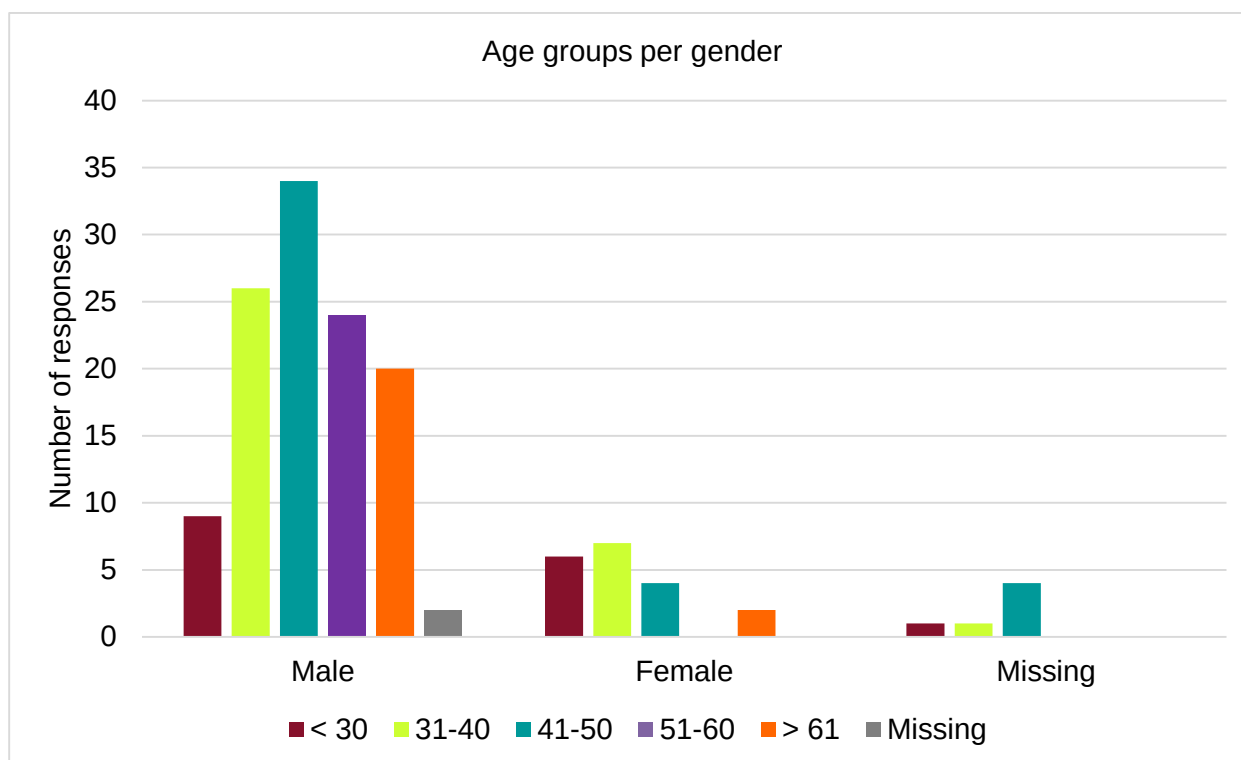


Figure 3-3: Age groups per gender.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

3.2.3.1.2 Representation of proposed programme

Figures 3-4 and 3-5 illustrate the form in which the participants of the IMESA 2014 Conference survey chose to receive the capacity-building guideline document. The data presented are indicative of the completed sections, as a result 69.5% of the participants indicated that they would prefer the programme to be presented in the form of a short course with the submission of assignments as evaluation method. The largest portion of participants (46.8%) also gave preference to a soft copy (digital and interactive copy) version of the document, while 31.9% of the participants indicated a preference to an online version of the document which will enable the adaptation of the document on a biannual basis

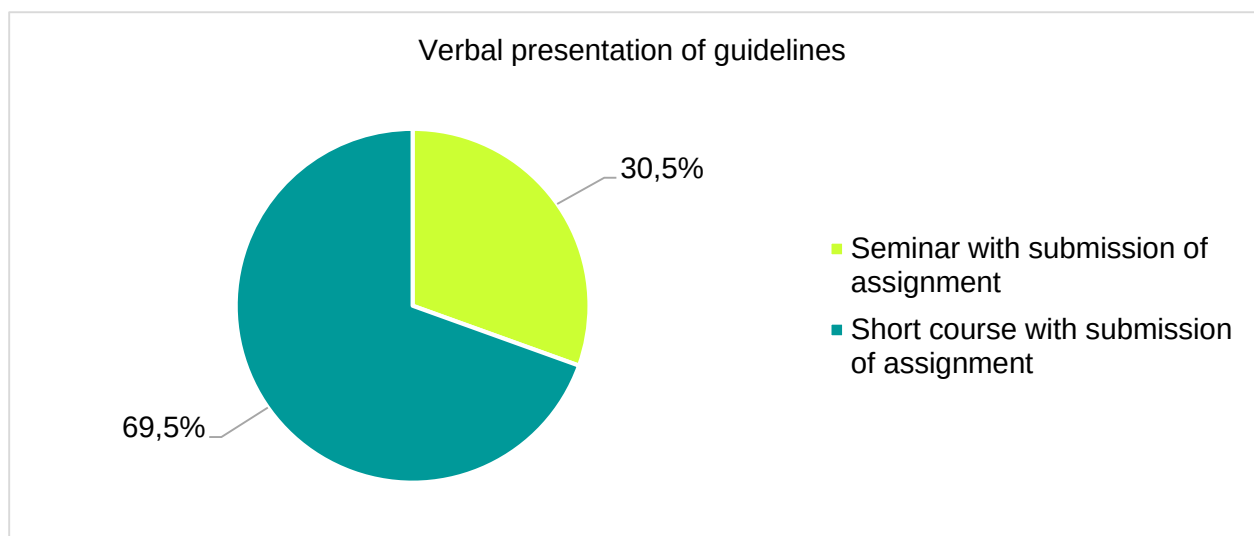


Figure 3-4: Verbal presentation of the guidelines.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

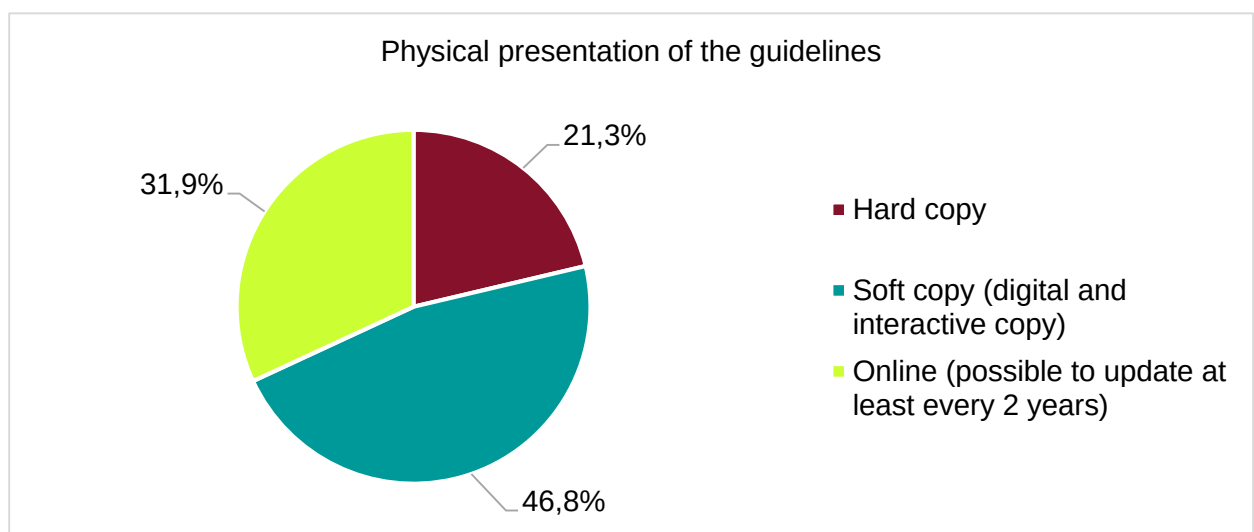


Figure 3-5: Physical presentation of the guidelines.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

Participants also had the option of providing requests or suggestions other than those mentioned in Figures 3-4 and 3-5 regarding the capacity building document/programme. The following responses were recorded for this question:

- *Township establishment processes;*
- *Engineers with planning understanding to assist with presentation;*
- *Define relationship between services ... , planning principles, legal and to be applied stringently;*
- *IMESA should also include scholars in terms of promoting engineering sector;*
- *Water planning; sanitation planning;*
- *Practical application of the arrangement;*
- *The planning ... should let joint i.e. multiple. Only planners or engineers have all the answers, How to really plan in a joint fashion;*
- *Seminar with submission of assignment and rewards for best innovative design;*
- *Hands-on approach;*
- *I am very much interested because as a Cllr you are always meeting engineers when having projects in the ward and it is important to have knowledge in the Municipal Engineers;*
- *An accredited year course;*
- *It should apply to town and regional planners also that I have an improved understanding in terms of engineering principles and regulations;*
- *Not possible to do in short training sessions!;*
- *Summaries of major planning policies i.e. SPLUMA, land use policy; IDP/SDF;*
- *I am not a municipal engineer;*
- *Approach technikon and universities for addition to modules;*
- *Forums at regional community meetings, nationally with feedback via website, magazine;*
- *Papers at the conference; proper manual like the asset management one.*

3.2.3.2 Qualitative data analysis

The qualitative results of the survey is quantified in order to increase the understand-ability of the results.

Figure 3-6 illustrates the specific responses to the two open-ended questions included in Section B of the IMESA Conference 2014 survey. A total of 253 responses were received for these two

questions, while 27 responses was recorded as missing data due to incomplete questions. The questions were as follows:

- (a) Do you think the Municipal Engineers in South Africa and its personnel has sufficient working knowledge of the domain of Urban and Regional Planning and its processes, to make sufficient comments on the related issues, provide an explanation? Motivate your answer.
- (b) Do you think it is necessary to broaden the understanding/knowledge of Urban and Regional planning under Municipal Engineers, provide an explanation of what you think they should know more of? Motivate your answer.

For question (a) 56 (44.1%) “Yes” responses were received with the opinion that municipal engineers do have sufficient working knowledge of urban and regional planning, while 71 (55.9%) “No” responses were received stating the opposite.

For question (b) a resounding 118 (93.7%) “Yes” responses were received with the opinion that there is a necessity to broaden the understanding/knowledge of urban and regional planning among the municipal engineers, while a mere 8 (6.3%) “No” responses were received stating the opposite.

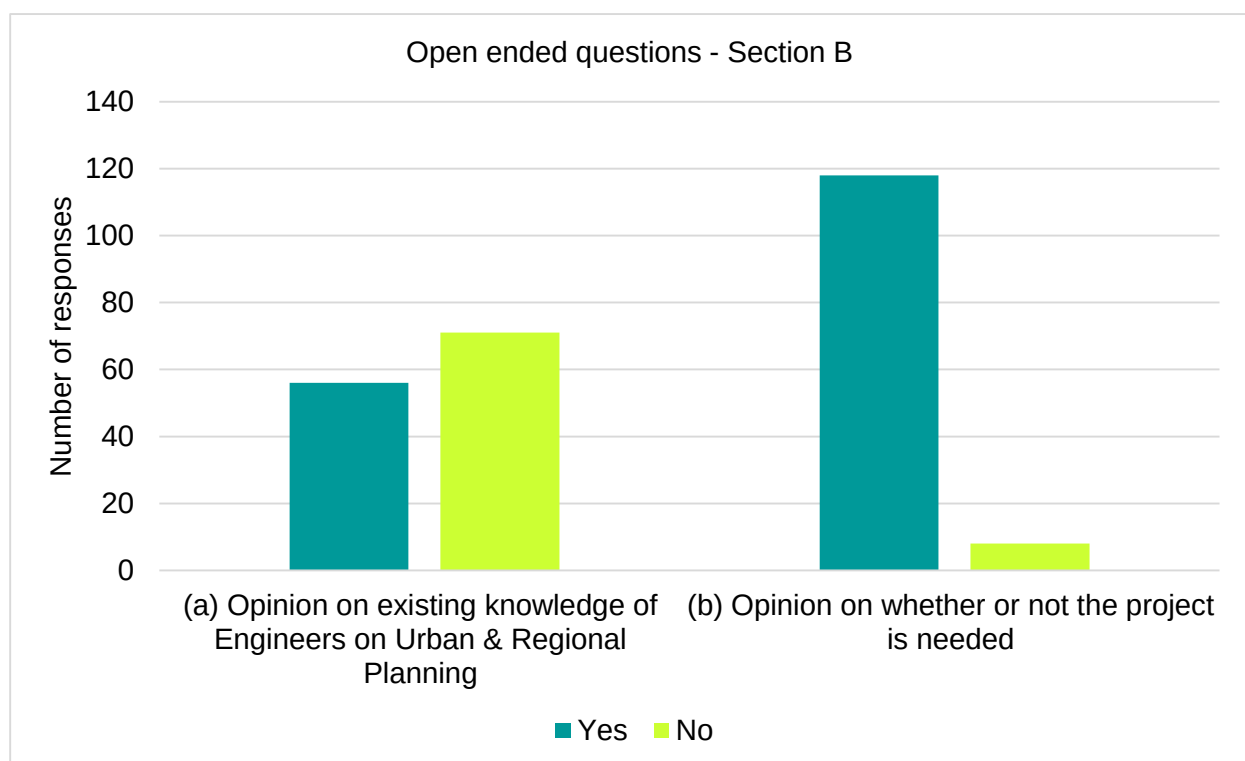


Figure 3-6: Open ended questions - Section B.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

The “No” responses deduced from answers included phrases such as “no, only some, not certain, don't think so, not necessarily, moderate”, etc. The following section provides a thematic analysis of the responses to the questions illustrated above.

3.2.3.2.1 Themes, sub-themes and sub-sub-themes identified throughout the survey

Table 3-4 is a summary of the themes, sub-themes and sub-sub-themes identified from the responses to question (a), as mentioned above, with the inclusion of some of the references made to them.

Subsequently the sub-themes and sub-sub-themes for opinions provided for question (a) can be explained with particular reference made to the two themes identified. Figure 3-7 illustrates the various themes, sub-themes and sub-sub-themes discussed and included in the table below. Figure 3-8 illustrates the various responses received per theme and sub-themes.

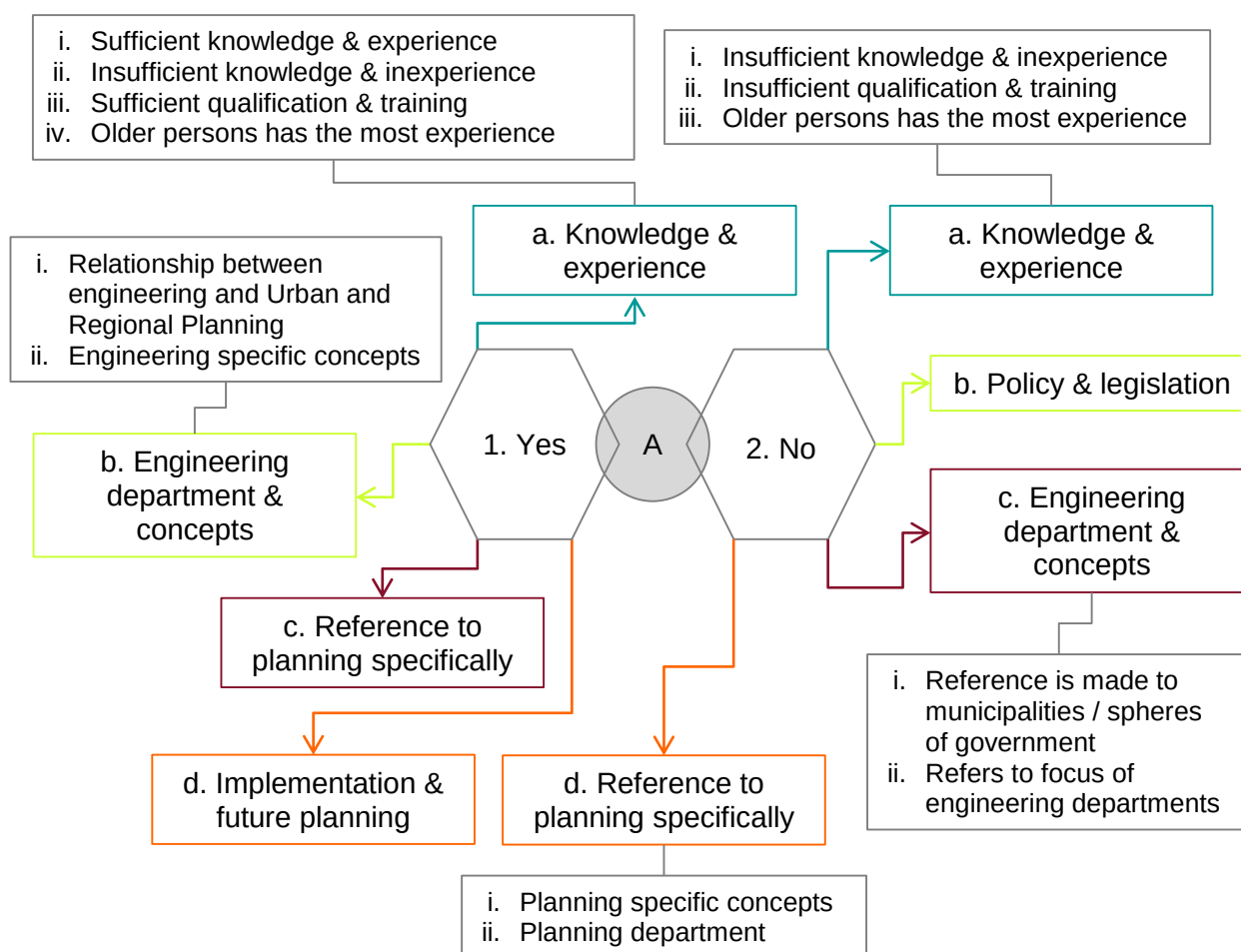


Figure 3-7: IMESA Conference 2014 – flowchart of question (a) thematic analysis.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

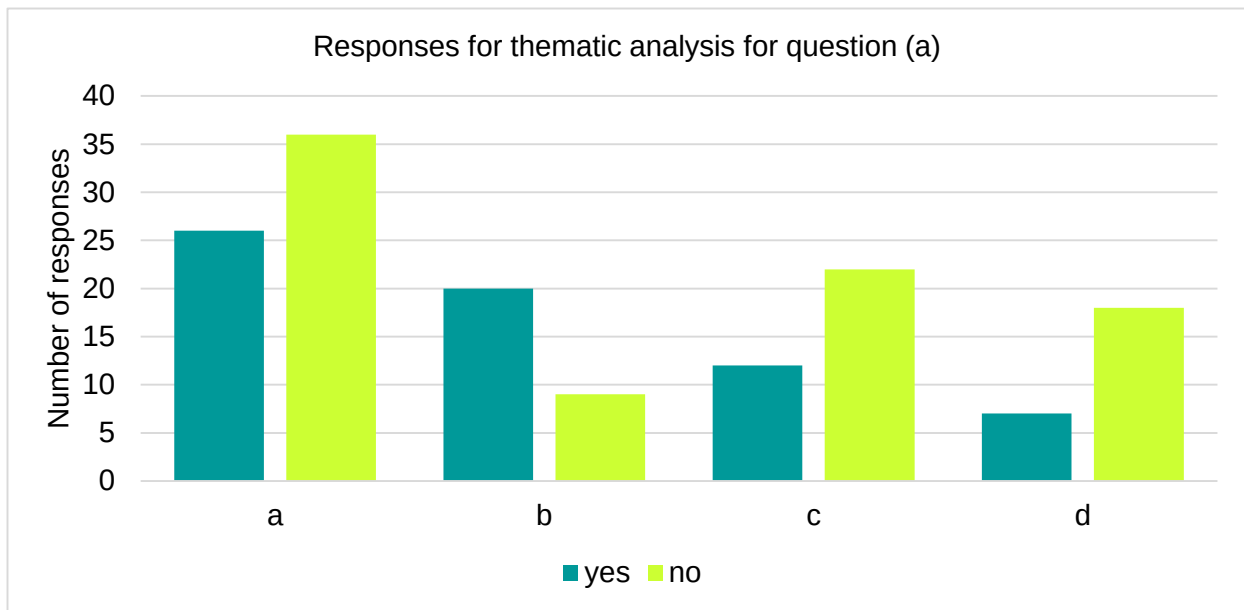


Figure 3-8: Responses for sub-themes received for each theme identified.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

1. Yes – Theme

This theme was deduced from the number of “Yes” responses received for question (a), thus indicating that the respondents are of the opinion that existing knowledge of municipal engineers on urban and regional planners is sufficient. Four sub-themes have been identified with sub-sub-themes included, where necessary. These sub-themes derive from the participants’ responses to the question,.

- (a) **Knowledge & experience:** Throughout the responses to question (a), 26 references are made to the knowledge and experience of municipal engineers, including the opinions of the participants regarding knowledge and experience. References are also made to the insufficient knowledge and experience, qualification and training of the engineers and the opinion of older personnel. Four sub-sub-themes were derived from the responses.
- (b) **Engineering department & concepts:** The responses to question (a) included 20 references made to the engineering department and associated concepts, including the opinions of the participants regarding the relationship between engineering and urban and regional planning as well as engineering specific concepts. Two sub-sub-themes were derived from the responses.
- (c) **Reference to planning specifically:** The responses to question (a) included 12 references made to planning specific concepts such as land use management, housing, among others.

- (d) **Implementation & future planning:** The responses to question (a) included seven references made to implementation and future planning.

2. No – Theme

This theme was deduced from the number of “No” responses received for question (a), thus indicating that the respondents are of the opinion that existing knowledge of engineers on urban and regional planners is not sufficient. Four sub-themes have been identified with sub-sub-themes included, where necessary. These sub-themes derive from the participants’ responses to the questions to the question, by the participants.

- (a) **Knowledge & experience:** Throughout the responses to question (a), 36 references are made to the lack of knowledge and experience of municipal engineers, including the opinions of the participants regarding knowledge and experience. References are also made to the insufficient knowledge and experience, qualification and training of the engineers and the opinion of older personnel. Three sub-sub-themes were derived from the responses.
- (b) **Policy & legislation:** Nine references are made to policy and legislation in urban and regional planning, including the constant changes, policies and necessary related documentation.
- (c) **Engineering department & concepts:** The responses to question (a) included 22 references made to the focus of engineering departments and to municipalities/spheres of government, including the opinions of the participants regarding these concepts. Two sub-sub-themes were derived from the responses.
- (d) **Reference to planning specifically:** The responses to question (a) included 18 references made to the focus of planning departments such as housing, planning processes, support provided by the town planners, planning departments working alone and engineers only being relevant at later stages, including the opinions of the participants regarding these concepts. Two sub-sub-themes were derived from the responses.

Table 3-4: IMESA Conference 2014 - Question (a) thematic analysis

Themes	Sub-themes	Sub-sub-themes	References made in survey
1. Yes	a. Knowledge & experience	i. Sufficient knowledge & experience	Twelve references are made to the sufficiency in knowledge and experience of the municipal engineer in Urban and Regional Planning. • "...they have sufficient working knowledge of the domain of Urban and Regional Planning and its processes ..."; • "...there have been around for some time ... they have accumulated enough expertise"; • "...they have sufficient knowledge to understand the related issues..."; • "...do have the knowledge to make sufficient comments..."; • "They have enough experience..."; • "...municipal engineers has sufficient working knowledge, the problem is as political interference..."; • "...they are the only competent group capable of understanding both macro and micro issues".
		ii. Insufficient knowledge & inexperience	Four references are made to the insufficiency in knowledge and inexperience of the municipal engineer in Urban and Regional Planning. • "...require more exposure..."; • "...not an in-depth understanding of master planning & integrated planning".
		iii. Sufficient qualification & training	Six references are made to the sufficiency in qualification and training of the municipal engineer in urban and regional planning. • "...they have updates in engineering sector..."; • "...they are qualified and have done special courses in the field. The experience they have also plays a positive part."; • "...better training is essential".
		iv. Older persons has the most experience	Four references are made that the older municipal engineers have more knowledge on urban and regional planning, than some of the younger engineers. • "...former/older technical personnel were very involved in township establishment, rezoning, densification, etc. New personnel do not have the experience and knowledge...";

			• "...Senior staff about to approach retirement do have knowledge but not enough transferred to younger..."; • "...getting older ... leaving huge knowledge vacuum".
	b. Engineering department & concepts	i. Relationship between engineering and urban and regional planning	Ten references are made to the interaction and relationship of the municipal engineer in Urban and Regional Planning. • "...engineers do understand the Urban and Regional Planning as there is a close relationship between land use and traffic generated and roads form the back bone and of land use planning"; • "...they need to play more of a role in urban planning"; • "...depending on the nature of the work that they do. It is unlikely to be ... undertaken by municipal engineers but rather in conjunction with town planners"; • "...Engineers and planners must provide inputs before plans can be finalised. An integrated approach"; • "...must be supported by a professional town planner...".
		ii. Engineering-specific concepts	Ten references are made to engineering specific concepts such as service provision. • "...supply change process to appoint services from professional service providers"; • "We provide input on first order layouts with regards to ... infrastructures"; • "...Municipal engineers are the main implementers of service delivery..."; • "...Planning for urban and regional is integrated in municipal service delivery..."; • "...they do have the knowledge but in many accessions technical criteria gets overstepped".
	c. Reference to planning specifically	n/a	• "...they should have a good basic knowledge. Unfortunately the planning is done in "silo's" and not together"; • "...field of low cost housing, those engineers forming part of professional teams, do have the knowledge to make sufficient comments"; • "...problems tend to impact neighbours"; • "...planning and design of bulk infrastructure must provide for future change land use and township developments"; • "...Engineers that are directly involved in township development".

	d. Implementation & future planning	n/a	• “Yes, but poor at implementation”; • “...municipal engineers do have sufficient knowledge but it is not being sufficiently passed down at municipal level”; • “...with ever changing legislation... be included in decision making since they are ... affected and have to implement”.
2. No	a. Knowledge & experience	i. Insufficient knowledge & inexperience	Twenty-four references are made to the insufficiency in knowledge and inexperience of the municipal engineer in Urban and Regional Planning. • “...not receiving/obtaining enough experience...”; • “...lack of practical knowledge...”; • “...new staff are unskilled and inexperienced. There is a huge gap between us and new staff...”; • “...need more technical skills”; • “...Lack of experience in all aspects...”; • “...not sufficient working knowledge...”; • “...need to bridge this knowledge gap...”; • “...More engineers should get experience on these matters”; • “...It is only some engineers ... that has the knowledge”.
		ii. Insufficient qualification & training	Nine references are made to the insufficiency in qualification and training of the municipal engineer in Urban and Regional Planning. • “...Not at all or not enough in studies”; • “...not properly qualified”; • “...not enough attention is given to this in tertiary education”; • “...lack of education, training qualified personnel”; • “...Municipal engineers have neglected to update on the latest developments with regards to urban and regional planning”; • “...Do not have all their training background ... specific training with regards to urban planning...”; • “...Many inexperienced people who are not even technically qualified are in positions they are not capable of managing”.

		iii. Older persons has the most experience	Three references are made that the older municipal engineers have more knowledge on urban and regional planning, than some of the younger engineers. • “Only the older engineers. Today's younger have limited knowledge”; • “Senior MEs yes (reasonably well) younger ME's no”.
	b. Policy & legislation	n/a	• “...legislation is changing consistently...”; • “...because of legislation changes and new legislation...”; • “...Political decisions priority instead of engineering decision”; • “...to much political influence”; • “...where all municipal services operated without interventions”; • “...the publication of urban plans by parliamentary minister as guideline document for industry need to be done”.
	c. Engineering department & concepts	i. Reference is made to municipalities / spheres of government	Eight (8) references are made to municipalities / spheres of government, shortage of staff, few municipal engineers and smaller municipalities. • “...scarce technical staff there is not sufficient time for interaction with the Urban and Regional Planning issues”; • “...current staff within municipalities are not properly informed and trained. There is in smaller municipalities a too high staff turnover and job hopping”; • “...lack of capacity in municipal(rural) management level positions”; • “...lack of capacity particularly in rural municipalities”; • “...district municipalities is out of their competencies”; • “Yes in good municipalities, no in poor performing municipalities”; • “...very few Municipal Engineers working for Local Authorities”.
		ii. Refers to focus of engineering departments	Fourteen references are made to the focus of engineering departments. • “...only focusing on engineering related matters”; • “...not personnel with specific units with focus elsewhere”; • “...most engineers ... focus on their own field of expertise...”; • “...they are trained as civil engineers”; • “...focus ... on other core issues such as service delivery...”; • “...their work doesn't involve urban planning”;

			• "...certain areas needs professionals"; • "...experience in the planning sections of the larger municipalities have sufficient knowledge".
	d. Reference to planning specifically	i. Planning specific concepts	Fourteen references are made to planning specific concepts. • "...through services contributing and service delivery"; • "...insufficient planning leads to disorganised infrastructure"; • "...knowledge is not sufficient and it create problems in terms of water supply, sanitation and stormwater facilities"; • "...integrated planning is not enhanced ..."; • "...urban sprawl is not the answer to the lack of housing..."; • "...not a lot that know about the processes ..."; • "...provision of services to the informal housing sector"; • "...Not many are well informed in terms of the planning processes of Urban and Regional Planning"; • "...process are changing continuously..."; • "...insufficient understanding ... in ... transport planning".
		ii. Planning department	Four references are made to the planning department. • "...need to be supported by planners"; • "...engineers most come at further stages (at least most) in the urban planning where further design on infrastructure is required"; • "...Town and regional planning work in isolation of engineering departments".

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

Table 3-5 is a summary of the themes, sub-themes and sub-sub-themes that were identified from the responses to question (b), as mentioned above with the inclusion of some of the references made to them.

Subsequently the sub-themes and sub-sub-themes for opinions provided for question (a) can be explained with particular reference made to the two themes identified. Figure 3-9 illustrates the various themes, sub-themes and sub-sub-themes discussed and included in the table below. Figure 3-10 illustrates the various responses received per theme and sub-themes.

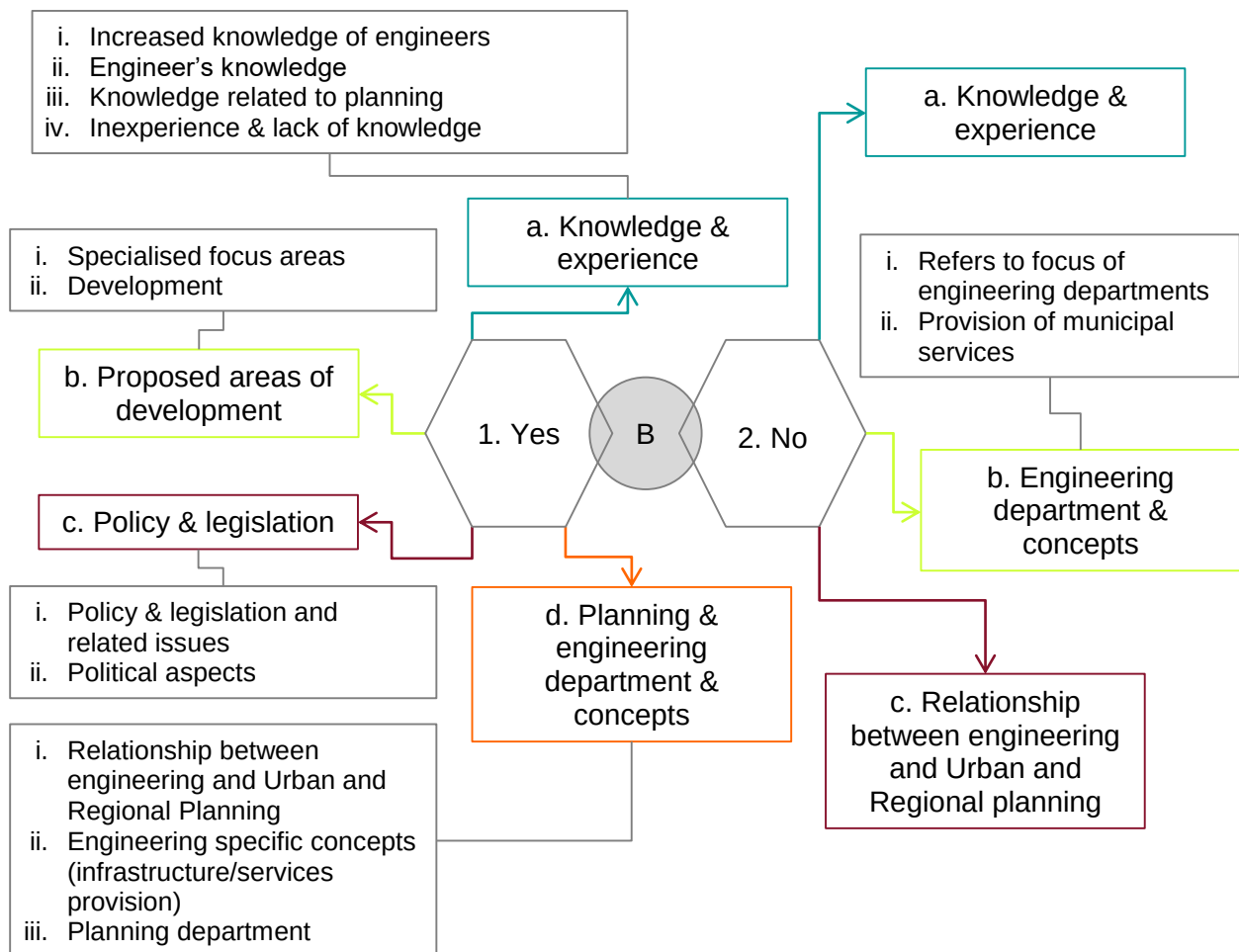


Figure 3-9: IMESA Conference 2014 - flow chart of question (b) thematic analysis.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

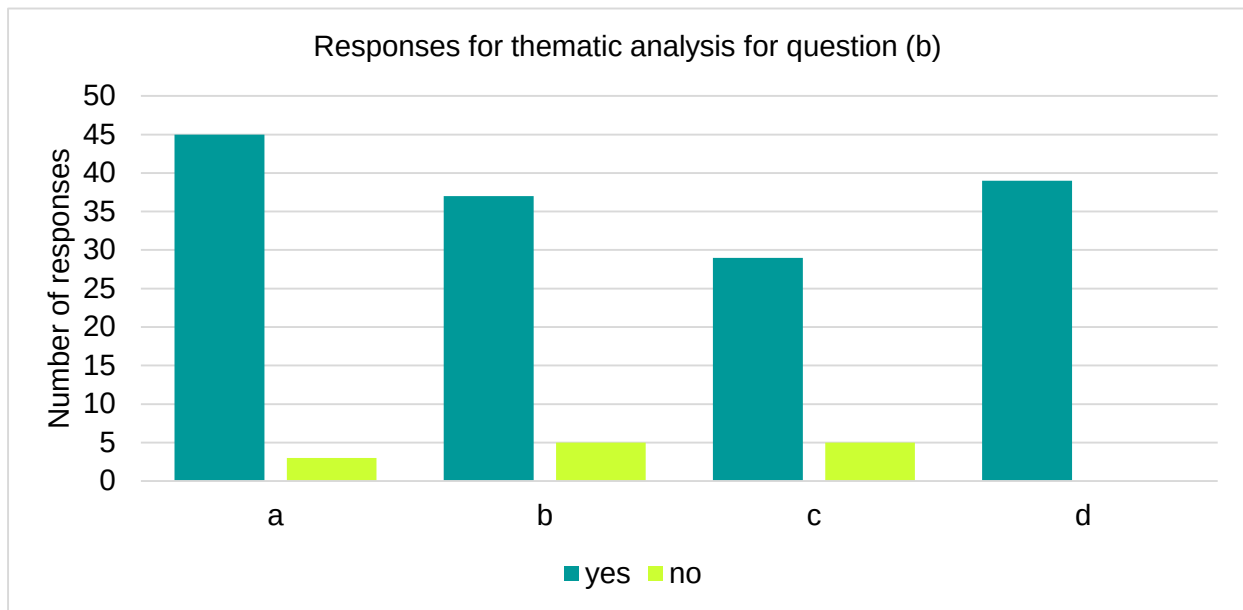


Figure 3-10: Responses for sub-themes received for each theme identified.

Source: Own synthesis from IMESA Conference 2014 questionnaires.

1. Yes – Theme

This theme was deduced from the number of “Yes” responses received for question (b), thus indicating that the respondents are of the opinion that it is necessary to broaden the understanding/knowledge of urban and regional planning under municipal engineers. Four sub-themes have been identified with sub-sub-themes included, where necessary. These sub-themes refer to the opinions expressed by the participants.

- (a) **Knowledge & experience:** Throughout the responses to question (b), 45 references are made to the knowledge and experience of municipal engineers and the need for the programme, including the opinions of the participants regarding the knowledge of engineers. References are also made to the insufficient knowledge and experience, knowledge related to planning and the urgency for the programme. Four sub-sub-themes were derived from the responses.
- (b) **Proposed areas of development:** The responses to question (b) included 37 references made to the proposed areas of development, including the opinions of the participants regarding the specialised focus and development areas. Two sub-sub-themes were derived from the responses.
- (c) **Policy & legislation:** The responses to question (b) included 29 references made to policies & legislation, including the related issues as to political aspects. Two sub-sub-themes were derived from the responses.

- (d) **Planning & Engineering department & concepts:** The responses to question (b) included 38 references made to the planning and engineering departments and concepts, include the opinions of the participants regarding, among others, the need for integration, mistakes in planning infrastructure, shortage of staff and strengthening the responsibilities of urban and regional planners. Four sub-sub-themes were derived from the responses.

2. No – Theme

This theme was deduced from the number of “No” responses received for question (b), thus indicating that the respondents are of the opinion that it is necessary to broaden the understanding/knowledge of urban and regional planning among municipal engineers. Three sub-themes have been identified with sub-sub-themes included, where necessary. These sub-themes refer to the participants’ responses to the question.

- (a) **Knowledge & experience:** The responses to question (b) included three references made to the knowledge and experience of the municipal engineer in urban and regional planning.
- (b) **Engineering department & concepts:** The responses to question (b) included five references made to the engineering departments and concepts, including the opinions of education, challenges, design of services, etc. Two sub-sub-themes were derived from the responses.
- (c) **Relationship between engineering and Urban and Regional Planning:** The responses to question (b) included five references made to the relationship between engineering and urban and regional planning.

Table 3-5: IMESA Conference 2014 - Question (b) thematic analysis.

Themes	Sub-themes	Sub-sub-themes	References made in survey
1. Yes	a. Knowledge & experience	i. Increased knowledge of engineers	Twenty-nine references are made to the increased knowledge of the municipal engineer in Urban and Regional Planning. • "...their studies; through consultation"; • "...this will assist where there is a lack of knowledge"; • "...Let them gain experience under an experienced mentor or manager"; • "...continuous development of younger engineers coming into the practise. Experience more with older engineers"; • "...broader understanding is needed both among engineers and planners"; • "...difficult to transfer skills at an academic level. Much better done at working with good mentoring"; • "...have a general understanding of overall urban and regional planning".
		ii. Engineers' knowledge	Three references are made to the engineers' knowledge in Urban and Regional Planning. • "...important that there are knowledgeable engineers in municipalities for development"; • "...so that small municipalities have common understanding in engineering".
		iii. Knowledge related to planning	Nine references are made to the knowledge related to planning. • "...be empowered to say no, not possible, or can be done, but better cheaper and feasible if done this way"; • "...be able to interact with planners and various government departments"; • "...Planners should also get technical training"; • "...required to broaden the understanding..."; • "...need for more training & workshops"; • "Urban planning short courses must be done as a prerequisite or compulsory for all personnel that area dealing with municipal planning".
		iv. Inexperience & lack of knowledge	Four references are made to the inexperience a lack of knowledge of municipal engineers in urban and regional planning. • "...unexperienced personnel are appointed in strategic positions ...";

			• "...lack of education, training qualified personnel"; • "There is a necessity for this, although not urgently".
	b. Proposed areas of development	i. Specialised focus areas	Twenty-nine references are made to the specialised areas of focus of the municipal engineer in Urban and Regional Planning. • "...general township related issues/ housing provision and building met control"; • "...spatial development frameworks is very important"; • "...understanding ... greenfield developments ... in local development"; • "...they should broaden their knowledge on Public Management"; • "...broaden the knowledge of sustainable development, planning administration and legal practices"; • "...relationships regarding development planning and engineering services"; • "...especially regarding the programming of projects of considerable lead up time ... required by EIA and LUPO processes. Thus engineers need to appreciate this also regarding public participation processes"; • "...understanding ... drainage of land for stormwater and sewer; geotechnical conditions in relation to land use".
		ii. Development	Eight references are made to the development in urban and regional areas. • "...better understanding of spatial planning and its impact on rural communities and the environment"; • "...they must not improve or develop only in the Urban Areas only..."; • "...Engineers and planners is one of the most important role players in the design and future planning of a town therefore closer understanding and collaboration is needed..."; • "...ensure future capacity is available..."; • "...principal engineers needs to accommodate the anticipated regional growth".
	c. Policy & legislation	i. Policy & legislation and related issues	Twenty-four references made to policy & legislation and related issues. • "...legislation regarding development..."; • "...SPLUMA and other legislation"; • "...general knowledge of legislation; processes and procedures"; • "...processes involved in planning are social requirements";

			• "...familiar with the processes from local to provincial government..."; • "...more emphasis placed on norms and standers..."; • "...ever changing world so one should keep up to date...".
		ii. Political aspects	Five references made to political aspects. • "They need to understand politics and politicians..."; • "...need to remove it from the political arena"; • "...to include all stakeholders in a municipality to reduce interference".
	d. Planning & Engineering department & concepts	i. Relationship between engineering and Urban and Regional Planning	Eighteen references made to the relationship between engineering and Urban and Regional Planning. • "...forward planning needs to be more integrated in all disciplines"; • "...they work very closely with town planners"; • "...beyond the understanding and the planning of the development."; • "...provides solutions to the challenges municipalities face. Integrated framework."; • "...urban development approval should lead municipal development and engineers should influence interoperate planning land on transport and urban stadium planning ..."; • "...they should know more and work closely with town planners and for ... forward planning they should have a broader understanding and ability to translate these urban plans into projects"; • "...Total integration of service delivery..."; • "...no coordination between what municipal engineers do and ... planners do".
		ii. Engineering specific concepts (infrastructure/service provision)	Seventeen references made to engineering specific concepts (infrastructure/service provision). • "...today's mistakes made in planning infrastructure ... will cost a fortune in future to connect"; • "...engineering services impact on planning"; • "...Urban planning relates to service delivery..."; • "...planning not good especially when it comes to water and sanitation"; • "...Infrastructure long-term cost/maintenance";

			• "...Cooperation is needed where services are planned".
		iii. Engineering & Planning departments	Three (3) references made specifically to the Engineering & Planning departments. • "...this will enable the municipalities to have their own planning department for any developments..."; • "...empower municipal managers ... to strengthen urban and regional planning responsibilities"; • "...more professionals are required".
2. No	a. Knowledge & experience	n/a	• "...necessary if you are in transport..."; • "...more productive to train the urban and regional planners to plan and or to get the municipal engineers to do the planning"; • "...It is not the municipal engineers that need to know more, it is the politicians and non-technical managers that need education".
	b. Engineering department & concepts	i. Refers to focus of engineering departments	Three references are made that refers to focus of engineering departments. • "...engineers are occupied with enough challenges..."; • "...depending on the nature of the work being undertaken ...".
		ii. Provision of municipal services	Two references are made to the provision of municipal services. • "...Urban and regional planning in essence deals with the location and distribution of infrastructure ... they should be under municipal engineers".
	c. Relationship between engineering and Urban and Regional Planning	n/a	• "...Tertiary procedure is the bottleneck. 'Appeal'"; • "...Urban/Regional planning should be undertaken prior to the feasibility determination and design of service infrastructure"; • "Must be part of team, from planning stage".

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

3.2.3.2.2 Level of existing knowledge determined through the survey

Figure 3-11 illustrates the qualifications obtained per tertiary institution for the participants of the IMESA Conference 2014 survey. The institutions and qualifications correlates to Table 3-2: Matrix of tertiary qualifications presented in Urban and Regional Planning and Civil Engineering courses at various accredited tertiary institutions. As a result not all institutions and qualifications indicated by the participants of the survey are provided. It is clear that the qualifications represented the most are the “B degrees” and “B.Tech” categories, which include the Baccalaureus Engineering degrees etc. (25) and the Baccalaureus Technologiae degrees (22). The University of Stellenbosch and University of Pretoria had 21 and 23 representatives, respectively.

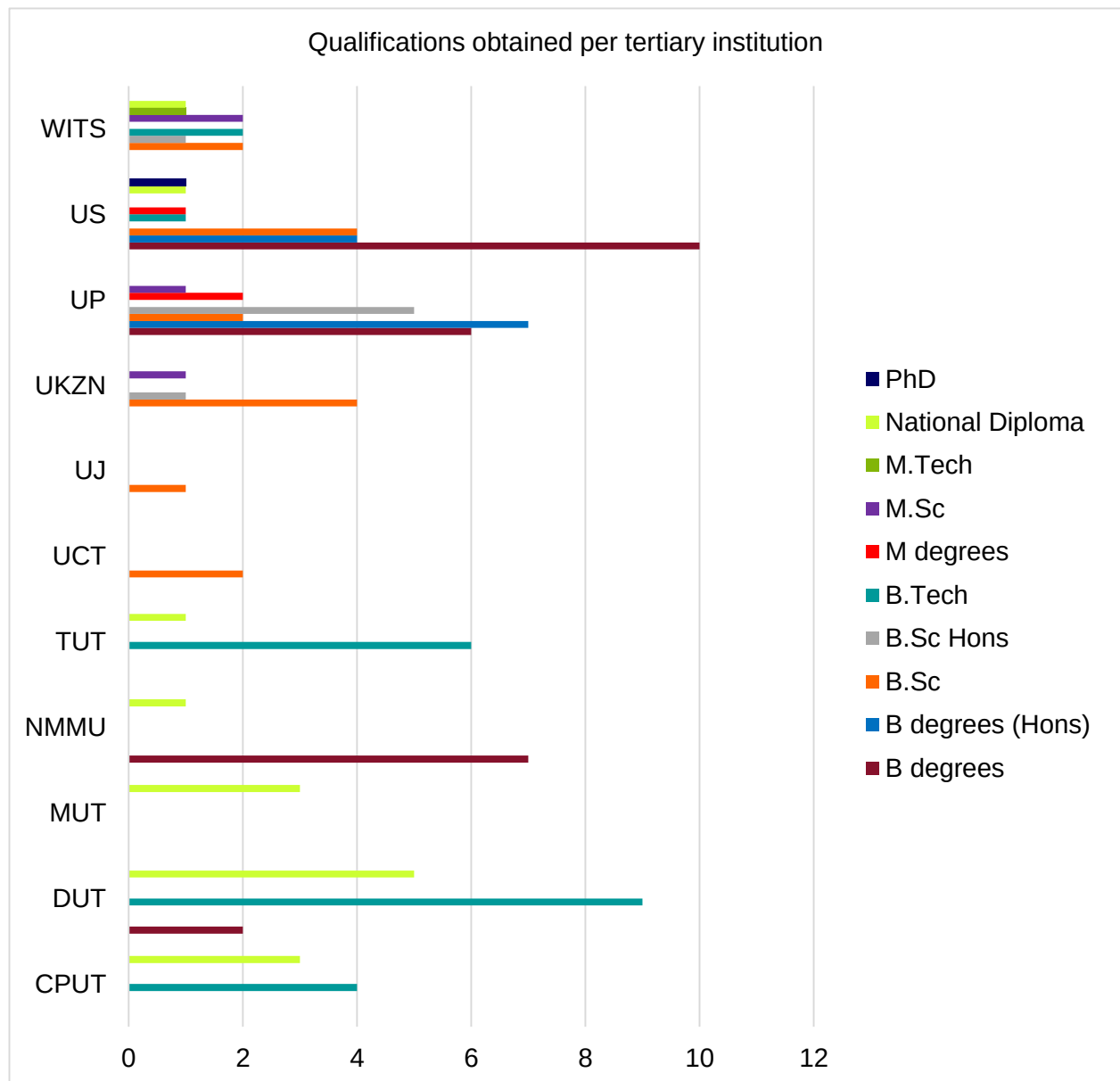


Figure 3-11: Qualifications obtained per tertiary institution.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

The participants were requested to give an indication of their level of knowledge regarding concepts related to Urban and Regional Planning and the rest of the Built Environment. A brief description of these concepts was provided in the brochure that was handed out together with the questionnaires. The descriptions per topics and descriptions are as follow:

1. **Definitions & Terminology:** Can you define and understand the “language” of Planning?
2. **Policy & Legislative Framework:** Previous and current frameworks applicable to Planning.
3. **SPLUMA (Spatial Planning and Land Use Management Act No. 16 of 2013):** When this commences several current legislations will laps.
4. **Developmental Principles; Norms & Standards:** Guidelines such as the Red– and Blue Books.
5. **Intergovernmental Support:** Focuses on the three spheres of government.
6. **Spatial Development Frameworks:** Guidelines for future development and land use patterns.
7. **Land Use Management:** Land development and land use categories and regulation thereof.
8. **Related Land Development Matters:** Land Use Schemes, land uses and layout planning.
9. **Environmental & Development Procedures:** EIA requirements according to NEMA, Regulations etc.
10. **Transportation Provision:** Transportation planning, requirements and recommendations.
11. **Engineering Services Provision:** Informal settlement formalisation, sewage, water, stormwater & electricity
12. **Housing Provision:** Housing typologies and recommendations for housing provision.
13. **Land Development Issues:** Applications including township development, land uses, consent use, etc.
14. **Building Management Control:** Guidelines on building control compiled by the DTI.
15. **Sustainable Development:** Promoting green and efficient development.

The scale ranged from 1 to five 5 with 1 being the lowest level of knowledge and 5 being the highest. An additional option (“Not applicable” = Level 6) was provided for those participants that did not wish to complete the questions. An average of 133.93 responses were received per topic with the lowest number of responses being 127 and the highest being 138. An average of 41.07 responses were received with either missing data or “Level 6” responses.

Figure 3-12 illustrates the total level of knowledge obtained for each topic provided on the questionnaire.

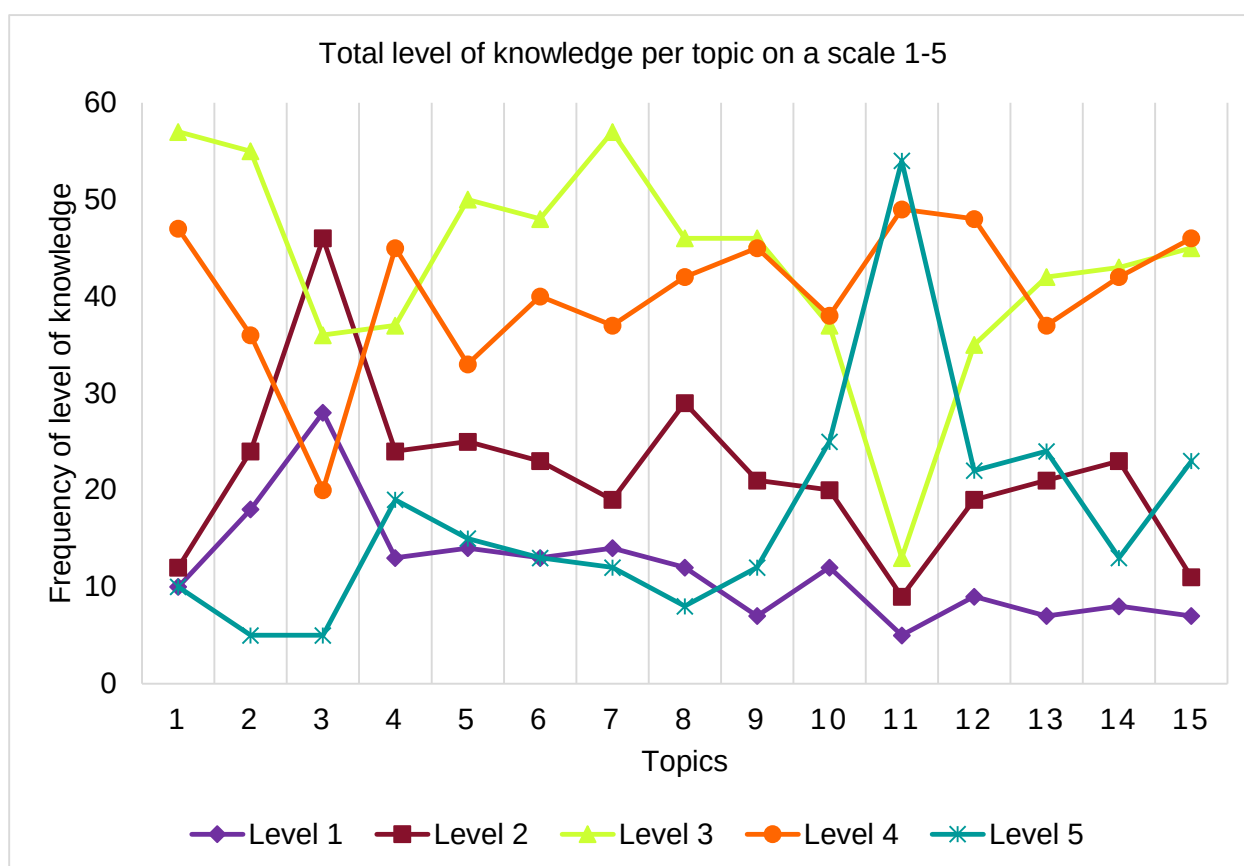


Figure 3-12: Total level of knowledge per topic on a scale 1-5.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

A reliability and factor analysis was conducted on the data collected regarding the level of knowledge portrayed in the responses to the IMESA Conference 2014 survey.

Table 3-6: Reliability statistics - total knowledge

Cronbach's Alpha	No of Items
.944	15

Source: Adapted from IMESA Conference 2014 Questionnaires.

Table 3-6 indicates that the Cronbach's Alpha coefficient for the data collected regarding the level of knowledge, is .944. According to the rules of thumb provided by George and Mallery (2003) the coefficient is "Excellent".

A KMO and Bartlett's Test (Table 3-7) was conducted on the data. The result for the test was .916. Lalanee (2008:1) states that a result of more than .90 can be considered as "marvellous" (Schwab, 2003?; IBM, 2011).

Table 3-7: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.916
Bartlett's Test of Sphericity Approx. Chi-Square	1181.994
df	105
Sig.	.000

Source: Adapted from IMESA Conference 2014 Questionnaires.

The communalities (Table 3-8) of the factor analysis were identified for the abovementioned items through the principal components extraction method.

Table 3-8: Communalities

	Initial	Extraction
B1_1	1.000	.603
B1_2	1.000	.612
B1_3	1.000	.750
B1_4	1.000	.524
B1_5	1.000	.616
B1_6	1.000	.743
B1_7	1.000	.766
B1_8	1.000	.716
B1_9	1.000	.593
B1_10	1.000	.565
B1_11	1.000	.721
B1_12	1.000	.621
B1_13	1.000	.633
B1_14	1.000	.496
B1_15	1.000	.735

Source: Adapted from IMESA Conference 2014 Questionnaires.

Table 3-9: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.493	56.620	56.620	8.493	56.620	56.620
2	1.201	8.008	64.628	1.201	8.008	64.628
3	.821	5.470	70.098			
4	.757	5.044	75.142			
5	.634	4.225	79.366			
6	.489	3.258	82.624			
7	.451	3.008	85.632			
8	.398	2.651	88.283			
9	.384	2.558	90.841			
10	.360	2.398	93.240			
11	.314	2.092	95.332			

12	.209	1.393	96.724			
13	.187	1.243	97.968			
14	.185	1.236	99.204			
15	.119	.796	100.000			

Source: Adapted from IMESA Conference 2014 Questionnaires.

From Table 3-9, it is apparent that there is a large difference between the first factor's eigenvalue and that of the second factor (8.493 versus 1.201) as well as between the second and the third (1.201 versus 0.821). The first factor also contributes 56.260% of the total variance. This illustrates that the scale items are to a great extent unidimensional (UCLA Statistical Consulting Group, 2015?).

Two factors were extracted through the factor analysis. After a Varimax rotation, the percentage of variance explained by the two rotated factors, are 33.760% and 30.0868% respectively (Table 3-10).

Table 3-10: Total Variance Explained - Rotation sums

Component	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	5.064	33.760	33.760
2	4.630	30.888	64.428

Source: Adapted from IMESA Conference 2014 Questionnaires.

Figure 3-13 illustrates a Scree Plot. This indicates that the first component (8.493) is very important, although the presence of a second construct is also evident (1.201).

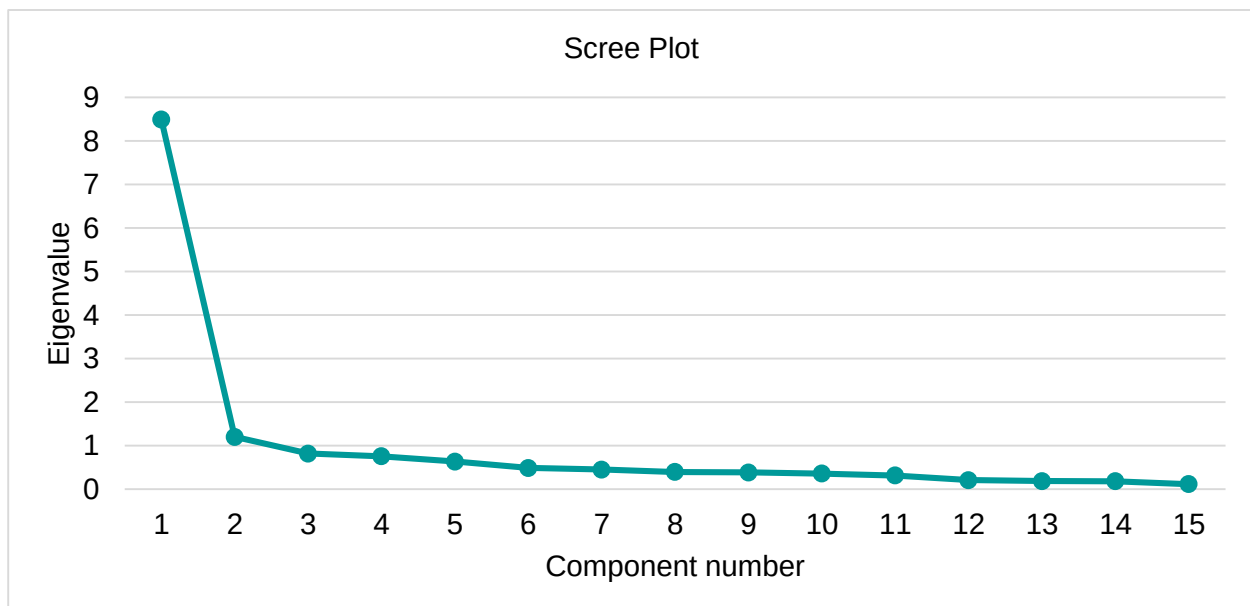


Figure 3-13: Scree Plot

Source: Adapted from IMESA Conference 2014 Questionnaires.

Table 3-11 and Table 3-12 illustrate the original component matrix of loadings compared to that of the rotated component matrix, by means of a Varimax rotation. Note that loading values smaller than 0.3 in absolute value are not reported.

Table 3-11: Component Matrix

	Component	
	1	2
B1_7	.850	
B1_6	.846	
B1_8	.813	
B1_15	.791	.330
B1_1	.764	
B1_5	.764	
B1_9	.762	
B1_12	.760	
B1_13	.757	
B1_2	.749	
B1_10	.737	
B1_4	.724	
B1_14	.668	
B1_3	.647	-.576
B1_11	.615	.585

Source: Adapted from IMESA Conference 2014 Questionnaires.

Table 3-12: Rotated Component Matrix

	Component	
	1	2
B1_3	.866	
B1_7	.761	.432
B1_8	.753	.385
B1_6	.730	.458
B1_2	.699	.351
B1_5	.681	.391
B1_1	.653	.421
B1_4	.536	.486
B1_11		.848
B1_15	.350	.783
B1_13	.383	.698
B1_12	.412	.671
B1_14	.332	.621
B1_10	.436	.612
B1_9	.477	.605

Source: Adapted from IMESA Conference 2014 Questionnaires.

As a result components B1_1 – B1_8 were included under Factor 1 and components B1_9 – B1_15 were included under Factor 2. The factors will include the following knowledge topics and be known as:

Factor 1 = Baseline knowledge

- Definitions & Terminology;
- Policy & Legislative Framework;
- SPLUMA (Act No. 16 of 2013);
- Development Principles; Norms & Standards;
- Intergovernmental Support;
- Spatial Development Frameworks;
- Land Use Management;

Factor 2 = Output driven knowledge

- Environmental & Developmental Procedures;
- Transportation Provision;
- Engineering Services Provision;
- Housing Provision;
- Township Related Issues;
- Building Management Control;
- Sustainable Development.

- Related Land Development Matters.

(a) Baseline knowledge

The baseline knowledge factor has a reliability of .923 as shown in the following table:

Table 3-13: Reliability statistics - Baseline knowledge

Cronbach's Alpha	No of Items
.923	8

Source: Adapted from IMESA Conference 2014 Questionnaires.

Table 3-14: Item-Total statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
B1_1	20.74	39.670	.691	.489	.916
B1_2	21.10	38.743	.711	.578	.915
B1_3	21.53	38.680	.680	.523	.917
B1_4	20.75	38.126	.667	.542	.919
B1_5	20.90	37.299	.740	.580	.913
B1_6	20.82	36.546	.819	.722	.906
B1_7	20.85	36.779	.822	.784	.906
B1_8	20.93	37.431	.795	.721	.908

Source: Adapted from IMESA Conference 2014 Questionnaires.

Table 3-15: Scale statistics

Mean	Variance	Std. Deviation	No of Items
23.94	48.973	6.998	8

Source: Adapted from IMESA Conference 2014 Questionnaires.

(b) Output driven knowledge

The output driven knowledge factor has a reliability of .891 as proven in the following table:

Table 3-16: Reliability statistics - Output driven knowledge

Cronbach's Alpha	No of Items
.891	7

Source: Adapted from IMESA Conference 2014 Questionnaires.

Table 3-17: Item-Total statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
B1_9	20.57	26.914	.676	.487	.876
B1_10	20.51	25.235	.682	.490	.876
B1_11	19.74	26.592	.650	.438	.879
B1_12	20.48	25.735	.715	.532	.871
B1_13	20.46	25.667	.719	.533	.871
B1_14	20.60	26.743	.653	.463	.879
B1_15	20.30	25.994	.718	.525	.871

Source: Adapted from IMESA Conference 2014 Questionnaires.

Table 3-18: Scale statistics

Mean	Variance	Std. Deviation	No of Items
23.78	34.925	5.910	7

Source: Adapted from IMESA Conference 2014 Questionnaires.

Figure 3-14 illustrates the average level of knowledge determined for both the private- and public sectors. It is clear that the baseline knowledge of both sectors is significantly lower (3.2 and 3.0 for the private and public sectors, respectively) than the output driven knowledge (3.6 and 3.5 for the private and public sectors, respectively). In general the level of knowledge for the public sector is lower than that of the private sector. This, however, can be attributed to the 42 responses that were received for the private sector, while 93 responses were received for the public sector. The average minimum levels of knowledge for the private- and public sectors, are 2.1 and 1.8 respectively, and the average maximum levels of knowledge are 4.1 and 4.4, correspondingly.

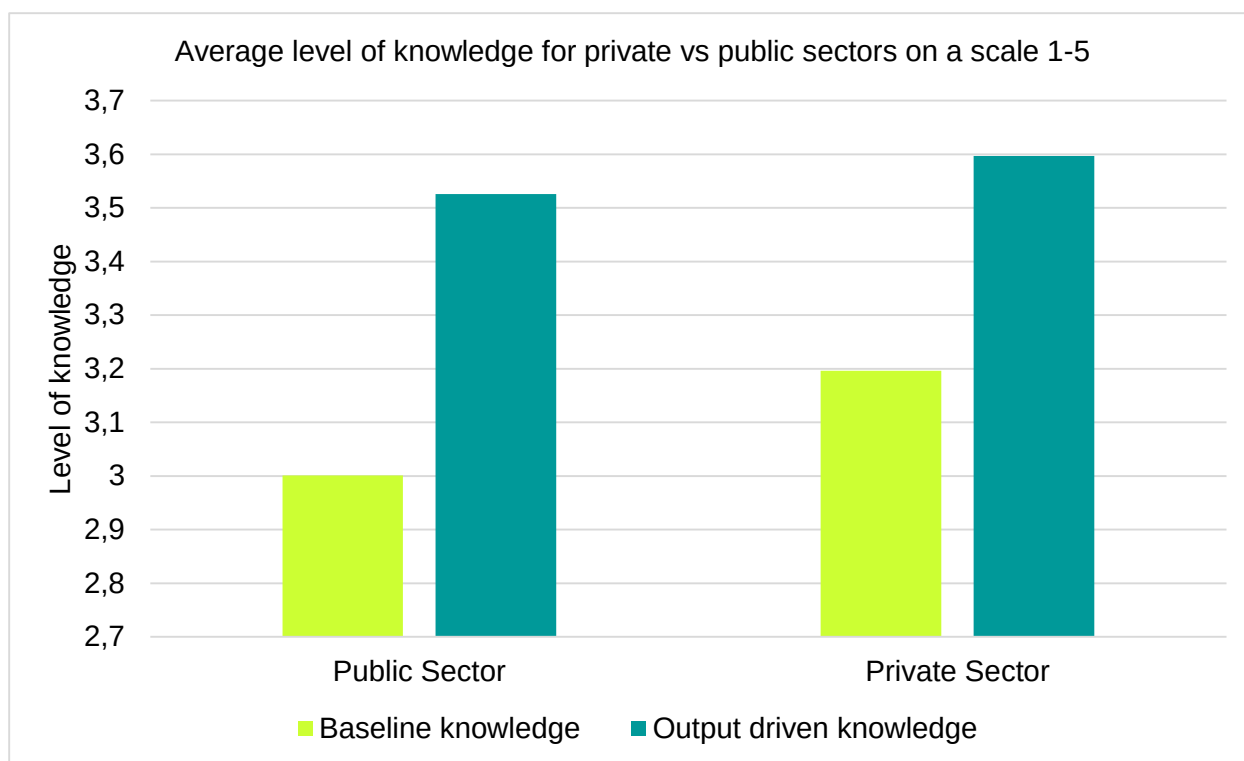


Figure 3-14: Average level of knowledge for private vs public sectors on a scale 1-5.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

Figure 3-15 illustrates the average level of knowledge determined according to the number of years' experience the participants indicated during the IMESA Conference 2014 survey. It is clear that the baseline knowledge levels are generally lower than those of the output driven knowledge for all the years' experience. The level of knowledge for participants with less than four years' experience have a much higher average level of knowledge with a much lower difference (0.11) between the baseline knowledge and output driven knowledge, compared to the difference (0.55) in that of the participants with more than 31 years' experience. This however, can be attributed to the 11 responses that were received for the former, while 30 responses were received for the latter. The average minimum levels of baseline knowledge and output driven knowledge, are 1.23 and 1.41 respectively, and the average maximum levels of knowledge are 4.46 and 4.72, correspondingly. The data included under "Missing" on the horizontal axes (x-axes), is representatives who included their level of knowledge and not their number of years' experience.

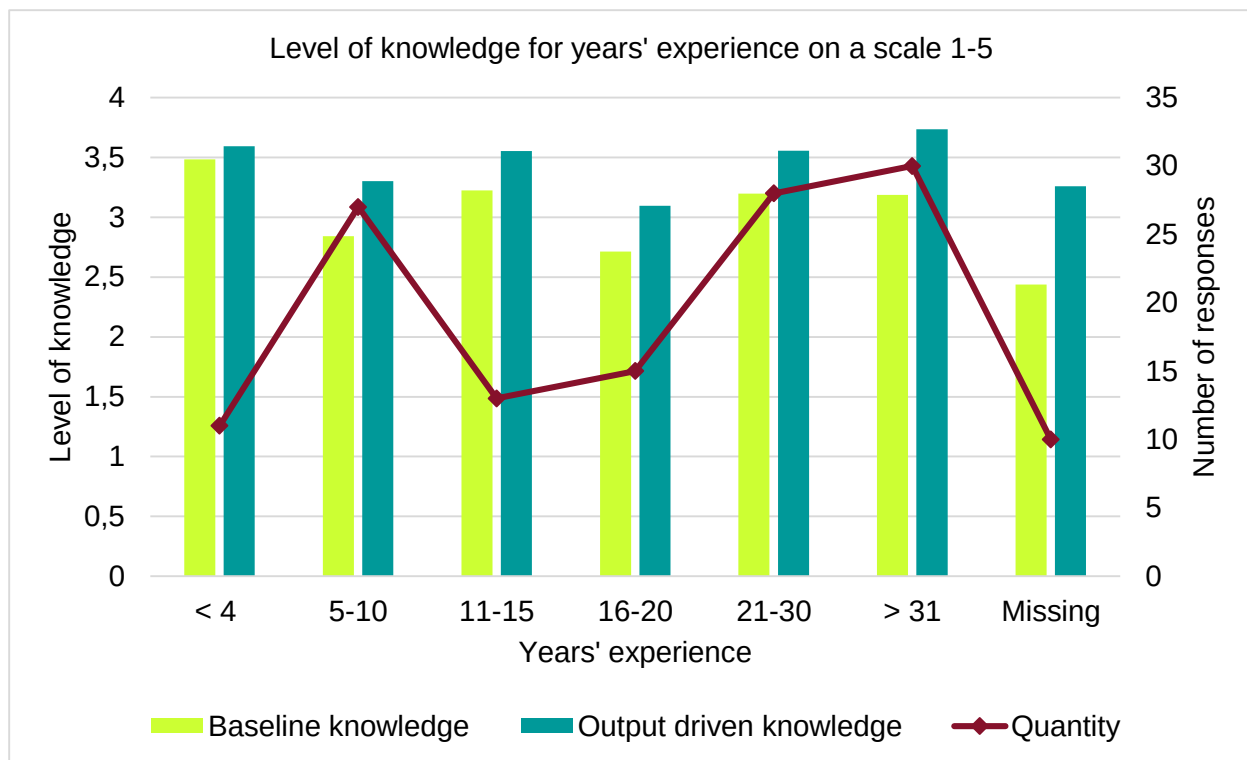


Figure 3-15: Level of knowledge for years' experience on a scale 1-5.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

3.2.4 SACPLAN Survey 2015 results

In June 2015, the total number of SACPLAN-registered town and regional planners was 3 408, which includes Professional Planners (2 113), Technical Planners (230) and Candidate Planners (1 065). Through correspondence, SACPLAN also indicated that about 80% of the registered planners provided working email addresses. Questionnaires were circulated to the planners by means of an online survey generated through SoGoSurvey!. The service, however, indicated that only 443 planners had access to the public URL provided to them through an invitation sent out by SACPLAN themselves (see Annexure E), to which 70 responses were received. The questionnaires contained three sections, including quantitative and qualitative questions as discussed in Section 1.7 above (see Annexure D).

It is important to note that in the light of the small number of responses, conclusions can merely be drawn as trends among the planners registered to SACPLAN and will not be considered as conclusive and no assumptions will be made as to the generalisation of the planning community. The following sections illustrate the data collected during this survey.

3.2.4.1 Quantitative data analysis

3.2.4.1.1 Demographic data

Figure 3-16 illustrates the demographic distribution for the SACPLAN Survey 2015. The greatest number of representatives at the conference came from Gauteng (32%), followed by the Western Cape (18%) and KwaZulu-Natal (15%).

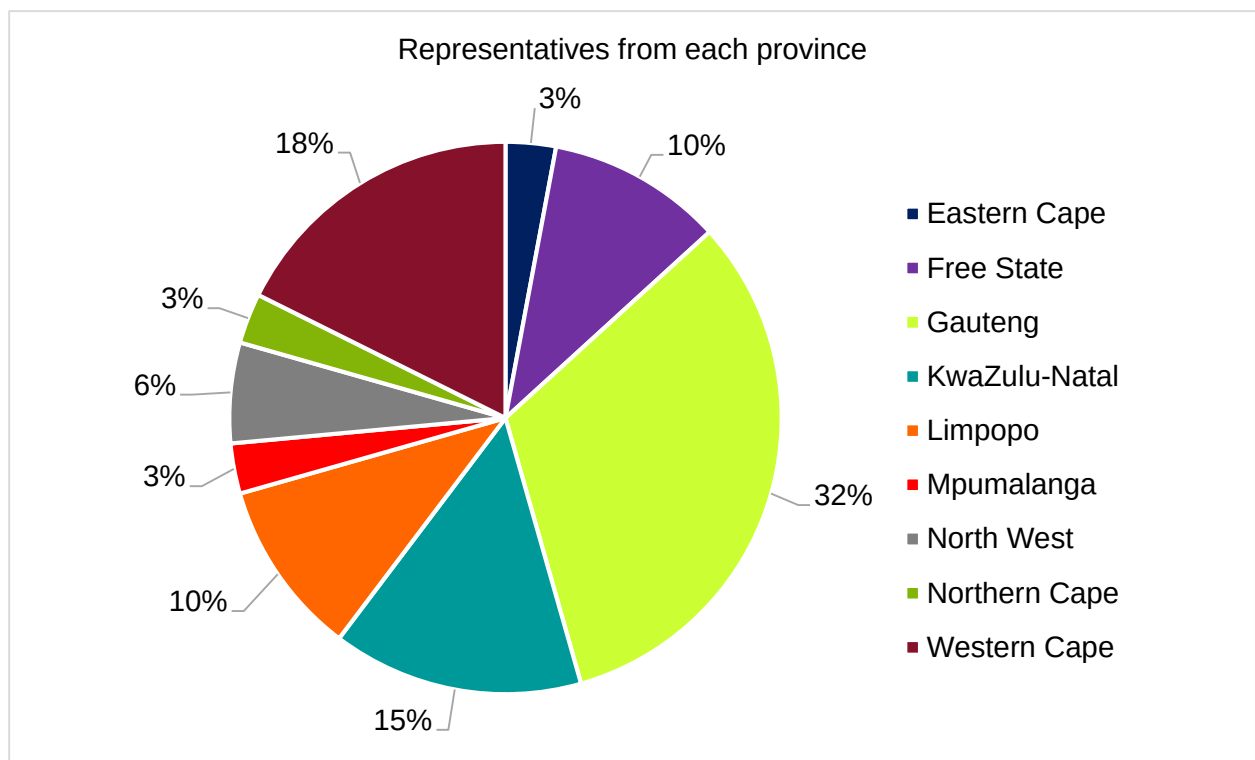


Figure 3-16: Representatives from each province.

Source: Own synthesis from SACPLAN 2015 Survey.

Subsequently the number of representatives practising in the private sector and public sector was determined for each province. In Figure 3-17 it is clear that the majority of participants represented the private sector. This is expected as the majority planners registered to SACPLAN is associated with privately owned planning consultancy companies.

Figure 3-18 illustrates the age groups relevant to each gender. From this it is evident that the field of Urban and Regional Planning and in particular the participants in the SACPLAN Survey 2015, is largely dominated by men. Both the men and women were largely represented by persons in the age group younger than thirty. The data included under missing on the horizontal axes (x-axes), is representatives who included their age group and not their gender.

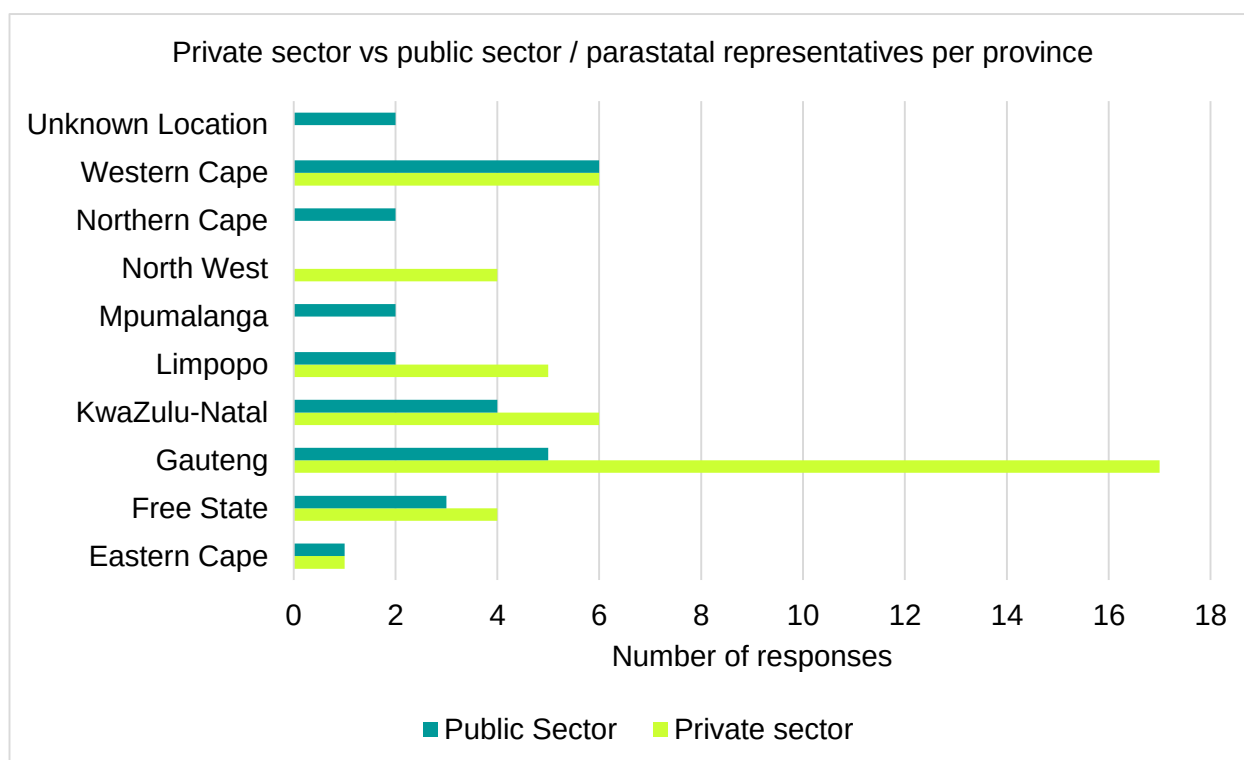


Figure 3-17: Private sector vs public sector / parastatal representatives per province.

Source: Own synthesis from SACPLAN 2015 Survey.

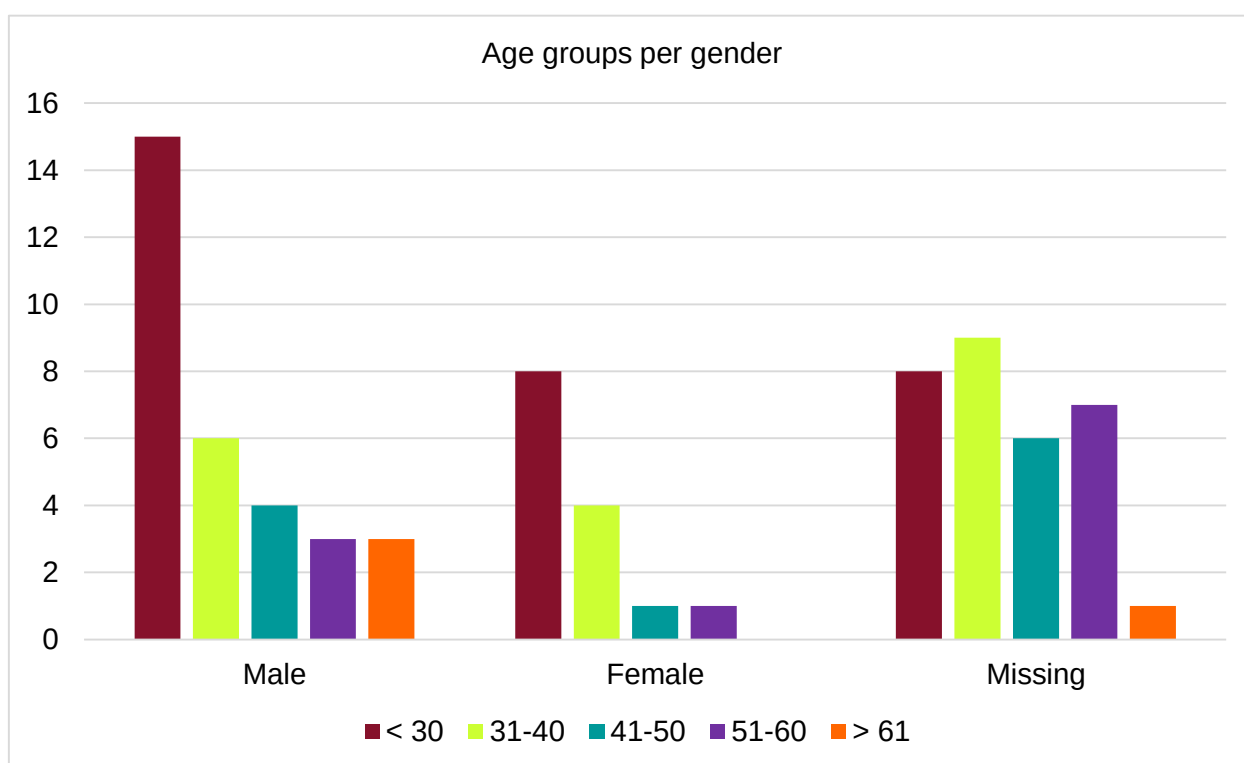


Figure 3-18: Age groups per gender

Source: Own synthesis from SACPLAN 2015 Survey.

The registration as a Town and Regional Planner with SACPLAN can be done in terms of three categories, including professional, technical and candidate planners. Figures 3-19 illustrate the registration to each category, provided by the participants according to their number of years' experience.

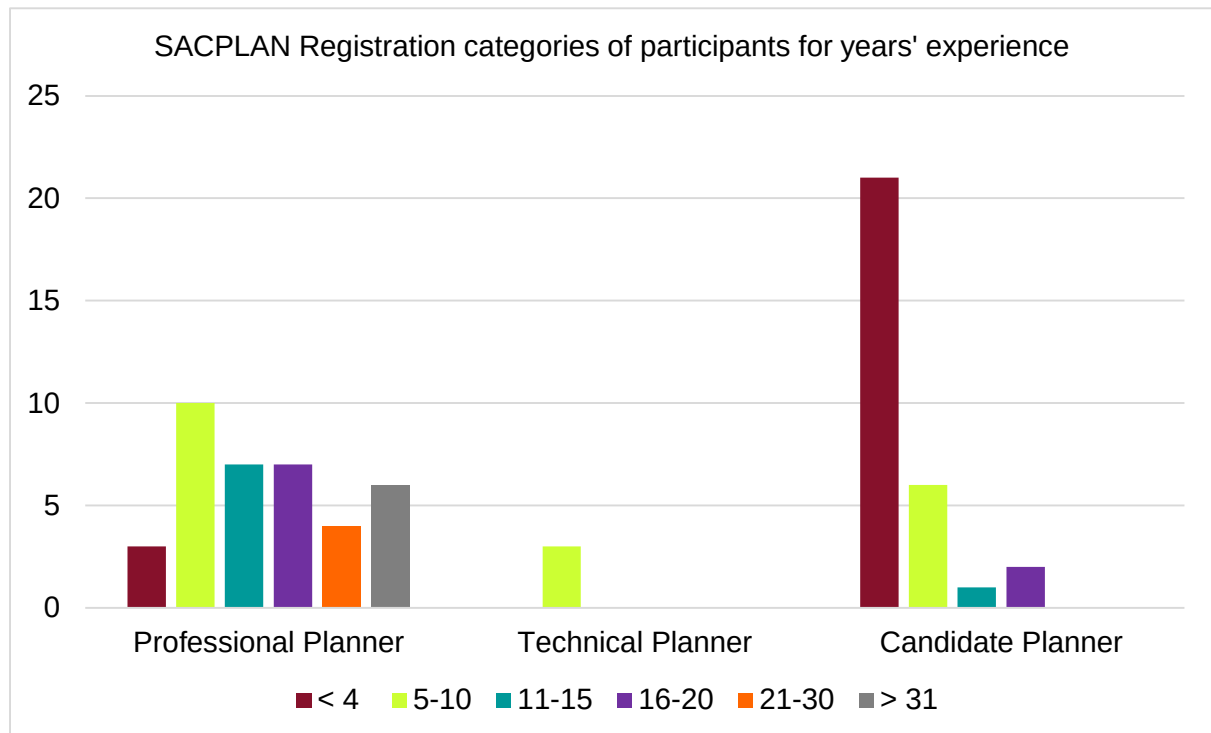


Figure 3-19: SACPLAN Registration categories of participants for years' experience.

Source: Own synthesis from SACPLAN 2015 Survey.

3.2.4.1.2 Representation of proposed programme

Figures 3-20 and 3-21 illustrate the form in which the participants of the SACPLAN Survey 201 received the capacity building guideline document. The data presented are indicative of the completed sections. As a result 80% of the participants indicated that they would prefer the programme to be presented in the form of a short course with the submission of assignments as the evaluation method. The largest portion of participants (30%) also indicated a preference for an online version of the document which would enable the adaptation of the document on a biannual basis, while 31,9% of the participants indicated a preference for a soft copy (digital and interactive) version of the document basis.

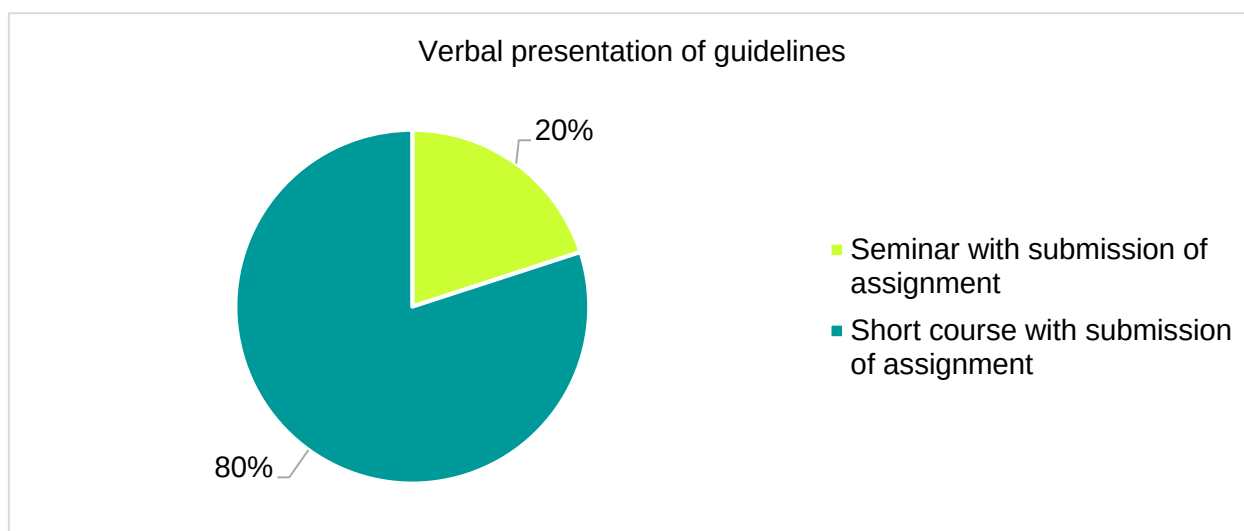


Figure 3-20: Verbal presentation of the guidelines.

Source: Own synthesis from SACPLAN 2015 Survey.

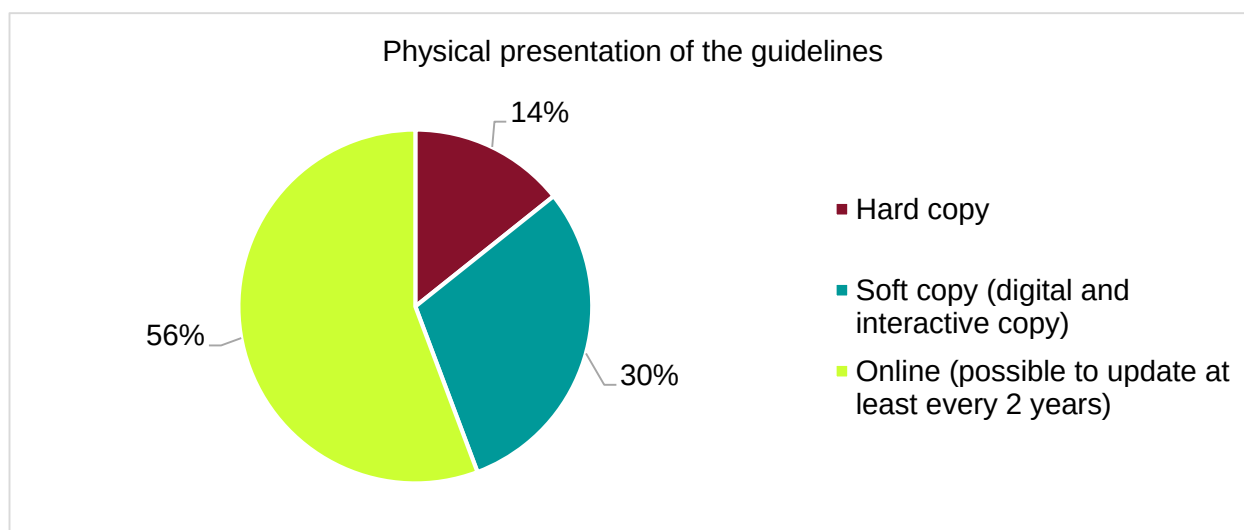


Figure 3-21: Physical presentation of the guidelines.

Source: Own synthesis from SACPLAN 2015 Survey.

Participants also had the option of providing requests or suggestions other than those mentioned in Figures 3-20 and 3-21, regarding the capacity building document/programme. The following responses were recorded for this question:

- *I have added my personal detail, please do not abuse or distribute it.*
- *As mentioned previously, the knowledge of Municipal Engineers regarding the planning field is highly needed and appropriate, I do however suggest that a VERY CLEAR delineation is given between the duties and responsibilities of the said urban and regional planner and the CONSEQUENTIAL duties and responsibilities of municipal engineers in a concerted effort to allocate the various roles and responsibilities of the two professions to rid the current challenge of other professions performing and executing planners' actions.*

- *Why is the focus on Municipal Engineers? If planning is subservient to municipal engineers then that must change.*
- *Register course with the GDE, supported by tertiary institutions, to obtain an official accreditation. Registration criteria should comprise of minimum qualifications i.e. appropriate degree etc.*
- *Your questionnaire is mixing issues, although, I appreciate the attempt to explore these issues. I just collected data, exploring the perceptions of urban and regional planners regarding their readiness to implement SPLUMA. It seems to me that you are trying to identify the knowledge gap and the training needs for engineers and urban and regional planners regarding these respective disciplines but also recognising that they are interconnected. Hence, providing training that's going to address these needs. My suggestion therefore, is that there is a need to unpack in detail, exactly what the training needs are and how they are going to enhance the planners' and engineers work (not that I see them as separate, some planners are engineers and some engineers, planners).*
- *As a manager, i recommend for my subordinates to go for longer study rather than short course. Want everyone with masters. Short course I will prefer Autocad and GIS.*
- *As I mentioned previously, I do not believe that a course will open these lines of communication. As such, I resent being forced to answer the two preceding questions. This needs to be an ongoing process that requires involvement from all parties. A review of the existing legislative framework may provide major assistance in unpacking the challenges / stumbling blocks which prevent the various professions from working with one another. Unpacking these stumbling blocks may be very informative as part of this research.*
- *Online courses (or webinars) could be invaluable but physical, eye-to-eye contact and interaction once in a while is also crucial. I would suggest that online courses be combined with 'practicals'*
- *Need to include urban and regional planning as part of the Continuing Professional Development for their profession.*
- *Town planners need education at two levels - one to keep up with trends and incorporate these into town planning schemes etc. and secondly to be able to more independently be able to evaluate applications - the more modern issues incorporated into the scheme need to be well presented to staff (they need good ongoing training which should be mandatory).*
- *Engineering service departments should appoint town planners and consultants also appoint engineers.*

3.2.4.2 Qualitative data analysis

The qualitative results of the survey is quantified in order to increase the understand-ability of the results.

Figure 3-22 illustrates the specific responses to the four open-ended questions included in Section B of the SACPLAN 2015 Survey. A total of 226 responses were received for these questions, while 51 responses was recorded as missing data due to incomplete questions. The questions were as follows:

- (a) Do you think the Municipal Engineers in South Africa and its personnel has sufficient working knowledge of the domain of Urban and Regional Planning and its processes, to make sufficient comments on the related issues, provide an explanation? Motivate your answer.
- (b) Do you think it is necessary to broaden the understanding/knowledge of Urban and Regional planning under Municipal Engineers, provide an explanation of what you think they should know more off? Motivate your answer.
- (c) Do you think the municipal town planners in South Africa and its personnel, have sufficient working knowledge of the domain of engineering and its processes, to make sufficient and valuable comments on the related issues? Motivate your answer.
- (d) Do you think consultants have sufficient knowledge to provide proper, sufficient and to the point applications with the inclusion of good motivational reports and concept layouts to be meaningful to the Municipal Engineers and to contribute to their decision-making processes? Motivate your answer.

For question (a) 19 (27.1%) “Yes” responses were received with the opinion that municipal engineers do have sufficient working knowledge of urban and regional planning, while 46 (65.7%) “No” responses were received stating the opposite.

For question (b) a resounding 62 (88.6%) “Yes” responses were received with the opinion that there is a necessity to broaden the understanding/knowledge of urban and regional planning among the municipal engineers, while a mere 2 (2.9%) “No” responses were received stating the opposite.

For question (c) 22 (31.4%) “Yes” responses were received with the opinion that municipal town planners do have sufficient working knowledge of engineering, while 41 (58.6%) “No” responses were received stating the opposite.

For question (d) a resounding 30 (42.9%) “Yes” responses were received with the opinion that consultants do have sufficient working knowledge to make meaningful contributions to the Municipal Engineers, while a mere 4 (47.1%) “No” responses were received stating the opposite.

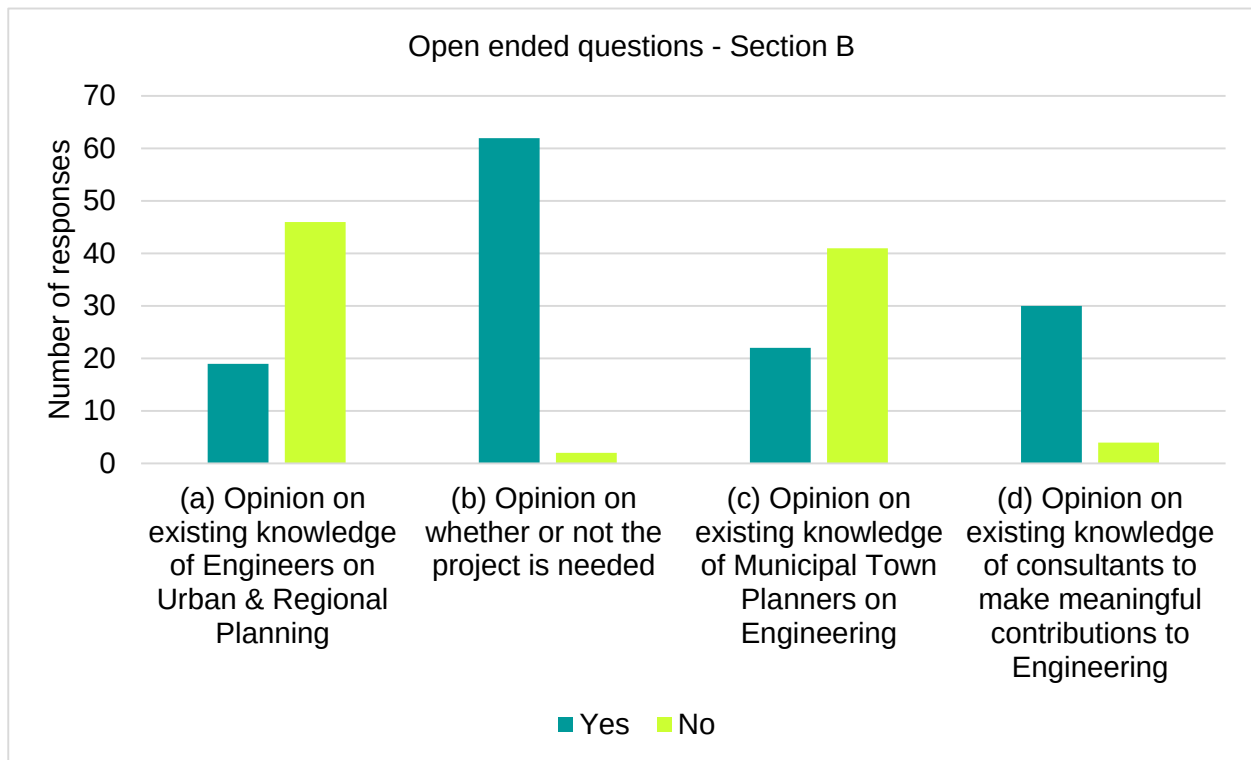


Figure 3-22: Open ended Questions - Section B.

Source: Own synthesis from SACPLAN 2015 Survey.

The “No” responses were deduced from answers included phrases such as “no, only some, not certain, don’t think so, not necessarily, moderate”, etc. The following section will provide a thematic analysis of the responses to the questions illustrated above.

3.2.4.2.1 Themes, sub-themes and sub-sub-themes identified throughout the survey

Table 3-19 is a summary of the themes, sub-themes and sub-sub-themes that were identified from the responses to question (a), as mentioned above, with the inclusion of some of the references made to them.

Subsequently the sub-themes and sub-sub-themes for opinions provided for question (a) can be explained with particular reference made to the two themes identified. Figure 3-23 illustrates the various themes, sub-themes and sub-sub-themes discussed and included in the table below. Figure 3-24 illustrates the various responses received per theme and sub-themes.

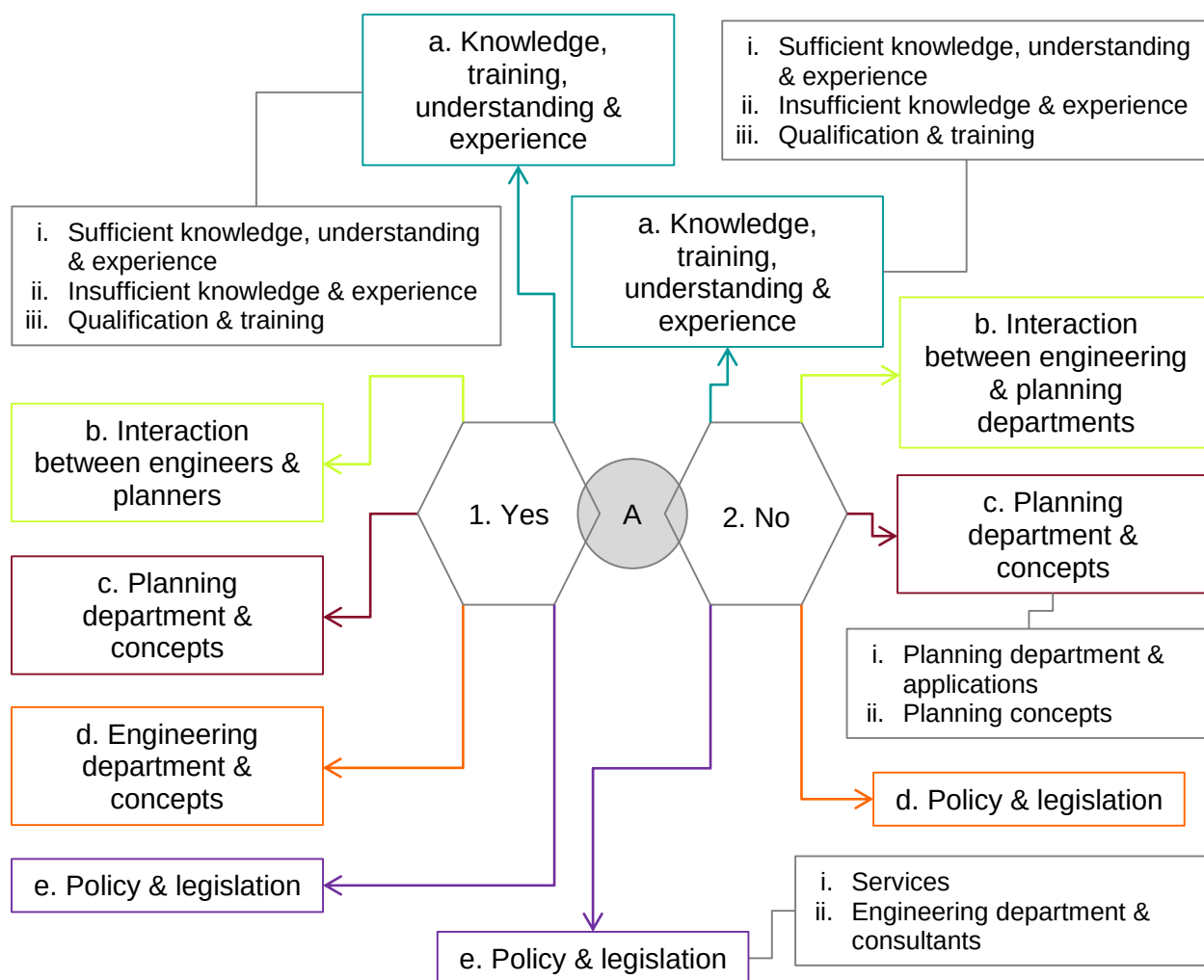


Figure 3-23: SACPLAN 2015 Survey - flow chart of question (a) thematic analysis.

Source: Own synthesis from SACPLAN 2015 Survey.

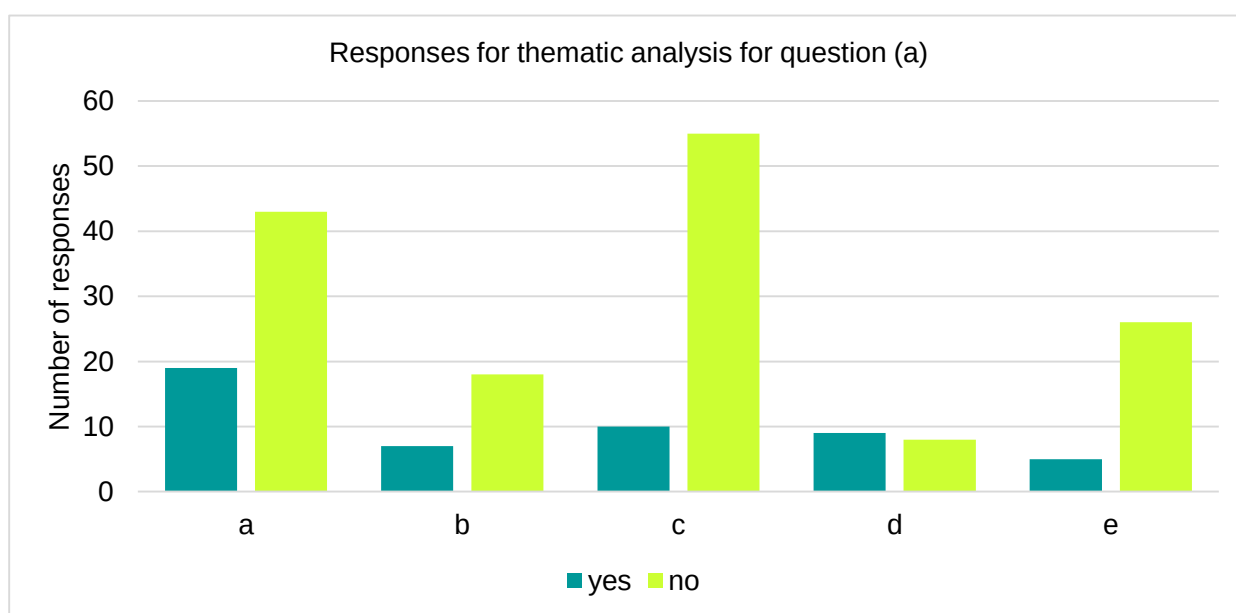


Figure 3-24: Responses for sub-themes received for each theme identified.

Source: Own synthesis from SACPLAN 2015 Survey.

1. Yes – Theme

This theme was deduced from the number of “Yes” responses received for question (a), thus indicating that the respondents are of the opinion that existing knowledge of Municipal Engineers on Urban and Regional Planners are sufficient. Five sub-themes have been identified with sub-sub-themes included, where necessary. These sub-themes refer to the opinions provided to the question, by the participants.

- (a) **Knowledge, training, understanding & experience:** Throughout the responses to question (a), 19 references are made to the knowledge, training, understanding and experience of municipal engineers, includes the opinions of the participants regarding the knowledge and experience. References are also made to the insufficient knowledge and experience, qualification and training of the engineers and the opinion of older personnel. Three sub-sub-themes were derived from the responses.
- (b) **Interaction between engineers & planners:** The responses to question (a) included seven references made to the interaction between engineers and planners.
- (c) **Planning department & concepts:** The responses to question (a) included 10 references made to the planning department and associated concepts.
- (d) **Engineering department & concepts:** The responses to question (a) included nine references made to the engineering department and associated concepts, including the opinions of the participants on engineering comments provided by the department, engineering concepts and the view that the municipal engineer has to urban and regional planning.
- (e) **Policy & legislation:** The responses to question (a) included five references made to policies & legislation.

2. No – Theme

This theme was deduced from the number of “No” responses received for question (a), thus indicating that the respondents are of the opinion that existing knowledge of engineers on urban and regional planners is not sufficient. Five sub-themes have been identified with sub-sub-themes included, where necessary. These sub-themes refer to the participants’ responses to the question.

- (a) **Knowledge, training, understanding & experience:** Throughout the responses to question (a), 43 references are made to the lack of knowledge and experience of municipal engineers, including the opinions of the participants regarding knowledge and experience.

References are also made to the insufficient knowledge and experience, qualification and training of the engineers and the opinions of older personnel. Five sub-sub-themes were derived from the responses.

- (b) **Interaction between engineering & planning departments:** Eighteen references are made to the lack of interaction between engineers and planners.
- (c) **Planning department & concepts:** The responses to question (a) included 55 references made to the focus of planning departments such as housing, planning processes, support provided by the town planners, planning departments working alone and engineers only being relevant at later stages. The responses included in this sub-theme provide the opinions of the participants regarding these concepts. Two sub-sub-themes were derived from the responses.
- (d) **Policy & legislation:** Eight references are made to policy and legislation in urban and regional planning, including the constant changes, policies and necessary related documentation.
- (e) **Engineering department:** The responses to question (a) included 26 references made to the focus of engineering departments and to municipalities/spheres of government, including the opinions of the participants regarding these concepts. Two sub-sub-themes were derived from the responses.

Table 3-19: SACPLAN 2015 Survey - Question (a) thematic analysis

Themes	Sub-themes	Sub-sub-themes	References made in survey
1. Yes	a. Knowledge, training, understanding & experience	i. Sufficient knowledge, understanding & experience	Ten references are made to the sufficiency in knowledge, understanding and experience of the municipal engineer in Urban and Regional Planning references are also made to the locality of Municipal Engineers and urban and regional planners. • "...understands the process better than most planners themselves..."; • "...gap between the experienced (older) engineers and the upcoming (younger) staff ...knowledge won't necessarily be transferred"; • "...in general. However, ... there are areas where this is not the case, especially in rural areas further away from metropolitan areas"; • "...engineers developed to more developments will know the process, while those that don't deal with a lot of developments won't"; • "...engineers in the metro and district level are exposed to more developments ... Whereas the engineers and planners in local municipalities from smaller towns would at times deal with less than five applications per year, which denies them the exposure to knowledge of town planning process"; • "...they have previous experiences".
		ii. Insufficient knowledge & experience	Five references are made to the insufficiency in knowledge and experience of the municipal engineer in Urban and Regional Planning. • "...incumbents in senior engineering positions are not registered engineers and have little experience"; • "...they have a basic knowledge of what planning involves in order to enable them to provide comments..."; • "...Most engineers lack the theoretical base...".
		iii. Qualification & training	Four references are made to the qualification and training of the municipal engineer in urban and regional planning. • "...somebody who did development studies being accredited as professional town planner without having concrete background of urban and regional planning"; • "...in varsity engineers are trained on spatial planning and other related planning courses"; • "...Municipal Engineers are suitably qualified...".

	b. Interaction between engineers & planners	n/a	• "...there are strong ties between us (planner) & engineers, a common vision is shared amongst us ... and are in daily basis in communication with us..."; • "...in order to work well with their fellow planners"; • "...We have a good working relationship with our in-house engineers. They are involved in new and existing developments at all times"; • "...get their work done more efficiently...".
	c. Planning department & concepts	n/a	• "...until the real value of (forward) planning is recognised..."; • "...not necessarily a deeper knowledge of the legalities and processes"; • "...cannot see the detail importance of elements within the process which holds a significant influence".
	d. Engineering department & concepts	n/a	• "...only see the obvious facts and do not always look at the larger scope of influence..."; • "...directly comment on land use and land development matters..."; • "...Given their education and training they should be able to provide appropriate comments pertaining to their level of proficiency..."; • "...in the upgrading of informal settlements where engineering standards cannot be deviated from".
	e. Policy & legislation	n/a	• "...not showing interest in the broader strategic plans such as spatial frameworks, housing sector plan and planning legislation"; • "...In many instances the legislative framework does not provide the flexibility needed to achieve better organised settlements...".
2. No	a. Knowledge, training, understanding & experience	i. Sufficient knowledge, understanding & experience	Thirteen references are made to the sufficiency in knowledge, understanding and experience of the municipal engineer in Urban and Regional Planning references are also made to the locality of Municipal Engineers and urban and regional planners. • "...experienced engineers who left the municipalities for better paying jobs..."; • "...At smaller municipalities the situation is worse"; • "...Political appointments useless"; • "...Some have the knowledge, but don't have the time".
		ii. Insufficient knowledge & experience	Twenty-six references are made to the insufficiency in knowledge, understanding and experience of the municipal engineer in Urban and Regional Planning

			references are also made to the locality of Municipal Engineers and urban and regional planners. • "...inexperienced technocrats..."; • "...knowledge of some planning related issues are relatively good, it may not be sufficient to judge an intricate planning application based on theory..."; • "...No exposure or very little exposure because of lack of capacity and staff to get exposure from"; • "...the experience, quality, work ethic and expertise of municipal engineers is shockingly bad"; • "...I don't think they have sufficient knowledge..."; • "...municipal officials are not able to understand their own records and plans"; • "...Officials do not have the sufficient technical skills or working knowledge..."; • "...Engineers in general do not display the underlying philosophies and principles of urban and regional planning..."; • "...without trying to understand the overall impacts that urban and regional planning processes".
		iii. Qualification & training	Four references are made to the qualification and training of the municipal engineer in Urban and Regional Planning, than some of the younger engineers. • "...Lack of experience and quality of tertiary education..."; • "...municipal engineers need to be further educated within the domain of urban and regional planning..."; • "...Most municipalities do not even employ a qualified engineer...".
	b. Interaction between engineering & planning departments	n/a	• "...engineers and town planners work in silo's, there is no integration between these two professions ..."; • "...engineers and Planners work closely together on the same projects and have a basic understanding of what the other profession entail ..."; • "...Municipal Engineers in most cases only concern themselves with the technical issues..."; • "...A general understanding of the importance of Urban and Regional Planning and specifically the integrated processes associated with strategic planning needs...";

			• "...the engineer is approving housing plans without planners inputs with regard to the coverage, density, FAR, and building lines' restriction"; • "...there are still huge gaps between engineering and urban planning...".
	c. Planning department & concepts	i. Planning department & applications	Twenty-two references are made to the focus of planning departments including references to the town planning applications submitted thereto. • "...achieving spatial planning/sustainable development principles, harmonious flow of land uses, ensuring integrated planning of socio-economic and environmental activities"; • "...limited understanding of town and regional planning issues and processes"; • "...Processes are not properly followed and many decisions are taken with political guidance as the deciding factor..."; • "...Resulting in a "dumbed down" version of the application resulting in the loss of valuable information required by senior municipal town planners for good decision making related to the outcome of the application"; • "...previously, there was no town planning unit in the district...".
		ii. Planning concepts	Twenty-three references are made to planning specific concepts. • "...Municipal engineers do not understand the planning legislative processes and the urban design layouts"; • "...broad level of complete integration of all aspects of strategic planning and land development aspects..."; • "...other respects, such as land use management, and spatial planning where issues of social justice /equity are balanced with financial and economic /LED and ecological sustainability may be less limited..."; • "...sustainable development and development norms and standards..."; • "...issues such public participation and strategic planning of the municipality".
	d. Policy & legislation	n/a	• "...an un capacitated municipal system"; • "...SDF's in terms of SPLUMA... integration in the municipal planning processes is vital to the success of the implementation and intent of SPLUMA"; • "...SDF's and LUS must be aligned with the proposed IDP...";

			• "...Some of our engineering colleagues refuse to understand proper sound planning principles and procedures as they see it as non-important and a waste of time..."
	e. Engineering department	i. Services	Eight references are made to services and infrastructure provided by municipalities. • "...optimize movement, and to calculate services (sewage, electricity, etc) required/provided..." • "...Engineers are mostly interested on compliance with norms and standards on the provision of infrastructure"; • "...supported by infrastructure provision and cost of bulk service provision... Specifically in terms of water provision..."
		ii. Engineering department & consultants	Eighteen references are made to the focus of engineering departments and the relevant consultants. • "...With engineering being an exact science and planning being a more social science, engineers do not understand the importance of planning and its interdisciplinary impact and nature"; • "...sprawl are fuelled by a strong engineering perspective and normative framework..." • "...often departments tend to rely on consultants for assistance..." • "...Engineering services reports are called for most types of applications ..."; • "...they sometimes overlook planning processes which ends up delaying projects"; • "...objectivity is lacking"; • "...struggle with a large number of vacant positions and individuals "jumping" from one position to a next"; • "...They make decisions purely on a technical engineering level".

Source: Own synthesis from SACPLAN 2015 Survey.

Table 3-20 is a summary of the themes, sub-themes and sub-sub-themes that was identified from the responses to question (b), as mentioned above with the inclusion of some of the references made to them.

Subsequently the sub-themes and sub-sub-themes for opinions provided for question (b) can be explained with particular reference made to the two themes identified. Figure 3-25 illustrates the various themes, sub-themes and sub-sub-themes discussed and included in the table below. Figure 3-26 illustrates the various responses received per theme and sub-themes.

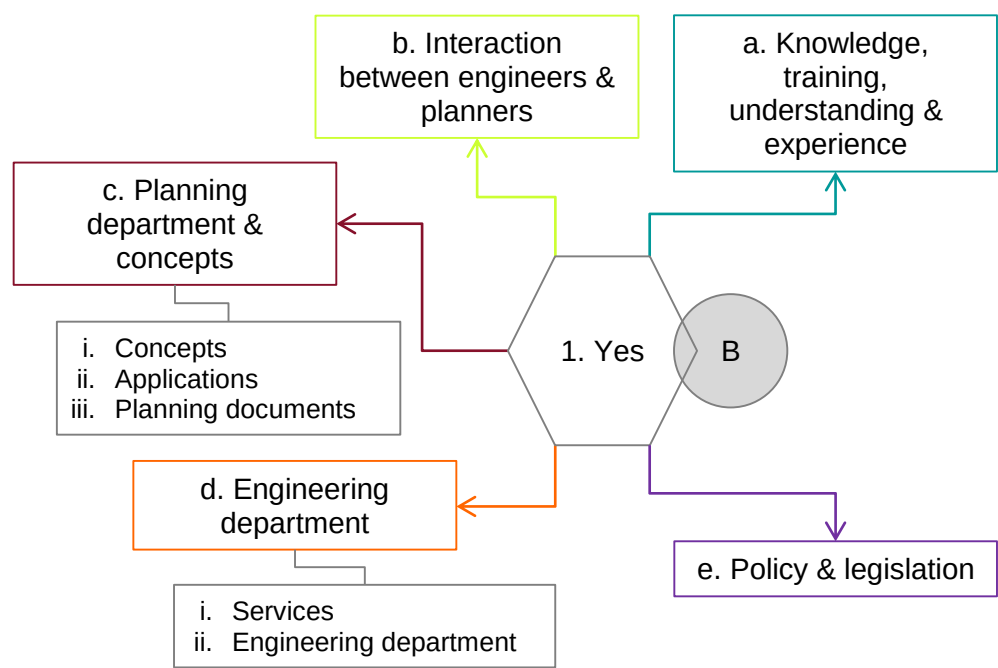


Figure 3-25: SACPLAN 2015 Survey – flow chart of question (b) thematic analysis.
 Source: Own synthesis from SACPLAN 2015 Survey.

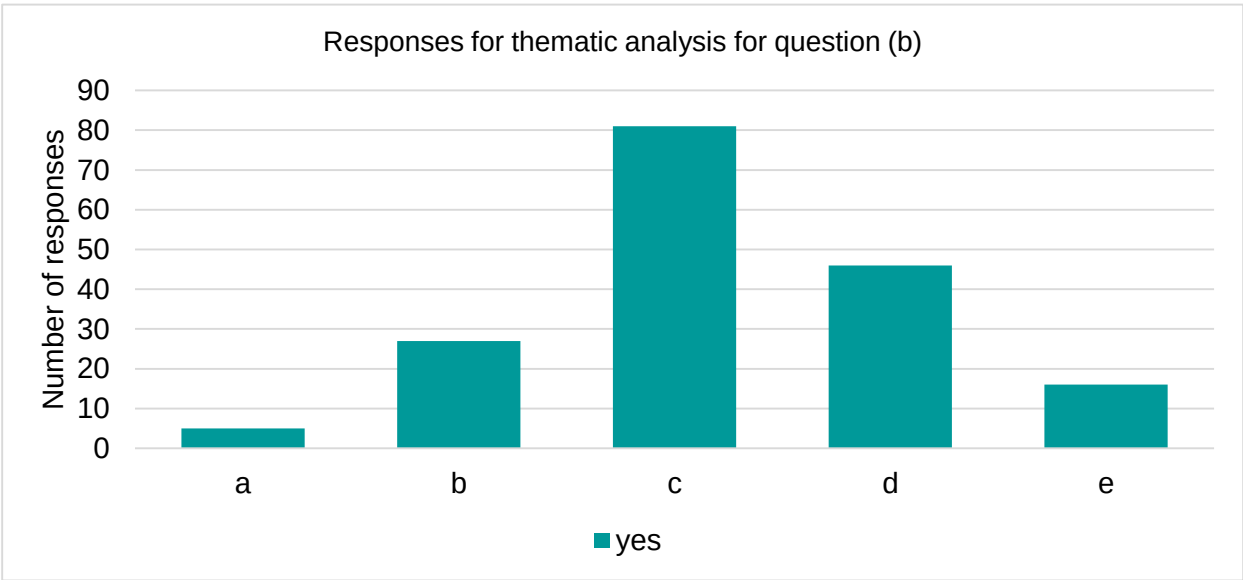


Figure 3-26: Responses for sub-themes received for each theme identified.
 Source: Own synthesis from SACPLAN 2015 Survey.

There were only two participants that made references to the “no” theme while the remaining were of the opinion that the project is necessary. Due to the small number of responses received for the “no” theme, only the “yes” theme will be discussed and described for consistency with the thematic analysis applied in this section.

1. Yes – Theme

This theme was deduced from the number of “Yes” responses received for question (b), thus indicating that the respondents are of the opinion that it is necessary to broaden the understanding/knowledge of engineering under urban and regional planners. Five sub-themes have been identified with sub-sub-themes included, were necessary. These sub-themes refer to the opinions provided to the question, by the participants.

- (a) **Knowledge, training, understanding & experience:** Five references are made to the sufficiency in knowledge, understanding and experience of the municipal engineer in urban and regional planning references are also made to the locality of municipal engineers and urban and regional planners.
- (b) **Interaction between engineers & planners:** Twenty-sevven references are made to the interaction between engineers and planners.
- (c) **Planning department & concepts:** The responses to question (b) included 81 references made to the focus of planning departments such as housing, planning processes, support provided by the town planners, planning departments working alone and engineers only being relevant at later stages, including the opinions of the participants regarding these concepts. Three sub-sub-themes were derived from the responses.
- (d) **Engineering department:** The responses to question (b) included 46 references made to the focus of engineering departments and to municipalities/spheres of government, including the opinions of the participants regarding these concepts. Two sub-sub-themes were derived from the responses.
- (e) **Policy & legislation:** Sixteen references are made to policy and legislation in urban and regional planning, including the constant changes, policies and necessary documentation related thereto.

Table 3-20: SACPLAN 2015 Survey - Question (b) thematic analysis

Themes	Sub-themes	Sub-sub-themes	References made in survey
1. Yes	a. Knowledge, training, understanding & experience	n/a	• "...an certainly benefit from having a better technical understanding of especially engineering services (water, sewer, electricity and roads/transportation)"; • "Basic concepts could be conveyed to assist with practical application... one should refrain from going into too much detail such as legal processes"; • "...They must have qualification first, practical training to acquire experience...".
	b. Interaction between engineers & planners	n/a	• "...focus should be placed on interdisciplinary cooperation..."; • "...integration should be promoted between town planners and municipal engineers"; • "...process should be integrated and the officials should not work in isolation..."; • "...forge a cohesive approach to development..."; • "...They need to be aware of the complexities involved in working towards integrated communities..."; • "...Engineers should not be the supervisors to town planners..."; • "...help them acknowledge the role and responsibility that planners play in sustainable development"; • "...If Town Planners and Engineers combine their knowledge and experience its often evident that it overlaps, but this is the best way to cover all aspects of planning"; • "...Some of them do not consult because they do not know that we are the responsible people for certain services...".
	c. Planning department & concepts	i. Concepts	Forty-five references are made to Urban and Regional Planning concepts and focus / specialised areas. • "...They impress on land use control so they can also help avert the overburdening of the bulk infrastructure..."; • "...That development are triggered driven by the intangibles - the "soft stuff" of the economy and social issues and decisions - that manifest in the "real / hard " stuff like infrastructure and not the other way around..."; • "...the importance of processes to contribute to sustainable and well planned living and functional spaces";

			• "...in order for engineers to get more knowledge in planning matters"; • "...when it comes to matters of aesthetics and impact on the amenity of adjoining properties and the broader neighbourhood"; • "...with emphasis on sustainable approaches to service delivery, housing and development..."; • "...more natural or traditional ways to achieve certain objectives, e.g. erosion doesn't always need concrete as an intervention"; • "...Engineers also need to understand the impact of their services in the communities they work."; • "...They should be more aware of the extreme impact of urban sprawl..."; • "...the best level of understanding especially in the area of planning design work...".
		ii. Applications	Twenty-two references are made to town planning applications, its processes and implications. • "...this will shorten the process that applications take..."; • "...Town planners should also be granted wider scope in the decision-making processes..."; • "Involve municipal Engineers in the municipal planning processes to so that they can see how their service delivery integrate with other municipal services..."; • "...the role a planner plays in community participation in addressing different competing stakeholder interests"; • "...but you hardly see EIA applications being submitted for projects, but if planning was consulted Service Providers would be told to submit these"; • "...planning for infrastructure (engineering) and planning for future growth (town planning) is often disconnected..."; • "...Urban planning is often viewed by others as simply developing drawings and images of the city in the future, without discerning how the process and the decisions it requires can become the backbone of urban transformation...".
		iii. Planning department	Eleven references are made to the focus and duties of planning departments. • "...The broader context of development...";

			• "...Then add the main elements of development towards a cohesive / evolving / dynamic picture to move away from often a site specific fixation only it requires a balanced strategy..."; • "...They should know more of relevant planning considerations and processes".
	d. Engineering department	i. Services	Twenty-four references made to engineering specific concepts (infrastructure/service provision). • "...resulting in the request for outrageous engineering contributions due to the lack of understanding of the application, and the inability to provide proper reasons for these requests"; • "...as requirement for parking ... whereby most of the clientele needs no form of transport to and from the 'house shop'"; • "...if the engineers (and finance) do not understand the strategic direction that the council is taking regarding development, they will not be able to make appropriate provision for such engineering services"; • "...to a certain extent certain borders should be removed to ease provision of services that requires the collaboration of engineers and planners..."; • "...More input with regard to detail design of services".
		ii. Engineering department	Twenty-two references made to the engineering department. • "...this will enable the engineers to not only understand the applications better, but will also enhance the quality of comments received on the application related to the engineering services provided..."; • "...They should also master the township establishment as well as rezoning, process to fast track development approvals"; • "...The normative framework or rather the design rationale of what engineers should understand and incorporate in their approaches and desirably in their solutions..."; • "...they need to broaden their focus ..."; • "...engineers tend to focus on cost-effectiveness and efficiency..."; • "...why and how certain issues are approached, they can better inform us of their concerns"; • "...everything is not always about the bottom line and cost, design and user friendly should also be taken into cognisance".

	e. Policy & legislation	n/a	• "...Legislation that guides land development such SPLUMA..."; • "...town planning and related acts, legislation, ordinances and schemes..."; • "...Specific details in the legislative requirements related to SDF's at municipal level...SDF's now forms a crucial decision-making tool and all functions of local authorities needs to be aligned with SDF and ultimately with the IDP"; • "...They must know policies, legislatures, norms and standards to deliver in line and quality"; • "...institutional challenges in order to foster sustainable development".
2. No	n/a	n/a	n/a

Source: Own synthesis from SACPLAN 2015 Survey.

Table 3-21 is a summary of the themes, sub-themes and sub-sub-themes that was identified from the responses to question (c), as mentioned above with the inclusion of some of the references made to them.

Subsequently the sub-themes and sub-sub-themes for opinions provided for question (c) can be explained with particular reference made to the two themes identified. Figure 3-27 illustrates the various themes, sub-themes and sub-sub-themes discussed and included in the table below. Figure 3-28 illustrates the various responses received per theme and sub-themes.

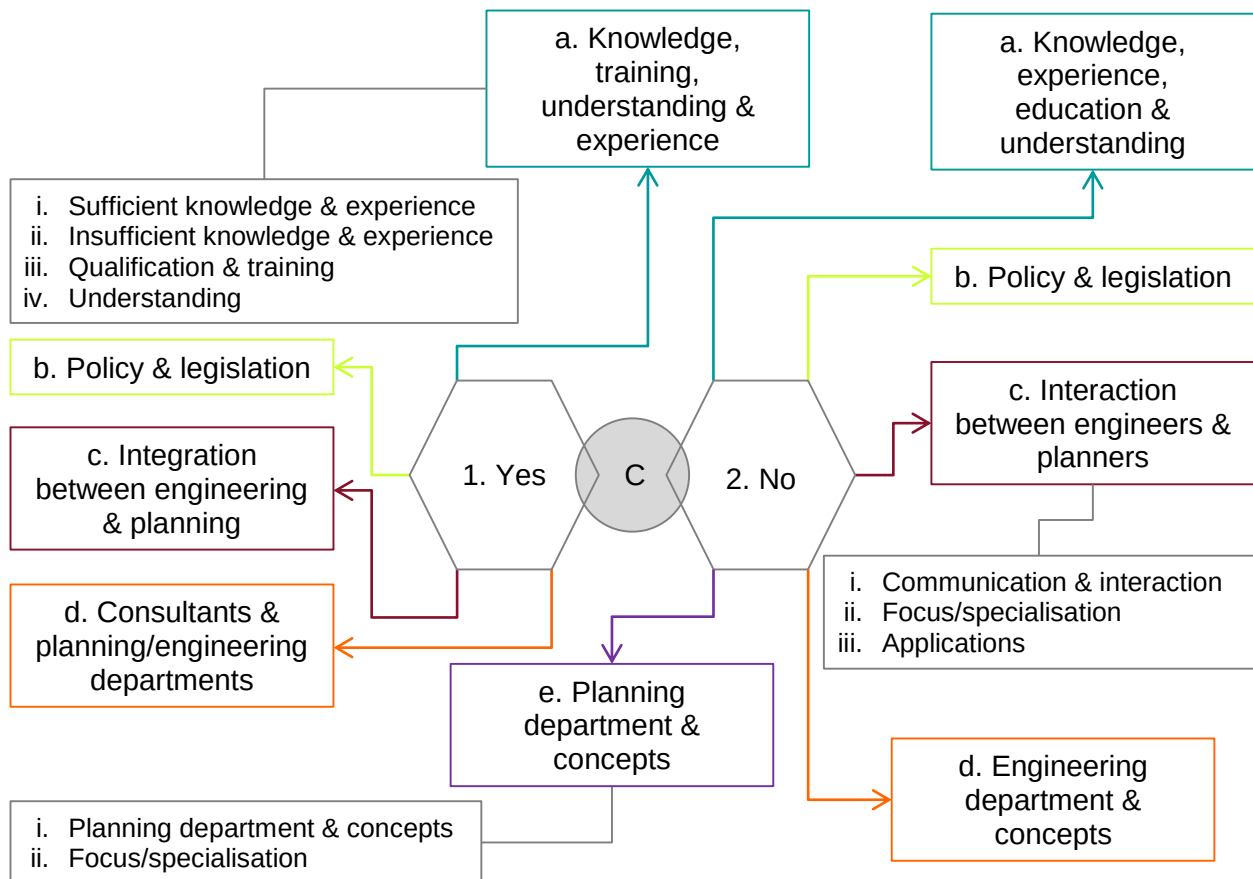


Figure 3-27: SACPLAN 2015 Survey - flow chart of question (c) thematic analysis.

Source: Own synthesis from SACPLAN 2015 Survey.

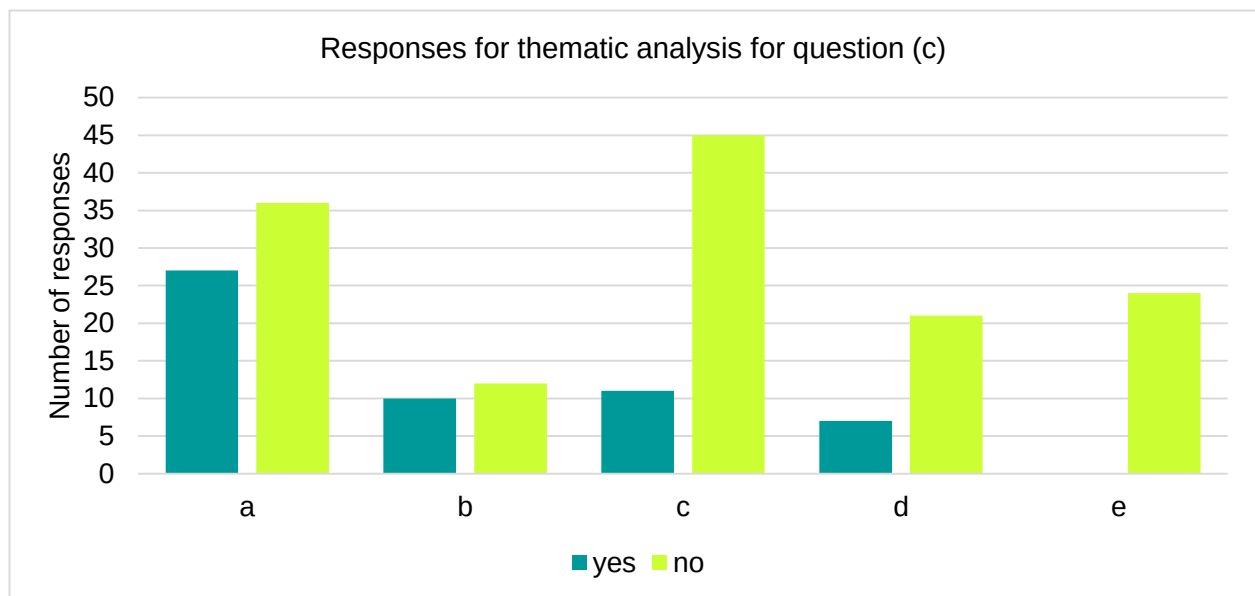


Figure 3-28: Responses for sub-themes received for each theme identified

Source: Own synthesis from SACPLAN 2015 Survey.

1. Yes – Theme

This theme was deduced from the number of “Yes” responses received for question (c), thus indicating that the respondents are of the opinion that existing knowledge of Municipal Town Planners on Engineering are sufficient. Four sub-themes have been identified with sub-sub-themes included, were necessary. These sub-themes refer to the opinions provided to the question, by the participants.

- (a) **Knowledge, training, understanding & experience:** Throughout the responses to question (c), 27 references are made to the knowledge and experience of municipal town planners, including the opinions of the participants regarding the knowledge and experience. References are also made to the insufficient knowledge and experience, qualification and training of the engineers and the opinion of older personnel. Four sub-sub-themes were derived from the responses.
- (b) **Policy & legislation:** The responses to question (c) included 10 references made to policy and legislation.
- (c) **Integration between engineering & planning:** The responses to question (c) included 11 references made to the interaction between town planners and engineers.
- (d) **Consultants & planning/engineering departments:** Seven references are made to the planning and engineering consultants and departments together with their specific concepts.

2. No – Theme

This theme was deduced from the number of “No” responses received for question (c), thus indicating that the respondents are of the opinion that existing knowledge of municipal town planners on engineering is not sufficient. Five sub-themes have been identified with sub-sub-themes included, were necessary. These sub-themes refer to the participants’ responses provided to the question.

- (a) **Knowledge, experience, education & understanding:** Thirty-six references are made to lack of knowledge and experience of municipal town planners. References are made to the knowledge, experience, education and understanding of the municipal town planners in engineering.
- (b) **Policy & legislation:** Twelve references are made to policy and legislation in urban and regional planning, including the constant changes, policies and necessary documentation related thereto.
- (c) **Interaction between engineers & planners:** The responses to question (c) included 45 references made to the interaction between engineers and town planners, including the opinions of the participants regarding these concepts. Three sub-sub-themes were derived from the responses.
- (d) **Engineering department & concepts:** Twenty-one references are made to lack of the engineering department including specific concepts and its personnel.
- (e) **Planning department & concepts:** The responses to question (c) included 24 references made to the focus of planning departments such as housing, planning processes, support provided by the town planners, planning departments working alone and engineers only being relevant at later stages, including the opinions of the participants regarding these concepts. Two sub-sub-themes were derived from the responses.

Table 3-21: SACPLAN 2015 Survey - Question (c) thematic analysis

Themes	Sub-themes	Sub-sub-themes	References made in survey
1. Yes	a. Knowledge, training, understanding & experience	i. Sufficient knowledge, experience & understanding	Eleven references are made to the sufficiency in knowledge and experience of the Municipal Town planners in engineering. • "...Most of the big engineering firms have a strong town planning section, so the inter-understanding is betting better"; • "...the experienced town planners do have working knowledge..."; • "...Thus planners do have broaden knowledge of the engineering processes"; • "...Information sharing and interaction is always the best path to follow ... to create the lines of communications between the various silos and allow that information / knowledge share to happen informally...".
		ii. Insufficient knowledge & experience	Five references are made to the insufficiency in knowledge and inexperience of the municipal town planners in Engineering. • "They do but in a limited capacity so they need to be educated in this field more throw training"; • "...the planner have basic knowledge of engineering though not detailed".
		iii. Qualification & training	Five references are made to the qualification and training of the municipal town planners in engineering. • "...in varsity town planners receive numerous courses on engineering related courses..."; • "...institution of qualification and institution in which one graduated from...".
		iv. Age/years' experience	Six references are made that the age and experience of municipal town planners with reference to the level of knowledge on engineering. • "...Experienced planners ... the younger generation of planners might not have sufficient working knowledge"; • "...At the beginning of a career... But as they progress in obtaining work experience...".
	b. Policy & legislation	n/a	• "...Political influence and prejudice is also a major stumbling block for the formal processes and results";

			• "...There is also very good reference documents available from the CSIR"; • "...Deeper knowledge in legislations & processes needed".
	c. Integration between engineering & planning	n/a	• "They seem to have enough working knowledge, but if it gets more complex they refer the matter to the Engineer"; • "Planners are qualified given their education & training should make appropriate comments. Basic knowledge of engineering to provide comments..."; • "...municipal planners do have sufficient knowledge which is however not gained from training at a university but through experience in the work place as it is inevitable for planners to interact with engineers in the work place..."; • "...Opening these lines of communication is an ongoing matter that needs constant work"; • "...is done at the planning phase and then engineering phase is last with the actual construction of whatever it is that is being built...".
	d. Consultants & planning/engineering departments	n/a	• "...we do have sufficient knowledge of engineering. In most instances, there is an integrated approach"; • "...in development everything else follows after for example in a project based environment the planning phase of obtaining all necessary business cases and environmental documentation"; • "...Town planners learn from the beginning to think integrated".
2. No	a. Knowledge, training, understanding & experience	n/a	• "...This creates misunderstandings and communication gaps..."; • "...Some municipal planners do not even have sufficient education, as they are admin personnel, promoted to doing town planning reports with only the title Town Planner, especially in the smaller local municipalities"; • "...have a general idea of what they do but the information is not enough..."; • "...municipal town planners lack expertise, work ethic, experience and academic background in engineering aspects ... Town and regional planners on municipal level need to better trained..."; • "...basic knowledge is essential but can be obtained gradually, be ongoing and can be shared..."; • "...It always depends on the exposure, work experience and passion of an individual town planner...";

			• ...the absence of qualified planners...”;
	b. Policy & legislation	n/a	• “...development control and legislation ...”; • “...Such as town planning schemes and SDF’s ...”; • “...municipal town planner must be registered at SACPLAN...”.
	c. Interaction between engineers & planners	i. Communication & interaction	Sixteen references are made to the communication and interaction between planning and engineering departments. • “...there exists a knowledge gap between these two departments...”; • “...also affects interdisciplinary cooperation”; • “...By integrating our knowledge pool, we will be enabled to adopt a holistic approach...”; • “...Still very much silo orientated”;
		ii. Focus / Specialisation	Sixteen references are made to the focus or specialisation of engineering and planning departments. • “...it seems like they do not "talk" to each other and have limited knowledge of the roles each department plays”; • “...cause it is not their domain of expertise”; • “...as these are different disciplines...”; • “...it has been a norm that planning function often being performed by engineers”.
		iii. Applications	Fourteen references are made to the town planning applications submitted to the municipalities for consideration. • “...comments provided by the engineers...”; • “...engineers to gauge their processes and critical issues they face, therefore i am limited to providing planning based comments”; • “...request comments from these engineering services departments for applications”.
	d. Engineering department & concepts	n/a	• “...Town planners do lack a working and 'up to standard' knowledge of the engineering domain and its associated processes”;

			• “...Identify, quantify and provide location requirements of engineering infrastructure and services provision for existing and future development needs for the next five years...”; • “...basic engineering principles of each discipline must be understood ...”; • “...In municipalities where there are no engineers employed, the planners do not have that interaction with the engineering divisions...”; • “...Issues of densification and efficient public transport relies heavily on the provision of adequate engineering services...”; • “...Some have the knowledge, but don’t have the time. So they just provide formalistic comments...”.
	e. Planning departments & concepts	i. Planning department & concepts	Thirteen references are made to planning specific concepts and the planning departments. • “...town planners are from other field such as Economics, Environmental Studies, Development Studies, Agriculture, Public Administration and Architects”; • “...lack the ability to provide proper explanations regarding the comments provided by the engineers...”; • “...if planners explore the engineering mind, then it might be possible to generate and design cities that are much more prone to be sustainable and desirable and liveable and memorable at the same time...”; • “...don't know the basics of planning legislation, environmental legislation, urban design frameworks, application reports ... and spatial development frameworks...”.
		ii. Focus / Specialisation	Six references are made to the focus and/or specialisation of the planning department. • “...We are dreamers. And those of us that are not a part of the visionary dreamers clan you are into development control and legislation clan...”; • “...unique and different mind-set and focus is needed for each specialised field...”; • “...Town planning is such a multidisciplinary profession means that Town Planners seem to know a little about all the related professions...”.

Source: Own synthesis from SACPLAN 2015 Survey.

Table 3-22 is a summary of the themes, sub-themes and sub-sub-themes that were identified from the responses to question (d), as mentioned above with the inclusion of some of the references made to them.

Subsequently the sub-themes and sub-sub-themes for opinions provided for question (d) can be explained with particular reference made to the two themes identified. Figure 3-29 illustrates the various themes, sub-themes and sub-sub-themes discussed and included in the table below. Figure 3-30 illustrates the various responses received per theme and sub-themes.

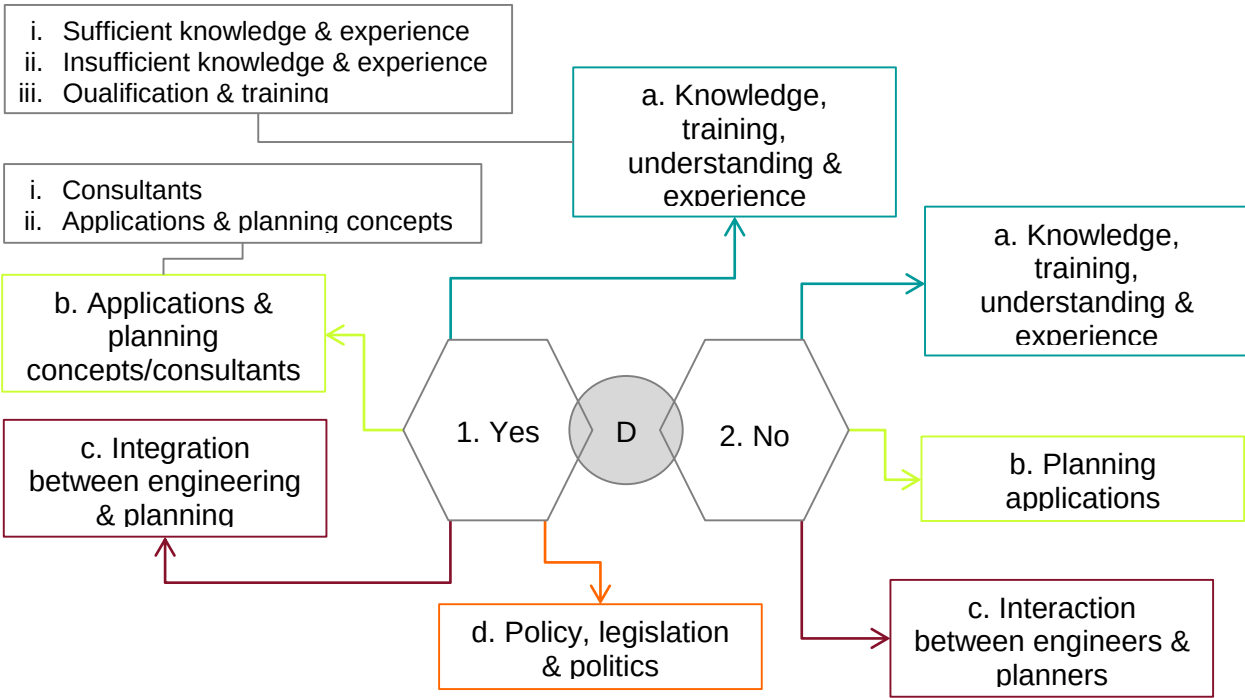


Figure 3-29: SACPLAN 2015 Survey - flow chart of question (d) thematic analysis.

Source: Own synthesis from SACPLAN 2015 Survey.

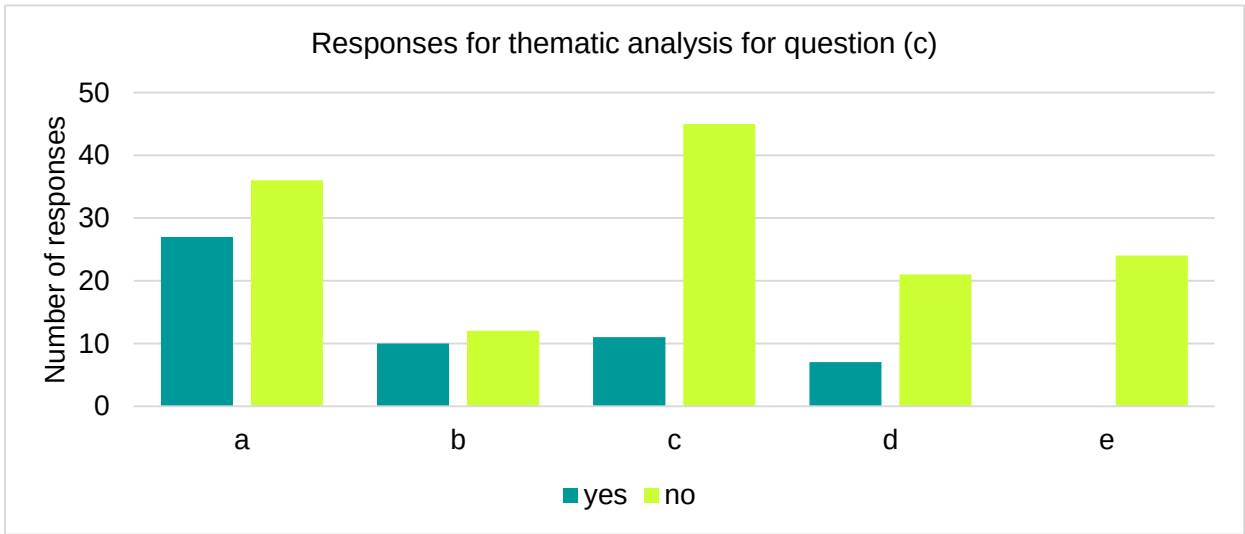


Figure 3-30: Responses for sub-themes received for each theme identified.

Source: Own synthesis from SACPLAN 2015 Survey.

1. Yes – Theme

This theme was deduced from the number of “Yes” responses received for question (d), thus indicating that the respondents are of the opinion that consultants have sufficient knowledge to provide meaningful applications to municipal engineers. Four sub-themes have been identified with sub-sub-themes included, where necessary. These sub-themes refer to the participants’ responses to the question.

- (a) **Knowledge, training, understanding & experience:** Throughout the responses to question (d), 19 references made to the sufficiency of knowledge, training, understanding and experience of consultants in order to provide meaningful applications to municipal engineers, including the opinions of the participants regarding the knowledge of consultants. References are also made to the insufficient knowledge and experience, knowledge related to planning. Three sub-sub-themes were derived from the responses.
- (b) **Applications & planning concepts / consultants:** The responses to question (d) included 46 references made to the planning consultants, their concepts and the applications prepared and submitted by them to the municipal engineers, including the opinions of the participants regarding the specialised focus and development areas. Two sub-sub-themes were derived from the responses.
- (c) **Interaction between engineers & planners:** The responses to question (d) included 14 references made to the interaction between engineers and planners.
- (d) **Policy, legislation & politics:** The responses to question (d) included nine references made to policies, legislation and politics.

2. No – Theme

This theme was deduced from the number of “No” responses received for question (d), thus indicating that the respondents are of the opinion that consultants do not have sufficient knowledge to provide meaningful applications to municipal engineers. Three sub-themes have been identified, and no sub-sub-themes are included under this theme. These sub-themes refer to the participants’ responses to the question.

- (a) **Knowledge, training, understanding & experience:** The responses to question (d) included 21 references to the insufficient knowledge, training, understanding and experience of consultants in order to provide meaningful applications to municipal engineers.

- (b) **Planning applications:** The responses to question (d) included 13 references made to the planning applications submitted by consultants to Municipal Engineers.
- (c) **Interaction between engineers & planners:** The responses to question (d) included nine references made to the interaction between engineers and planners.

Table 3-22: SACPLAN 2015 Survey - Question (d) thematic analysis

Themes	Sub-themes	Sub-sub-themes	References made in survey
1. Yes	a. Knowledge, training, understanding & experience	i. Sufficient knowledge & experience	Nine references are made to the sufficiency of knowledge and experience of the consultants submitting applications to Municipal Engineers. • "...Current procurement and appointment across the country is evidence of this"; • "...professionals that i do work with do have that knowledge ..."; • "...all the experience lies in the private sector"; • "...some professionals that is in practice for up to 40 years and has experienced the transformation of planning principles in South Africa..."; • "...experienced planners have this knowledge they've learned through trial and error. They even know more effective and efficient ways around the system".
		ii. Insufficient knowledge & experience	Six references are made to the insufficiency of knowledge and experience of the consultants submitting applications to municipal engineers. • "...some do have a vivid knowledge of what is expected from them, however there is still room for improvement..."; • "It depends from consultant to consultant"; • "...The vast research is required".
		iii. Qualification & training	Four references are made to the qualification and training of the consultants submitting applications to municipal engineers. • "...skills are being transferred inside consultancies and from the older generations to the younger and the reliable method of learning as you make mistakes is probably the most valuable contribution"; • "...Universities can do more to prepare students on the presentation of applications, power point presentations, layout plan presentation, etc.".
	b. Applications & planning concepts / consultants	i. Consultants	Twenty-nine references are made to the consultants submitting applications to municipal engineers. • "...mostly, if those consultants work in multidisciplinary firms. Not always when they work in a pure town planning firm"; • "...consultants often work in teams consisting of professionals in various disciplines";

			• "...The newer generation consultants are taken into the private sector immediately and often requires more insight into these matters..."; • "...have all the necessary resources to provide sound applications covering engineering and planning aspects"; • "...I would actually prefer that only accredited Planning professionals can be allowed to draft and submit applications"; • "...consultants are expected to master their work they are bidding or implementing..."
		ii. Applications & planning concepts	Nineteen references are made to the applications and planning specific concepts. • "...We proud ourselves on the quality of our applications..."; • "...But the quality is dwindling. I have seen reports recently. I was left with awe expression. Full of errors, mistakes and contradictions"; • "...older generation consultants who was employed in Government had sufficient knowledge of the content and path that an application should take"; • "...consultants know their heritage, environmental and planning legislation; consultants prepare motivational reports that are of very high standards and include comprehensive concept layouts etc. ..."; • "...consultants comply with all the requirements of council. in most cases we do much more than what is expected of us in order to expedite applications..."
	c. Interaction between engineers & planners	n/a	• "...development and the related processes is managed / prepared by a team consisting of experienced professionals"; • "...consultants have far more knowledge on the planning and engineering aspects than their municipal counterparts..."; • "...municipal engineers at times lack the required knowledge to interpret concept layouts and don't understand the planning reports. This provides bottlenecks in the application procedure process as most municipal engineers take tremendous time to process motivational reports..."; • "...can only be possible if an engineer clearly understand the role of a planner"; • "...Consultants also have the luxury of bring in scares skills temporarily into a project that requires so in order to make sure that a job is well done".
	d. Policy, legislation & politics	n/a	• "...this is if the engineer at council have sufficient knowledge himself"; • "...municipal engineers ... they don't understand the basic planning and environmental legislation";

			• "...Due to the fact that governmental organisations outsources all the work..."
2. No	a. Knowledge, training, understanding & experience	n/a	• "...young planners do not have the knowhow, and lack the ability to write ... a lack for proper writing skills development in the education system ... and they cannot structure an argument effectively..." • "...older planner are behind ... struggle to develop / design effective, innovative and clever layout plans - but this is due to the education they had..." • "...education are not only responsible for our skills, but also for our frame of mind..." • "...in the private planning field some municipalities rely on trainee/candidate planners to compile such documents without providing proper guidance in basic execution skills and result execution ... other municipalities have planners with significant experience ... but the reports, layouts, etc. produced to engineers are erroneous and lacking basics..." • "...knowledge is maybe adequate, but not quite sufficient - or up to the standard ..."
	b. Planning applications	n/a	• "...we are not always informed to what extend and detail is wanted from us. Certain persons would like to only receive the bare facts, and others would like an in-depth explanation. If we know what the various persons involved within the process would like beyond the basic requirements, we can provide that to them" • "...Planning reports should not be lodged with engineers for decisions..." • "...a planning consultancy has to have at least one director/partner that is a SAPLAN registered professional planner..." • "...most consultants I've spoken too have indicated that they wish they did things differently..."
	c. Reference to planning specifically	n/a	• "...result in planners being less meaningful to engineers" • "...due to the lack of skill on both sides there is an attitude of dependence that is sometimes exploited for financial reasons" • "...they get their answers/proposals out of discussions with municipal officials" • "...do not comprehend the difference between green field and brown field developments, thus not ... need for engineering contributions and the need for reports"

Source: Own synthesis from SACPLAN 2015 Survey.

3.2.4.2.2 Level of existing knowledge determined through the survey

Figure 3-31 illustrates the qualifications obtained per tertiary institution for the participants of the SACPLAN 2015 Survey. The institutions and qualifications correlates to Table 3-2. As a result not all institutions and qualifications indicated by the participants of the survey are provided. It is clear that the qualifications represented the most is the “B degrees” & “M Degrees” categories, which include the Baccalaureus Town Planning degrees etc. (43) and the Magister Town Planning degrees (11). The North-West University and University of Venda had 22 and 17 representatives, respectively.

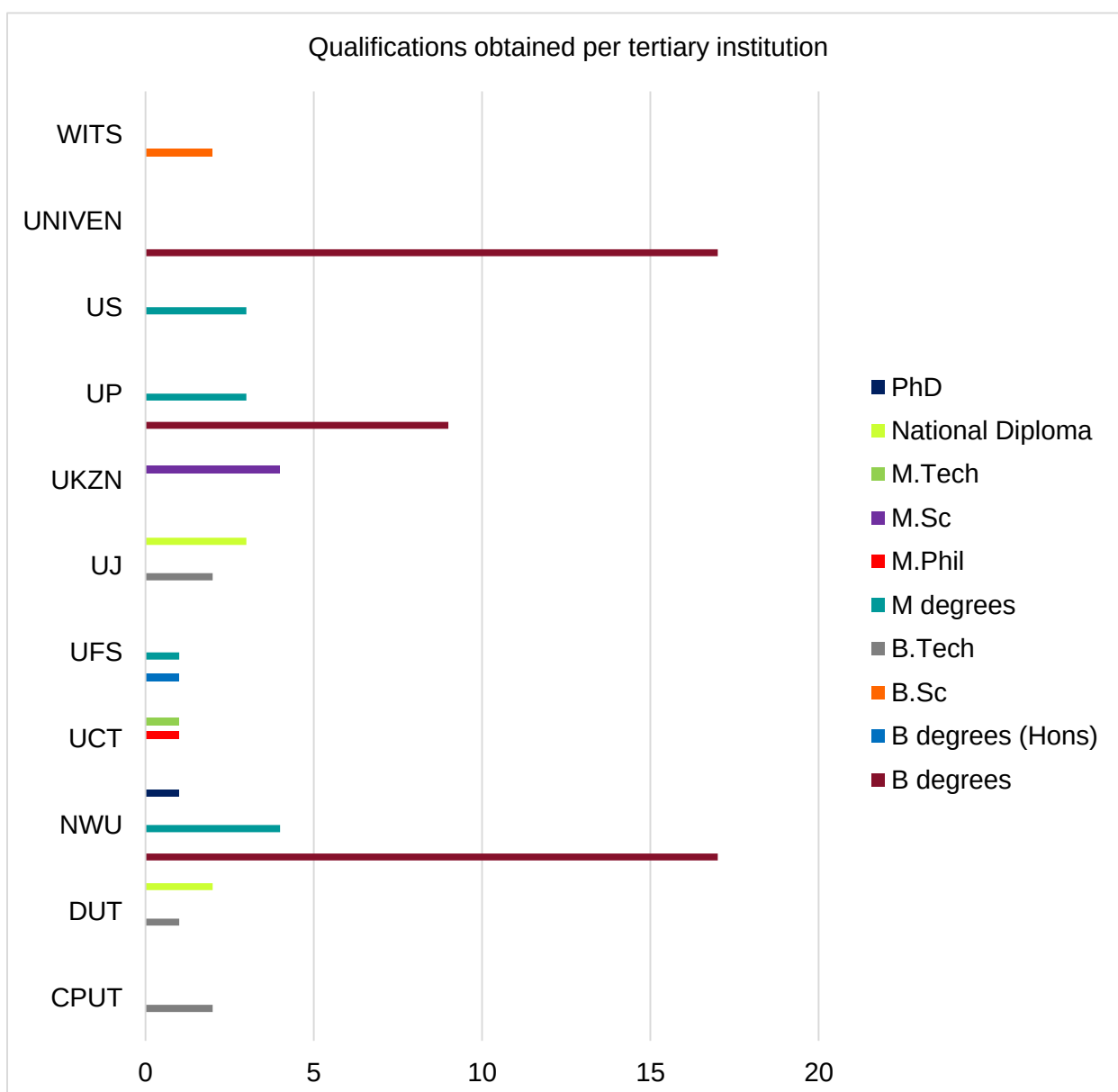


Figure 3-31: Qualifications obtained per tertiary institution.

Source: Own synthesis from SACPLAN 2015 Survey.

The participants were requested to give an indication of their *level of knowledge* regarding concepts related to urban and regional planning and the rest of the built environment. The descriptions per topics and descriptions are as follows:

1. **Definitions & Terminology:** Can you define and understand the “language” of Planning?
2. **Policy & Legislative Framework:** Previous and current frameworks applicable to Planning.
3. **SPLUMA (Spatial Planning and Land Use Management Act No. 16 of 2013):** When this commences several current legislations will laps.
4. **Developmental Principles; Norms & Standards:** Guidelines such as the Red– and Blue Books.
5. **Intergovernmental Support:** Focuses on the three spheres of government.
6. **Spatial Development Frameworks:** Guidelines for future development and land use patterns.
7. **Land Use Management:** Land development and land use categories and regulation thereof.
8. **Related Land Development Matters:** Land Use Schemes, land uses and layout planning.
9. **Environmental & Development Procedures:** EIA requirements according to NEMA, Regulations etc.
10. **Transportation Provision:** Transportation planning, requirements and recommendations.
11. **Engineering Services Provision:** Informal settlement formalisation, sewage, water, stormwater & electricity
12. **Housing Provision:** Housing typologies and recommendations for housing provision.
13. **Land Development Issues:** Applications including township development, land uses, consent use, etc.
14. **Building Management Control:** Guidelines on building control compiled by the DTI.
15. **Sustainable Development:** Promoting green and efficient development.

The scale ranged from 1 to 5 with 1 being the lowest level of knowledge and 5 being the highest. An average of 69.27 responses were received per topic with the lowest number of responses being 68 and the highest being 70. An average of 0.73 responses were received with missing data.

Figure 3-32 illustrates the total level of knowledge obtained for each topic provided on the questionnaire.

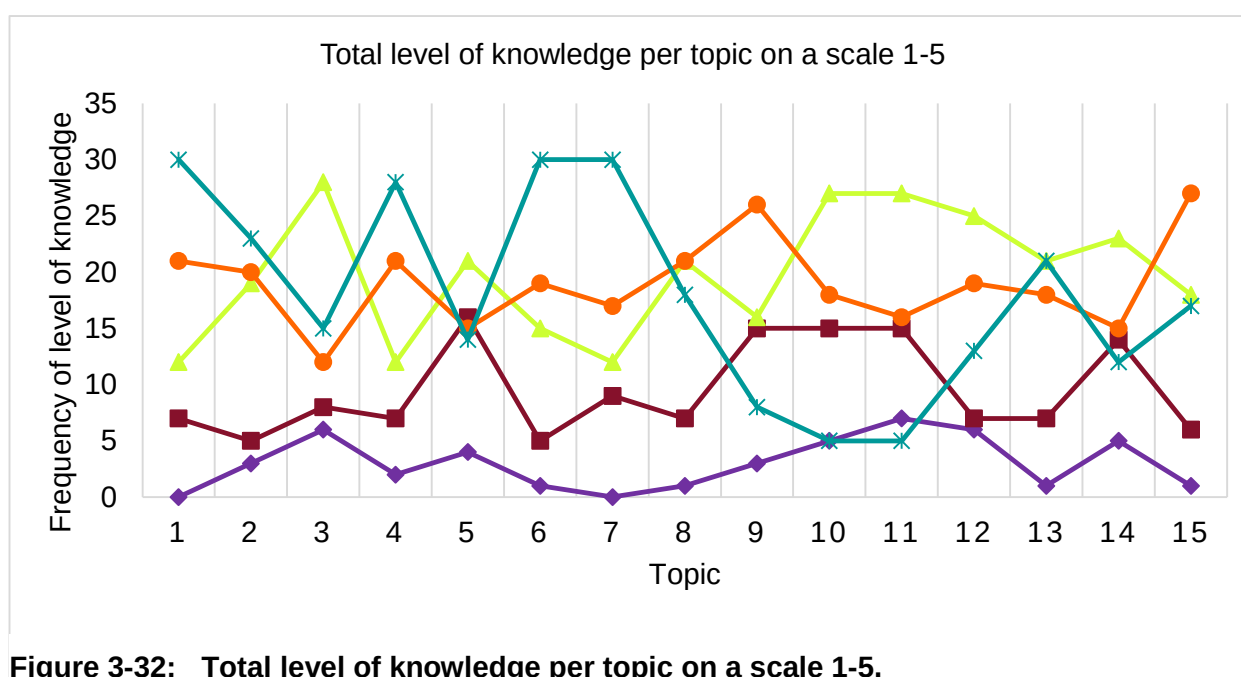


Figure 3-32: Total level of knowledge per topic on a scale 1-5.

Source: Own synthesis from SACPLAN 2015 Survey.

A reliability and factor analysis was conducted on the data collected regarding the level of knowledge portrayed in the responses to the SACPLAN 2015 Survey.

Table 3-23: Reliability statistics - total knowledge

Cronbach's Alpha	No of Items
.950	15

Source: Adapted from SACPLAN Survey 2015.

Table 3-23 indicates that the Cronbach's Alpha coefficient for the data collected regarding the level of knowledge, is .950. As mentioned for the reliability of the IMESA Conference 2014 data, the rules of thumb provided by George and Mallery (2003) indicates that the coefficient is "Excellent".

A KMO and Bartlett's Test (Table 3-24) was conducted on the data. The result for the test was .916. Lalanee (2008:1) states that a result of more than .80 can be considered as "meritorious" (Schwab, 2003?; IBM, 2011).

Table 3-24: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.881
Bartlett's Test of Sphericity Approx. Chi-Square	787.368
df	105
Sig.	.000

Source: Adapted from SACPLAN Survey 2015.

The communalities (Table 3-25) of the factor analysis were identified for the abovementioned items through the principal components extraction method.

Table 3-25: Communalities

	Initial	Extraction
B1_1	1.000	.714
B1_2	1.000	.755
B1_3	1.000	.476
B1_4	1.000	.801
B1_5	1.000	.697
B1_6	1.000	.664
B1_7	1.000	.615
B1_8	1.000	.668
B1_9	1.000	.649
B1_10	1.000	.773
B1_11	1.000	.833
B1_12	1.000	.659
B1_13	1.000	.678
B1_14	1.000	.665
B1_15	1.000	.501

Source: Adapted from SACPLAN Survey 2015.

Table 3-26: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.887	59.249	59.249	8.887	59.249	59.249
2	1.259	8.395	67.643	1.259	8.395	67.643
3	1.108	7.384	75.027			
4	.672	4.483	79.510			
5	.642	4.283	83.793			
6	.495	3.299	87.091			
7	.387	2.581	89.672			
8	.313	2.089	91.761			
9	.269	1.793	93.554			
10	.252	1.682	95.236			
11	.237	1.583	96.819			
12	.188	1.250	98.069			
13	.123	.823	98.892			
14	.093	.618	99.510			
15	.073	.490	100.000			

Source: Adapted from SACPLAN Survey 2015.

From Table 3-26, it is apparent that there is a large difference between the first factor's eigenvalue and that of the second factor (8.887 versus 1.259) as well as between the second and the third (1.108 versus 0.672). The first factor also contributes 59.249% of the total variance. This illustrates that the scale items are to a great extent unidimensional (UCLA Statistical Consulting Group, 2015?).

Two factors were extracted through the factor analysis. After a Varimax rotation, the percentage of variance explained by the two rotated factors, are 34.952% and 32.691% respectively (Table 3-27).

Table 3-27: Total Variance Explained - Rotation sums

Component	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	5.243	34.952	34.952
2	4.904	32.691	67.643

Source: Adapted from SACPLAN Survey 2015.

Figure 3-33 illustrates a Scree Plot. This indicates that the first component (8.887) is very important, although the presence of a second construct is also evident (1.259).

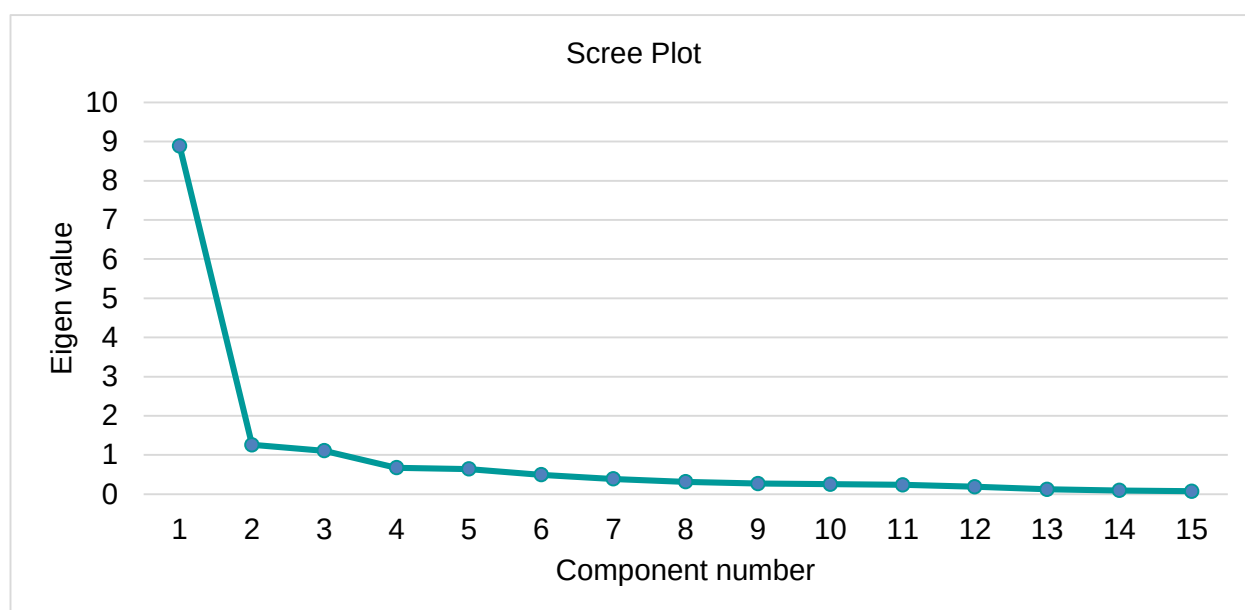


Figure 3-33: Scree Plot

Source: Adapted from SACPLAN Survey 2015.

Table 3-28 and Table 3-29 illustrate the original component matrix of loadings compared to that of the rotated component matrix, by means of a Varimax rotation. Note that loading values smaller than 0.3 in absolute value are not reported.

Table 3-28: Component Matrix

	Component	
	1	2
B1_4	.821	.356
B1_14	.813	
B1_11	.812	-.416
B1_8	.805	
B1_10	.804	-.355
B1_2	.800	.338
B1_1	.800	
B1_6	.791	
B1_7	.784	
B1_9	.767	
B1_13	.756	-.327
B1_12	.741	-.330
B1_3	.687	
B1_5	.686	.476
B1_15	.653	

Source: Adapted from SACPLAN Survey 2015.

Table 3-29: Rotated Component Matrix

	Component	
	1	2
B1_11	.874	
B1_10	.827	
B1_13	.772	
B1_12	.764	
B1_9	.725	.352
B1_8	.681	.452
B1_7	.585	.523
B1_3	.541	.428
B1_4	.347	.825
B1_5		.818
B1_2	.345	.798
B1_1	.391	.749
B1_6	.437	.687
B1_15		.650
B1_14	.549	.603

Source: Adapted from SACPLAN Survey 2015.

The rotated loading pattern is, however, slightly different from that given in Table 3-29, but it was decided rather to use the last resulting pattern and therefore components B1_1 – B1_8 were included under Factor 1 (baseline knowledge) and components B1_9 – B1_15 were included under Factor 2 (output driven knowledge). The factors are divided in exactly the same way as in of Section 3.2.3.

(d) Baseline knowledge

The baseline knowledge factor has a reliability of .916 as proven in the following table:

Table 3-30: Reliability statistics - Baseline knowledge

Cronbach's Alpha	No of Items
.916	8

Source: Adapted from SACPLAN Survey 2015.

Table 3-31: Item-Total statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
B1_1	26.12	37.585	.805	.899

B1_2	26.35	36.569	.816	.897
B1_3	26.86	38.150	.579	.918
B1_4	26.21	36.447	.784	.900
B1_5	26.92	36.902	.690	.908
B1_6	26.12	37.924	.745	.903
B1_7	26.18	37.751	.697	.907
B1_8	26.50	38.285	.709	.906

Source: Adapted from SACPLAN Survey 2015.

Table 3-32: Scale statistics

Mean	Variance	Std. Deviation	No of Items
30.18	48.336	6.952	8

Source: Adapted from SACPLAN Survey 2015.

(e) Output driven knowledge

The output driven knowledge factor has a reliability of .905 as proven in the following table:

Table 3-33: Reliability statistics - Output driven knowledge

Cronbach's Alpha	No of Items
.905	7

Source: Adapted from SACPLAN Survey 2015.

Table 3-34: Item-Total statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
B1_9	20.11	28.004	.682	.894
B1_10	20.38	27.553	.796	.882
B1_11	20.42	26.434	.844	.876
B1_12	20.03	26.718	.752	.886
B1_13	19.65	28.138	.700	.892
B1_14	20.17	26.987	.703	.892
B1_15	19.65	30.263	.546	.907

Source: Adapted from SACPLAN Survey 2015.

Table 3-35: Scale statistics

Mean	Variance	Std. Deviation	No of Items
23.40	37.150	6.095	7

Source: Adapted from SACPLAN Survey 2015.

Figure 3-34 illustrates the average level of knowledge determined for both the private- and public sectors. It is clear that the baseline knowledge of both sectors is significantly higher (3.3 and 3.9 for the private and public sectors, respectively) than the output driven knowledge (2.9 and 3.3 for the private- and public sectors, respectively). In general the level of knowledge in the public sector is higher than that in the private sector. This, however, can be attributed to the 43 responses that were received for the private sector, while 27 responses were received for the public sector. The average minimum levels of knowledge for the private and public sectors, are 2.0 and 2.6 respectively, and the average maximum levels of knowledge are 4.0 and 4.5, correspondingly.

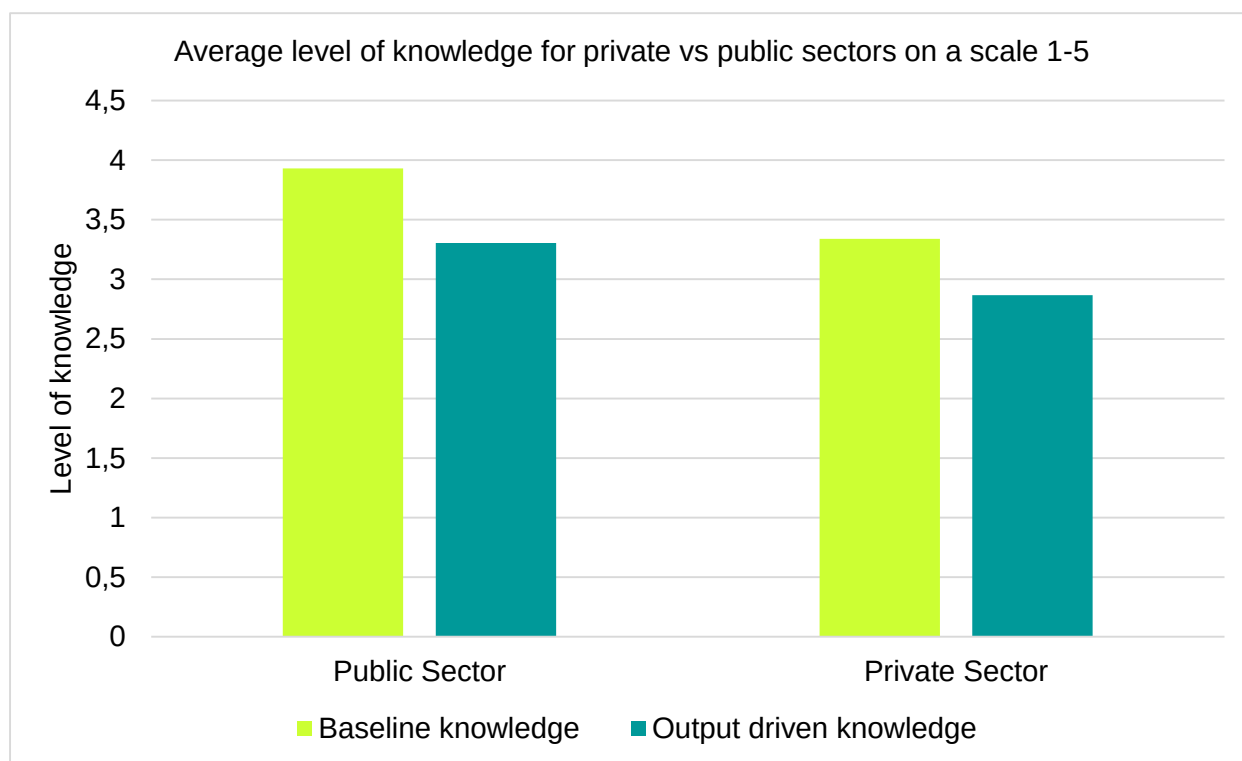


Figure 3-34: Average level of knowledge for private vs public sectors on a scale 1-5.

Source: Own synthesis from SACPLAN Survey 2015.

Figure 3-35 illustrates the average level of knowledge determined according to the number of years' experience the participants indicated during the SACPLAN Survey 2015. It is clear that the baseline knowledge levels are generally higher than those of the output driven knowledge for all the years' experience, this can be the result of planners relying on consultants to assist with the specific knowledge. The level of knowledge for participants with more than 31 years' experience have a higher average level of knowledge with a much higher difference (0.24) between the baseline knowledge and output driven knowledge, compared to the difference (0.32) in that of the participants with less than four years' experience. This however, can be attributed to the six responses that were received for the former, while 24 responses were received for the latter. The average minimum level of baseline knowledge and output driven knowledge, is 2.53 and 2.09, respectively and the average maximum level of knowledge, is 4.64 and 4.09, respectively.

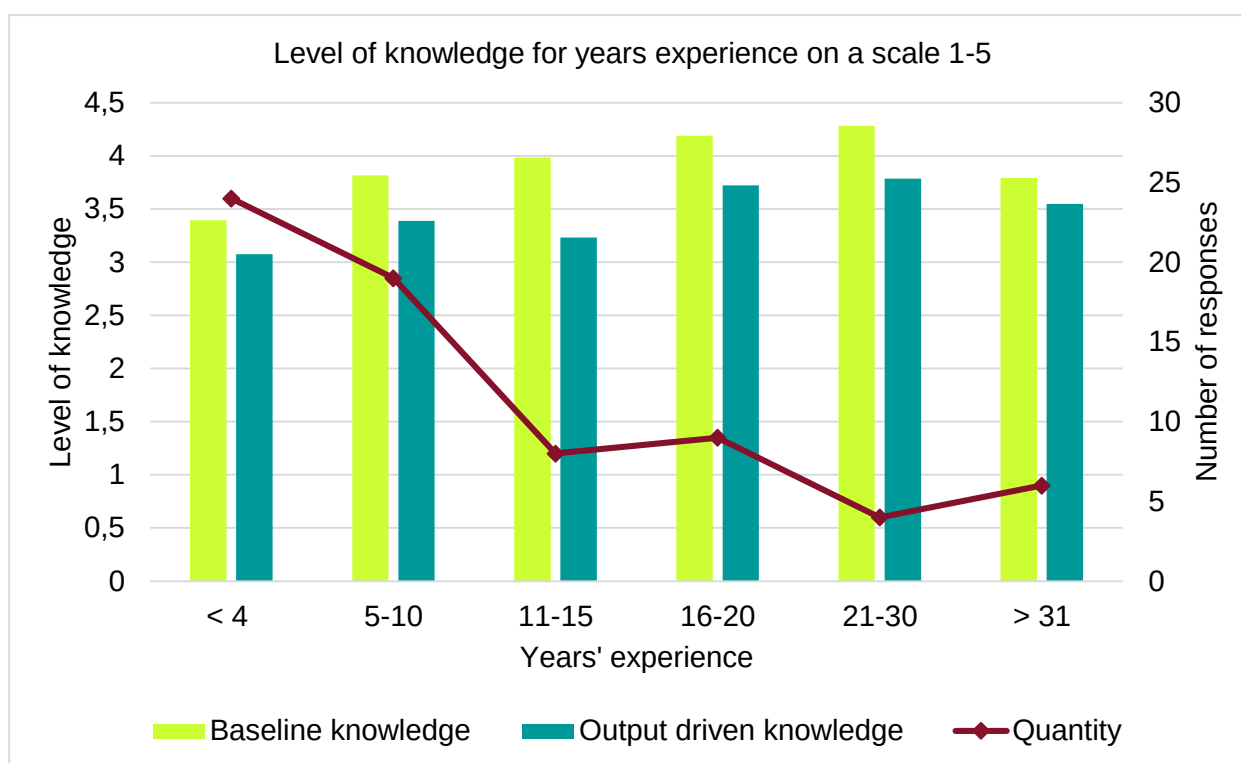


Figure 3-35: Level of knowledge for years' experience on a scale 1-5.

Source: Own synthesis from SACPLAN Survey 2015.

3.3 Evaluability assessment

The executive summary (see Annexure A) of the programme is used to conduct the evaluability assessment. This includes reviewing the content of the programme as a response to its identified aims and objectives, as well as determining whether or not the contents of the programme provides in the needs identified in Section 3.2. A SWOT analysis and balanced scorecard is included in this section, which is in line with Section 2.2.2.

The problem statement and substantiation (Chapter 1) provides the preconditions for evaluability assessment. These preconditions are in line with the needs assessment done regarding the programme. As a result this exemplifies the evaluability of the programme and establishes that the programme can be evaluated on grounds of its content, in light of the need that has been established. Figure 3-36 illustrates the content of the programme. This includes the various chapters with the themes addressed under each topic.

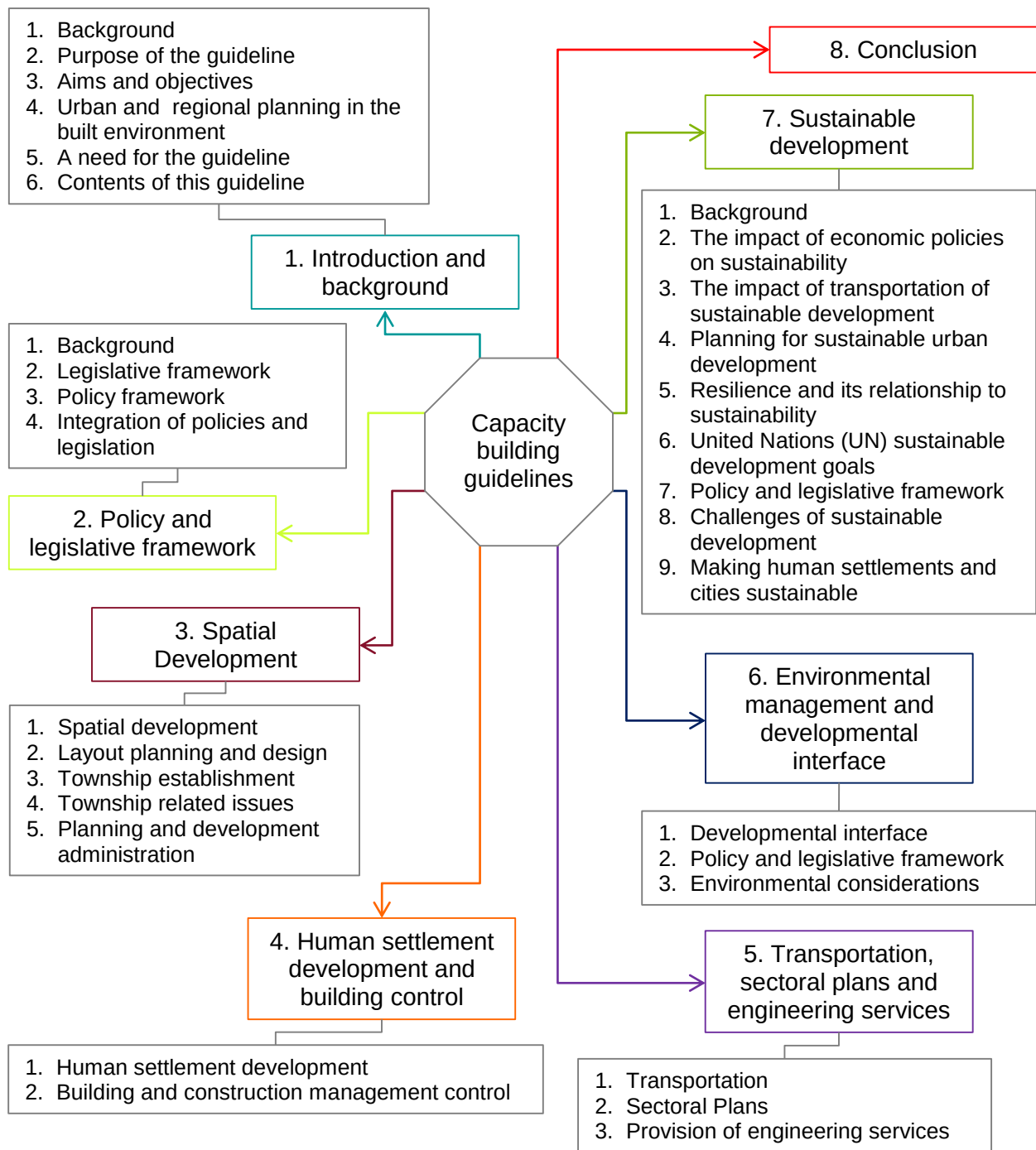


Figure 3-36: Programme contents - Capacity building guidelines.

Source: Own synthesis from Jansen van Rensburg and Schoeman (2015:ii-vi).

3.3.1 SWOT analysis

Chapter 2 provides a description of a SWOT analysis. The executive summary of the programme provides a good representation of the final programme. This section describes the SWOT analysis and the SWOT matrix.

Table 3-36: SWOT analysis of the programme.

Strengths	Weaknesses
• The contents of the programme are concise and to the point when taking the intended content into account; • The programme includes a large variety of topics which can accommodate varying needs of the user; • The documentation is provided in a summarised version (executive summary) and a complete guideline (source document), thus making it more user friendly; • It is intended to be interactive and available in an online, electronic or printed versions; • The programme addresses the needs identified in the knowledge of the intended user; • It attempts at assisting the intended user in their correspondence with other professions and activities involved and their daily duties; • It includes the various resources and consultants to refer to if more information is required.	• The content tends to be technical and may not provide sufficient information to all laypersons; • The content can easily be outdated due to changing processes, policies and legislation; • Frequent updated versions will render older versions of the document as redundant; • Difficulty in implementing the programme on all government levels; • Policies and some legislation vary from municipality to municipality; it is thus not possible to generalise and include all the information; • The intended user might need to refer to various additional resources to fully comprehend a topic; • The municipal structure may negatively influence the effective utilisation of the programme.
Opportunities	Threats
• After the first review of the programme by the initiators and the intended users, it can be adapted to address the changing needs identified; • The programme is intended to be interactive, allowing constant updates and thus preventing the information from becoming outdated; • Due to the connection between the programme initiators and the intended users, the programme can be widely implemented; • The programme can be implemented through encouraging methods such as the provision of CPD points if presented in the form of a short course or seminar; • The programme should be utilised together with the experienced professions in the municipality, in order to improve its effectiveness; • The programme can result in the better contribution by municipal engineers to the formulation of strategic policies and the provision of comments to town planning applications.	• Due to the constant change in the anticipated needs regarding the contents of the programme, it may not be sufficient; • The programme initiators were not certain on what they intended to include in the programme, which resulted in unnecessary information being included with too much detail; • Frequent newer versions released may lead to the use of outdated information or the discontinued use of the programme; • Difficulty in implementing and enforcing the programme; • Other professions may see the programme as a training course and not a capacity-building guideline.

Source: Own synthesis.

Table 3-37: 2x2 SWOT framework.

		External factors	
Internal Factors		Opportunities	Threats
	Strengths	• Possible to be easily implemented; • Constant improvement will be advantageous; • Improve the interaction between relevant professions.	• Constant improvement can lead to the unwillingness to follow changes and improvements; • Contents may not be sufficient in providing in the need identified.
	Weaknesses	• The programme is difficult to implement and enforce; • Cannot be adapted to include information included in the various policies and legislation; • The interaction between professions in the specific area were increased capacity is needed.	• The programme can possibly be seen as training rather than capacity building; • Content can be too technical for some of the intended users.

Source: Own synthesis.

The SWOT analysis indicates that the programme has several weaknesses and threats. However, the number of strengths and opportunities outweighs the negative points. The implications of the programme can only be evaluated once it has been implemented.

3.3.2 Balanced scorecard

Chapter 2 states that KPIs should be used in order to formulate an effective balanced scorecard. These KPIs can be derived from both the outcomes of the programme and the information included in the SWOT analysis. This provides key areas for improvement to and the measurement of achievements by the programme. The main aim, secondary aims, objectives and intended purpose is used to identify the necessary KPIs in order to evaluate of the programme.

The programme aims at providing “capacity building guidelines in Urban and Regional Planning practices in order to enhance effectiveness and efficiency of municipal engineers and engineering staff in their engagement, participation and contribution in statutory land development applications, policy compilations, spatial planning and related development processes within municipalities” (Jansen van Rensburg & Schoeman, 2015:3).

Table 3-38: Balanced scorecard of the programme.

Perspective	KPI	Measure	Target	Initiatives	Description
Consumer	Increase response time	Days	Improve response time from weeks or months to at least 1–2 weeks	Provide a better understanding of what is needed and required in the responses and if it is necessary	Increase time in which comments or feedback is provided on town planning applications and spatial planning policies
	Increase ability to handle complicated issues	n/a	Improve response time to hours if possible	Provide a wide variety of easily understandable and useable information in various widely available forms	Increase the ability of engineers and engineering staff to handle complicated issues other than in the field of engineering through increasing their knowledge in other matters
Learning and education/ growth	Increase general knowledge	Questionnaire responses	Increase average level of knowledge from 3,25 to 4	Provide a wide variety of easily understandable and useable information in various widely available forms	Increase average level of general knowledge of urban and regional planning practices in municipal engineers and engineering staff
	Increase baseline knowledge	Questionnaire responses	Increase average level of knowledge from 3,0 to 4	Provide easily understandable and useable information in the baseline knowledge	Increase average level of baseline knowledge including policy, legislative and regulatory frameworks and general basic information of urban and regional planning in municipal engineers and engineering staff

	Increase output-driven knowledge	Questionnaire responses	Increase average level of knowledge from 3,5 to 4	Provide easily understandable and useable information in the output-driven knowledge	Increase average level of output-driven knowledge including concepts for implementation such as engineering services provision, housing development and transportation and general basic information of urban and regional planning in municipal engineers and engineering staff
Internal processes	Increase collaboration between departments	Questionnaire responses	Decrease misunderstandings and non-compliance with procedures	Provide a description of what the role of each profession is in urban and regional planning	Increase the understanding of the role the municipal engineers and engineering staff play in urban and regional planning and vice versa
	Increase quality of feedback	n/a	Decrease misunderstandings and non-compliance with procedures	Provide sufficient information to inform the user of the importance of their role and feedback	Increase the quality of feedback provided by municipal engineers and engineering staff regarding strategic policy developments and comments related to town planning applications
Finance	Decrease cost of training	Cost	Decrease the cost training needed to improve knowledge	Use a free user guideline to be referred to at any time to guide the user and refer to experts and external documents	Decrease the cost of training needed to improve the knowledge of the municipal engineer and engineering staff through the provision of a freely available guideline that includes the information needed
	Increase the value of staff	n/a	Increase the competency and knowledge of the staff	Provide a general guideline which includes numerous topics to increase the competency of the staff	In areas where there is not sufficient staff or educated staff, increase the value of the engineer and engineering staff through the improvement of knowledge and the ability to respond to complicated situations

Source: Own synthesis from Jansen van Rensburg and Schoeman (2015:2-4) and IMESA Conference 2014 Questionnaires.

The balanced scorecards indicate that the programme includes various aspects or KPIs that the programme aspires to address. This also includes the initiatives that it uses to reach the targets identified.

3.4 Programme monitoring

Chapter 2 states that it is important to conduct monitoring on a programme. This ensures that the programme is frequently reviewed and adapted to the changing needs and the requirements of the programme initiators.

A logic model is used to illustrate the monitoring that took place on the programme in question.

3.4.1 Logic modelling

It can be assumed that the content of the programme was amended from the first proposal made by the initiators in 2009 (IMESA, 2009) to the content shown in Figure 3-37. Both the programme initiators and the programme leader were responsible for the revision of the contents leading to the amendment of the content. The initiators acknowledged the revision and amendments made to the programme.

The programme will be provided on the website of the initiator for review by the intended users. It was promoted in the IMESA Magazine in January 2015 (as mentioned in Chapter 1) and at the IMESA Conference 2015.

External factors to the programme include the acceptance of it by other professions and that it is not seen as a threat but rather as a benefit in conducting their daily duties, as it is proposed to enrich the municipal engineer and engineering staff. Other environmental factors that can influence the programme include funding and its adaptation by all municipalities on a nationwide basis.

The logic model in Figure 3-37 includes the monitoring of the programme compiled under the abovementioned assumptions and with the consideration of the environmental factors.

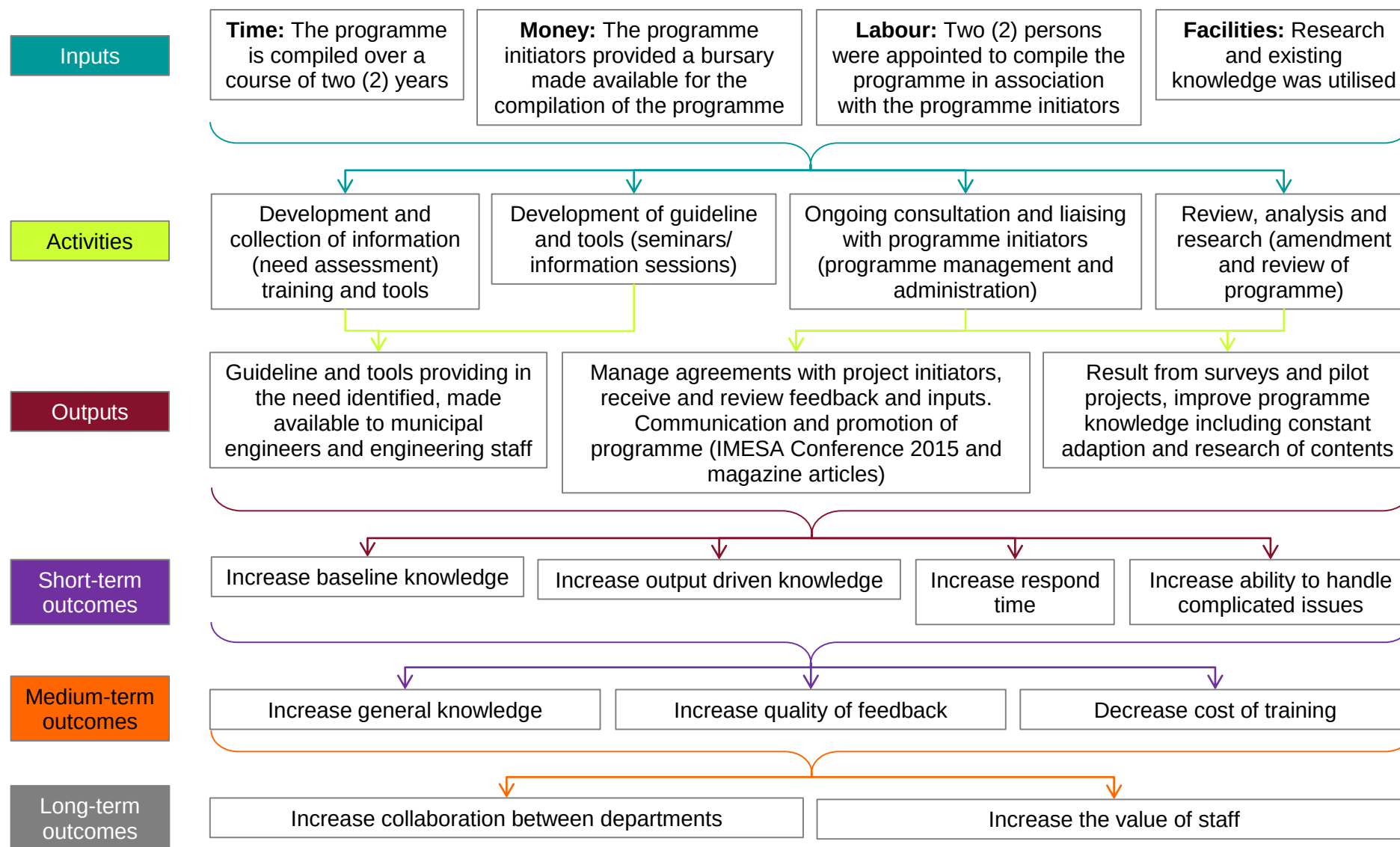


Figure 3-37: Logic model of programme.

Source: Own synthesis from Jansen van Rensburg and Schoeman (2015:1-17) and IMESA (2009).

The empirical study included a needs assessment, evaluability assessment and programme monitoring. By considering this, it can be determined whether or not the programme will be able to satisfy the needs identified. Chapter 4 gives the interpretation of the findings included in this chapter as well as the linkage with Chapter 2.

CHAPTER 4 FINDINGS AND CONCLUSION

4.1 Introduction

A correlation between the literature review (Chapter 2) and the empirical research (Chapter 3), should be made in order to understand the results of the evaluation done on the proposed programme. This section provides an overview of the findings together with the correlation between the previous chapters.

4.2 Alignment with literature review

Chapter 2 provided an overview of the literature applicable to this study. This includes the review of the professions included in the built environment, skills transfer, policy and legislative frameworks on both a national and international level and similar studies.

The literature review (Chapter 2) indicated that urban and regional planning and civil engineering are seen as scarce and critical skills. This emphasises the need for skills transfer to existing personnel, as this will contribute to the reduction of the need in a shorter time compared to the provision of formal training or the training of new personnel and the gaining of the experience needed for the position or profession.

It is clear that the interaction between the two professions (urban and regional planning and civil engineering) in question is unavoidable and should be acknowledged and can be enhanced through sufficient skills transfer. The professions should be informed of their role in respect of each other in order to promote the collaboration between them, especially in municipalities. It should, however, be noted that these two professions do not exist in a vacuum and that other professions also have an influence on them. The close relationship between the two professions motivated the distribution of questionnaires to two separate groups of participants, resulting in valuable responses (Chapter 2.3).

The policy initiatives of the BRICS countries, and in particular IBSA (Chapter 2.4), are significant to the study, as this promotes the importance and awareness of skills transfer on an international level. The policy and legislative approach in South Africa is closely aligned to the international standard, even though it may not be applied in the same manner.

The regulatory framework and guidance of professions in South Africa is provided and implemented to a better standard than that of the professions reviewed in India and Brazil. In South Africa there is one regulatory body guiding each profession with one or several voluntary bodies, all easily accessible to each other. This, however, is not the case on the international level as India and Brazil have a large variety of regulatory bodies which are not clearly identified nor

easily accessible in some cases. This is a difficulty especially if one were to consider undertaking a development in one of these countries.

The national policies and legislation reviewed refer to the transfer of skills and promote the need for programmes similar to the one proposed and under evaluation. The policies included indicate that the need for skills transfer is recognised on a national level. The provision of similar programmes to professions noted as scarce and critical skills is not often available as they may be considered insufficient regarding the specialisation of these professions.

The existing studies (Chapter 2.4.2) reviewed indicate that similar studies have been done regarding skills transfer. The results of these studies indicate that there is a need for the amendment of tertiary qualifications and modules included in them in an attempt to promote a more rounded qualification and especially critical thinking and problem-solving skills. It also promotes internal and external training through the use of skills transfer between professions and senior and junior personnel. The existing studies promoted the review of tertiary qualifications provided to professions in the built environment.

4.3 Discussion and interpretation of findings

Chapter 3 includes a review of the tertiary qualifications and the general modules included therein, as presented in urban and regional planning and civil engineering at tertiary institutions as well as a needs assessment, evaluability assessment and programme monitoring. This section discusses the findings described in Chapter 3 and attempts to provide answers to the research questions raised in Chapter 1.

4.3.1 Needs assessment

4.3.1.1 Review of existing tertiary education provided to professions in the built environment

A needs assessment was conducted through the review of accredited tertiary qualifications and modules presented at 16 tertiary institutions (Chapter 3.2.1). However, the University of Salzburg (UNIGIS) was excluded from further review as this only provided qualifications in land surveying.

Civil engineering is, in general, the most accessible qualification, offered at 12 institutions, while urban and regional planning is available at 11 institutions. Baccalaureus degrees in both professions are offered at five institutions, technical degrees (B.Tech) in both professions are offered at six institutions, master's degrees and national diplomas in all professions are available at seven institutions.

Only eight of the institutions included in the review, provide courses in both civil engineering and urban and regional planning, resulting in restrictive access to additional modules which can supplement the qualifications in order to include the necessary skills to inform the profession of its role in the other. In general, the courses presented at CPUT and UJ include all the modules identified for the evaluation, thus making these qualifications desirable in review of the variety of modules included. However, these qualifications cannot be seen as the best options as the composition and internal workings of each module and course are unique to each institution.

4.3.1.2 IMESA Conference 2014 survey results

Chapter 3.2.2 provided the results of the IMESA Conference 2014 survey. The qualitative analysis indicated that 44.1% of the respondents are of the opinion that municipal engineers have sufficient knowledge in urban and regional planning compared to the 55.9% that stated the opposite, thus indicating a need in the knowledge of the municipal engineers through self and peer review. This need is supported by the thematic analysis done on these responses. The analysis further indicated that 93.7% of the respondents are of the opinion that the proposed programme is needed while only 6.3% stated the opposite.

The most represented tertiary qualification in this survey was the national diploma followed by the baccalaureus, science (B.Sc) and technical degree (B.Tech).

The average level of output driven knowledge (3.55) for both the private and public sector was higher than that of the baseline knowledge (3.1). This is to be expected as engineers are mainly trained in these topics and the standards, policies and legislation that accompany them. In the municipal engineers' situation the average level of baseline knowledge (3.0) should be higher as they are required to contribute to policy formulation and comment on town planning applications almost on a daily basis. Engineers in the private sector do not generally deal directly with urban and regional planning, thus it is expected that their average output driven knowledge is at a higher level than that of baseline knowledge. This magnifies the need for the proposed programme.

Several of the participants indicated that they are of the opinion that engineers with more experience will have a greater knowledge regarding urban and regional planning. The results of the survey indicated that the engineers with less experience do indeed have the greatest average level of knowledge followed by those with the most experience; this can possibly be attributed to the number of responses related to the years of experience of the different groups. On the other hand, the cause of this can be either the result of engineers having responsibilities related to conducting urban and regional planning or that they have received a more comprehensive tertiary education. Again the need for the programme is stressed.

4.3.1.3 SACPLAN Survey 2015 survey results

Chapter 3.2.3 provided the results of the SACPLAN Survey 2015 survey. The qualitative analysis indicated that 27.1% of the respondents are of the opinion that municipal engineers have sufficient knowledge in urban and regional planning compared to the 65.7% that stated the opposite, thus indicating a need in the knowledge of the municipal engineers through the review of urban and regional planners. The respondents indicated that neither municipal town planners nor consultants have sufficient knowledge of engineering. This need is supported by the thematic analysis done on these responses. The analysis further indicated that 88.6% of the respondents are of the opinion that the proposed programme is needed while only 2.9% stated the opposite.

The most represented tertiary qualifications in this survey were the baccalaureus and master's degree qualifications.

The average level of output driven knowledge (3.1) for both the private and public sector was lower than that of the baseline knowledge (3.6). This is anticipated as urban and regional planners are mainly trained in these topics and the standards, policies and legislation that accompany them.

A need is thus identified, in support of the presumed need by the programme initiators, for the proposed programme with a clear indication given to the topics that should be included and focused on.

4.3.2 Evaluability assessment

The SWOT (Chapter 3.3.1) analysis indicates that the programme has been sufficiently planned as the strengths and opportunities of the analysis outweigh the weaknesses and threats, given that the various sections have many points in common which are all applicable to the question. The programme can thus be deemed evaluable.

A balanced scorecard (Chapter 3.3.2) was compiled to provide parameters for further evaluation of the programme in an attempt to measure its effectiveness. The programme has been adapted and will continue to undergo adaptations in an attempt to reduce the weaknesses and threats identified, which will result in the effective implementation thereof. The contents of the programme, for example, have been amended in order to provide for the needs identified.

4.3.3 Programme monitoring

Taking the assumptions and external factors into account, the logic model (Chapter 3.4.1) explains the monitoring done on the inputs and outputs of the programme. The proposed short-, medium- and long-term outcomes should be monitored after implementation of the programme.

These outcomes also refer to the KPIs identified in the balanced scorecard; as a result it is important to use the balanced scorecard as part of the programme monitoring.

The promotion and review of the programme should be completed and continued in order to reduce the weaknesses and threats identified in the SWOT analysis. Programme monitoring can, as a result, assist in transferring urban and regional planning practices and principles to the relevant professions in the built environment through the continued adaptation of the programme, as the need changes.

4.4 Conclusion

The purpose of this dissertation was to evaluate the proposed programme with the inclusion of a needs assessment, evaluability assessment and programme monitoring. It can thus be stated that the dissertation answered the research question through the qualitative and quantitative data collected in the needs assessment, which concluded that an interactive document including the topics with the highest need identified, should be compiled. This promotes in-service training and can contribute greatly to the collaboration between urban and regional planners and the municipal engineers.

However, further research should be conducted to fully comprehend the existing knowledge of the other professions included in the built environment, in order to determine whether or not the same principles will be applicable. Further, the need for broadening the knowledge of municipal town planners and consultants in engineering should be further researched, and it is also proposed that a similar programme be compiled for use by the planners in order to increase their general level of knowledge in engineering.

It was also determined that the existing contents of the programme are sufficient and meet the need identified through the study. The programme should, however, be continuously monitored and updated in order to provide for changing needs and revision of some of the contents. The knowledge of the intended users should be evaluated, after the implementation of the programme, in order to ensure that the programme does indeed provide for their needs, and to determine in what manner the needs have changed.

CHAPTER 5 LIMITATIONS SUMMARY AND RECOMMENDATIONS

5.1 Research limitations

Several restrictions were encountered throughout the research, such as the circulation of questionnaires.

Some limitations were encountered during the review of the relevant professions in the BRICS and IBSA countries. The main reason for this is that most information available cannot be translated into English without the use of an external consultant. This posed some difficulty in gathering all the necessary information on the relevant legislation and education provided in the professions, especially during the review of professions in Brazil. Further limitations included the use of various regulatory or voluntary organisations for each profession by Brazil.

Electronic questionnaires were intended to be delivered by email to the remaining members of IMESA, by the programme initiators themselves, in order to obtain as large a response as possible. The emails, which would include a brief description and the intent of the questionnaires, would have had the questionnaires attached. These, however, generated no responses from the target respondents.

It was further proposed that a questionnaire should be included in the IMESA Newsletter of January and February 2015, together with the publishing of the article in the January 2015 issue of the IMESA Magazine. However, though numerous attempts were made to gain access to the newsletter, no response was received from the magazine or the target respondents as no confirmation was received on the distribution of these questionnaires.

The SACPLAN questionnaires were circulated to all registered planners in all categories. However, limited responses were received due to missing or incorrect email addresses of some of the planners as well as the possible unwillingness of some of the target respondents to complete the questionnaires.

The willingness of the target respondents to participate in the questionnaires influenced the trustworthiness of feedback of questionnaires. The participants may also have completed the questionnaires with false information or answered the question of knowledge levels with either the average level of knowledge (a number 3) or with the incorrect level as they did not wish to disclose their shortcomings. This may have influenced the results a great deal, although the effects may not be measurable.

Limited responses and feedback were provided to the researcher by the programme initiators and the programme leader; thus it is possible that the project could not reach its full potential, resulting

in the possible need for a revised version in order to enable the project to reach its full and expected potential.

5.2 Summary

Urban and regional planning responsibilities have been assumed by newly established and existing local municipalities. Of these municipalities, many do not have the financial means to employ full-time urban and regional planners to manage these responsibilities.

A programme was developed in an attempt to recognise the need for capacity building in physical development planning at all levels, including all local, district and national authorities. It is proposed to equip the relevant persons with user-friendly and comprehensive user guidelines in order to guide them in understanding their role in urban and regional planning.

This dissertation includes a comprehensive literature review with references made to existing policy and legislative frameworks, skills transfer and capacity building and a brief analysis of the professions included in the built environment. It further evaluated the proposed programme through conducting a needs assessment. This includes a review of existing qualifications presented at tertiary institutions in South Africa and the results from both quantitative and qualitative data collected from two surveys, circulated to both professions in the built environment and urban and regional planners.

The dissertation uses OBE which further includes an evaluability assessment, through the use of a SWOT analysis and balanced scorecard, as well as programme monitoring, through the use of a logic model. The resulting recommendations will provide an approach to skills transfer applicable to the professions included in the built environment.

5.3 Recommendations

The programme should not be seen as a training document, but rather as a capacity-building guideline, as implied in the title. This will thus not affect the stricter definition of urban and regional planning duties made in the Spatial Planning and Land Use Management Act (16 of 2013). The imminent amendments to the Planning Profession Act 36 of 2002 will contribute to the reservation of urban and regional planning responsibilities to planners. This will formalise the boundaries of professions involved.

Table 2-8 emphasises the close relationship between urban and regional planning and some of the other professions included in the built environment. Chapter 2 further justifies the focus on engineering for the research rather than the use of all the professions included in the built environment. Due to the close relationship between municipal engineers and urban and regional

planning it is important to increase their knowledge of the field. This will reduce possible problems and improve the collaboration between the engineering and town planning departments.

It is critical to improve the relationship between the town planning and engineering departments on a municipal level and the collaboration between engineers and municipal engineering staff, especially with urban and regional planners, in order to improve development.

The implementation plan of the programme is a recommendation on how the executive summary together with the source document can be used to address the needs identified through the research conducted. The proposed programme monitoring should be viewed in conjunction with the implementation plan.

5.3.1 Proposed implementation plan

The proposed timeframe for implementation is as follows:

- The Draft Executive Summary of Capacity Building Document is completed;
- It should be posted on the IMESA Website for further comments by the intended users and all interested parties between the beginning of December 2015 and the end of April, 2016;
- The Final Draft Capacity Building Document should be approved by IMESA in June, 2016;
- An implementation strategy for rolling out of the capacity building process through IMESA Branches, CPD short courses and online support systems should be developed and implemented during August, 2016; and
- Formal handing over of the Project can take place at the IMESA Conference in 2016 in East London.

With the abovementioned kept in mind, the programme should be reviewed by the programme initiators and the intended users to ensure that it meets the necessary standards, before distribution and implementation. Arrangements should be made with the regulatory body of urban and regional planning, for them to review the programme, and their inputs and recommendations should be considered and included if deemed necessary.

After amendment and final approval of the programme, the executive summary should be made freely available to all municipal engineers and to any other professionals that might find it helpful in understanding certain urban and regional planning concepts.

It is recommended that the programme should be implemented on a national basis with the use of short courses in order to provide orientation and much-needed information to those engineers in need. This can also be linked to the provision of CPD points. At a later stage the programme can be distributed to all local, provincial and district municipalities, including an assessment of the

user's existing knowledge prior to receiving the information, and a re-evaluation after the course has been completed.

Possible negotiations should be conducted with the SETA and especially CETA, for the accreditation of the programme in order for it to be included in the education and training of engineers and engineering staff in municipalities and other professions that may require information in urban and regional planning. This will rely on the provision of CPD points as a form of encouragement and will improve the implementation of the programme on a national basis.

The source document can be divided into several short courses in terms of the various topics, such as land use management or policy and legislative frameworks. This will be presented by CETA and will be linked to CPD points. An assessment should be done of the level of knowledge of the attendee prior to commencing with the course and should be evaluated again after completion. This can be used to further assess the effectiveness of the programme.

5.3.2 Proposed programme monitoring

The programme should be evaluated on a regular basis, preferably after a re-evaluation of the need among the intended users, in order to determine the relevance of the programme and the correctness of the contents. It should then be amended and distributed as previously mentioned.

Further research should be conducted in order to determine whether the programme has reached its intended purpose with regard to enabling municipal engineers to better comprehend urban and regional planning policies, legislation and concepts. This should also include determining whether the responses and comments provided by municipal engineers on town planning matters and their addressing of problems have improved as a result of the programme. It should be determined if knowledge transfer takes place in practice and if the KPIs (Table 3-38), included in Chapter 3, have been addressed and improved. It should also be determined if the relationship between planners in the private sector with engineers and the collaboration between the town planning and engineering departments have improved.

After implementation of the programme, an assessment of the knowledge of the engineers should be done on an annual basis in order to determine the mediate impact the programme has on the intended users. An assessment should be conducted every three to five years to determine the long-term impact and implications of the programme. This will also determine if the programme is effective in meeting the needs and if it contributed to the improvement of the knowledge of the municipal engineer in urban and regional planning.

5.3.3 Future research

A similar programme or module is proposed, which will inform engineering students, or all students of professions included in the built environment, at a tertiary level, of what urban and regional planning is and what their role in it is. This will enable them to apply much-needed knowledge to their profession and enable them to better comprehend the topics and processes they may encounter in their early days as a municipal or civil engineer.

Research can thus be done to determine the most effective way in which to include the information in the programme in the introductory course to be presented for all the above mentioned students. This module should be presented to all civil engineering students and those professions included in the built environment. This will address the needs identified in Table 3-3.

Diploma courses can be developed through the use of the source document of the programme, similar to the short courses mentioned in Section 5.3.1. This can be used to formalise the programme. However this should only be done with the approval of SACPLAN. The reservation of urban and regional planning duties to the SACPLAN-registered planners will ensure that the duties of a planner cannot be done by any individual gaining the proposed diploma.

Similar research should also be conducted on other professions included in the built environment to determine their knowledge level of urban and regional planning which can lead to the formulation of a similar programme to be distributed to, among others, architects and land surveyors.

REFERENCES

- ABCE (Brazilian Engineering Consultants Association). 2015. ABCE.
http://www.abceconsultoria.org.br/quem_somos. Date of access: 14 Apr. 2015.
- Abdi, H. 2003. Factor rotation in factor analyses. <http://www.utdallas.edu/~herve/Abdi-rotations-pretty.pdf>. Date of access: 11 Jun. 2015.
- Acts see South Africa.
- Adamson, D. & Burgess, K. 2012. Monitoring & evaluation: a guide.
<http://regenwales.org/upload/pdf/110612112705Monitoring%20and%20Evaluation%20-%20A%20Guide.pdf>. Date of access: 14 Aug. 2015.
- Agarwal, R. 2012. Perspectives in balanced scorecard (4 perspectives).
<http://www.yourarticlelibrary.com/accounting/performance-measurement/perspectives-in-balanced-scorecard-4-perspectives/53100/>. Date of access: 14 Aug. 2015.
- Ahmadi, F. & Toghyani, S. 2011. The role of urban planning in achieving sustainable urban development. *OIDA International Journal of Sustainable Development*. 2(11):23-26.
http://research.iaun.ac.ir/pd/ahmadi.f/pdfs/PaperM_8634.pdf. Date of access: 30 Jul. 2015.
- Akbar, D. & Rasul, M.G. 2012. Review of the nexus between urban and regional planning and engineering education. *Australian Association for Engineering Education 2012 Conference*.
<http://www.aaee.com.au/conferences/2012/documents/abstracts/aaee2012-submission-135.pdf>.
Date of access: 30 Jul. 2015.
- Altschuld, J.W., Lee, Y-F., White, J. Hung, H-L. 2010. Introduction to designing needs assessment surveys. Workshop presented at the Annual Meeting of the American Evaluation Association, San Antonio, Texas, November.
ucanr.edu/sites/CEprogramevaluation/files/141188.ppt. Date of access: 07 Aug. 2015.
[PowerPoint presentation].
- Archer, T.M. 2003. Web-based surveys. *Journal of Extension*, 41(4).
<http://www.joe.org/joe/2003august/tt6.php>. Date of access: 29 Mar. 2015.
- Bamberger, M. & Hewitt, E. 1986. Monitoring and evaluating urban development programs, a handbook for program managers and researchers. World Bank Technical Paper no. 53. 1st ed. Washington, DC: The World Bank.
- Bandor, M.S. 2006. Quantitative methods for software selection and evaluation.

<http://www.sei.cmu.edu/reports/06tn026.pdf>. Date of access: 15 Aug. 2015.

Berkowitz, B. & Nagy, J. 2005. Section 7: conducting needs assessment surveys.
<http://ctb.ku.edu/en/table-of-contents/assessment/assessing-community-needs-and-resources/conducting-needs-assessment-surveys/main>. Date of access: 7 Aug. 2015.

Bielavitz, T. 2010. The balanced scorecard: a systematic model for evaluation and assessment of learning outcomes?. *Evidence Based Library and Information Practices*. 5(2):35-46.
<https://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/6928/6962>. Date of access: 28 Jul. 2015.

Boddy, J., Neumann, T., Jennings, S., Morrow, V., Alderson, P., Rees, R. & Gibson, W. 2011. Asking questions of participants: questionnaires. <http://www.ethicsguidebook.ac.uk/Asking-questions-of-participants-100>. Date of access: 28 Jan. 2015.

Brown, S. 2007. Standardized technology evaluation process (STEP) user's guide and methodology for evaluation teams.
http://www2.mitre.org/work/sepo/toolkits/STEP/files/StepUsersGuide_09.pdf. Date of access: 04 Aug. 2015.

Bryman, A. 2006. Integrated qualitative and quantitative research: how is it done? *Qualitative research*. 6(1):97-113. <http://www.sagepub.com/bjohnsonstudy/articles/Bryman.pdf>. Date of access: 22 Jul. 2014.

Business Dictionary. 2014a. Convenience sampling.
<http://www.businessdictionary.com/definition/convenience-sampling.html#ixzz39LzUwYKL>. Date of access: 03 Aug. 2014.

Business Dictionary. 2014b. Quantification.
<http://www.businessdictionary.com/definition/quantification.html#ixzz38ElgFMcc>. Date of access: 22 Jul. 2014.

Business Dictionary. 2015. Quota sampling. <http://www.businessdictionary.com/definition/quota-sampling.html>. Date of access: 12 Aug. 2015.

Cambridge Dictionaries. 2015. Skills. <http://dictionary.cambridge.org/dictionary/english/skill>. Date of access: 23 Aug. 2015.

Caracelli, V.J. & Greene, J.C. 1997. Crafting mixed-method evaluation design. *New Directions for Evaluation*. 1997(74):19-32.
<http://www.academyhealth.org/files/phsr/Caracelli%20and%20Greene.pdf>. Date of access: 27

Jul. 2015.

CareerPlanet. 2015. Civil engineer. <http://www.careerplanet.co.za/careers/construction-engineering-and-mining/civil-engineering/civil-engineer>. Date of access: 25 Aug. 2015.

CBE (Council for the Built Environment). 2013. Council for the built environment strategic plan (2013-2017). http://www.cbe.org.za/upload/CBE_Strategic_Plan_2013-2017.pdf. Date of access: 4 Sep. 2015.

CBE (Council for the Built Environment). 2014. Do graduates in SA's built environment meet industry's expectations?. <http://www.ee.co.za/article/graduates-sas-built-environment-meet-industrys-expectations.html>. Date of access: 3 Sep. 2015.

CDC (Centres for Disease Control and Prevention). Apr. 2009a. Evaluation briefs 19 of 2009: analysing qualitative data for evaluation. Newsgroup: <http://www.cdc.gov/healthyyouth/evaluation/pdf/brief19.pdf>. Date of access: 5 Aug. 2014.

CDC (Centres for Disease Control and Prevention). Apr. 2009b. Evaluation briefs 20 of 2009: analysing quantitative data for evaluation. Newsgroup: <http://www.cdc.gov/healthyyouth/evaluation/pdf/brief20.pdf>. Date of access: 5 Aug. 2014.

Cedefop (European Centre for the Development of Vocational Training). 2011. Learning while working: how skills development can be supported through workplace learning. <http://www.cedefop.europa.eu/en/news-and-press/news/learning-while-working-how-skills-development-can-be-supported-through-workplace>. Date of access: 24 Aug. 2015.

CETA (Construction Education and Training Authority). 2013. Sector skills plan update: 2013/2014. <http://www.ceta.org.za/wp-content/uploads/2014/08/CETA-SSP-FINAL.pdf>. Date of access: 1 Sep. 2015.

CETA (Construction Education and Training Authority). 2014. Strategic plan for the construction education and training authority 2011-2016. <http://www.ceta.org.za/wp-content/uploads/2014/08/CETA-2014-15-STRATEGIC-PLAN-FINAL.pdf>. Date of access: 1 Sep. 2015.

Colbert, J. 2009. Defining and using key performance drivers. <http://www.b-eye-network.com/view/10742>. Date of access: 15 Aug. 2015.

Collins English Dictionary. 2014. Trustworthiness. <http://www.collinsdictionary.com/dictionary/english/trustworthiness>. Date of access: 24 Jul. 2014.

CONFEA (Federal Council of Engineering, Architecture and Agronomy). 2014. CONFEA. <http://www.confearg.br/cgi/cgilua.exe/sys/start.htm?sid=906>. Date of access: 15 Apr. 2015.

CPUT (Cape Peninsula University of Technology). 2015a. Faculty handbook 2015: informatics and design. http://www.cput.ac.za/storage/study_at_cput/prospectus_and_handbook/fid_handbook_2015.pdf. Date of access: 15 Feb. 2015.

CPUT (Cape Peninsula University of Technology). 2015b. Faculty handbook 2015: engineering. http://www.cput.ac.za/storage/study_at_cput/prospectus_and_handbook/engineering_handbook_2015.pdf. Date of access: 15 Feb. 2015.

Creswell, J.W. 2007. Qualitative inquiry and research design: choosing among five approaches. http://community.csusm.edu/pluginfile.php/21115/mod_resource/content/1/Creswell_J.W._2007_-_Designing_a_Qualitative_Study_Qualitative_inquiry_and_research_design-Choosing_among_5_approaches_2nd_ed._Thousand_Oaks_CA-_SAGE.pdf. Date of access: 27 Jul. 2014.

Creswell, J.W., Plano Clark, V.L. 2011. Designing and conducting mixed methods research. 2nd ed. Thousand Oaks, CA: SAGE.

Davidson, E.J. 2005. Theory-based needs assessment. Demonstration session at the Canadian evaluation society & American evaluation association conference. 28 October. <http://realevaluation.com/pres/tbne05.pdf>. Date of access: 07 Aug. 2015. [PowerPoint presentation].

Davis, R.M. 2009. Professional education in built environment and design: exploring stakeholder roles and responsibilities. <http://eprints.qut.edu.au/18943/3/18943.pdf>. Date of access: 4 Sep. 2015.

Department of Higher Education and Training see South Africa. Department of Higher Education and Training.

Department of Water Affairs & Forestry see South Africa. Department of Water Affairs & Forestry.

Delport, C.S.L., Fouché, C.B. 2011. Mixed methods research. (*In De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaick Publishers. p.441-442*).

Delport, C.S.L., Fouché, C.B., Schurink, W. 2011. Theory and literature in qualitative research.

(In De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaick Publishers. p. 312-317).

Delport, C.S.L. & Roestenburg, W.J.H. 2011. Quantitative data- collection methods: questionnaires, checklists, structured observation and structured interview schedules. (In De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaick Publishers. p. 171-195).

DUT (Durban University of Technology). 2015a. Handbook for 2015 – faculty of engineering and the built environment: department of town and regional planning.
<http://ddt72ar9zv4px.cloudfront.net/wp-content/uploads/handbooks/EBE%20Town%20and%20Reg%20Planning%202015%20web.pdf>.
Date of access: 15 Feb. 2015.

DUT (Durban University of Technology). 2015b. Handbook for 2015 – faculty of engineering and the built environment: department of civil engineering and surveying.
<http://ddt72ar9zv4px.cloudfront.net/wp-content/uploads/handbooks/EBE%20Civil%20Eng%20&%20Survey%202015%20web.pdf>.
Date of access: 15 Feb. 2015.

Dyson, R.G. 2003. Strategic development and SWOT analysis at the University of Warwick. *European Journal of Operational Research*. 152(3):631-640.
<http://www.di.ufpe.br/hermano/cursos/si/artigos/strategic-development-and-SWOT-analysis-at-the-university-of-warwick.pdf>.
Date of access: 19 Aug. 2015.

ECI (Engineering Council of India). 2015. Engineering council of India. <http://www.ecindia.org/>.
Date of access: 3 Sep. 2015.

ECSA (Engineering Council of South Africa). 2014. University degrees accredited as meeting the educational requirement for registration as a professional engineer (E-20-PE).
https://www.ecsa.co.za/education/EducationDocs/List_of_AccrUniv_E-20_PE.pdf.
Date of access: 18 Dec. 2014.

ECSA (Engineering Council of South Africa). 2015. What is ECSA?.
<https://www.ecsa.co.za/about/SitePages/What%20Is%20ECSA.aspx>.
Date of access: 25 Aug. 2015.

EDTP SETA (Education, Training and Development Practices Sector Education and Training Authority). 2014. Scarce and critical skills guide 2015.

<http://www.etdpseta.org.za/live/files/publications/Scarce-and-Critical-Skills-Guide-Web-Version.pdf>. Date of access: 21 Aug. 2015.

Elphick-Moore, D. 2012. Skills development defined.

<http://www.entrepreneurmag.co.za/advice/staff/increasing-productivity/skills-development-defined/>. Date of access: 23 Aug. 2015.

EVALSED (Evaluating Socio Economic Development). 2013. Evaluating socio economic development, SOURCEBOOK 2: methods & techniques - formative evaluation.

http://nyshealthfoundation.org/uploads/general/evaluating-socio-economic-development-sourcebook-2-methods-techniques-for-formative_evaluation.pdf. Date of access: 09 Aug. 2015.

Field, A. 2006. Reliability analysis. <http://www.statisticshell.com/docs/reliability.pdf>. Date of access: 12 Jun. 2015.

Fifth Brics Summit. 2013. About BRICS. <http://www.brics5.co.za/about-brics/>. Date of access: 18 May. 2013.

Firestone, W.A. 1993. Alternative arguments for generalizing from data as applied to qualitative research. *Educational Researcher*. 22(16):16-23.

<http://www.msuedtechsandbox.com/hybridphd/wp-content/uploads/2010/06/Firestone-1993.pdf>. Date of access: 25 Jul. 2014.

FNA (National Federation of Architects and Town Planners). 2011. Unions and associations.

<http://www.fna.org.br/site/secoes/pagina/124/Sindicatos-e-Associacoes>. Date of access: 3 Sep. 2015.

Forbes, J. 2011. An introduction to municipal planning within South Africa.

[http://www.salga.org.za/app/webroot/assets/files/PLANNING%20BROCHURE\(1\).pdf](http://www.salga.org.za/app/webroot/assets/files/PLANNING%20BROCHURE(1).pdf). Date of access: 25 Oct. 2015.

Fouché, C.B. 2011. Evaluation research. (*In De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaick Publishers. p. 254 & 267*).

Fouché, C.B. & Bartley, A. 2011. Quantitative data analysis and interpretation. (*In De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaick Publishers. p. 249-265*).

Fouché, C.B. & Delport, C.S.L. 2011. Introduction to the research process. (*In De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: for the social sciences*

and human service professions. 4th ed. Pretoria: Van Schaick Publishers. p. 61-78).

Fouché, C.B. & Schurink, W. 2011. Qualitative research designs. (*In* De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaick Publishers. p. 312-317).

Gauteng Provincial Treasury. 2013. Quarterly Bulletin – January to March 2013: South Africa's position in BRICS. Newsgroup:
<http://www.treasury.gpg.gov.za/Documents/South%20African%20position%20in%20BRICS.pdf>.
Date of access: 30 Aug. 2015.

Glasgow, R.E. & Linnan, L.A. 2008. Evaluation of theory-based interventions. (*In* Glanz, K., Rimer, B.K. & Viswanath, K. Health behaviour and health education: theory, research, and practice. 4th ed. San Francisco: Wiley. p. 487-508).

Gliem, J.A. & Gliem, R.R. 2003. Calculating, interpreting, and reporting Cronbach's Alpha reliability coefficient for Likert-type scales. <http://www.ssnpstudents.com/wp/wp-content/uploads/2015/02/Gliem-Gliem.pdf>. Date of access: 11 Jun. 2015.

Goh, G. 2013. The difference between effectiveness and efficiency explained.
<http://www.insightsquared.com/2013/08/effectiveness-vs-efficiency-whats-the-difference/>. Date of access: 10 Aug. 2015.

Govender, C. & Bisschoff, T. 2007. A Management framework for training providers to improve workplace skills development. *Acta Commercii*. 54-56.

Grbich, C. 2007. Qualitative data analysis: an introduction. 1st ed. Thousand Oaks, CA: SAGE.

Green, F. 2011. What is skill? An inter-disciplinary synthesis.<http://www.llakes.org/wp-content/uploads/2011/02/Green-What-is-Skill-reduced.pdf>. Date of access: 23 Aug. 2015.

Greene, J.C., Caracelli, V.J. & Graham, W.F. 1989. Toward a conceptual framework for mixed-method evaluation designs. *Education Evaluation and Policy Analysis*. 11(3):255-274.
<http://counseling.wvu.edu/r/download/58215>. Date of access: 28 Jul. 2015.

Greshman, T. 2011. Civil engineering vs urban planning. <http://work.chron.com/civil-engineering-vs-urban-planning-5572.html>. Date of access: 2 Aug. 2015.

Griffin, B.W. 2005. Advanced educational research: Cronbach's Alpha (measure of internal consistency).
http://www.bwgriffin.com/gsu/courses/edur9131/content/cronbach/cronbachs_alpha_spss.htm.
Date of access: 12 Jun. 2015.

Grimsley, S. 2015. What is needs assessment? - Definition & examples.

<http://study.com/academy/lesson/what-is-needs-assessment-definition-examples-quiz.html#lesson>. Date of access: 09 Aug. 2015.

Guy, S.M. 2008. Community needs assessment survey guide.

<http://www.extension.usu.edu/files/uploads/surveyguide.pdf>. Date of access: 7 Aug. 2015.

Harger-Forde, S. 2012. Community development evaluation research – 1. Literature review of evaluation methods & methodologies. Auckland, New Zealand: Community of Waitakere.

<http://www.communitywaitakere.org.nz/communitywaitakere/assets/File/research1.pdf>. Date of access: 22 Jul. 2015.

Hsee, C.K. & Zhang, J. 2010. General evaluability theory. *Perspectives on Psychological Science*. 5(4):343-355.

<http://faculty.chicagobooth.edu/christopher.hsee/vita/Papers/GeneralEvaluabilityTheory.pdf>. Date of access: 28 Jul. 2015.

IBGE (Brazilian Institute of Geography and Statistics). 2014. BRICS: joint statistical publication 2014. http://www.brics.ibge.gov.br/downloads/BRICS_Joint_Statistical_Publication_2014.pdf.

Date of access. 19 Apr. 2015.

IBM. 2011. Kaiser-Meyer-Olkin measure for identity correlation matrix. <http://www-01.ibm.com/support/docview.wss?uid=swg21479963>.

Date of access: 11 Jun. 2015.

IBM. 2014. Kaiser-Meyer-Olkin measure for identity correlation matrix. <http://www-01.ibm.com/support/docview.wss?uid=swg21479627>.

Date of access: 12 Jun. 2015.

IBSA Trilateral. 2013. About IBSA background. <http://www.ibsa-trilateral.org/about-ibsa/background>.

Date of access: 30 Aug. 2015.

ICE(I) (Institute of Civil Engineers (India)). 2015. Institute of civil engineers (India).

<http://www.ice.net.in/index.php>. Date of access: 2 Sep. 2015.

IMESA (Institute of Municipal Engineers in South Africa). 2006. IMESA municipal guidelines: guidelines for traffic calming. 2nd ed. Durban: IMESA.

IMESA (Institute of Municipal Engineers in South Africa). 2009. Manual on town and regional planning practices: Volume 2. (Unpublished).

ISE (Institution of Structural Engineers). 2015. Institution of structural engineers.

<http://ceindia.org/ISE.html>. Date of access: 3 Sep. 2015.

Israel, B.A., Parker, E.A., Rowe, Z., Salvatore, A., Minkler, M., López, J., Butz, A., Mosley, A., Coates, L., Lambert, G., Potito, P.A., Brenner, B., Rivera, M., Romero, H., Thompson, B., Coronado, G. & Halstead, S. 2005. Community-based participatory research: lessons learned from the centers for children's environmental health and disease prevention research. *Environmental Health Perspective*. 113(10):1463-1471.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1281296/>. Date of access: 27 Jul. 2014.

ITPI (Institute of Town Planners, India). 2015. Institute of town planners, India.

<http://www.itpi.org.in/>. Date of access: 9 Apr. 2015.

Ivankova, N.V., Creswell, J.W. & Plano Clark V.L. 2007. Foundations and approaches to mixed methods research. (In Maree, K. First steps in research. Pretoria: Van Schaik. p. 441-442).

Jansen van Rensburg, I. & Schoeman, C.B. 2015. Capacity building guidelines in urban and regional planning for municipal engineers and engineering staff within municipalities: executive Summary. (Unpublished).

Jiabao, L. 2013. Experts call for BRICS free trade pact. China Daily. 27 Mar.

http://www.chinadaily.com.cn/cndy/2013-03/27/content_16347691.htm. Date of access: 17 May. 2013.

Jones, T.C.E. 2011. The Value Scorecard – a methodology for evaluating the impact of knowledge transfer.

<http://www.leydesdorff.net/th9/Th9%20Subtheme%206%20full%20tcej%20O-025.pdf>. Date of access: 27 Jul. 2015.

JRSA (Justice Research and Statistics Association). 2003. Evaluability assessment: examining the readiness of a program for evaluation. <http://www.jrsa.org/pubs/juv-justice/evaluability-assessment.pdf>. Date of access: 12 Aug. 2015.

Jurevicius, O. 2013. SWOT analysis – do it properly!.

<http://www.strategicmanagementinsight.com/tools/swot-analysis-how-to-do-it.html>. Date of access: 20 Aug. 2015.

Kaplan, R.S. 2010. Conceptual foundation of the balanced scorecard.

<http://www.hbs.edu/faculty/Publication%20Files/10-074.pdf>. Date of access: 15 Aug. 2015.

Karabatsos, G. 2002. Principal components analysis and factor analysis.

<http://www.uic.edu/classes/epsy/epsy546/Lecture%204%20---%20notes%20on%20PRINCIPAL%20COMPONENTS%20ANALYSIS%20AND%20FACTOR%20ANALYSIS1.pdf>. Date of access: 11 Jun. 2015.

- Khorshid, S. & Ranjbar, R. 2015. Developing a comprehensive strategic plan based on SWOT matrix, strategies of, balanced scorecard and Qfd Fuzzy. *Arth Prabandh: A Journal of Economics and Management*. 4(1):158-178. <http://prj.co.in/setup/business/paper368.pdf>. Date of access: 19 Aug. 2015.
- Kigotho, W. 2014. BRICS – Partnering to build education for the future. <http://www.universityworldnews.com/article.php?story=20141008165201566>. Date of access: 30 Aug. 2015.
- Krefting, L. 1991. Rigor in qualitative research: the assessment of trustworthiness. *The American Journal of Occupational Therapy*. 45(3):214-222. [http://portal.limkokwing.net/modulemat/rigor%20in%20qualitative%20research%20trustworthiness%20test\(1\).pdf](http://portal.limkokwing.net/modulemat/rigor%20in%20qualitative%20research%20trustworthiness%20test(1).pdf). Date of access: 23 Jul. 2014.
- Kreuger, L.W. & Neuman, W.L. 2006. Social work research methods: qualitative and quantitative applications. Boston: Pearson Education.
- Krishnan, S. 2006. Ethics in qualitative research methods. http://icmr.nic.in/bioethics/cc_bioethics/presentations/haryana/session6_2.pdf. Date of access: 28 Jan. 2015.
- Krueger, R.A. 2005?. Needs Assessment. http://www.tc.umn.edu/~rkrueger/evaluation_na.html. Date of access: 07 Aug. 2015.
- Kryder-Reid, E., Brancolini, K.R. & Johnson, E. 2006. What difference do we make?: outcomes based evaluations. Seminar presented at the RBMS Preconference, Austin Texas, 21 June. shapingoutcomes.com/rbms.ppt. Date of access: 28 Jul. 2015. [PowerPoint presentation].
- Laerd Statistics. 2013. Cronbach's Alpha (α) using SPSS. <https://statistics.laerd.com/spss-tutorials/cronbachs-alpha-using-spss-statistics.php>. Date of access: 12 Jun. 2015.
- Lalanne, C. 2008. Appendix 6: Comments on statistical validity of factor analysis samples. http://www.aliquote.org/articles/tech/multivar/22_Appendix_6.pdf. Date of access: 11 Jun. 2015.
- Law Dictionary. 2014. Quantification. <http://thelawdictionary.org/quantification/>. Date of access: 22 Jul. 2014.
- Lee, S.F. & Ko, A.S.O. 2000. Building balanced scorecard with SWOT analysis, and implementing "Sun Tzu's the art of business management strategies" on QFD methodology. *Managerial Auditing Journal*. 15(1):68-76. <http://www.apmforum.com/strategy/swotsun.pdf>. Date of access: 20 Aug. 2015.

- Leedy, P.D. & Ormrod, J.E. 2005. Practical research: planning and design.
<ftp://doc.nit.ac.ir/cee/jazayeri/Research%20Method/Book/Practical%20Research.pdf>. Date of access: 27 Jul. 2014.
- Lincoln, Y.S. & Guba, E.G. 1985. *Naturalistic inquiry*. 1st ed. Beverly Hills, CA: SAGE Publications.
- Lovelace, E.H. 1965. The civil engineer and the urban planning. *American institute of civil engineering*.
<http://astro.cornell.edu/~lovelace/pdfs/40.%20The%20Civil%20Engineer%20and%20Urban%20Planning%201965.pdf>. Date of access: 30 Jul. 2015.
- Lunt, N., Davidson, C. & Mckegg, K. (Eds). 2003. Evaluating policy and practice: a New Zealand reader. Auckland: Pearson Education.
- Mackay, A. 2004. A practitioner's guide to the balanced scorecard.
http://www.cimaglobal.com/Documents/Thought_leadership_docs/tech_resrep_a_practitioners_guide_to_the_balanced_scorecard_2005.pdf. Date of access: 14 Aug. 2015.
- Marchiononi, G. & Teague, J. 1987. Elementary students' use electronic information services: an exploratory study. *Journal of Research on Computing Education*. 20(2):139-155.
- Marr, B. 2010. What is a modern balanced scorecard? http://www.ap-institute.com/media/3967/what_is_a_modern_balanced_scorecard.pdf. Date of access: 14 Aug. 2015.
- Marr, B. 2015?. The balanced scorecard – a complete introduction. <http://www.ap-institute.com/strategy-management-articles/the-balanced-scorecard-a-complete-introduction.aspx>. Date of access: 14 Aug. 2015.
- Marshall, M.N. 1996. Sampling for qualitative research. *Family Practice*. 13(6):522-525.
<http://spa.hust.edu.cn/2008/uploadfile/2009-9/20090916221539453.pdf>. Date of access: 03 Aug. 2014.
- McCarthy, S. & Chapman, A. 2013. Balanced scorecard.
http://www.businessballs.com/balanced_scorecard.htm. Date of access: 28 Jul. 2015.
- McCawley, P.F. 2002. The logic model for program planning and evaluation.
<http://www.cals.uidaho.edu/edcomm/pdf/CIS/CIS1097.pdf>. Date of access: 16 Aug. 2015.
- McCawley, P.F. 2009. Methods for conducting an educational needs assessment: guidelines for cooperative extension system professionals.

<http://www.cals.uidaho.edu/edcomm/pdf/BUL/BUL0870.pdf>. Date of access: 07 Aug. 2015.

McLaughlin, J.A. & Jordan, G.B. 2010. Using logic models. (*In* Wholey, J.S., Hatry, H.P. & Newcomer, K.E. *Handbook of practical program evaluation*. 3th ed. San Francisco, CA: Wiley. p. 55-80).

McNamara, C. 2002. Basic guide to program evaluation (including outcomes evaluation). <http://managementhelp.org/evaluation/program-evaluation-guide.htm>. Date of access: 28 Jul. 2015.

McNamara, C. 2008. Basic guide to outcomes-based evaluation for nonprofit organizations with very limited resources. <http://managementhelp.org/evaluation/outcomes-evaluation-guide.htm>. Date of access: 28 Jul. 2015.

Merriam-Webster. 2015?a. Skills. <http://www.merriam-webster.com/dictionary/skill>. Date of access: 23 Aug. 2015.

Merriam-Webster. 2015?b. Demographic. <http://www.merriam-webster.com/dictionary/demographic>. Date of access: 08 Jun. 2015.

Milstein, B. & Chapel, T. 2005. Section 1: Developing a logic model or theory of change. <http://ctb.ku.edu/en/table-of-contents/overview/models-for-community-health-and-development/logic-model-development/main>. Date of access: 16 Aug. 2015.

Ministry of External Affairs. 2013. IBSA [India, Brazil & South Africa]. <http://mea.gov.in/in-focus-article.htm?21578/IBSA+India+Brazil+amp+South+Africa>. Date of access: 30 Aug. 2015.

Molloy, A., Miller, A. & Elicker, M. 2007. The balanced scorecard: customer perspective, internal processes, learning and growth. www.millersville.edu/.../54268-The%20Balanced%20Scorecard.ppt. Date of access: 14 Aug. 2015. [PowerPoint presentation].

Morrison, M. 2014. SWOT analysis (TWOS matrix) made simple. <https://rapidbi.com/swotanalysis/#.VdWnxTovIU>. Date of access: 20 Aug. 2015.

Mouzas, S. 2006. Efficiency versus effectiveness. <http://impgroup.org/uploads/papers/4729.pdf>. Date of access: 09 Aug. 2015.

MUT (Mangosuthu University of Technology). 2015. Department of civil engineering and surveying. <http://www.mut.ac.za/index.php/civilengineering>. Date of access: 15 Feb. 2015.

National Development Commission see South Africa. National Development Commission.

NCRPB (National Capital Region Planning Board). 2015. National capital region planning board. <http://ncrpb.nic.in/>. Date of access: 2 Sep. 2015.

NMMU (Nelson Mandela Metropolitan University). 2015. Faculty of engineering, the built environment and information technology: Prospectus 2015. <http://www.nmmu.ac.za/getmedia/2953166b-8b6c-47f8-b332-d03b54d15bbe/2015-EBEIT-Prospectus?disposition=attachment>. Date of access: 15 Feb. 2015.

NWU (North West University). 2015. Calendar 2015: faculty of natural sciences postgraduate programmes (Potchefstroom Campus). <http://www.nwu.ac.za/sites/www.nwu.ac.za/files/files/p-academic-administration/dokumente/Undergrad2015/2015-NATURALSCIENCES-POSTGRADUATE.pdf>. Date of access: 18 Dec. 2014.

NWU (North West University). 2015b. Calendar 2015: faculty of natural sciences undergraduate (Potchefstroom Campus). <http://www.nwu.ac.za/sites/www.nwu.ac.za/files/files/p-ns/documents/Jaarboek%202015/2015%20PC%20NATUURWETENSKAPPE%20Eng%20Voorgaadse%20Jaarboek.pdf>. Date of access: 16 Feb. 2015.

Nyamathi, A. & Shulder, P. 1990. Focus group interviews: a research technique for informed nursing practice. *Journal of Advanced Nursing*. 15(11):1281-1288.

OECD (Organisation for Economic Co-operation and Development). 2002. Glossary of key terms in evaluation and result based management. <http://www.oecd.org/dac/2754804.pdf>. Date of access: 29 Jul. 2015.

OECD (Organisation for Economic Co-operation and Development). 2011. DAC criteria for evaluating development assistance. <http://www.oecd.org/dac/evaluation/daccriteriaforevaluatingdevelopmentassistance.htm>. Date of access: 11 Aug. 2015.

OME (Office of Migrant Education). 2001. Comprehensive needs assessment. <https://www2.ed.gov/admins/lead/account/compneedsassessment.pdf>. Date of access: 07 Aug. 2015.

Othieno, J. 2011. Outcome based evaluation: planning, process & implementation. http://www.healtorture.org/sites/healtorture.org/files/Outcome%20Based%20Evaluation%20final_0.pdf. Date of access: 28 Jul. 2015. [PowerPoint presentation].

OVC (Office for Victims of Crime). 2010. Guide to conducting a needs assessment. <https://www.ovcttac.gov/taResources/OVCTAGuides/ConductingNeedsAssessment/pfv.html>. Date of access: 07 Aug. 2015.

Penna, R.M. & Phillips W.J. 2005. Eight outcome models. *Evaluation Exchange*. XI(2):4-5.
<http://www.hfrp.org/var/hfrp/storage/original/application/d6517d4c8da2c9f1fb3dffe3e8b68ce4.pdf>
f. Date of access: 28 Jul. 2015.

Pennsylvania State University. 2004. Factor analysis: Varimax Rotation.
http://sites.stat.psu.edu/~ajw13/stat505/fa06/17_factor/13_factor_varimax.html. Date of access:
11 Jun. 2015.

Pierce County. 2009. Basic outcome based evaluation guide. <http://wa-piercecounty.civicplus.com/DocumentCenter/View/7390>. Date of access: 27 Jul. 2015.

Pinson, D. 2004. Urban planning : an 'undisciplined' discipline?. *Futures, Elsevier, Transdisciplinarity*, 36(4) <https://halshs.archives-ouvertes.fr/hal-00789207/document>. Date of access: 30 Jul. 2015.

Pitts, J.M. 1994. Personal understanding and mental models if information: a qualitative study of factors associated with information seeking and use of adolescents: Florida State University (Thesis - PhD).

PLATO (South African Council for Professional and Technical Surveyors). 2014?. Studying: where to study. <http://www.plato.org.za/5studywhere.php>. Date of access: 18 Dec. 2014.

PLATO (South African Council for Professional and Technical Surveyors). 2015. Registration. <http://www.plato.org.za/4regcouncilfees.php>. Date of access: 25 Aug. 2015.

Poister, T.H. 2010. Performance measurement: monitoring program outcomes. (*In* Wholey, J.S., Hatry, H.P. & Newcomer, K.E. Handbook of practical program evaluation. 3th ed. San Francisco, CA: Wiley. p. 100-124).

Poureisa, A., Ahmadgourabi, M.B.A. & Efteghar, A. 2013. Balanced scorecard: a new tool for performance evaluation. *Interdisciplinary Journal of Contemporary Research in Business*. 5(1):974-978. <http://journal-archieves32.webs.com/974-978.pdf>. Date of access: 27 Jul. 2015.

Presidency see South Africa. Presidency.

Rabinowitz, P. 2005. Section 6: participatory evaluation. <http://ctb.ku.edu/en/table-of-contents/evaluate/evaluation/participatory-evaluation/main>. Date of access: 28 Jul. 2015.

Rahmaan, A. 2011. The imperatives of urban and regional planning, 1st ed. United States of America: Xlibris Corporation.

Razaghi, M. & Finger, M. 2013. A multidisciplinary conceptual framework for urban governance

studies, insights from social, political and economic theories of governance.

http://www.eura2013.org/media/Full_papers_Track_3/184_Razaghi_A_multidisciplinary_conceptual_framework_for_urban_governance_studies_insights.pdf. Date of access: 30 Jul. 2015.

Rebernik, M. & Bradač, B. 2008. Idea evaluation methods and techniques. http://www.creative-trainer.eu/fileadmin/template/download/module_idea_evaluation_final.pdf. Date of access: 15 Aug. 2015.

Reigeluth, C.M. & Frick, T.W. 1999. Formative research: a methodology for creating and improving design theories.

<http://www.indiana.edu/~syschang/decaturn/documents/26formres.pdf>. Date of access: 09 Aug. 2015.

Reynaldo, J. & Santos, A. 1999. Cronbach's Alpha: a tool for assessing the reliability of scales. *Journal of Extension*, 37(2). <http://www.joe.org/joe/1999april/tt3.php>. Date of access: 11 Jun. 2015.

Robertson, K. 2007. 7 steps to creating a quality monitoring program.

<http://www.krconsulting.com/7-steps-to-creating-a-quality-monitoring-program/>. Date of access: 20 Aug. 2015.

Rodriguez, E., Valdebenito, C. & Mondragón, L. 2008. Ethics of research in social sciences.

http://desa.uchile.cl/documentos/ethics-of-research-in-social-sciences_76704_14_5937.pdf. Date of access: 28 Jan. 2015.

Rossi, P.H., Lipsey, M.W. & Freeman, H.E. 2004. Evaluation: a systematic approach, 7th ed. Thousand Oaks, CA: SAGE.

SAACPP (South African Association of Consulting Professional Planners). 2015. South African association of consulting professional planners. <http://www.saacpp.org.za/index.php>. Date of access: 26 Aug. 2015.

SACAP (South African Council for the Architectural Professionals). 2011. Matrix 1: registering persons with qualifications.

http://c.ymcdn.com/sites/www.sacapsa.com/resource/collection/B770721C-AE1C-4B7E-9CE8-29550788D7CA/SACAP_Registration_Matrix_072011.pdf. Date of access: 24 Aug. 2015.

SACAP (South African Council for the Architectural Professionals). 2015. Policy on the identification of work for the architectural profession.

http://www.sacapsa.com/resource/resmgr/News_items_for_website/IDOW_Policy_04062015.doc?hhSearchTerms=%22policy%22. Date of access: 24 Aug. 2015.

SACPLAN (South African Council for Planners). 2012. Practical training requirements for purposes of registration. <http://www.sacplan.org.za/documents/registration/SACPLAN%20Registration%20Practical%20Training%20Requirements.pdf>. Date of access: 26 Aug. 2015.

SACPLAN (South African Council for Planners). 2014a. Planning schools. http://www.sacplan.org.za/index.php?option=com_content&view=article&id=74&Itemid=205. Date of access: 18 Dec. 2014.

SACPLAN (South African Council for Planners). 2014b. Guidelines for job profiling of planners. <http://www.sacplan.org.za/documents/Job%20profiling.pdf>. Date of access: 26 Aug. 2015.

SACPLAN (South African Council for Planners). 2014c. Guidelines for the registration of planners. <http://www.sacplan.org.za/documents/Registration%20Guidelines.pdf>. Date of access: 26 Aug. 2015.

Saggers, M & Jacobs, K. 2011. Monitoring toolkit: how to develop a monitoring system for a community rights workers program. <http://www.icrw.org/files/publications/Monitoring-Toolkit-How-to-Develop-Monitoring-System-for-Community-Rights-Workers-Program.pdf>. Date of access: 16 Aug. 2015.

SAGI (South African Geomatics Institute). 2015. Land surveyors. <http://www.sagi.co.za/>. Date of access: 25 Aug. 2015.

SAIA (South African Institute of Architects). 2014. SA universities. http://saia.org.za/?page_id=303. Date of access: 18 Dec. 2014.

SAICE (South African Institute of Civil Engineers). 2014. SAICE administration file. <http://saice.org.za/downloads/SAICE%20Admin%20File/28>. Date of access: 18 Dec. 2014.

SAPI (South African Planning Institute). 2015. Joining SAPI. <http://www.sapi.org.za/content/joining-sapi>. Date of access: 26 Aug. 2015.

Saran, S. & Sharan, V. 2013. The IBSA moment. <http://www.bricsforum.com/2013/08/05/the-ibsa-moment/>. Date of access: 30 Aug. 2015.

Sarantakos, S. 2012. Social research, 4th ed. South Yarra: Palgrave Macmillan.

Saumure, K. & Given, L.M. 2008. Data saturation. (*In The Sage Encyclopaedia of qualitative research methods*. <http://www.stiba-malang.com/uploadbank/pustaka/RM/QUALITATIVE%20METHOD%20SAGE%20ENCY.pdf>. Date of access: 24 Jul. 2014).

Sera, Y. & Beaudry, S. 2007. Monitoring & evaluation: tips for strengthening organisational capacity. <http://siteresources.worldbank.org/INTBELARUS/Resources/M&E.pdf>. Date of access: 29 Jul. 2015.

Schneider, T. & Leslie, B. 2011. Efficiency vs effectiveness: defining the difference. <http://www.switchpointllc.com/pdf/Efficiency%20v%20Effectiveness.pdf>. Date of access: 10 Aug. 2015.

Schoeman, C.B. 2010. Urban and regional planning and the interface with environmental management and transportation planning. Inaugural address (238).

Schoeman, C.B. 2013. SBSS 412: Study unit 1.3 - the role of planning in the housing process (Integrated housing development) [class notes]. 28 Feb. 2013. Potchefstroom.

Schoeman, C.B. 2014. Conference questionnaires [email]. 2 Oct. 2014.

Schoeman, C.B. 2015. Contents: Part 1: Orientation and context. (*In* Jansen van Rensburg, I. & Schoeman, C.B. 2015. Capacity building guidelines in urban and regional planning for municipal engineers and engineering staff within municipalities. 79th Annual IMESA Conference: Changing the face of the municipal engineer, Cape Town, 28-30 October 2015).

Schurink, W., Fouché, C.B., de Vos, A.S. 2011. Qualitative data analysis and interpretation (*In* De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaick Publishers. p. 397-423).

Schwab, A.J. 2003?. Measures of appropriateness of factor analysis. http://www.utexas.edu/courses/schwab/sw388r7/Tutorials/PrincipalComponentsAnalysisintheLiterature_doc_html/027_Measures_of_Appropriateness_of_Factor_Analysis.html. Date of access: 11 Jun. 2015.

Service Seta see South Africa. Service Seta.

Shapiro, J. 2001. Monitoring and evaluation. <http://www.civicus.org/new/media/Monitoring%20and%20Evaluation.pdf>. Date of access: 29 Jul. 2015.

Shenton, A.K. 2004. Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*. 2004(22):63-75. http://www.angelfire.com/theforce/shu_cohort_viii/images/Trustworthypaper.pdf. Date of access: 23 Jul. 2014.

- Sivasubramaniyan, P. 2012. Research methodology: an introduction.
<http://www.limat.org/data/research/Research%20Methodology.pdf>. Date of access: 24 Jul. 2014.
- Smith, J.A., Harré, R. & Van Langenhoven, L. 1995. Rethinking methods of psychology. 1st ed. London: SAGE.
- Soule-Kohndou, F. 2013. The India-Brazil-South Africa Forum a decade on: mismatched partners or the rise of the South?.
http://www.globaleconomicgovernance.org/sites/geg/files/Soule-Kohndou%20GEG%20Working%20Paper%202013_88.pdf. Date of access: 30 Aug. 2015.
- South Africa. 1996. Constitution of the Republic of South Africa 1996.
- South Africa. Department of Higher Education and Training. 2011. National skills development strategy III. <http://www.cathsseta.org.za/wp-content/uploads/2013/04/NSDS3.pdf>. Date of access: 4 Sep. 2015.
- South Africa. Department of Higher Education and Training. 2013. White paper for post-school education and training.
<http://www.dhet.gov.za/SiteAssets/Latest%20News/White%20paper%20for%20post-school%20education%20and%20training.pdf>. Date of access: 4 Sep. 2015.
- South Africa. Department of Higher Education and Training. 2014a. Call for comments on the national scarce skills list: Top 100 occupations in demand. *Government notice*, 380, 23 May.
- South Africa. Department of Higher Education and Training. 2014b. List of occupations in high demand: 2014. *Government notice*, 863, 4 November.
- South Africa. Department of Water Affairs & Forestry. 2005. Project monitoring and evaluation. <http://www.daff.gov.za/doaDev/sideMenu/ForestryWeb/dwaf/cmsdocs/Elsa/Docs/PFM/PFM%20Guideline7.pdf>. Date of access: 29 Jul. 2015.
- South Africa. National Development Commission. 2011. National development plan: vision for 2030. http://www.gov.za/sites/www.gov.za/files/devplan_2.pdf. Date of access: 5 Sep. 2015.
- South Africa. 1998. Skills Development Act 97 of 1998.
- South Africa. 2002. Planning Profession Act 36 of 2002.
- South Africa. Presidency. 2010. New growth path.

http://www.gov.za/sites/www.gov.za/files/NGP%20Framework%20for%20public%20release%20FINAL_1.pdf. Date of access: 4 Sep. 2015.

South Africa. Service Seta. 2012. SIC codes per Seta. *Government notice*, 33756, 11 Nov.

South Africa. 2013. Planning Profession Act 2002 (Act no. 36 of 2002): South African council for planners: rules and code of conduct. (General notice no. 1230). *Government gazette*, 37189, 23 Dec.

Steckler, A., McLeroy, K.R., Goodman, R.M., Bird, S.T. & McCormick, L. 1992. Towards integrating qualitative and quantitative methods: an introduction.
<http://www.alnap.org/pool/files/7-8-towardintegratingqualitativeandquantitativemethods-.pdf>.
Date of access: 31 Jul. 2015.

Strydom, H. 2011. Ethical aspects of research in the social sciences and human service professions. (*In De Vos, A. S., Strydom, H., Fouché, C. B. & Delport, C. S. L. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaick Publishers. p. 119-123*).

Strydom, H., Delport, C.S.L. 2011. Sampling and pilot study in qualitative research. (*In De Vos, A. S., Strydom, H., Fouché, C. B. & Delport, C. S. L. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaick Publishers. p. 390-397*).

Struwig, F.W. & Stead, G.B. 2007. Planning, designing and reporting research. 4th ed. Cape Town: Pearson Education South Africa.

Tayler, W.B. 2007. The balanced scorecard as a strategy-evaluation tool: the effects of responsibility and casual-chain focus.
<https://tippie.uiowa.edu/accounting/mcgladrey/pdf/tayler.pdf>. Date of access: 27 Jul. 2015.

TCPO (Town and Country Planning Organisation). 2015. Town and country planning organisation. <http://tcpomud.gov.in/>. Date of access 2 Sep. 2015.

Trevisan, M.S. & Huang, Y.M. 2003. Evaluability assessment: a primer. *Practical Assessment, Research & Evaluation*, 8(20). <http://pareonline.net/getvn.asp?v=8&n=20>. Date of access: 12 Aug. 2015.

Trevisan, M.S. & Walser, T.M. 2014. The evaluability assessment story.
https://us.sagepub.com/sites/default/files/upm-binaries/64377_Trevisan_Chapter_1.pdf. Date of access: 12 Aug. 2015.

Trochim, W.M.K. 2006. Sampling. <http://www.socialresearchmethods.net/kb/sampling.php>. Date of access: 3 Aug. 2014.

TUT (Tshwane University of Technology). 2015. Faculty of engineering and the built environment – department of civil engineering (Pretoria Campus). <http://www.tut.ac.za/Students/facultiesdepartments/ebe/Documents/2015/2015%20Brochures/Civil%202015.pdf>. Date of access: 16 Feb. 2015.

UCLA Statistical Consulting Group. 2015?. SPSS FAQ: What does Cronbach's alpha mean?. <http://www.ats.ucla.edu/stat/spss/faq/alpha.html>. Date of access: 11 Jun. 2015.

UCT (University of Cape Town). 2014. Faculty of engineering & the built environment. <http://www.uct.ac.za/downloads/uct.ac.za/apply/handbooks/Handbook7AEBEUndergraduateStudies2014.pdf>. Date of access: 15 Feb. 2015.

UFS (University of the Free State). 2015. Rule book 2015: faculty of natural and agricultural sciences. http://apps.ufs.ac.za/dl/yearbooks/237_yearbook_eng.pdf. Date of access: 16 Feb. 2015.

UJ (University of Johannesburg). 2015. Faculty of engineering and the built environment: rules and regulations 2015. <http://www.uj.ac.za/EN/Faculties/Documents/Undergraduate%20Yearbook%202015.pdf>. Date of access: 16 Feb. 2015.

UKZN (University of KwaZulu-Natal). 2014. College of agriculture, engineering and science: handbook for 2014. http://engineering.ukzn.ac.za/Libraries/Documents/2014_CAES_handbook.sflb.ashx. Date of access: 16 Feb. 2015.

UKZN (University of KwaZulu-Natal). 2015. Master in Urban Regional Planning (Environment and Planning). <http://arch.ukzn.ac.za/Planning/planningProgram/MURP.aspx>. Date of access: 03 Jun. 2015.

UMEX (University of Missouri Extension). 2008. Program planning & development – program logic model. <http://outreach.missouri.edu/staff/programdev/plm/>. Date of access: 28 Jul. 2015.

UNESCO (United Nations Educational, Scientific and Cultural Organization). 2014a. BRICS Building education for the future: priorities for national development and international cooperation. <http://unesdoc.unesco.org/images/0022/002290/229054e.pdf>. Date of access: 30 Mar. 2015.

UNESCO (United Nations Educational, Scientific and Cultural Organization). 2014b. BRICS building education for the future: recommendations for cooperation. <http://unesdoc.unesco.org/images/0022/002296/229692e.pdf>. Date of access: 30 Mar. 2015.

UNESCO PRESS. 2013. UNESCO and BRICS ministers of education agree on basis for enhanced cooperation. http://www.unesco.org/new/en/media-services/single-view/news/unesco_and_brics_ministers_of_education_agree_on_basis_for_enhanced_cooperation/#.VeJFheTovIU. Date of access: 30 Aug. 2015.

United for Sight. 2011. How to quantify qualitative research. <http://www.uniteforsight.org/global-health-university/quantify-research>. Date of access: 23 Jul. 2014.

UNISA (University of South Africa). 2015. College of science, engineering and technology. <http://www.unisa.ac.za/contents/study/docs/myRegistration-Unisa-2015-CSET.pdf>. Date of access: 17 Feb. 2015.

Univen (University of Venda). 2012. School of environmental sciences: urban and regional planning. <http://www.univen.ac.za/index.php?Entity=Urban and Regional Planning&Sch=3>. Date of access: 17 Feb. 2015.

University of Michigan. 2011. Template consent general. http://www.irb.umich.edu/policies/consent/templates/Template_ConsentGeneral.pdf. Date of access: 28 Jan. 2015.

UNL (University of Nebraska-Lincoln). s.a. Factor Rotation. http://psych.unl.edu/psycrs/statpage/pc_rot.pdf. Date of access: 12 Jun. 2015.

UP (University of Pretoria). 2015a. Built Environment 2015. <http://www.up.ac.za/media/shared/360/Year%20Books%202015/EBIT/ebit-part-2-built-environment-2015.zp42449.pdf>. Date of access: 17 Feb. 2015.

UP (University of Pretoria). 2015b. Engineering 2015. <http://www.up.ac.za/media/shared/360/Year%20Books%202015/EBIT/ebit-part-1-engineering-2015.zp42447.pdf>. Date of access: 17 Feb. 2015.

US (University of Stellenbosch). 2014a. Faculty of Science. http://www.sun.ac.za/english/_layouts/15/WopiFrame.aspx?sourcedoc=/english/Documents/Yearbooks/Current/Science.pdf&action=default. Date of access: 17 Feb. 2015.

US (University of Stellenbosch). 2014b. Faculty of Engineering.

[http://www.sun.ac.za/english/_layouts/15/WopiFrame.aspx?sourcedoc=/english/Documents/Yea
rbooks/Current/Engineering.pdf&action=default](http://www.sun.ac.za/english/_layouts/15/WopiFrame.aspx?sourcedoc=/english/Documents/Yea
rbooks/Current/Engineering.pdf&action=default). Date of access: 17 Feb. 2015.

Van Voorhins, P. & Brown, K. 1996. Evaluability assessment: a tool for program development in corrections. <https://s3.amazonaws.com/static.nicic.gov/Library/014292.pdf>. Date of access: 12 Aug. 2015.

Van Wyk, J. 2012. Planning law. 2nd ed. Cape Town: JUTA.

Vaterlaus, J. & Higginbotham, B.J. 2011. Qualitative program evaluation methods. <http://www.ncsu.edu/ffci/publications/2011/v16-n1-2011-spring/vaterlaus-higginbotham.php>. Date of access: 24 Jul. 2014.

VI BRICS Summit. 2014. Information about BRICS. <http://brics6.itamaraty.gov.br/about-brics/information-about-brics>. Date of access: 19 Apr. 2015.

Vocational. 2015. Skills education training authorities in South Africa SETA. <http://www.vocational.co.za/>. Date of access: 24 Aug. 2015.

Voelker-Morris, R. 2004. Outcome-based evaluation: practical and theoretical applications. *CultureWork – A Periodic Broadside for Arts and Culture Workers*, 8(4). <http://pages.uoregon.edu/culturwk/culturework28.html>. Date of access: 28 Jul. 2015.

Wallerstein, N. & Duran, B.M. 2003. The conceptual, history, and practice roots of community-based participatory research and related participatory traditions. (*In* Minkler, M. Wallerstein, N. eds., *Community-Based Participatory Research for Health*, 2nd ed. San Francisco, CA: Jossey-Bass. p. 27-52.)

Walker, J.L. 2012. The use of saturation in quality research. *Can J Cardiovasc Nurs*. 22(2):37-46. (Abstract). <http://www.ncbi.nlm.nih.gov/pubmed/22803288>. Date of access: 24 Jul. 2014.

Walsh, K. 2012. Board editorial: quantitative vs qualitative research: a false dichotomy. *Journal of Research in Nursing*. 2012(17):9-11. <http://jrn.sagepub.com/content/17/1/9.full.pdf+html>. Date of access: 24 Jul. 2014.

Wang, K. 2007. A Process view of SWOT analysis. Paper presented at the 51st annual meeting of the international society for the systems sciences, Tokyo, 5-10 August. <http://journals.isss.org/index.php/proceedings51st/article/viewFile/470/242>. Date of access: 19 Aug. 2015.

Ward, T. 2007. Re-gendering data: quantifying qualitative. <http://www2.gsu.edu/~wwwire/pdf/Quantifying%20Qualitative%20Data.pdf>. Date of access: 22

Jul. 2014.

Watkins, R., Meiers, M.W., Visser, Y.L. 2012. A guide to assessing needs. Washington, DC: The World Bank.

Webster's New World College Dictionary. 2010. Demographics.

<http://www.yourdictionary.com/demographics>. Date of access: 08 Jun. 2015.

Weinbach, R. W. 2005. Evaluating social work services and programs. Boston: University of South Carolina.

Wits (University of the Witwatersrand). 2015a. School of architecture and planning.

<http://www.wits.ac.za/academic/ebe/4874/archplan.html>. Date of access: 26 Feb. 2015.

Wits (University of the Witwatersrand). 2015b. School of civil and environmental engineering.

<http://www.wits.ac.za/cee/4712/cee.html>. Date of access: 26 Feb. 2015.

WKKF (W.K. Kellogg Foundation). 2004. Using logic models to bring together planning, evaluation, and action: logic model development guide.

<http://www.smartgivers.org/uploads/logicmodelguidepdf.pdf>. Date of access: 16 Aug. 2015.

Wong, C. 2011. Definitions of skills and levels for position description questionnaire.

<http://www.xavier.edu/hr/compensation-redesign/documents/Skill-Level-Definitions.pdf>. Date of access: 23 Aug. 2015.

Zang, Y. & Wildemuth, B.M. 2009. Qualitative analysis of content.

https://www.ischool.utexas.edu/~yanz/Content_analysis.pdf. Date of access: 26 Jul. 2014.

ANNEXURES

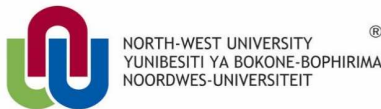
- Annexure A : Proposed programme – Capacity building guidelines in urban and regional planning for municipal engineers and engineering staff within municipalities:
Executive Summary
- Annexure B : IMESA Conference 2014 Questionnaire
- Annexure C : IMESA Conference 2014 Brochure
- Annexure D : SACPLAN 2015 Questionnaires on SoGoSurvey!
- Annexure E : SACPLAN 2015 Questionnaires Invitation from SoGoSurvey!

CAPACITY BUILDING GUIDELINES IN URBAN AND REGIONAL PLANNING FOR MUNICIPAL ENGINEERS AND ENGINEERING STAFF WITHIN MUNICIPALITIES.

EXECUTIVE SUMMARY



A product by:



In collaboration with:



NWU (Potchefstroom Campus). Unit for Environmental Sciences and Management.

Authors:

Me. Ilana Jansen van Rensburg and Prof. Carel B Schoeman

ABSTRACT

Urban and Regional Planning responsibilities have been assumed by newly established and existing local municipalities. Of these municipalities, many do not have the financial means to employ full-time Urban and Regional Planners to manage these responsibilities. Recognizing the need for capacity building in physical development planning at all levels, including all local-, district- and national authorities, for equipping them with a user friendly and comprehensive user guideline, the project will assist in carrying out their Urban and Regional Planning duties and associated responsibilities. The project is proposed to serve in this need although it *is not aimed at training* engineering staff to become Urban and Regional Planners *but rather to enable them* to engage with planning specialists. The purpose of this project is to provide an understanding of Urban and Regional Planning and associated practices, the policy and legislative framework that it accompanies and the implications it has for spatial development, transportation, the environment, land development and layout planning, the provision of engineering services and housing, sustainable development, statutory planning processes, etc. A basic knowledge of this will build capacity within staff working in related disciplines. The project will also inform all parties involved of the changes SPLUMA will bring and attempt to guide them through the transition from the old legislation towards an integrated approach. Thus the project will contribute to changing the face of the Municipal Engineer from an Urban and Regional Planning perspective. The interface between Urban and Regional Planners and Municipal Engineers and its staff is contextualised and formalized through this project.

Key terms:

- Urban and Regional Planning practices and principles;
- Capacity building guideline;
- Municipal engineer;
- Improved skills.

TABLE OF CONTENTS

1.	INTRODUCTION AND BACKGROUND	1
1.1	Background.....	1
1.2	Purpose of the guideline	2
1.3	Aims and objectives.....	3
1.4	Urban and regional planning in the built environment.....	4
1.4.1	The need for professions in the built environment.....	4
1.4.2	Urban and regional planning as a profession	5
1.4.3	The professions included in the built environment.....	9
1.5	A need for the guideline.....	13
1.6	Contents of this guideline	16
2.	POLICY AND LEGISLATIVE FRAMEWORK.....	18
2.1	Chapter contents and brief description.....	18
2.1.1.1	Background.....	18
2.1.1.2	Legislative framework.....	18
2.1.1.3	Policy framework	18
2.1.1.4	Integration of policies and legislation	19
2.2	Important knowledge to take note of	23
3.	SPATIAL DEVELOPMENT.....	24
3.1	Spatial development.....	24
3.1.1	Chapter contents and brief description	24

3.1.1.1	Regulatory framework in spatial development.....	24
3.1.1.2	Land use management in spatial development	25
3.1.1.3	Existing spatial development.....	26
3.1.2	Important knowledge to take note of	27
3.2	Layout planning and design.....	28
3.2.1	Chapter contents and brief description	28
3.2.2	Important knowledge to take note of	29
3.3	Township establishment	30
3.3.1	Chapter contents and brief description	30
3.3.2	Important knowledge to take note of	31
3.4	Township related issues.....	32
3.4.1	Chapter contents and brief description	32
3.4.1.1	Generic components of town planning applications	33
3.4.1.2	Consolidation and/or subdivision applications	33
3.4.1.3	Building line relaxation / servitude abolishment.....	34
3.4.1.4	Consent use applications	35
3.4.1.5	Rezoning applications	36
3.4.1.6	Removal/amendment of restrictive title conditions	37
3.4.1.7	Professional inputs that may be required.....	38
3.4.1.8	Evaluation of land use applications.....	38
3.4.1.9	Appeals and objections against applications	38
3.4.1.10	Notarial connections between properties.....	38
3.4.2	Important knowledge to take note of	38

3.5	Planning and development administration	40
3.5.1	Chapter contents and brief description	40
3.5.1.1	Contents of a development administration model.....	40
3.5.1.2	Understanding development administration.....	41
3.5.1.3	The correlation between planning and development administration	41
3.5.2	Important knowledge to take note of	42
4.	HUMAN SETTLEMENT DEVELOPMENT AND BUILDING CONTROL	43
4.1	Human settlement development.....	43
4.1.1	Chapter contents and brief description	43
4.1.1.1	Policy and legislative framework	43
4.1.1.2	Key concepts of human settlement development.....	46
4.1.1.3	South African housing situation.....	46
4.1.1.4	Development guidelines	46
4.1.1.5	Case study.....	46
4.1.2	Important knowledge to take note of	46
4.2	Building and construction management control.....	48
4.2.1	Chapter contents and brief description	48
4.2.1.1	Policy and legislative framework	48
4.2.1.2	Correlation between building control and planning.....	49
4.2.1.3	Correlation between building control and construction management	50
4.2.1.4	Roles and responsibilities of the Building Control Officer (BCO) and Building Inspector	50
4.2.2	Important knowledge to take note of	51

5.	TRANSPORTATION, SECTORAL PLANS AND ENGINEERING SERVICES.....	52
5.1	Transportation	52
5.1.1	Chapter contents and brief description	52
5.1.1.1	Developmental interface.....	52
5.1.1.2	Policy and legislative framework	52
5.1.1.3	Development and implementation of the Gautrain as a high speed transportation method.....	55
5.1.2	Important knowledge to take note of	56
5.2	Sectoral Plans.....	58
5.2.1	Integrated Transport Plan (ITP).....	58
5.2.2	Water Services Development Plan (2012) (WSDP)	58
5.2.3	Housing Sector Plan (HSP).....	59
5.2.4	Important knowledge to take note of	59
5.3	Provision of engineering services.....	60
5.3.1	Chapter contents and brief description	60
5.3.1.1	Development guidelines and services design.....	60
5.3.1.2	Levels of services to be provided.....	61
5.3.1.3	Service Level Agreements	61
5.3.1.4	Formalization of informal settlements and case study.....	62
5.3.2	Important knowledge to take note of	63
6.	ENVIRONMENTAL MANAGEMENT AND DEVELOPMENTAL INTERFACE	65

6.1	Chapter contents and brief description.....	65
6.1.1	Developmental interface.....	65
6.1.2	Policy and legislative framework	65
6.1.3	Environmental considerations	68
6.2	Important knowledge to take note of	69
7.	SUSTAINABLE DEVELOPMENT	70
7.1	Chapter contents and brief description.....	70
7.1.1	Background.....	70
7.1.2	The impact of economic policy on sustainability.....	70
7.1.3	The impact of transportation on sustainable development.....	70
7.1.4	Planning for sustainable urban development.....	70
7.1.5	Resilience and its relationship to sustainability.....	71
7.1.6	United Nations (UN) sustainable development goals	71
7.1.7	Policy and legislative framework	72
7.1.8	Challenges of sustainable development	73
7.1.9	Making human settlements and cities sustainable	73
7.2	Important knowledge to take note of	73
8.	CONCLUSION.....	75

LIST OF TABLES

Table 1-1: Scarce and critical skills list for some of the professions in the built environment.	4
Table 1-2: Some professional focuses of the Urban and Regional Planning as per interpretation on a national and international level.	5
Table 1-3: Explanation of professions in the built environment and their interaction with Urban and Regional Planners.	10
Table 2-1: Important knowledge to take note of - General policy and legislative framework.	23
Table 3-1: Important knowledge to take note of - Spatial development.....	27
Table 3-2: Important knowledge to take note of - Layout planning and design.	29
Table 3-3: Distinguishing between township establishment and sectional title schemes.	30
Table 3-4: Important knowledge to take note of - Township establishment.	31
Table 3-5: Important knowledge to take note of - Township related issues.	39
Table 3-6: Important knowledge to take note of - Planning and development administration.....	42
Table 4-1: Important knowledge to take note of - Human settlement development.	46
Table 4-2: Important knowledge to take note of - Building and construction management control.....	51
Table 5-1: Important knowledge to take note of - Transport and other sectoral plans.	56
Table 5-2: Important knowledge to take note of - Transport and other sectoral plans.	59
Table 5-3: Important knowledge to take note of - Provision of engineering services.	63
Table 7-1: Important knowledge to take note of - Sustainable development.....	73

LIST OF FIGURES

Figure 1-1: Micro and macro interface relationships between Urban and Regional Planning and other disciplines.....	7
Figure 1-2: Stakeholders in sustainable development.....	8
Figure 1-3: Open ended questions - Section B.....	13
Figure 1-4: Total level of knowledge per topic.....	14
Figure 1-5: Level of knowledge for years' experience.....	15
Figure 1-6: Average level of knowledge for private vs public sectors.....	15
Figure 1-7: Project contents.....	17
Figure 2-1: General legislative framework - flow chart.....	20
Figure 2-2: General policy framework - flow chart.....	21
Figure 2-3: Interaction between private and public sector and associated policies and legislation.....	22
Figure 3-1: Steps included in compiling a LUMS.....	26
Figure 3-2: Generic processes for consolidation and subdivision applications.....	34
Figure 3-3: Generic processes for consent use applications.....	36
Figure 3-4: Generic processes for rezoning applications.....	37
Figure 4-1: Human settlement development legislation - flow chart.....	44
Figure 4-2: National housing programmes - flow chart.....	45
Figure 4-3: Human settlement development policies - flow chart.....	45
Figure 4-4: Building and construction management control legislative framework - flow chart.....	49
Figure 5-1: Transportation legislative framework - flow chart.....	53

Figure 5-2: Transportation policy framework - flow chart.....	54
Figure 5-3: Contents and process of the HSP.....	59
Figure 6-1: Environmental legislative framework – flow chart.....	66
Figure 6-2: Environmental policy framework – flow chart.....	67
Figure 7-1: Dimensions of urban sustainability.....	71
Figure 7-2: 2030 Agenda for Sustainable Development Goals.....	72

1. INTRODUCTION AND BACKGROUND

1.1 Background

Urban and Regional Planning is included as one of the main role players in the vast multi-disciplinary sector that is the built environment. The role of Urban and Regional planning is unavoidable and integral in the success of, among others, sustainable and efficient development (Ahmadi & Toghyani, 2011:26; Schoeman, 2010). This is enhanced through the relationship between the relevant disciplines, and the understanding of the disciplines role in handling certain responsibilities.

Along with the democratisation of South Africa in 1994, the new government inherited the long list of spatial planning and development problems that was the result of failed attempts to address possible spatial planning problems and development regulations in the past. These problems included segregation, fragmented and spatial system and other problems with regards to, not only spatial problems but also economic implications (Forbes, 2011:6; Schoeman, 2010; van Wyk, 2012: 25 & 50-52).

As a result of the implementation of “wall-to-wall” municipalities after the 1994 elections in South Africa, a large amount of new municipalities were developed, such as local, district and local municipalities (Forbes, 2011:12; van Wyk, 2012:101-127). This development resulted in Urban and Regional Planning responsibilities being assumed by newly established and existing local municipalities. Of these municipalities, many do not have the financial means to employ full-time Urban and Regional Planners to manage these responsibilities (IMESA, 2009).

Recognizing the need for capacity building in physical development planning at all levels, IMESA (Institute of Municipal Engineers of Southern Africa) identified the need in all municipalities, including all local-, district- and national authorities, for equipping them with a user-friendly and comprehensive user guideline, the project will assist in carrying out their Urban and Regional Planning duties and associated responsibilities. The project is proposed to serve in this need (IMESA, 2009). Further need assessment was conducted in order to confirm the presumed need and to establish whether or not the project will be adequate and sufficient.

The document is further described by Schoeman (2014) as:

*“The project consists of capacity building guidelines to empower municipal engineers and engineering staff to have a basic understanding of the theory, concepts, definitions, practices and procedures underpinning the Profession of Planning. The point of departure is **not to train** engineering staff to be Urban and Regional Planners **but to enable** such members of staff to be*

able to engage with planning specialists and related applications such as spatial plans, land development applications etc.”

The document will thus serve only for capacity building in urban and regional planning practice in order to enhance knowledge, effectiveness and efficiency of municipal engineers and engineering staff in engagement, participation and contribution in statutory land development applications, spatial planning and related development processes within municipalities. It is thus important to note that no formal training will be provided to the parties concerned as this document.

1.2 Purpose of the guideline

The purpose of this project is to provide an understanding of Urban and Regional Planning and associated practices (IMESA, 2009), the policy and legislative framework, that it accompanies and the implications it has for spatial development, transportation, environment, land development and layout planning, the provision of engineering services and housing, sustainable development, etc. A basic knowledge of this will build capacity with staff working in related disciplines.

The document will further enable an understanding of the processes supporting statutory planning and the content of processes documents required for the development of various categories of land applications to be submitted to all municipalities and tribunals, along with an understanding of the engineers’ responsibility regarding the scope and extent of their planning related responsibilities.

Other purposes will be to (IMESA, 2009):

- Formulate town planning and related policies;
- Brief consultants to prepare town planning schemes, structure plans, development plans and policies;
- Understand the various town planning procedures specified by the various Acts and Ordinances related to town planning;
- Adjudicate and process development applications received;
- Control development and land uses.

Furthermore, the alignment of Urban and Regional Planning within the built environment, including the reason behind the knowledge of Urban and regional Planning, etc. will be provided.

The document will largely be made available in an electronic version in order to allow continuous updates, which will decrease the aging of the document, whilst keeping to relevant to all current available data.

1.3 Aims and objectives

The primary aim of the project is to provide capacity building guidelines in Urban and Regional Planning practices in order to enhance effectiveness and efficiency of municipal engineers and engineering staff in their engagement, participation and contribution in statutory land development applications, policy compilations, spatial planning and related development processes within municipalities.

The secondary aims will:

- Explore the interface and relevance of Urban and Regional Planning in the built environment;
- Explore the interaction of Urban and Regional Planning within a multi-disciplinary environment;
- Determine, explain and provide an understanding of Urban and Regional Planning practices and the working thereof in the built environment;
- Provide an overview of the policy and legislative frameworks relevant to the goal of this document;
- Establish a framework in order to determine which information should be included in the document, thus deemed as important information regarding capacity building;
- Provide and illustrate understandable information serving as summarisations of the information determined as important and relevant to the aim of the capacity building guidelines;
- Ensure that the information provided is easily understandable and will enhance capacity building as determined by the aim of the guidelines.

The following objectives will be addressed in accordance with the aim and sub-aims of this document, the reader will:

- When facing a problem in the practitioners field, be able to refer to policies, legislation, regulations, principles, guidelines, and/or knowledge from urban and regional planning to help solve a problem in a multi-disciplinary manner;
- Be able to participate in conversation regarding Urban and Regional Planning;
- Be able to better understand the information relevant to urban and regional planning regarding statutory land development applications;
- Be able to provide adequate and accurate comments on statutory land use planning applications;
- Be able to participate in the compilation and implementation of developmental policies;
- Be able to better assist in processes regarding spatial planning and related development processes;

- Be able to refer to the document, when having questions and concerns regarding the content, related to Urban and Regional Planning problems;
- Have the capacity to substantiate their decisions regarding Urban and Regional Planning practices relevant to their specialised fields.

1.4 Urban and regional planning in the built environment

1.4.1 The need for professions in the built environment

The South African Parliament, in 1998, identified a need for the improvement of skills development. In response to this need the Sector Education Training Authorities (SETA's) was established, each with its own clearly defined sector and sub-sectors made up of a variety of related economic activities. SETA's are concerned with learner ships, internships, unit based skills programmes, and apprenticeships. They are also responsible for the collection of skills levies, in terms of the Skills Development Levies Act (1999), from each sector, which is then reused in the specific sector for training purposes in the form of, amongst others, grants and bursaries (Vocational, 2015).

The professions included in the built environment forms part of the Construction Education and Training Authority (CETA) (CETA, 2013).

Scarce and critical skills refer to the professions which currently, or in the future, has a scarcity of qualified and experienced people. This can be the result of skilled people not being available, known as absolute scarcity, or that there are skilled people available, but they do not meet the employment criteria, known as relative scarcity (DHET, 2014a; EDTP SETA, 2014).

Several sources are used to identify profession is identified as a scarce and critical skill, including, amongst others, the National Development Plan (2012), the New Growth Path (2010). The rankings of professions generally related to the built environment on the scarce and critical list of 2014, are as follow (DHET, 2014a):

Table 1-1: Scarce and critical skills list for some of the professions in the built environment.

Ranking	Profession
2	Civil Engineer
4	Quantity Surveyor
6	Physical and Engineering Science Technicians (Civil Engineering Technicians; Surveying or Cartographic Technicians; Town Planning technicians)
48	Land Surveyor

62	Civil Engineering Technologist
72	Architect
80	Urban and Regional Planner

Source: Adapted from (DHET, 2014a).

It should be noted that the list provided above was finalised by the DHET (2014b), after receiving feedback from the public on its original list. The positions mentioned above are all included in the final list, however, there is no ranking allocated to any specific profession.

1.4.2 Urban and regional planning as a profession

Urban and Regional Planning forms part of an interconnected web of several disciplines. This include the spheres of inter alia Natural Science, Engineering, Research and Development, Biological Science, Law and Legislation, Mathematics & computer science, Economics. Urban and Regional Planning also forms part of the Built Environment which in turn include the disciplines such as Architecture, Land Surveying, Urban Design, and so forth (Akbar & Rasul, 2012; Pinson, 2004; Rahmaan, 2011:182-184).

The following table illustrates the grouping of the Urban and Regional Planning domain as per interpretation on a national and international level, into several relevant sections of core professional focuses (Schoeman, 2010) meaning that there are several subsections (domains) provided under each of the identified sections (Akbar & Rasul, 2012; Pinson, 2004; Rahmaan, 2011:182-184). These sections also illustrate the vast applicability and knowledge contained in Urban and Regional Planning.

Table 1-2: Some professional focuses of the Urban and Regional Planning as per interpretation on a national and international level.

Sections of core professional focuses	Domain as per interpretation on a national and international level
Spatial Planning	Planning systems; practices in regional spaces; role of places; strategic frameworks; forward planning; scale of regional planning; impact of migration; regional corridor and nodal development.
Urban Planning	Anticipating development; scale of urban planning; urban regeneration and development; urban design; site planning; neighbourhood development.
Policy and strategy formulation	Policy interventions; multi-perspective approaches; disaster preparedness plans; input in draft of policy legislation.
Land use management	Land use management and control; regulating development; legal issues related to land use and building codes & environmental regulations.

Built environment	Style of buildings; conservation of historic buildings; development of public spaces and places, location, design and layout of buildings.
Land availability	Land reservation; identification of land for development.
Transportation planning	Accessibility between places of residence, work and amenities; traffic congestion management; air pollution management; transport and land use models; transportation frameworks.
Environmental Management	Relationship between build and environment; negative impacts on natural environment; natural impacts on communities; standards of environmental quality & sustainability; landscape development; legal issues related to environmental management.
Social-economic and spatial development	Social and economic status quo and forecasting; community regeneration; regional and economic development; smart growth strategies; economic development plans; development resources.
Facilitation and communications	Lead public consultation processes; education, training and capacity building; identification of community needs; community goals and vision compilation.
Human settlement development	Housing development and strategies.
Rural development	Community based development and area based planning.
Feasibility studies	Appreciation of spatial complexities; deeper underlying causes; integrated analysis.
Implementation	Infrastructure needs; general management; implementation and enforcement strategies; determination of infrastructure and amenities capacity.
Project management	Management of programmes for planning and implementation; quality management.
Management and analysis support systems	GIS applications and techniques, modelling and system analysis.

Source: Adapted from (Akbar & Rasul, 2012; Greshman, 2011; Schoeman, 2010).

The inter-active disciplinary approach promoting Urban and Regional Planning and other professions in the built environment, is also important for the stakeholder involvement to be taken into consideration as this may influence the resulting sustainable development (Rahmaan, 2011:182-184; Schoeman, 2010). This includes the responsibilities of professions such as engineering which deals, in general with the transportations and traffic systems and utilities such as water, stormwater, sewer and electricity, to name only a few (Greshman, 2011; Lovelace, 1965). It is known that Engineers in general, deals with individual projects related to infrastructure while planners deals with these projects in their bigger application to the local planning structure and proposed development principles (Greshman, 2011).

The domain of Urban and Regional Planning can be viewed from an interface perspective with the inclusion of other disciplines (Akbar & Rasul, 2012; Pinson, 2004; Rahmaan, 2011:182-184) such as engineering, architecture, environmental management, etc. It is stated that the planning education and the interfaces within the academic and research environment, are used to form the basis for developments such as residential development (Schoeman 2013).

Urban and Regional Planning and its associated policy and legislative framework, serves as the foundation and integration between other disciplines. There is also several challenges that the current Urban and Regional Planning Domain in order to promote the interfaces between professions in human settlement development (Razaghi & Finger, 2013; Schoeman, 2013).

Figure 1-1 will illustrate not only the macro context (Schoeman, 2010) in which urban and regional planning is included within a multi-disciplinary system, but will also illustrate the close proximity of engineering and in particular “Engineering Planning”. Through this figure it is clearly indicated that engineering is a fundamental and vital aspect to Urban and Regional Planning (“URP”). It is also clear that engineering will not be able to stand on its own, with no support from other disciplines. The results in an interdependent relationship between not only the two fields in question but also within the fields indicated as “Fields fundamental to URP” (Schoeman, 2010).

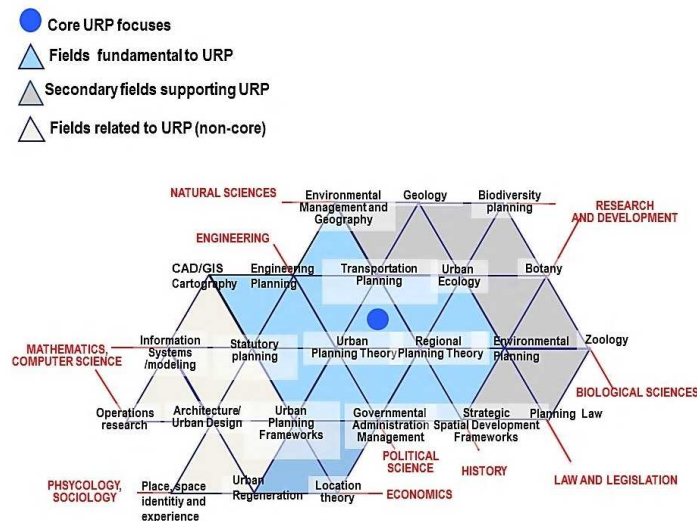


Figure 1-1: Micro and macro interface relationships between Urban and Regional Planning and other disciplines.

Source: Adapted from (Schoeman, 2010; Schoeman, 2013).

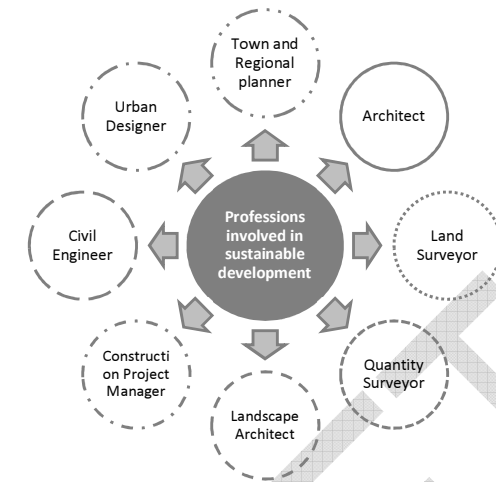


Figure 1-2: Stakeholders in sustainable development.

Source: Adapted from (ITPI, 2015; Schoeman, 2013).

In review of the above mentioned it is clear that Engineering plays an integral and vital role in Urban and Regional Planning and its associated practices. It is thus important that an understanding of this profession is generated in the endeavours of those persons in Engineering and associated professions, have an understanding of what the implications of Urban and Regional Planning procedures entails as well as their impacts thereon.

The Planning Profession Act (36 of 2002) states that planning along with the planning profession can be seen as areas of expertise focused on the initiation and management of change in both the built and natural environment across a spectrum of areas, including the urban and rural areas defined on various geographic scales such as regions, sub regions, cities, towns, villages and neighbourhoods.

Specific fields for the management of constant change is needed in order to promote human development and environmental sustainability, this can be obtained through the synthesis and integration of information assisting in the preparation of strategic, policy, statutory and other development plans, included within the South African development context. These fields include (Planning Profession Act 36 of 2002):

- Land use management, allocation and regulation.
- The organisation of service infrastructure, utilities, facilities and housing for human settlement.

- The co-ordination and integration of social, economic and physical sectors included in human settlement.

Planning should pursue and serve the interest of the public to benefit the present and future generations (Planning Profession Act 36 of 2002). This description of planning and the planning profession can also be seen as the definition of sustainable development.

The Planning Profession Act (36 of 2002) further provides the definition of a planner as a person exercising skills and competencies in the initiation and management of change in the built and natural environment, in order to promote environmental sustainability and human development, as provided above.

1.4.3 The professions included in the built environment

It is important to comprehend the interaction of the Urban and Regional Planner with other professions in the built environment. This substantiates the importance of skills transfer of Urban and Regional Planning practices and principles to these professions.

Section 1.4.2 indicates that there is a close relationship between Urban and Regional Planning and engineering, it includes a brief description of the correlation and linkages between Urban and Regional Planning and engineering, or specifically civil engineering. However, it is important not to gain an understanding of the relationship between Urban and Regional Planning and engineering as they cannot be considered as a stand-alone entity.

Akbar and Rasul (2012) states that civil engineering focuses on the design, construction and maintenance of the built environment, including infrastructure such as roads, bridges, sanitation systems and buildings, while Urban and Regional Planning mostly deals with the planning of infrastructure development, service delivery, land use management, community development and transport and communication planning. These professions are located within the built environment and should be considered as such.

As a result, a brief description of some of the professions included in the built environment are provided along with the regulatory body and voluntary association along with their registration categories, applicable regulatory legislation, the linkage with Urban and Regional Planning and the role in and towards to municipalities is provided in Table 1-3.

Table 1-3: Explanation of professions in the built environment and their interaction with Urban and Regional Planners.

Profession	Civil Engineer	Land Surveyor	Architect
Description	Civil engineering can be described as the use of science and technology in an attempt to control and use the forces and materials of nature, for the advanced benefit of people. They are responsible for the design, planning, maintenance or servicing and management of projects of a very large scale. Their work include amongst others, buildings, harbours, bridges, roads, the supply of municipal services, large scale housing development. They also verify the structural integrity of buildings and constructions. A civil engineer can focus on, amongst others: • Structural engineering: The design of bridges, roads, towers and tunnels. • Transportation or traffic engineering: Includes airports, conducting traffic impact assessments, conducting traffic control. • Geotechnical engineering: Includes mining, excavations, foundations, soil investigations & compositions. • Water engineering: Includes the design of pipelines, sewerage systems, water networks. • Environmental engineering: Design of environmentally friendly initiatives.	Surveying is one of the oldest recorded professions and includes projects varying in size. The work of a land surveyor include both field works, such as the measurement of a terrain and pegging of beacons, and office work, including the processing of information. A land surveyor can specialise in: • Geodetic surveying: Focuses on providing a framework of accurately coordinated and heightened beacons, in order to generate linkages with other maps. • Cartography: It is usually done by photogrammetry, where the data is included on a map showing data in an easily understandable form. • Cadastral Surveying: Includes the surveying of land (the development of townships on farms) and buildings (the development of sectional titles) and the determining of property boundaries. • Engineering surveying: The measurement, setting out and monitoring of roads, tunnels, bridges and structures. • Hydrographic/oceanographic surveying: Concerned with mapping the marine environment including inland bodies of water, also includes the	Architecture refer to the design of the human environment, including buildings or groups of buildings and the space between buildings. Other activities of architecture include the documentation of design and the inspection of buildings and may also include: • Landscape architecture: The design landscapes on properties and between buildings. • Interior architect: Similar to the work done by interior designers, although this includes, amongst others, the design of furniture to fit in a room. The size of architectural projects range from large buildings or building complexes to small additions to a single dwelling house.

		positioning at sea to indicate danger zones.	
Applicable regulatory legislation	Engineering Profession Act No. 46 of 2000	Geomatics Profession Act No. 19 of 2013	Architectural Profession Act No. 44 of 2000
Regulatory body, voluntary association and accreditation	The Engineering Council of South Africa (ECSA) is seen as the regulatory body to which the all engineers should be registered, in order to be able to practice as, amongst others, a professional engineer. The South African Institute of Civil Engineering (SAICE) and the Institute of Municipal Engineers of Southern Africa (IMESA) are the voluntary organisations to which civil engineers and municipal engineers can register, respectively.	The South African Council for Professional and Technical Surveyors (PLATO) is seen as the regulatory body to which all surveyors should be registered, in order to be able to practice as a professional or technical surveyor. The South African Geomatics Institute (SAGI) is the voluntary organisation to which surveyors can register.	The South African Council for the Architectural Profession (SACAP) is seen as the regulatory body to which all Architectural professionals should be registered, in order to be able to practice as a professional architect. The South African Institute of Architects (SAIA) is the voluntary organisation to which architects can register.
Regulatory body and voluntary association registration categories	• ECSA membership: Professional Engineer; Professional Engineer Technologist; Professional Certified Engineer; Professional Engineering Technician; Candidate Engineer • SAICE membership: Honorary Fellow; Fellows; Member; Associate-; Student members • IMESA membership: Professional-; Graduate-; Student-; Associate members.	• PLATO membership: Professionals; Surveyors – Technologists; Technicians; Persons in training. • SAGI membership: Professional; Technologist; Survey Technician; Student.	• SACAP membership: Professional Architect; Professional Senior Architectural Technologist; Professional Architectural Technologist; Professional Draughtsperson; Candidate Architect; Candidate Senior Architectural Technologist; Candidate Architectural Technologist; Candidate Draughtsperson. • SAIA membership: Architect-; Life-; Honorary-; Retired-; Candidate-; Associate member.
Linkage to Urban and	Civil engineers are consulted when large scale town planning developments are proposed such as township establishments and in particular for large	Land surveyors in particular, are able to submit consolidation and subdivision applications to the local authorities. These applications comply with all the	Architects usually provide the site development plans for a rezoning or removal of restrictive title conditions application submitted to the local

Regional Planning	scale residential developments. Geological assessments are requested from civil engineers when a new township development is planned. This includes, amongst others, the composition of soils and the evaluation of possible drainage problems as a result of the gradient or slope of the proposed site. Other consultations include the assessment of the impact an increased traffic volume may have on the surrounding developments. The provision of sufficient services are also determined.	necessary legislation. Land surveyors are father responsible for the development of sectional schemes. Land surveyors are consultants, often used to identify and peg property boundaries or the gradient, slope and contours of a specific site.	authority by the town planner. These plans include the position of the existing and proposed development on the property. The town planners can also be seen as consultants to the architects, as they are contracted to do the planning applications on a property which will enable a certain project to continue. The collaboration between architects and town planners can result in a more integrated approach to new and continuous development in a city, especially through the use of urban design.
Role in and towards municipalities	Civil engineers can be employed by state departments, provincial administrations, municipalities and parastatals. They are responsible for the design, development and maintenance of transport systems and the provision of adequate and sustainable municipal services to the community. Civil engineers need to provide comments on all town planning applications submitted to the municipalities including an indication of whether the existing or proposed services will be able to provide in the need of the development. They also need to approve the building plans submitted by architects.	Several land surveyors are employed by state departments, provincial administrations, municipalities and parastatals. In these positions, they are responsible for mostly engineering surveying such as the determination and upgrading of roads as well as the pegging of developments such as new townships. Surveyors also manage the subdivision and consolidation applications and the Surveyor General Diagrams involved therein. They may also be required to approve the drawings of new township developments in order for it to be submitted to the Surveyor General of each province.	The building plans drawn by architects, need to be submitted to the local authority relevant to the property. These plans need to be approved by the Municipal Architect, Town Planner and the Engineering department, prior to the commencement of construction. A Municipal Architect or building inspector need to conduct inspections for each phase of construction. This is to ensure that all developments are up to standard and complies with the necessary regulations.

Source: Own synthesis from (CareerPlanet, 2015; ECSA, 2014; PLATO, 2015; SACAP, 2011; SACAP, 2015; SAICE, 2014; SAGI, 2015; SAIA, 2014).

1.5 A need for the guideline

Supporting research conducted, determined that there is indeed a need for this guideline. Questionnaires were circulated, by hand, at the IMESA Conference 2014. The survey was used to determine the current level of skills and knowledge of municipal engineers in Urban and Regional Planning and related fields as well as the expectations and experience from the related professions towards each other. The questionnaires contained three (3) sections, including quantitative and qualitative questions.

A total of 817 delegates were registered to attend the conference of which 140 feedbacks were received during the conference time frame from 28-31 October 2014. From this, 71 (55.9%) of the participants indicated that they are of the opinion the Municipal Engineers of South Africa do not have sufficient working knowledge of the domain of Urban and Regional Planning. In addition, 118 (93.7%) of the participants are of the opinion that it is necessary to broaden the understanding of Urban and Regional Planning under Municipal Engineers (Figure 1-3).

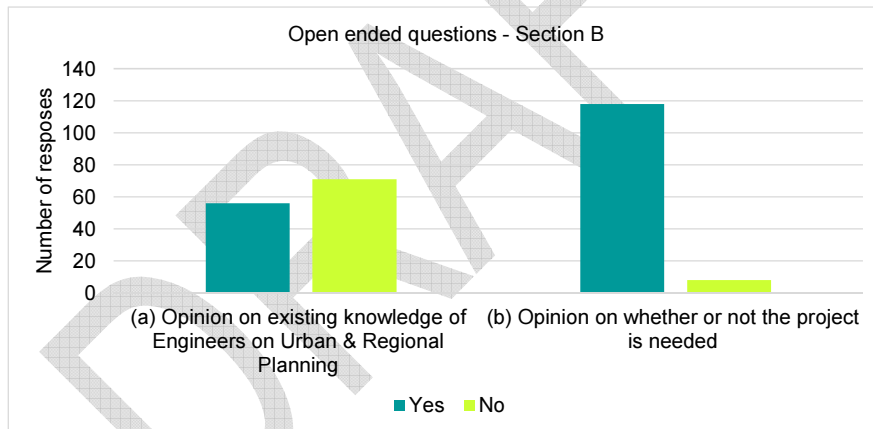


Figure 1-3: Open ended questions - Section B.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

Figure 1-4 substantiates the above mentioned through the low levels of average knowledges determined through the surveys.

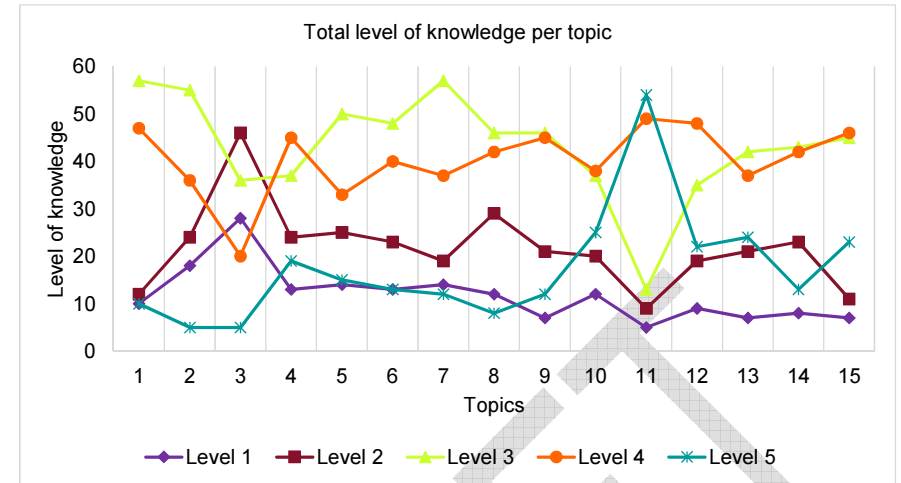


Figure 1-4: Total level of knowledge per topic.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

Figure 1-5 illustrates the level of knowledge relating to the private and public sectors as indicated during the IMESA Conference 2014 survey. Although it is expected that the average level of knowledge for Baseline knowledge should generally be much higher for the public sector than for the private sector, it is evident that it is not the case. Engineers in the private sector do not generally deal directly with Urban and Regional Planning, thus it is expected that their average Output driven knowledge is higher than that of Baseline knowledge. In contrast the engineers in the public sectors are required to provide opinions and comments on most of the Town planning applications received by the municipalities, as well as policies and legislation rolled out by the municipalities and governmental departments. As a result they are expected to have a much higher average level of Baseline knowledge with a very small difference between the averages of that of Output driven knowledge, resulting in the confirmation of the need for a project such as the Capacity Building Guidelines.

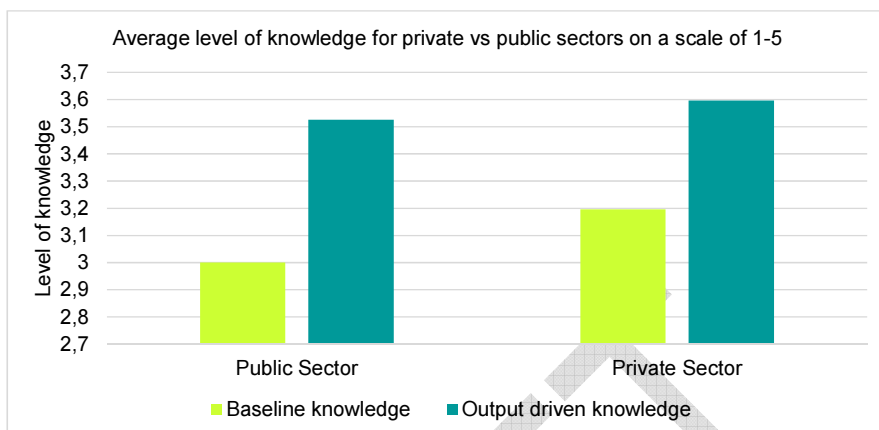


Figure 1-6: Average level of knowledge for private vs public sectors.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

Figure 1-6 illustrates the average level of knowledge per group of years' experience by participants. Included in this figure is the amount of responses received for each group, ensuring better interpretation of the results obtained. Even though several of the participants indicated that they are of the opinion. That engineers with more experience will have a greater knowledge regarding Urban and Regional Planning, the results of the survey indicated that the engineers with less experience do indeed have the greatest average level of knowledge followed by those

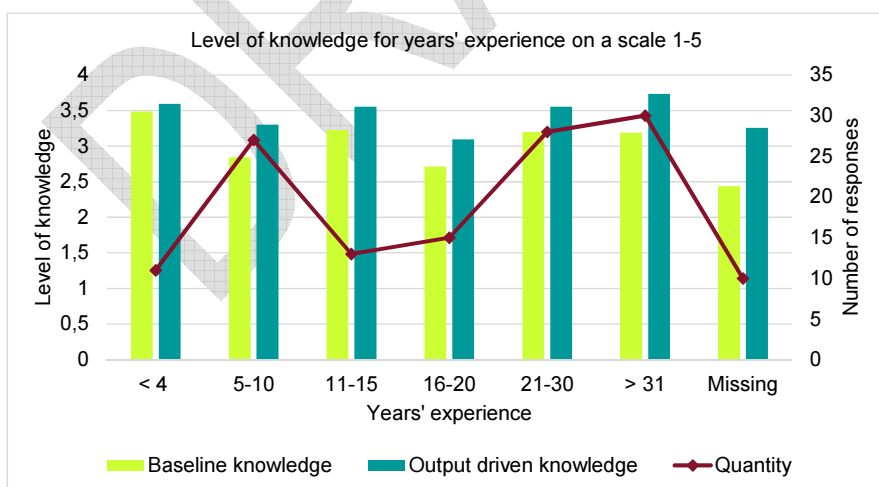


Figure 1-5: Level of knowledge for years' experience.

Source: Own synthesis from IMESA Conference 2014 Questionnaires.

with the most amount of experience, this however can be attributed to the amount of responses received per years' experience group. The cause of this can be either the result of engineers having to conduct Urban and Regional Planning related responsibilities or that they have received a more comprehensive tertiary education. Again the need for the programme is stressed.

Through this research along it became evident that there is indeed an alarming need for this guideline.

1.6 Contents of this guideline

Several policies and legislation included under Urban and Regional Planning, is provided and discussed in brief; the environmental interface with the inclusion of a summary of all regulations related thereto; guidelines in handling the legal practices, existing spatial development and land use management related thereto; guidelines on transportation planning and other sectoral plans as well as the requirements and regulations included; housing provision guidelines; and town planning regulations and summarised guidelines which will enable the reader to provide comments and assist with such applications. Illustrations and tables will be included to enable a better understanding of the document and the data included.

The changes, as a result of the Spatial Planning and Land Use Management Act (SPLUMA) (Act No. 16 of 2013), is included in the document. This will enable the relevant parties to make a transition from the old legislation towards an integrated approach as proposed by the Act and will form an important focus of the document, as it will have a large influence in the town planning applications and its associated processes. SPLUMA commenced on 01 July 2015, with implications on various municipalities. The municipalities however, are granted with a transitioning period in which they are to prepare specified by-laws. An overview of the generalised by-laws is included in an attempt to explain the processes it includes. Up until the new policies for each municipality or province have been developed, the existing processes will be used, if it is not in contradiction with SPLUMA, or has been repealed.

Figure 1-7 illustrates the topics discussed in the document.

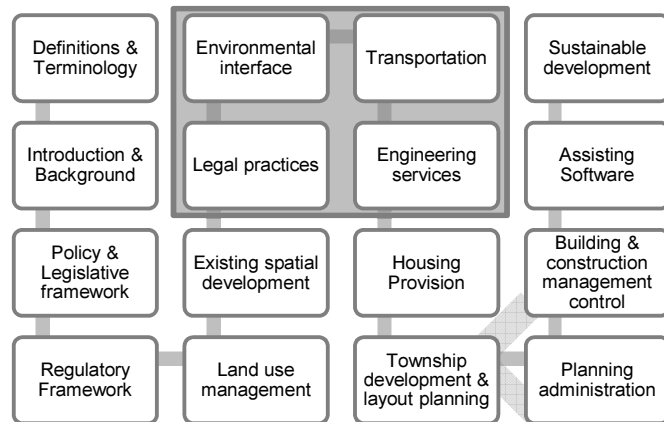


Figure 1-7: Project contents.

Source: Own synthesis.

The interaction between Urban and Regional Planning and Engineering forms an integral part of this document, as it will be attempted to not only guide the engineer needing to deal with town planning applications, but also the town planner to understand the role of the engineer in the applications they present. The document includes a summarisation of what the role of the engineer will be regarding the particular topic, as well as whom he/she can contact for assistance, what resources (documents) and practitioner can be consulted, the processes that need to be followed, etc. It will typically be presented in a table similar to the following, with accompanying explanations where processes should be explained.

2. POLICY AND LEGISLATIVE FRAMEWORK

2.1 Chapter contents and brief description

2.1.1.1 Background

Planning legislation in South Africa largely contributes its origins to the ruling party, the National Party (NP) whom in 1948 gave rise to apartheid or separated development between races. As a result they made plans for development and Town Planners was responsible for the implementation of these plans. In 1960 the Decentralisation Policy came into effect, which kept non-white residents in the rural areas and out of the cities which restricted the growth of the major cities at that time.

The first national plan was implemented in 1975 which also lead to the implementation of National Planning as sub-category of Urban and Regional Planning. As a result wall-to-wall municipalities was established. This meant that the areas between urban areas was also now included under the local municipalities. All regional planning legislation was also implemented since 2000. Some of the current policies, entities, National Plans, etc. are the product of the assistance of the BRICS (Brazil, Russia, India, China, South Africa) group.

Urban and Regional Planners deals with a comprehensive web of policies and legislation across all spheres of government, in order to conduct their work. It is thus important to comprehend the interaction of these policies and legislation, as it may have a great influence on the processes used.

2.1.1.2 Legislative framework

Figure 2-1 illustrates the relevant legislation that influences spatial development and land use and as a result the development in South Africa. Various legislation have been put in place since the 1950's with some of these legislation being phased out as new legislation is designed to take its place while others have recently been repealed by SPLUMA (2013). These legislation are responsible for the development of policies and guide development as such. Other specialised legislation are included in the appropriate chapters. The relevant legislation are briefly discussed in the *Source Document*.

2.1.1.3 Policy framework

Figure 2-2 illustrates the relevant policies that has an influence on development in South Africa, however, this does not include policies such as the Spatial Development Frameworks (SDFs) on

all levels as these are included in Chapter 3. Other specialised policies are included in the appropriate chapters. The relevant policies are briefly discussed in the *Source Document*.

2.1.1.4 Integration of policies and legislation

The interface between spatial planning, transportation planning and environmental management, are promoted through the Spatial Planning and Land Use Management Act (16 of 2013) (SPLUMA), which includes (Schoeman, 2015):

- Development principles and norms and standards;
- Intergovernmental support;
- Spatial Development Frameworks (SDF's);
- National Spatial Development Framework (NSDF);
- Provincial Spatial Development Framework (PSDF);
- Regional Development Framework (RSDF);
- Municipal Development Framework (MSDF);
- Land Use Management (LUM);
- Land Development Management (LDM);
- Municipal Land Use Plans (MLUP);
- Statutory Planning (SP).

Figure 2-3 provides a brief overview of the interaction between the private and public sector and the associated policies and legislation frameworks.

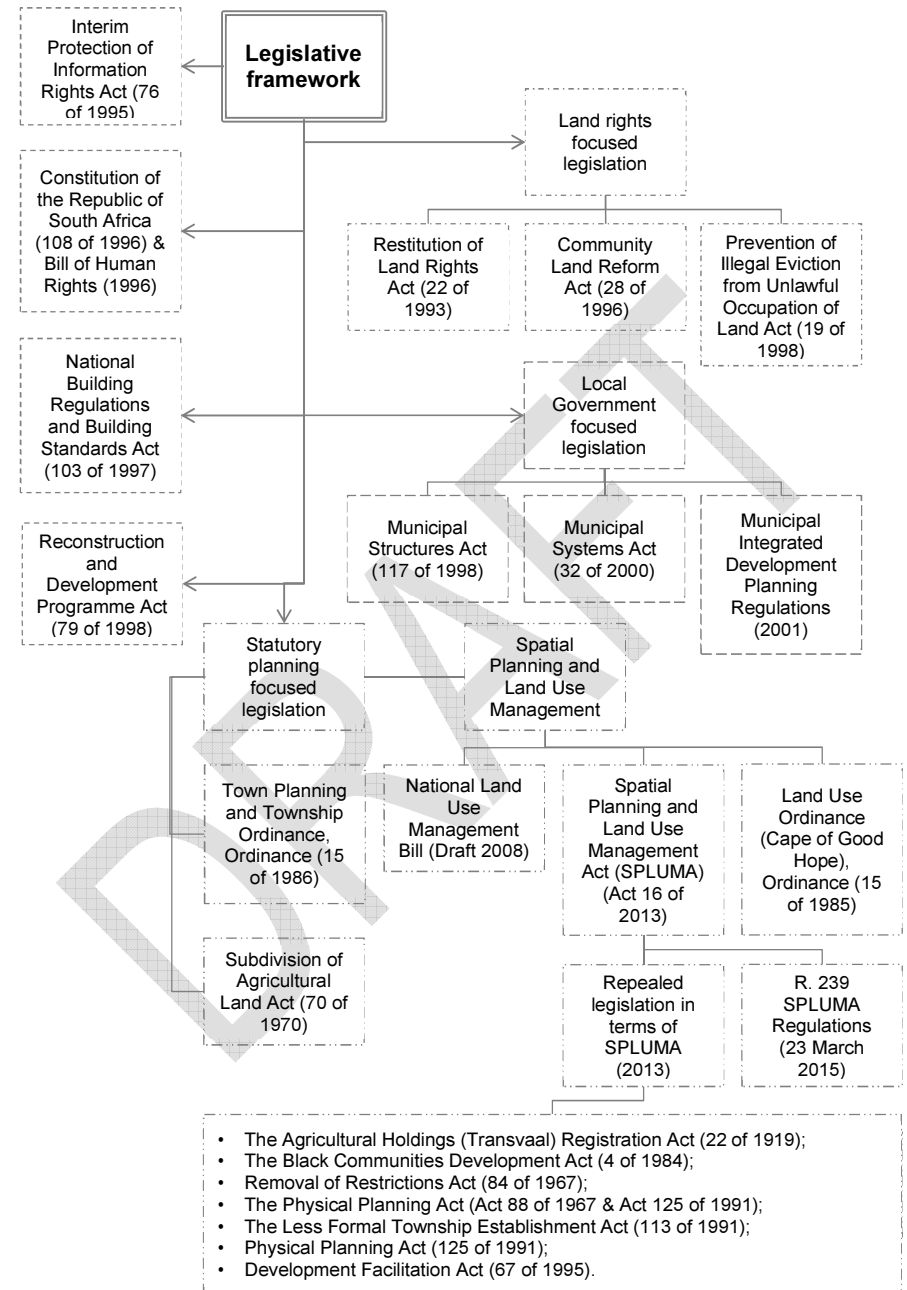


Figure 2-1: General legislative framework - flow chart.

Source: Own synthesis (Schoeman, 2015; Van Wyk, 2012:645-687).

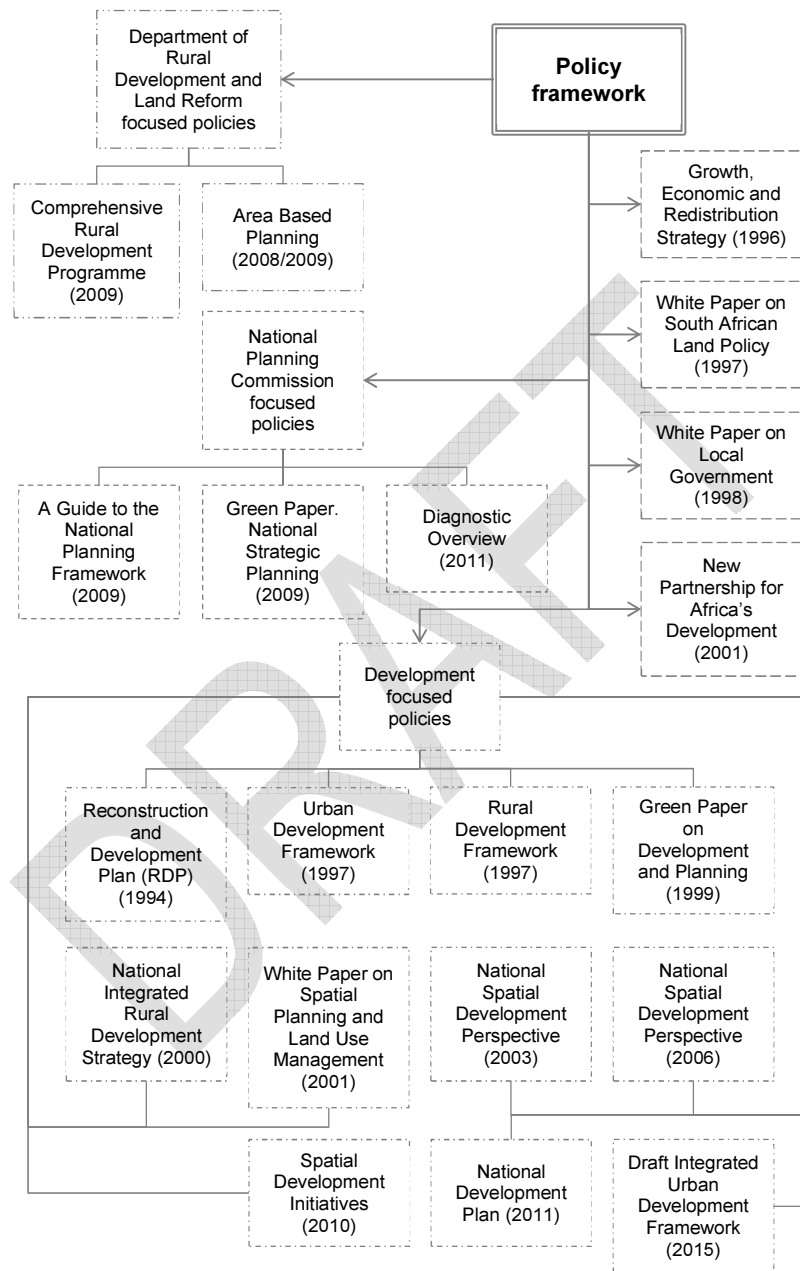


Figure 2-2: General policy framework - flow chart.

Source: Own synthesis (Schoeman, 2015; Van Wyk, 2012:645-687).

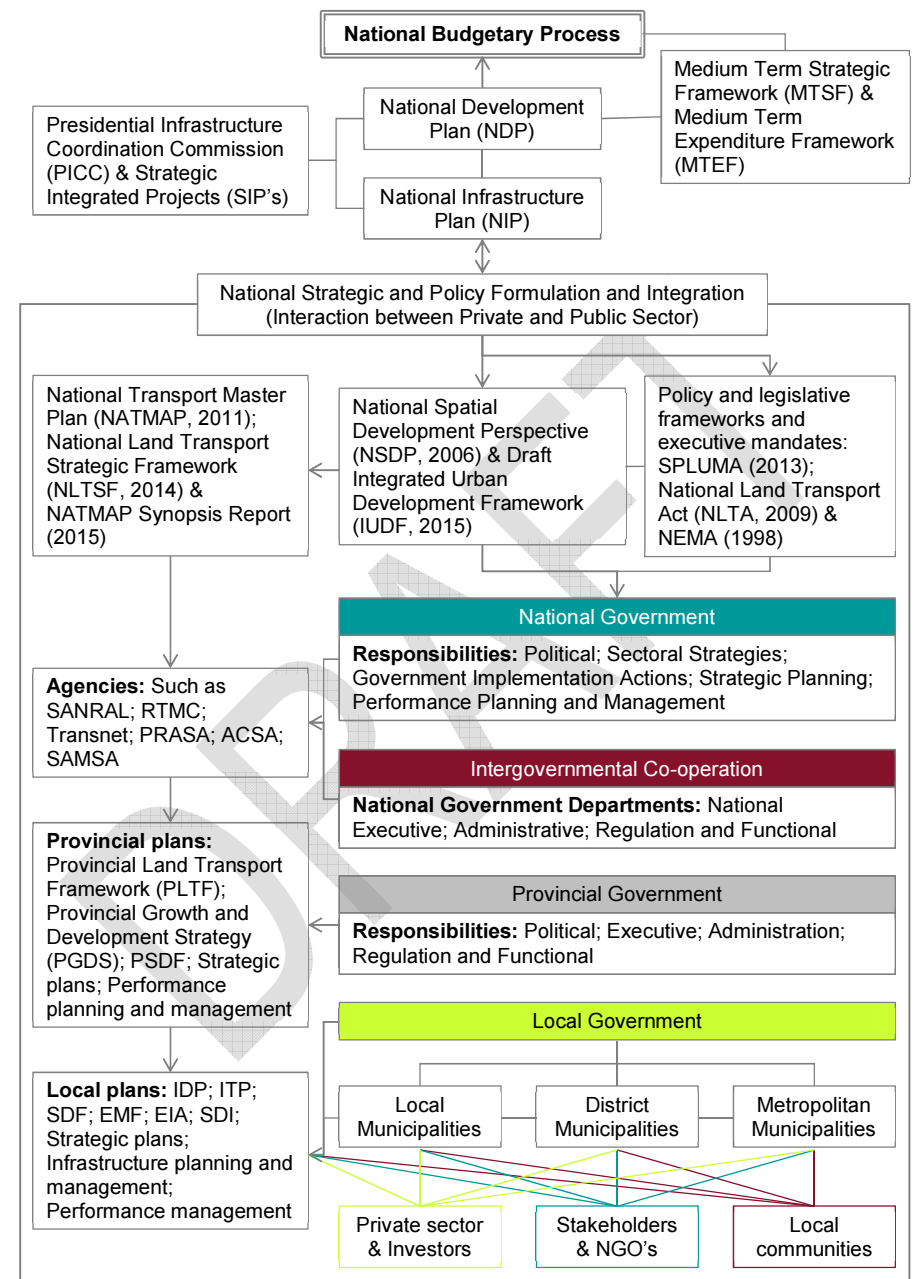


Figure 2-3: Interaction between private and public sector and associated policies and legislation.

Source: Adapted from (Schoeman, 2015).

2.2 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Table 2-1: Important knowledge to take note of - General policy and legislative framework.

Concept	General policy and legislative framework
Process to follow	Each policy and legislation has its own process for either the development thereof or for the review and implementation of a newer module. The <i>source document</i> includes the relevant processes where applicable, such as the processes for SPLUMA (2013).
The role of the Engineer	It is the responsibility of the municipal engineer to assist in the implementation of these policies and legislations and should adhere to the regulations and requirements stipulated therein.
What is important to know	The general policies and legislative framework has an influence on the development, it is thus important to know the role of each applicable policy and legislation and the impact it has on development.
How it should be implemented	These policies and legislations are implemented through each municipality, either by policies formulated in terms of the regulations of legislation, or by their by-laws developed as a response to the national policies.
Consultants to contact for assistance	Town Planner; Land Surveyor; Attorney; Consulting Engineers; Environmentalists; Government Departments, to name a few. These consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation and by-laws such as the Town Planning Scheme, SDF, IDP, LUMS, ITP, environmental guidelines.

Source: Own synthesis.

3. SPATIAL DEVELOPMENT

This chapter consist of five (5) sections, including spatial development, layout planning and design, township establishment, township related issues and planning and development administration. These sections are included in the same chapter as they play an integral part in urban and regional planning and in each other. In essence, building and construction management are implemented to guide and to maintain the various town planning applications and the strategic framework responsible for guiding development.

3.1 Spatial development

3.1.1 Chapter contents and brief description

This section includes the various spatial development initiatives, such as the processes and requirements of each by-law (SDF, IDP and LUMS). It further includes a description of the regulatory framework of spatial development and land use management. The legal practices is also included and briefly discussed.

3.1.1.1 Regulatory framework in spatial development

The Guidelines for Human Settlement Planning and Design, 2000 (Redbook) and Sustainable Human Settlement Planning: Resource Book (2008) should be consulted as this provides guidelines for development which can be used alongside the regulatory framework in spatial development. The combination of these resources will ensure sustainable and sufficient growth and development in all areas, if implemented correctly.

The Town Planning and Township Ordinance (Ordinance 15 of 1986) and the Spatial Planning and Land Use Management Act (16 of 2013) should be viewed in conjunction with each other as these legislation provides support for one another. The Town Planning and Township Ordinance (Ordinance 15 of 1986) provides the backbone for the development and implementation of the Spatial Planning and Land Use Management Act (16 of 2013). This section provides a brief description to these important documents and references is made to it throughout the document.

(a) Town planning schemes and zoning

The Town Planning Scheme can be described as the legal regulation of potential land use through the reserving of specific properties for certain land use types. As a result the Town Planning Scheme is used for the management of the use of land, the activities on each property, the height restrictions, density, surface floor area and parking requirements on each individual property

within the boundaries to which the Town Planning Scheme is allocated. This also means that one Local Municipality can use several Town Planning Schemes within the Municipal boundary of that particular municipality. The Town Planning Scheme makes provision for all uses permitted and restricted with the several zonings present in the Municipal boundary.

Included in this chapter is the definition and descriptions of these restrictions and guidelines included in the town planning schemes, such as the building lines of a property, property requirements, the coverage, density and floor area ratio (FAR).

Once SPLUMA (2013) has been fully implemented a Land Use Management Scheme will be used instead of the town planning scheme.

(b) Property characteristics

This section includes the various types of ownerships and the application and types of servitudes that can be used on properties. Title deeds are also explained with the identification of the most important aspects that should be considered, such as the deed of transfer number, whether or not a bond is registered on the property and the owner, size and description of the property.

3.1.1.2 Land use management in spatial development

Development tribunals must consider the applicable integrated development plans, including spatial development frameworks and urban development boundaries, when determining applications for the grant or alteration of land use rights.

Town planning schemes, Spatial Development Frameworks (SDFs), Land Use Management Schemes (LUMS) and other spatial initiatives can be used to guide land uses in its applicable area. This can be implemented at national, provincial, district or local level. Each erf is linked to a specific zoning as prescribed in the relevant Town Planning Scheme or Land Use Management Schemes, although they may not necessarily be connected to the relevant Spatial Development Framework (SDF) as it works on a neighbourhood plan and not on each specific erf. Streets are included in the planning for zoning allocation.

Chapter 5 of SPLUMA (2013) provides guidelines in the management of land uses through the use of a LUMS. It further provides, amongst others the purpose, contents, revision period and implementation thereof.

A LUMS should be reviewed and monitored in order to achieve consistency in the SDF, as a result it should be reviewed at least every five (5) years. Amendments can be made to the LUMS through rezoning applications or the changing of municipal boundaries.

The LUMS should promote economic growth, social inclusion, efficient land development and minimal impact on public health, the environment and natural resources. It should also include scheme regulations that provides procedures and conditions related to the use and development of land in all areas, a map which indicates the zoning of the municipal area and a register of all amendments made to the scheme.

Various other aspects should be included in a LUMS, this section provides a brief description of these aspects along with the processes that should be followed during the compilation and implementation of a LUMS. The general process is included in the figure below.

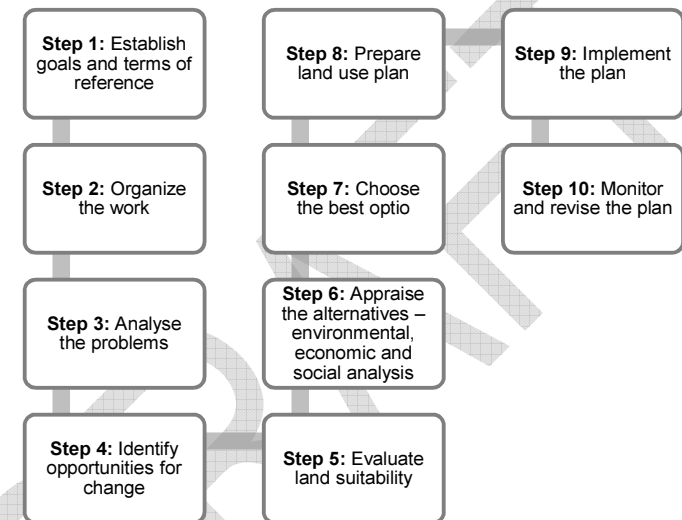


Figure 3-1: Steps included in compiling a LUMS.

Source: Own synthesis (SPLUMA, 2013).

3.1.1.3 Existing spatial development

(a) Current Spatial Planning in South Africa

Spatial planning is technical in nature although it relies on participation from stakeholders. It consists of a spatial orientation to support existing policies with limited interventions in order to address historical spatial deficiencies. Planning is now focused on needs within informal settlements. Formalisation is implemented in areas responsible for the establishment of fragmentation. This does not only apply to urban spatial systems but also exists in rural areas. Planning documents, policies and guidelines for normalisation and integration of spatial planning

exists in an attempt to guide development away from fragmentation. Application thereof are either restricted or used as spatial 'recipes', instead as guidelines for planning.

Various policies and legislation guided spatial development in South Africa, different by-laws are used to specifically guide development on a national, provincial, district and regional scale, this include die IDP, LIMS, SDF, Spatial Development Initiatives (SDI), 1999 and national initiatives such as the National Spatial Development Perspective (NSDP), 2002/2006. This section includes 'n brief description of the bylaws, including the processes and information related to specifically IDPs and SDFs.

(b) Migration, urbanisation and counter-urbanisation

Migration and urbanisation plays a major role in spatial development as this places pressure on the existing and available municipal infrastructure and development potential. These phenomenon should be addresses as soon as possible through the use of the above mentioned by-laws and building control. Counter-urbanisation and polarisation should also be addresses through the above mentioned by-laws.

These concepts can be understood as:

- Migration is any permanent or semi-permanent change in location. Spatial transfer from one social unit or neighbourhood which strains or ruptures previous social bonds. No limit is placed on the distance of migration or whether it is forced or free will migration (Internal or external migration). Exclude continued movement of migration workers and a vacation. Includes point of origin, migration streams and a destination (National Geographic, 2005).
- Urbanisation is the process through which the proportion of people living in towns and cities increase. The increase of the number of people is a result of people migrating from rural to urban areas (Collins, 2001).

3.1.2 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Table 3-1: Important knowledge to take note of - Spatial development.

Concept	Spatial development
Process to follow	Each policy and legislation has its own process for either the development thereof or for the review and implementation of a newer module. The <i>source document</i> includes the relevant processes where applicable, such as the processes for SPLUMA (2013).

The role of the Engineer	It is the responsibility of the municipal engineer to assist in the implementation of these policies and legislations and should adhere to the regulations and requirements stipulated therein.
What is important to know	The general policies and legislative framework has an influence on the development, it is thus important to know the role of each applicable policy and legislation and the impact it has on development.
How it should be implemented	These policies and legislations are implemented through each municipality, either by policies formulated in terms of the regulations of legislation, or by their by-laws developed as a response to the national policies.
Consultants to contact for assistance	Town Planner; Land Surveyor; Attorney; Consulting Engineers; Environmentalists; Government Departments, to name a few. These consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation and by-laws such as the Town Planning Scheme, SDF, IDP, LUMS, ITP, environmental guidelines. The Guidelines for Human Settlement Planning and Design, 2000 (Redbook) and Sustainable Human Settlement Planning: Resource Book (2008) should also be consulted.

Source: Own synthesis.

3.2 Layout planning and design

3.2.1 Chapter contents and brief description

This section makes specific references to the design requirements for, specifically, township establishments, although it can be applied to all town planning developments. Reference is made to the Guidelines for the provision of engineering services and amenities in residential township development, 1994 (GESRT) and Chapter 2 and 5 of the Guidelines for Human Settlement Planning and Design, 2000 (Redbook). Various other concepts are included in this section, such as (Behrens & Watson, 1996:10; CSIR, 1994):

- **Considerations in layout planning:** This includes the consideration of land use, movement networks, pedestrian movement, traffic volumes, safety, conservation and heritage, visual impact, geological environment and the manner in which it is implemented. The influence of poor layout planning can play a big role in the market and potential growth of the properties affected.
- **Concerns in layout planning:** The satisfaction of human needs and an improvement of the human conditions; the establishment of a sustainable relationship between urban settlements and their surrounding environment; promote the most efficient use of available resources.
- **Principles in layout planning:** Place making - The making of unique places; Scale - The scaling of urban environments to human dimensions; Access - The maximisation of access from the greatest number of people; Opportunity - The creation of economic opportunities; Efficiency - The efficient use of limited resources; Choice - The maximisation of choices available to communities.

3.2.2 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Table 3-2: Important knowledge to take note of - Layout planning and design.

Concept	Layout planning and design
Process to follow	- The analysis of the physical, socio-economic, financial and regulatory context; - The conversion of normative concerns into guiding layout planning principles, expressed as a set of written statements, and the identification of their implications for spatial relationships, expressed as a set of acontextual concept diagrams; - The quantification of needs into a programme of required facility, amenity and infrastructure investments; - Bringing together context analysis, guiding layout planning concepts and programme, in order to form concept plans at a range of scales; - Attaching widths, lengths and areas to these lines drawn on concept plans, to form more detailed plans.
The role of the Engineer	It is the responsibility of the municipal engineer to provide comments on all town planning applications. These comments should include aspects such as: - Roads (maintenance and provision thereof); - Stormwater (possible impact); - Water & sanitation and electricity (sufficiency of capacity for proposed development); etc. Consideration should be made to aspects including inter alia bulk- and internal services, cost effectiveness, development contributions.
What is important to know	Not all town planning applications are the same; circumstances and applicable legislation differ; SDF's, LUMS and other policies should be consulted for each application and should not be seen as blue prints as some are adaptable and can be changed. The aspect of urban fragmentation should be considered for each application as it influences its validity.
How it should be implemented	The housing shortage in South Africa is well known and a lot of the policies of each municipality, such as the SDF, promotes infill development. However, in many cases town planning applications with the specific aim at providing higher density housing, the problem regarding the availability of services usually prevents the provision of housing. Engineering comments should be provided in the required timeframe, the delay in the provision thereof, causes a ripple effect in the delay regarding the completion of the applications, resulting in a bottle-neck effect in all municipal departments. Engineering contributions should be explained in greater detail as the developers and owners are not educated in understanding the difference in green- and brown field developments and the difference in contributions.
Consultants to contact	Town Planner; Land Surveyor; Attorney; Architects; Landscape Architect; Quantity Surveyor; Consulting Engineers; Environmentalists; Government

for assistance	Departments; Urban Designers; Project manager and banks these consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation including Town Planning Scheme; SDF; IDP; LUMS; ITP; environmental guidelines; SABS Standards; the Housing Act; PIE Act; Rental Housing Act; Social Housing act; the white paper on housing; BNG; National housing code; Housing Sector Plans and policies by the local authorities. The Guidelines for Human Settlement Planning and Design, 2000 (Redbook) and Sustainable Human Settlement Planning: Resource Book (2008) should also be consulted.

Source: Own synthesis (Behrens & Watson, 1996:4-5).

3.3 Township establishment

3.3.1 Chapter contents and brief description

Section 96 of the Town Planning and Township Ordinance, Ordinance 15 of 1986 is used to regulate township establishment. It defines a town as *'any land laid out or subdivided or developed as sites for residential, business or industrial purposes or similar purposes where such sites are arranged in such a manner as to be intersected or connected by or to abut on any street, and a site or a street shall for the purposes of this definition include a right of way or any site or street which has not been surveyed or which is only notional in character'*.

This section includes the establishment of new townships with the inclusion of the difference and application of the use of a township establishment and a sectional title schemes (Table 3-3). Further included is the process of such application and the documents to be included.

Table 3-3: Distinguishing between township establishment and sectional title schemes.

	Township establishment	Sectional title schemes
Definition	Township establishment is used to redevelop farm portions or agricultural holdings into individual erven/plots/stands/sites. The property will as a result no longer be used for agriculture purposes nor will it obtain a farm description. The erven can be sold as separate entities thus enabling a developer to develop the erven of the township in a similar manner of erven included in existing townships.	To provide for the division of buildings into sections and common property and for the acquisition of separate ownership in sections coupled with joint ownership in common property; the control of certain incidents attaching to separate ownership in sections and joint ownership in common property; the transfer of ownership of sections and the registration of sectional mortgage bonds over, and real rights in, section; the conferring and registration of rights in, and the disposal of, common property; the establishment of bodies corporate to control common property and for that purpose to apply rules; and the establishment of a sectional titles

		regulation board; and to provide for incidental matters.
Ownership	- More than one erf/plot/site/stand; - More than one owner; - More than one use; - Agricultural land that is redeveloped; - Common parts of the township is owned by the body corporate or the managing body.	- Individual ownership of a selection such as a flat or commercial unit; - Joint ownership of the common parts of the Sectional Title Scheme; - Members of a managing body consisting of all the Sectional owners (similar to a body corporate).
Examples	The redevelopment of land into individual residential, industrial or commercial properties	To be developed on erven included in an existing residential township and is usually in the form of a town house complex.
Consultants responsible for development	Town planner; environmental consultants; consulting engineers; land surveyor; architect and attorney.	Land surveyor; architect and attorney.

Source: Own synthesis (Practice Group, 2015; Sectional Title Act (95 of 1986); Town Planning and Township Ordinance, Ordinance 15 of 1986; Van der Merwe & du Plessis, 2004:222).

The section further includes the detailed processes related to and documentation required for a township establishment process. The development guidelines for layout planning should also be considered and is included in this chapter.

3.3.2 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Table 3-4: Important knowledge to take note of - Township establishment.

Concept	Township establishment
Process to follow	A township establishment process is fairly complicated and various documentation may be required from different consultants. After the submission of the application to the local authority and relevant state departments, a report should be compiled which includes the comments received from all relevant parties. The application will now be considered by the local authority. If the application are to be approved it should be proclaimed in the provincial gazette, and will also include the informing of the Registrar of Deeds and the Surveyor General Office. However, if objections were received against the application, a tribunal hearing will be arranged during which the application will be reconsidered by independent parties.

The role of the Engineer	It is the responsibility of the municipal engineer to provide comments on all town planning applications. These comments should include aspects such as: - Roads (maintenance and provision thereof); - Stormwater (possible impact); - Water & sanitation and electricity (sufficiency of capacity for proposed development); etc. Consideration should be made to aspects including inter alia bulk- and internal services, cost effectiveness, development contributions.
What is important to know	Not all town planning applications are the same; circumstances and applicable legislation differ; SDF's, LUMS and other policies should be consulted for each application and should not be seen as blue prints as some are adaptable and can be changed. The aspect of urban fragmentation should be considered for each application as it influences its validity.
How it should be implemented	The housing shortage in South Africa is well known and a lot of the policies of each municipality, such as the SDF, promotes infill development. However, in many cases town planning applications with the specific aim at providing higher density housing, the problem regarding the availability of services usually prevents the provision of housing. Engineering comments should be provided in the required timeframe, the delay in the provision thereof, causes a ripple effect in the delay regarding the completion of the applications, resulting in a bottle-neck effect in all municipal departments. Engineering contributions should be explained in greater detail as the developers and owners are not educated in understanding the difference in green- and brown field developments and the difference in contributions.
Consultants to contact for assistance	Town Planner; Land Surveyor; Attorney; Architects; Landscape Architect; Quantity Surveyor; Consulting Engineers; Environmentalists; Government Departments; Urban Designers; Project manager and banks these consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation including Town Planning Scheme; SDF; IDP; LUMS; ITP; environmental guidelines; SABS Standards; the Housing Act; PIE Act; Rental Housing Act; Social Housing act; the white paper on housing; BNG; National housing code; Housing Sector Plans and policies by the local authorities. The Guidelines for Human Settlement Planning and Design, 2000 (Redbook) and Sustainable Human Settlement Planning: Resource Book (2008) should also be consulted.

Source: Own synthesis (Town Planning and Township Ordinance, Ordinance 15 of 1986).

3.4 Township related issues

3.4.1 Chapter contents and brief description

This section includes the various town planning application, including the processes of each and the documentation to be submitted along with the application. It further includes a description of the procedures and aspects to consider during the evaluation of the application. The appeals and objection process is also included and briefly discussed.

3.4.1.1 Generic components of town planning applications

Regulations 35 to 39 of the Town Planning and Township Ordinance, Ordinance 15 of 1986, Ordinance 15 of 1986, Section 6(1) of the Division of Land Ordinance 20 of 1986 and Agricultural Land Act, 1970 (Act 70 of 1970) stipulates that each town planning application should contain a collection of basic documents, such as the title deed, zoning certificate, land use surveys and surrounding zoning, power of attorney, mortgage bond details, motivational memorandum and application form, to name a few.

Various policy documents of all spheres of government should be consulted and considered prior to the compilation of an application. Applicable policy documents should be used in order to provide substantiation for the proposed land use and application. These documents include, amongst other, the Town Planning Scheme, SDF, IDP and LUMS.

Each type of application has its own advertisement regulated through relevant legislation including Town Planning and Township Ordinance, Ordinance 15 of 1986, Ordinance 15 of 1986, Section 6(1) of the Division of Land Ordinance 20 of 1986, Agricultural Land Act, 1970 (Act 70 of 1970) and SPLUMA (2013). It is important to note the format and wording of each notice including site- and newspaper notices, the timespan and period of the placement of the advertisements and the number of placements. The different notices will be discussed in more detail under the relevant application section, due to each application having its own notice format.

3.4.1.2 Consolidation and/or subdivision applications

(a) Consolidation and subdivision within a township

- Consolidation of two (2) or more properties, within an approved township, is regulated by Section 92 (1)(a) and (2)(c) of Town Planning and Township Ordinance, Ordinance 15 of 1986. Section 25(2) of the ordinance also states that if the application is not approved within sixty (60) days after receiving acknowledgement from the municipality, it can be presumed that the application was successful and that it has been approved
- Subdivision of a property into two (2) or more portions, within an approved township, is regulated by Section 92 (1)(b) of the Town Planning and Township Ordinance, Ordinance 15 of 1986.

(b) Subdivision of agricultural land

- **Act 70 of 1970:** piloted by the Department of Agriculture - applicable in instances where land is still subject to the stipulations of the relevant act.
- **Ordinance applications (Section 6(1) of the Division of Land Ordinance 20 of 1986):** mainly applies to land located in the area of jurisdiction of a local authority prior to 1994.

Each application includes its own process regulated by the relevant legislation. Figure 3-2 illustrates the generic components of these applications. For more information on details of this process see the *Source document*.

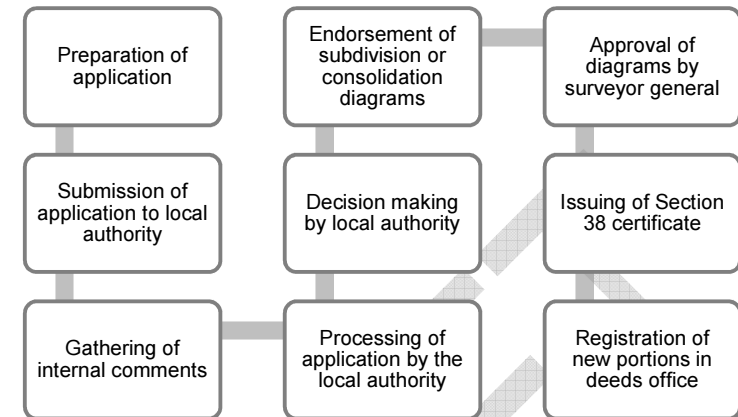


Figure 3-2: Generic processes for consolidation and subdivision applications.

Source: Own synthesis (Town Planning and Township Ordinance, Ordinance 15 of 1986).

The following documentation should accompany the application: Division plan; Motivating memorandum; Power of attorney and Copy of title deeds.

3.4.1.3 Building line relaxation / servitude abolishment

(a) Building line relaxation.

In general a building line or street building line can be relaxed through the removal of the restrictive condition prescribed in the Title Deed, however, some town planning schemes make provision for the relaxation of building lines through a consent use application, or the local authority will give permission that, if the property is a corner property, one (1) of its street building lines are relieved.

(b) Servitude abolishment

Servitudes can be cancelled / terminated by the registration of an abandonment in land record, extinctive prescription, merger, permanent impossibility to exercise the servitude and the death of the holder of a personal servitude. In a permanent merger (notarial tie) of the dominant and servient land, both registered and unregistered servitudes should only revive on separation if they

are expressly reconstituted. A reference to the notarial deed containing the servitude alone, should not be considered as sufficient (Van der Merwe & du Plessis, 2004:228).

Public servitudes can't be extinguished or cancelled by non-user or extinctive prescription, although they are terminated if the exercise of the servitude had been precluded by the land owner without the objection form the prescriptive period (Van der Merwe & du Plessis, 2004:229).

3.4.1.4 Consent use applications

The Town Planning Scheme relevant to the property on which the Consent Use is proposed, makes provision for certain uses of the property as secondary rights which can only be obtained with special permission and written consent from the Local Authority. These rights are indicated in the fourth (4th) column of the Town Planning Scheme's Zoning tables. Section 23(3)(a) states that the use and development of land may be changed only with the consent of the municipality.

The Title Deed of the property should also be viewed as this may prohibit certain uses that may be indicated in the Town Planning Scheme. If restrictions are included in the Title Deed to the property, a Removal of Restrictive conditions should be conducted along with the request for special consent.

Consent use applications may include special consent for a second dwelling unit, crèche, place of public worship, place of instruction, social halls and wedding or function venues, to name a few.

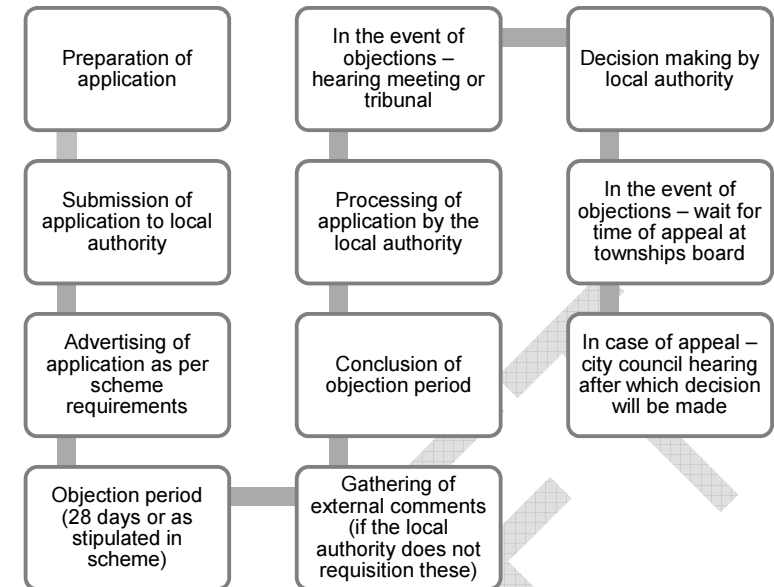


Figure 3-3: Generic processes for consent use applications.

Source: Own synthesis (Town Planning and Township Ordinance, Ordinance 15 of 1986).

The following documentation should be included in the application: Application form; Motivating memorandum; Title deed(s); Power of attorney; Bondholder's Consent (if applicable); Locality Plan; Zoning certificate; Proposed Site Development Plan.

3.4.1.5 Rezoning applications

Rezoning applications is described as amendments made to the town planning scheme or LUMS applicable to the area in question. Amendment schemes numbers refer to the amendments made to the town planning scheme, the new zoning of the property will thus be indicated with the accompanying number indicated on the scheme maps, this can thus be cross-referenced to the application made and the conditions of approval can thus be provided for any future enquiries. The same applies to annexure numbers are obtained in the same manner as an amendment scheme. This indicates specific developments on a property, this however, is not needed for all rezoning applications.

In the case of a rezoning alone, the applications is made in terms of Section 56 of the Town-Planning and Township Ordinance, 15 of 1986 or Section 28 of SPLUMA (2013).

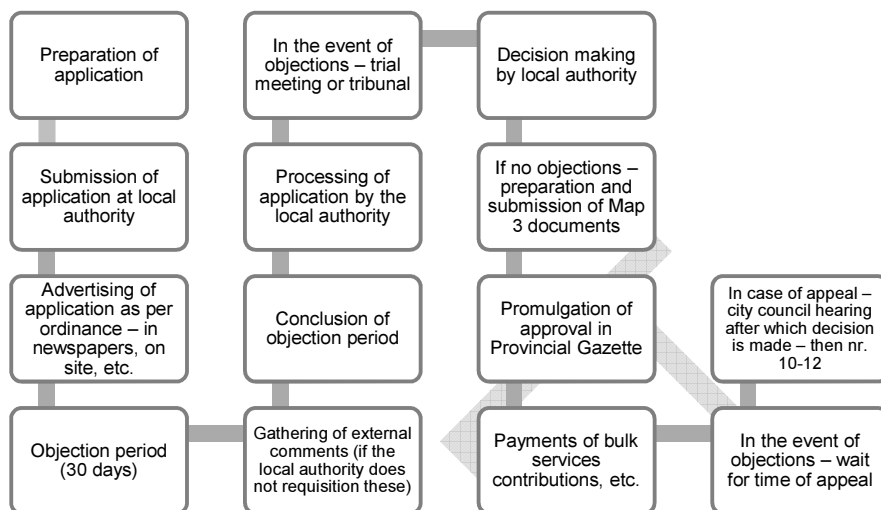


Figure 3-4: Generic processes for rezoning applications.

Source: Own synthesis (Town Planning and Township Ordinance, Ordinance 15 of 1986).

The following documentation should be included in the application: Application form; Map 3; Proposed scheme clauses; Motivating memorandum; Title deed(s); Power of attorney; Bondholder's Consent (if applicable); Locality Plan; Existing Land-uses; Existing Zoning; Zoning certificate; Proposed Site Development Plan.

3.4.1.6 Removal/amendment of restrictive title conditions

Application is submitted in terms of Section 47 of SPLUMA (2013). The application is used when there is conditions in the title deed to the property that needs to be amended or removed in order to allow the proposed development, giving that it is in line with the strategic by-laws of the municipality. The application can be submitted along with a rezoning application or as an application on its own to relax a building line, for example. The same process applicable to a rezoning application, should be followed for this application.

The following documentation should be included in the application: Application form; Motivating memorandum; Title deed(s); Power of attorney; Bondholder's Consent (if applicable); Locality Plan; Zoning certificate; Proposed Site Development Plan.

3.4.1.7 Professional inputs that may be required

Various inputs may be required to complete the process of a town planning application and to collect all the information that may be required. This includes, amongst others, services reports, geotechnical surveys/investigations, traffic impact studies (TPI), environmental authorisation or environmental impact assessments (EIA) and inputs from external and internal departments. Once all the required comments and documentation has been received the application is 'ready for report'.

3.4.1.8 Evaluation of land use applications

All town planning applications submitted to the relevant authority are to be evaluated before approving or declining the application. This includes various criterion such as the evaluation of the applications of development principles and the motivation given in terms of the guidelines provided in Chapter 2 of SPLUMA (2013). The alignment with the strategic guidelines and developmental objectives of the municipality should also be considered.

3.4.1.9 Appeals and objections against applications

Appeals or objections against a proposed development can be submitted, in writing, either to the authorised agent of the owner (the applicant) or to the town planning department of the local municipality. These objections should be considered and the objectors should be informed of the tribunal hearing that will take place as a response thereto.

3.4.1.10 Notarial connections between properties

For time immemorial registrars of deeds have been registering notarial tie-agreements which have the status of a personal servitude, and are capable of being registered under the provisions of Section 65 of the Deeds Registries Act 47 of 1937.

The notarial tie-agreement must be entered into between the owner or owners of the land being notorially tied and the person enforcing the tie-agreement. The enforcer could be the local authority, bank or any person or entity who would derive benefit from the properties being tied.

3.4.2 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Table 3-5: Important knowledge to take note of - Township related issues.

Concept	Township related issues
Process to follow	The following processes can be seen as the general processes in all land development applications (SPLUMA, 2013): 1. Submission of application 2. Fees and documents to accompany application 3. Simultaneous submission of applications 4. Screening of application 5. Registration of application 6. Notice of category 1 land development application 7. Notice of a category 2 land development or land use application 8. Objections 9. Comments pursuant to circulation 10. Amendments to application prior to referral 11. Referral of application by administrator 12. Decision and determination by land development officer 13. Procedure of tribunal 14. Consolidation and separation of applications 15. Continuation of application by new applicant 16. Power of tribunal to conduct site inspection 17. Decisions of tribunal 18. Conditions determined by tribunal 19. Non-compliance with conditions determined by tribunal 20. Approval of land development application that requires amendment of land use scheme 21. Approval of land development application on land where no town planning or land use scheme applies 22. Notification by administrator of decision of tribunal 23. Amendment of approval 24. Withdrawal of application 25. Effective date of decision by tribunal or land development officer
The role of the Engineer	It is the responsibility of the municipal engineer to provide comments on all town planning applications. These comments should include aspects such as; • Roads (maintenance and provision thereof); • Stormwater (possible impact); • Water & sanitation and electricity (sufficiency of capacity for proposed development); etc. Consideration should be made to aspects including <i>inter alia</i> bulk- and internal services, cost effectiveness, development contributions.
What is important to know	Not all town planning applications are the same; circumstances and applicable legislation differ; SDF's, LUMS and other policies should be consulted for each application and should not be seen as blue prints as some are adaptable and can be changed; illegal developments may warrant the proposed development even though the municipal documentation does not necessarily support the application completely. The aspect of urban

	fragmentation should be considered for each application as it influences its validity.
How it should be implemented	It is good to provide consequent and rigid comments on applications, it prevents the establishment of precedents, however if the proposed development does not necessarily comply with the policy documents, it should be considered with greater diligence. Engineering comments should be provided in the required timeframe, the delay in the provision thereof, causes a ripple effect in the delay regarding the completion of the applications, resulting in a bottle-neck effect in all municipal departments. Engineering contributions should be explained in greater detail as the developers and owners are not educated in understanding the difference in green- and brown field developments and the difference in contributions.
Consultants to contact for assistance	Town Planner; Land Surveyor; Attorney; Consulting Engineers; Environmentalists; Government Departments; etc. these consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation including <i>inter alia</i> Town Planning Scheme, SDF, IDP, LUMS, ITP, environmental guidelines.

Source: Own synthesis (SPLUMA, 2013; Town Planning and Township Ordinance, Ordinance 15 of 1986).

3.5 Planning and development administration

3.5.1 Chapter contents and brief description

MSG (2015) states that '*Development Administration is about projects, programs, policies and ideas which are focused at development of a nation, with the point of view of socio-economic and socio-political development of society in general, carried out by talented and skilled bureaucrats*'. Sapru (2002:80) substantiates this definition.

3.5.1.1 Contents of a development administration model

There are four (4) elements of a development administration model, including (MSG, 2015):

- Rejecting the status quo and moving towards change while being results orientated with every development function having a defined objective;
- Planning plays an integral role as this is used to develop a framework of resources and time allocated for each proposed development and the function thereof;
- Innovation will contribute to the dynamic nature of the model and will encourage new and improved methods of achieving the objectives;
- Focusing on planning for the people and with the people as this is a people-centred model which should empower the society as a whole and not be profit driven.

3.5.1.2 Understanding development administration

Development administration consist of two (2) concepts, including (MSG, 2015; Sapru, 2002:82):

- **Development administration:** Finding a means to optimally use available resources such as scarce material or human resources, while ensuring the new means for development gains prominence. This include:
 - Innovative planning at all levels;
 - Base-line development is very important and the development of human capital as a resource;
 - The establishment of constant and rapid change in the society can be achieved by viewing politics and administration together;
 - The freedom of administrative machinery to encourage and express ideas and views for the effective and efficient use of natural resources.
- **Administrative development:** The empowerment of administration encourages effective development administration. Administrative development should sustain the pleasures of developmental activities and bring about the change needed in the administrative framework, thus moving from the traditionalist approach towards a more socio-economic and political approach to development. This includes:
 - The development and improvement of decision making capabilities;
 - The development of skills ad specialization in the personnel to enable them the resolve complex issues;
 - Changing the administrative approach through the encouragement of the importance of training and effective use of technology;
 - The creating of leaders from bureaucrats for the promotion of development initiatives.

Development goals can be achieved through proper planning, the optimum use of resources, employing skilled personnel, accepting accountability in both words and actions, self-reliance and placing an emphasis on technology. Simultaneously, bureaucracy, innovativeness, build capabilities, integrity and decentralized decision making should be developed (MSG, 2015; Sapru, 2002:82-87).

3.5.1.3 The correlation between planning and development administration

Planning administration includes duties such as the maintenance of by-laws, clerical services, managing of the property and application database, amongst others (Whitby, 2015). This also includes many of the work done by private urban and regional planning practices in statutory planning duties. Planning administration is thus dependent on the development initiatives and goals set out through the administration of development. This section further discusses the correlation in the *Source Document*.

3.5.2 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Table 3-6: Important knowledge to take note of - Planning and development administration.

Concept	Planning and development administration
Process to follow	Each development administrative initiative will have its own process such as the development of an LED or IDP. This is in turn regulated by SPLUMA (2013) and other applicable legislation as previously mentioned in the chapter.
The role of the Engineer	The engineer will have more responsibility in planning administration, although they can be consulted to contribute to the development administration. The proposed initiatives, goals and objectives can guide the provision and expansion of services and the may also encourage development in the community which will require more assistance from the engineer.
What is important to know	Development administration entails the formulation of developmental initiatives, objectives and goals through the improvement of the personnel involved, using sustainable development initiatives and focussing on the residents of the area and not aiming at generating a profit.
How it should be implemented	The development initiatives are implemented through each municipality, either by policies formulated in terms of the regulations of legislation, or by their by-laws developed as a response to the national policies and the development goals.
Consultants to contact for assistance	Town Planner; Consulting Engineers; Ward councillors; Government Departments, to name a few. These consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation and by-laws such as the IDP and LED.

Source: Own synthesis.

4. HUMAN SETTLEMENT DEVELOPMENT AND BUILDING CONTROL

This chapter consist of two (2) sections, including human settlement development and building and construction management control. These sections are included in the same chapter as they play an integral part in urban and regional planning and in each other. In essence, building and construction management are implemented to guide and to maintain the various developments in human settlements, including residential properties and also other properties such as business developments.

4.1 Human settlement development

4.1.1 Chapter contents and brief description

Taking in to consideration the large amount of informal settlements and the housing shortage present in South Africa, it is important to co-ordinate the responsibilities and workings of both the Planning Departments and the Engineering departments in an attempt to improve human settlement development and especially housing provision. This chapter will provide a better insight on the concept of human settlement development.

4.1.1.1 Policy and legislative framework

Human settlement development is regulated by a variety of policies and legislation, housing institutions and international initiatives such as the UN-Habitat Agenda along with the Millennium Development Goals (MDGs) and the newly formalised 2030 Agenda for Sustainable Development. These policies, legislation and initiatives guide the provision of human settlement in South Africa (Millennium Project, 2006; The New York Times, 2015; Thwaites, 2015; UN DESA, 2015a; UN News Centre, 2015).

(a) Human settlement legislative framework (Primary legislation)

Figure 4-1 illustrates some of the important housing legislation including Housing Act 107 of 1997 (amended by Acts 28 and 60 of 1990; Act 4 of 2001) (Housing Act); Bill of Rights in Chapter 2 of the Constitution, section 26 (1996); Prevention of Illegal Eviction from and Unlawful Occupation of Land Act 19 of 1995 (PIE Act); Rental Housing Act 50 of 1999 (amended by Act 43 of 2007) (Rental Housing Act); National Norms and Standards for the Construction of Stand Alone Residential Dwellings Financed through National Housing Programmes (April 2007)(National Norms and Standards) and the Social Housing Act of 2008 (Social Housing Act) (Tissington, 2011).

(b) Human settlement policy framework

Figure 4-2 illustrates the two (2) relevant housing policies include the Housing Atlas (2006), the White Paper on Housing (1994) and the Breaking New Ground (2004) policies (Tissington, 2011).

(c) National Housing Code (2000, revised in 2009)

Figure 4-3 illustrates the National Housing Code and it's consistent with the Housing Act and emphasizes the underlying policy principles, guidelines and norm as well as standards which apply to the National Housing Programmes. The Housing Code binds the local and governmental spheres. It also includes the National Housing programmes with subsections including qualifying criteria for housing subsidy programmes (Tissington, 2011).

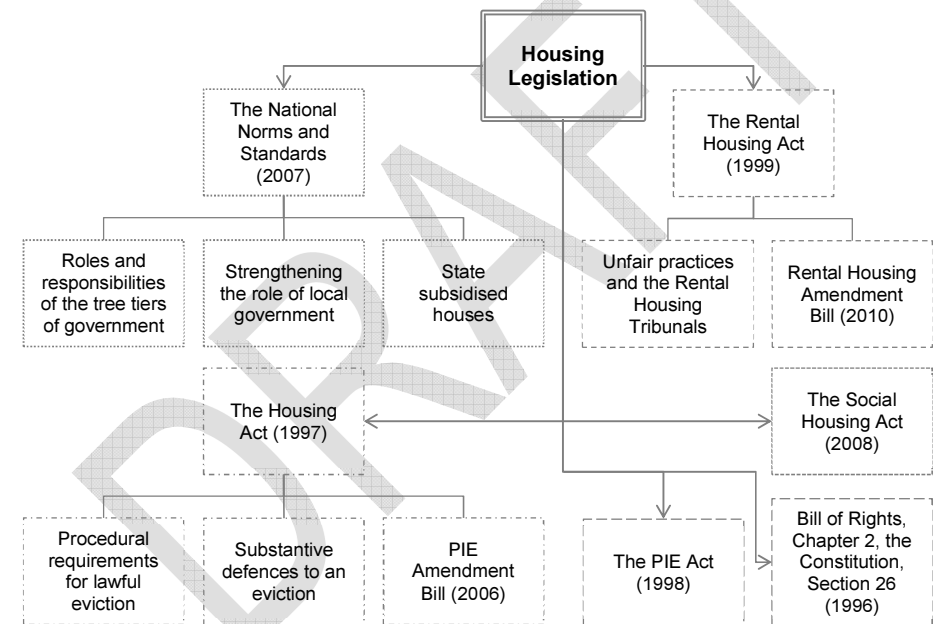


Figure 4-1: Human settlement development legislation - flow chart.

Source: Own synthesis (Tissington, 2011).

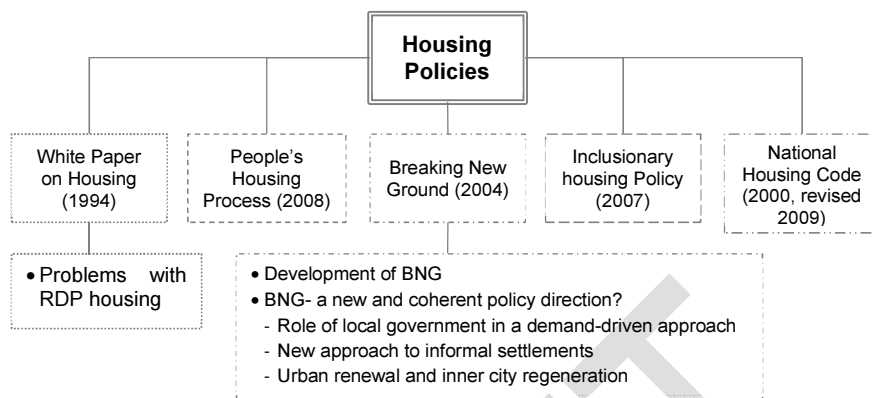


Figure 4-3: Human settlement development policies - flow chart.
Source: Own synthesis (Tissington, 2011).

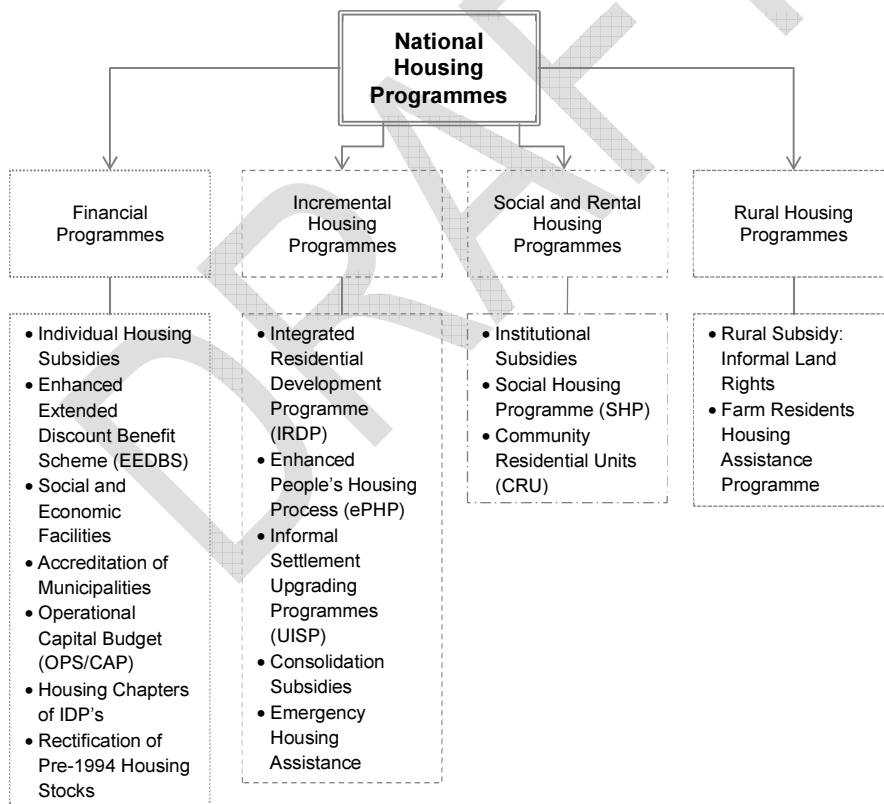


Figure 4-2: National housing programmes - flow chart.
Source: Own synthesis (Tissington, 2011).

4.1.1.2 Key concepts of human settlement development

It is important to understand the concept of human settlement development and specifically housing provision including all it entails such as the various types of housing available and the correlation to their proposed zonings and the key concepts included under housing provision. Reference is also made to the various professions involved in human settlement development along with their role therein. The types of ownership, including sectional-title and full-title ownerships, is also included (Opperman, 2015:10-12).

4.1.1.3 South African housing situation

The housing situation in South Africa is briefly described with the inclusion of the change in the policy and legislative framework, the proposed norms and standards for affordable housing, objectives for integrated human settlement and current challenges faced in housing delivery.

Housing development is further discussed through the brief description of the process thereof, the provision of housing in informal settlements, the possible risks that may arise and the management thereof.

4.1.1.4 Development guidelines

Specific reference is made to the Guidelines for Human Settlement Planning and Design, 2000 (Redbook) as this gives a good guideline for the development of integrated human settlements including the combination of specific land uses and the norms and standards for service delivery and layout designs (CSIR, 2006).

4.1.1.5 Case study

A case study is discussed in brief to provide a practical example of human settlement development and housing deliver.

4.1.2 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Table 4-1: Important knowledge to take note of - Human settlement development.

Concept	Human settlement development
Process to follow	Human settlement development includes various processes that can be followed for the provision thereof. These processes cannot be generalise as

	they rely on the situation they are implemented to guide the process. In general the processes should be viewed and aligned with the local municipalities IDP and include: • Housing procurement procedures in terms of the National Housing Code which must be read in conjunction with the MFMA; • Quality control which is linked primarily to the work of the national Home Builders Registration Council and overlaps with procurement and project management aspects of the housing development process; • Project management which is primarily based on the subsidy mechanism rules which include the phases of development, milestones and payment indicators; • Waiting lists and subsidy allocations. Subsidy allocations and approvals, conditional sale of land and deeds of sale are project based whilst waiting lists are queuing mechanisms or can be used as demand databases. The latter may be important in informing the housing demand in terms of the Housing Chapter.
The role of the Engineer	Persons who ensure that buildings and services are delivered according to national and provincial standards, without the “stamp of approval” from these persons, building can come to a complete halt, is also responsible for the building of roads, bridges, water and energy systems and needs to maintain infrastructure etc. The municipal engineer is also responsible for the provision of services and the guidance of housing developments within the capacity provided by the local authority.
What is important to know	The South African housing policy and the development of housing is the result of significantly complex shifts in state policy. The provision of housing, particularly low-cost housing, has been a major focus of the South African government in the post-apartheid era, with urban areas taking priority in this regard. Human settlement development is a vast concept and consists of various principle which forms part of the intricate process of human settlement development. Some of these concepts include housing as a basic right; housing as a process of enablement; Housing as a process of enablement; Housing as a people driven process; it is not isolated projects but rather integrated housing; it is an instrument for sustainable development; it should form part of the natural environment; provide a quality living environment.
How it should be implemented	The housing shortage in South Africa is well known and a lot of the policies of each municipality, such as the SDF, promotes infill development. However, in many cases town planning applications with the specific aim at providing higher density housing, the problem regarding the availability of services usually prevents the provision of housing. Engineering comments should be provided in the required timeframe, the delay in the provision thereof, causes a ripple effect in the delay regarding the completion of the applications, resulting in a bottle-neck effect in all municipal departments. Engineering contributions should be explained in greater detail as the developers and owners are not educated in understanding the difference in green- and brown field developments and the difference in contributions.
Consultants to contact for assistance	Town Planner; Land Surveyor; Attorney; Architects; Landscape Architect; Quantity Surveyor; Consulting Engineers; Environmentalists; Government Departments; Urban Designers; Project manager and banks these

	consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation including Town Planning Scheme; SDF; IDP; LUMS; ITP; environmental guidelines; SABS Standards; the Housing Act; PIE Act; Rental Housing Act; Social Housing act; the white paper on housing; BNG; National housing code; Housing Sector Plans and policies by the local authorities. The Guidelines for Human Settlement Planning and Design, 2000 (Redbook) and Sustainable Human Settlement Planning: Resource Book (2008) should also be consulted.

Source: Own synthesis (Department of Human Settlement, 2009:24, 29-30; Department of Housing, 2008:85).

4.2 Building and construction management control

4.2.1 Chapter contents and brief description

Building and construction management control are responsible for administering and overseeing the implementation of technical regulations and compulsory specifications stipulated in the National Building Regulations and Standards Act (103 of 1977), compiled by the National Regulator for Compulsory Specifications (NRCS), it is also guided by the National Regulator for Compulsory Specifications Act (5 of 2008) previously known as the SABS 10400. It can thus be understood that the local authority has the obligation to ensure that all developments meet the minimum standards proscribed and to intervene if they don't comply (Opperman, 2015:3-19).

4.2.1.1 Policy and legislative framework

This section further includes a brief discussion of the relevant legislative framework applicable, this is illustrated in Figure 4-4.

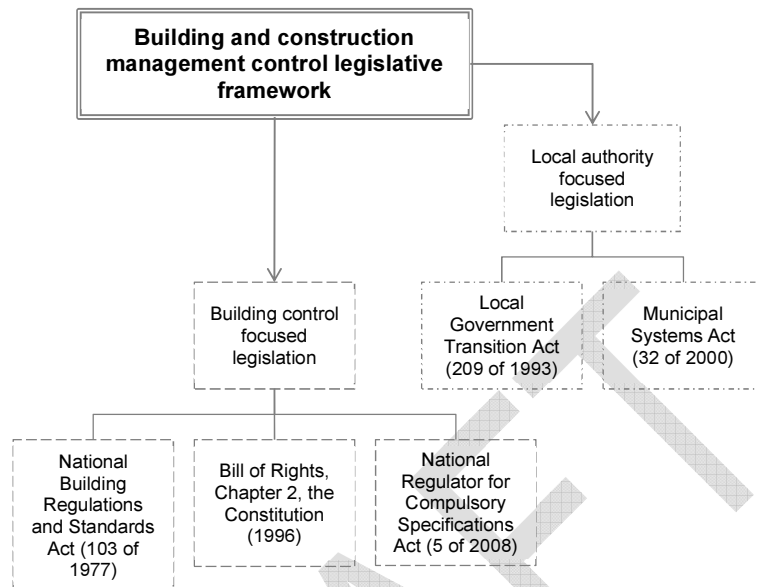


Figure 4-4: Building and construction management control legislative framework - flow chart.

Source: Own synthesis (Opperman, 2015a:3-19).

4.2.1.2 Correlation between building control and planning

It should be noted that town planning schemes, and thus Land Use Management Schemes (LUMS) and Spatial Development Frameworks (SDF's), have a major influence in building control as they are used to guide effective planning and building of urban areas with the allocation of appropriate land uses. It can thus be understood that building control ensures the proper quality of buildings and that they meet the minimum requirements, it can also be used to control land uses and determine if the current uses are legally obtained or not. The Building Control Officer (BCO) can be consulted to determine whether a town planning application complies with the relevant legislation (Opperman, 2015:6).

The section further includes the correlation between building control and town planning controls which includes the various town planning application types, the various housing typologies and ownership categories.

4.2.1.3 Correlation between building control and construction management

Construction management can be understood as the management of development, conservation and the improvement of the built environment. It is exercised at a variety of levels on the project site to the corporate organisations of the industry, clients and society. Construction management further embraces the entire construction value from the commencement of the project with the inclusion of recycling and a commitment to encourage sustainable construction. It also incorporates a wide variety of specialist services (Bale, 2010:4). The chapter further explores the correlation of construction management to building control.

4.2.1.4 Roles and responsibilities of the Building Control Officer (BCO) and Building Inspector

Also included in this section is the role and responsibilities of the BCO and the department, including (Opperman, 2015:19-21):

- **Submission of building plans for approval:** It is the responsibility of the building control office to accept or reject building plans within thirty (30) days for buildings with an area smaller than 500m² and sixty (60) days for buildings with an area larger than 500m². A comprehensive explanation with recommendations for alterations should be provided in cases where plans are rejected.
- **Documents to be provided to the department:** Various documents should be provided to the department, whether it is for comments on town planning applications or the submission of building plans. These documentations include the title deed to the property, application forms from the local authority and drawings. The latter include Site Development Plans (SDP), layout drawings and drainage installation drawings, to name a few.
- **Supporting documents that may be requested:** The department may request an engineering certificate, an approved SDP, comments from other departments such as engineering services and a competency certificate of the draftsmen or architect responsible for the drawings.

The building inspector is responsible for inspecting buildings and determining if it is in line with the requirements of the abovementioned regulations, and also to stop unauthorised building work. A building under construction should be inspected at least three (3) times including the checking of trenches for foundations, the drainage installation and the checking of the final building. It may be requested that more inspections should be scheduled depending on the complexity of the development or other requirements by the department (Opperman, 2015:31-32).

This section should be viewed alongside the standards provided in Chapter 3, 5 and 6.

4.2.2 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Table 4-2: Important knowledge to take note of - Building and construction management control.

Concept	Building and construction management control
Process to follow	The processes of building and construction management control include the approval of building plans and the inspection of buildings under construction (as described above). If the local authority is made aware of illegal land uses on a property, the BCO is requested to do an inspection, this may lead to the council informing the owner to either stop the use or legalise it through either a town planning application or the submission of new building plans. The building and construction management control department are requested to comment on all town planning applications which also requires site inspections in some cases.
The role of the Engineer	The engineer is firstly responsible for the provision of comments on whether or not the engineering services will be sufficient for the proposed development, after which these will be used to inform the BCO. Secondly, the engineer will be requested to review the building plans submitted for approval, they will review the plans and determine if the buildings are in line with the requirements.
What is important to know	Building and construction management control include the responsibility of inspecting buildings and determining if it is in line with the requirements of the abovementioned regulations, and also to stop unauthorised building work.
How it should be implemented	The relevant legislation stipulates that the local authorities should maintain control of building activities. This is carried out by the BCO or the building inspector. Building and construction management control should be done in accordance with the town planning policies and bylaws of the local authority in order to guide development. The engineering department will also play an integral role as they need to provide comments on building plans, for example.
Consultants to contact for assistance	Building Control Officer; Building Inspector; Town Planner; Land Surveyor; Consulting Engineers; Environmentalists; Government Departments; these consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation including Town Planning Scheme; SDF; IDP; LUMS; ITP; environmental guidelines; SABS Standards. The Guidelines for Human Settlement Planning and Design, 2000 (Redbook) should also be consulted.

Source: Own synthesis (Opperman, 2015:19-32).

5. TRANSPORTATION, SECTORAL PLANS AND ENGINEERING SERVICES

This chapter consists of three (3) sections, including transport and other sectoral plans and provision of engineering services. These sections are included in the same chapter as they play an integral part in urban and regional planning and in each other.

5.1 Transportation

5.1.1 Chapter contents and brief description

Wessel (2012) states that transportation provision is focussed on 'the act of moving something from one place to another' this is substantiated by Estefani (2013). It is thus important to include infrastructure or accommodation such as terminals or ports, vehicles or modes of transportation, a source of energy such as fuel, an operator or driver and supporting services enabling transport to occur safely (Estefani, 2013).

5.1.1.1 Developmental interface

The interface between spatial planning, transportation planning and environmental management, are promoted through the National Land Transport Transition Act (22 of 2000) (NLTTA) and the National Land Transport Act (5 of 2009) (NLTA), which includes (Schoeman, 2015):

- General principles for transportation planning;
- **Types of transportation plans:** Integrated Transport Plans (ITPs); Freight Transport Plans (FTP); Public Transport Plans (PTP's); Commuter rail plans (CRP); Transportation plans and changes in land use and public transport infrastructure and services;
- **Provisions on transportation planning:** National Land Transport Strategic Framework (NLTSF); Provincial Land Transport Frameworks (PLTF);
- Rationalization of public transport services (RATPLANS);
- Transport Impact Studies (TIS's);
- Traffic Impact Assessments (TIA's).

5.1.1.2 Policy and legislative framework

Various policies, legislation and regulations are utilised in an attempt to improve and maintain transportation and the influence it has on the built environment as a whole. This section includes brief descriptions of the policies and legislations included in the following figures. Figure 5-1

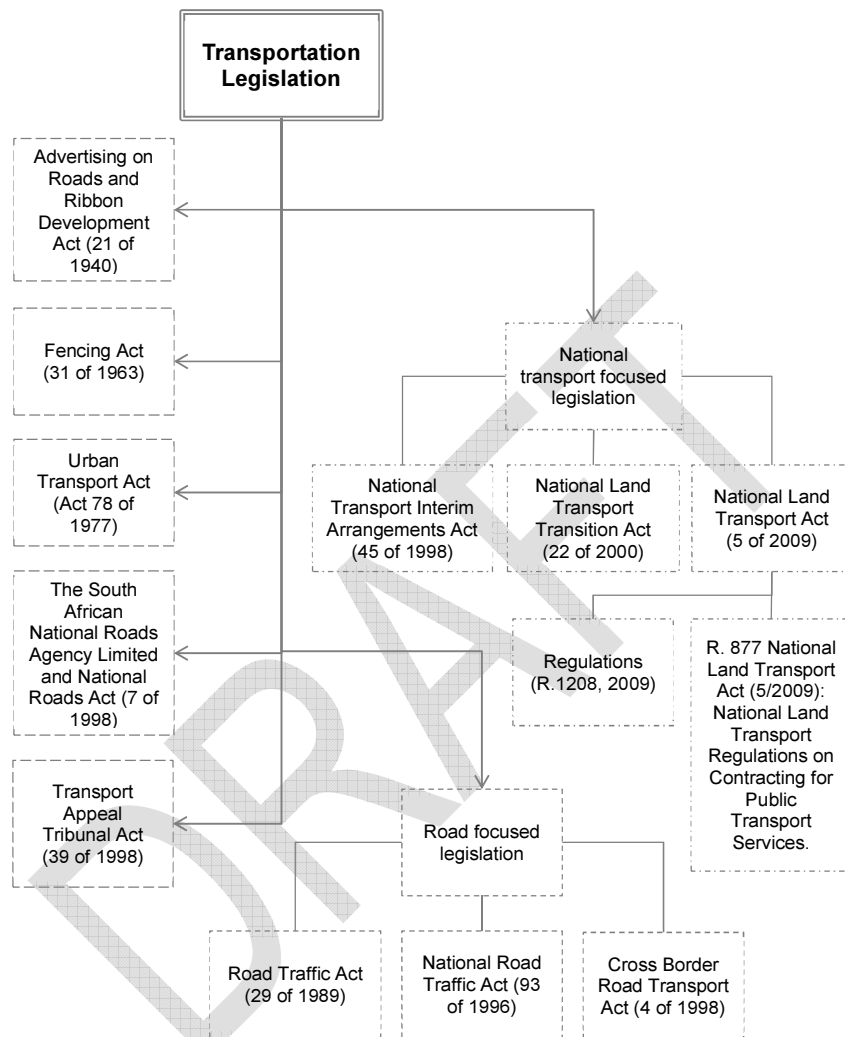


Figure 5-1: Transportation legislative framework - flow chart.

Source: Own synthesis (Schoeman, 2015).

provides a brief illustration of the legislative framework concerned. Figure 5-2 illustrates some of the policy framework included in transportation.

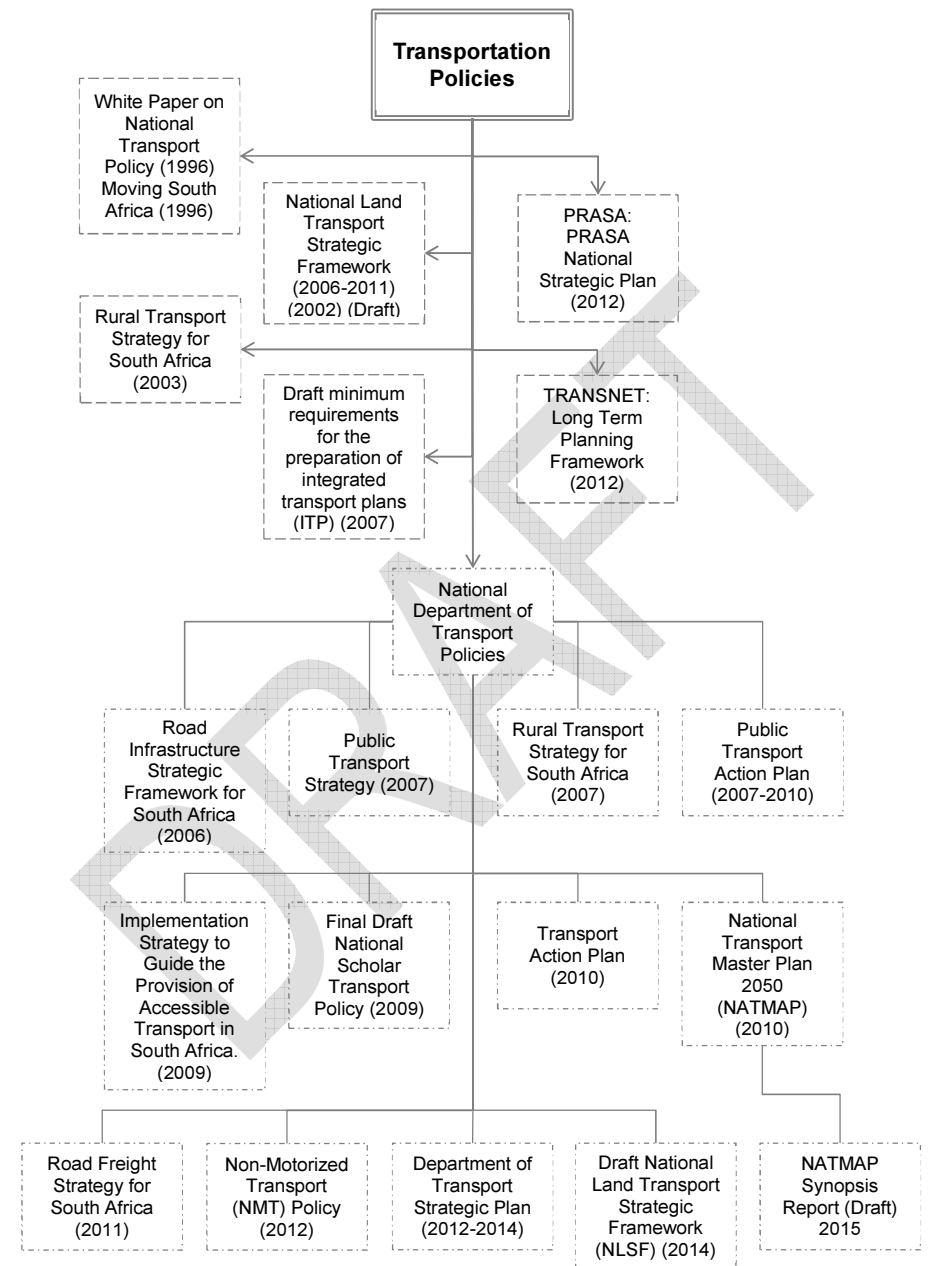


Figure 5-2: Transportation policy framework - flow chart.

Source: Own synthesis (Schoeman, 2015).

The National Transportation Master Plan (2050) (NATMAP) is also briefly described in this section as there is cross-references made to it in other national policies such as the National Development Plan (2012) (NDP), the New Growth Path (2010) (NGP), the National Spatial Development Perspective (2003 and 2006) (NSDP) and the Spatial Development Initiatives (SDI) (1995).

NATMAP (2005) serves as a master plan for developed from the proposals for an Integrated National Transport Plan. The plan was developed to identify and resolve the problems resulting from socio-economic development strategies etc. It furthermore, motivates a prioritised program for interventions to upgrade the transportation system in South Africa. The project makes provision for continued upgrading, innovation, changes in the environmental and economic aspects of sustainable transportation whilst enabling government strategies, growth, development and integration within the national spatial system. It further consists of four (4) phases, including an inventory and data analysis phase, future vision and forecast phase, forward planning phase and an action for agenda phase.

Transportation is guided through all the relevant policies mentioned above including various provincial and local policies, such as Integrated Transport Plans (ITP), Spatial Development Frameworks (SDF), Integrated Development Plans (IDP) and Local Economic Development (LED).

Various references are made to the requirements and standards provided in the Guidelines for Human Settlement Planning and Design, 2006 (Redbook). This includes references to improve pedestrian movement and catering for the various modes of transport, such as vehicle transport, public transport through the use of busses and rail transport for both people and cargo.

The interface between land use and transportation plays a major role and transport development as this includes the achievement of sustainability (see Chapter 7). The coordination between land uses can be used to reduce traffic movement and increase the use of public transport and thus lead to the reduction of travel time between the various land uses (Pacione, 2009:266). The correlation between transportation and urban form is unavoidable as is the relationship between transportation and sustainable urban development (Pacione, 2009:264).

5.1.1.3 Development and implementation of the Gautrain as a high speed transportation method

The development and implementation of the Gautrain as a high speed transportation method is discussed as a case study for the integration between land uses and transportation as well as the improvement of linkages between the various nodes in Gauteng. The Gautrain creates a connection between PTA, JHB and O.R. Tambo International Airport (ORTIA), which is one of the

Spatial Development Initiatives (SDIs) or Blue IQ of the Gauteng Government. According to the Gauteng SDI, the Gautrain will stimulate development in specific areas of the province with high economic growth potential, thus creating employment opportunities. This project promotes public transport and prioritise it over private transportation, according to the national Government's stated policy (Bohlweki Environmental (Pty) Ltd, 2002).

5.1.2 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Table 5-1: Important knowledge to take note of - Transport and other sectoral plans.

Concept	Transport
Process to follow	The following can be seen as a generalised process for transportation provision: 1. Establish vision and goals through liaising with the public and stakeholders; 2. Alternate improvement strategies through the monitoring of existing conditions and the comparison to the transportation performance goals; 3. Evaluation and prioritisation of strategies through the estimation of future population and employment growth, including projected land uses, redevelopments and proposed corridor developments as a result of growth; 4. Development of transportation plan including the identification of current and projected transportation needs through the development of performance measures and targets; 5. Development of transportation improvement programmes and strategies along with the analysis of their trade-offs through the use of detailed planning studies; 6. Project development including long term plans and short term programs focused on capital improvement, management and operational strategies for moving people and goods; 7. Systems operations (implementation) including the development of a financial plan in an attempt to secure sufficient revenues that cover the costs of implementation strategies to ensure ongoing maintenance and operation; 8. Monitoring system performance (data) through the estimation of the impact of recommended improvements on the transportation system and its impact on the achievement of performance goals, the estimation of the impact of the economy and environmental quality and air quality.
The role of the Engineer	They focus on traffic operations of roads, streets and highways as well as their networks, terminals, neighbouring lands and relationship with all modes of transport. They also focus on the planning and geometric design of the above mentioned thereby attaining safe, efficient and convenient movements of people and/or goods. As well as the evaluation of plans, proposal drafting

	and make changes where and when needed. They analyse schematics and engineering data, offer recommendations for traffic and driving policies, design transportation systems and analyse the effects of transport in urban areas. They may have to oversee plans with contractors and determine the overall costs of the projects.
What is important to know	Transportation consist of: • Transportation engineering: Transportation engineering is the safe movement of people and/or goods, it also includes the major types of transportation such as water and pipeline, highway, rail- and subway and air transportation. Like traffic engineers, transport engineers are also very similar to civil engineers, but they do the designing of the major types of transportation systems they also supervise the construction and repair of these systems. • Traffic engineering: Traffic engineers do the design and supervise the construction of roads and streets, thereby easing traffic congestion and movement. They also do the designing of pedestrian walkways, highways, study traffic statistics and the environmental aspects that will influence the transportation of people and/or goods. They plan new roads and traffic patterns. These engineers are very similar to civil engineers, but they focus more on the amount of traffic that has an influence on the way transportation systems are planned and designed. • Transportation planning: The application of transportation planning techniques is the operation, provision and management of facilities and services for any modes of transport to achieve safe, faster, comfortable, convenience, economic and environmental suitable movement of people and/or goods. These techniques can also be used to predict future travel demand and ensuring adequate facilities and services to provide in these demands. Each of these aspects plays a role in the provision of transportation and the infrastructure needed to provide in the needs of the expanding urban environment.
How it should be implemented	The municipal engineer is responsible for the provision of comments on town planning applications, relating to the provision of roads and the requirements of the proposed development and the impact that might have on the existing transportation infrastructure. If the information provided is not sufficient the engineer may request a traffic study to be completed by a consulting engineer.
Consultants to contact for assistance	Town Planner; Land Surveyor; Attorney; Consulting Engineers (Traffic engineers); Environmentalists and Government Departments these consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation including Town Planning Scheme; SDF; IDP; LUMS; ITP; environmental guidelines; SABS Standards. The Guidelines for Human Settlement Planning and Design, 2000 (Redbook) should also be consulted.

Source: Own synthesis (ADOT, s.a.; Transportation Planning Capacity Building Program, 2015:6-7; UNSW, 2015?a).

5.2 Sectoral Plans

5.2.1 Integrated Transport Plan (ITP)

The ITP is generally prepared by the planning authorities in compliance with the National Land Transport Act (5 of 2009). The ITP can be prepared in various forms such as (National Land Transport Act (5 of 2009)):

- **Comprehensive Integrated Transport Plan (CITP):** Includes a long term component, such as a long term vision and objectives for the transport system in the region, and a strategy for the development of the transport system in the region with its set of objectives. It is compiled by the metropolitan municipalities and all major municipalities and should comply with SPLUMA (2013) regulations and other applicable provincial legislation;
- **District Integrated Transport Plan (DITP):** To be prepared by all district municipalities and if the local municipality prepared a CITP, it should be incorporated to the DITP;
- **Local Integrated Transport Plan (LITP):** The LITP should be prepared by all local municipalities.

The ITP should include preliminary and detailed design of projects to be completed as part of the action plan of the ITP. This can include infrastructure and services and would be undertaken by the relevant authority or agency responsible for the execution of the work. This also includes the preparation of public transport plans and the transport register. The ITP should be prepared by all municipalities every five (5) years with annual updates made to it and works in collaboration with the SDFs and IDPs (National Land Transport Act (5 of 2009)).

5.2.2 Water Services Development Plan (2012) (WSDP)

The WSDP is regulated through the Constitution of South Africa, Act 109 of 1996 alongside the Municipal Structures Act (117 of 1998), the Municipal Systems Act (32 of 2000) and the Water Services Act (108 of 1997). The WSDP is prepared by a water services authority which is described as all municipalities. They are responsible for ensuring access to water for all residents of the community and ensuring efficient affordable, economical and sustainable access to water services (Department of Water and Sanitation, 2014).

This section includes the detail regarding the contents of each WSDP such as the size and distribution of the population of the area in question, the existing water services and the time frame for the plan and the relevant implementation programme for the five (5) year period for which the plan is relevant (Water Services Act (108 of 1997)).

5.2.3 Housing Sector Plan (HSP)

The development of a HSP is stipulated in Section 9(1) of the National Housing Act (107 of 1997) which states that each municipality, as part of the IDP process, should take the necessary steps to ensure that the residents within the municipality have adequate housing on a progressive basis through the establishment of housing delivery goals and the identification of suitable land for housing development including the planning, facilitation, initiation and co-ordination of housing development (National Housing Act (107 of 1997)).

Figure 5-3 illustrates the contents and process involved in the development of the HSP.

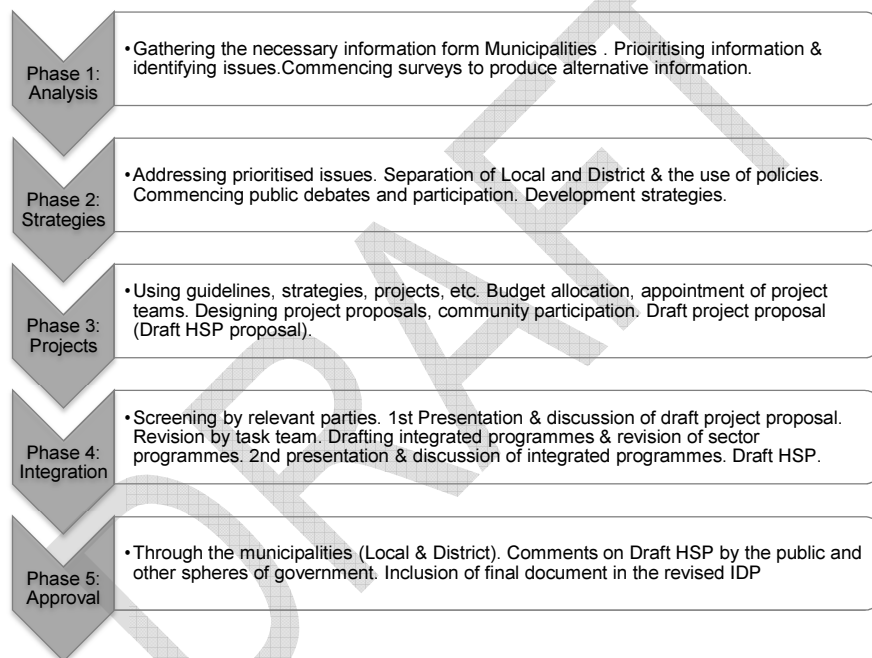


Figure 5-3: Contents and process of the HSP.

Source: Own synthesis (Tissington, 2011).

5.2.4 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Table 5-2: Important knowledge to take note of - Transport and other sectoral plans.

Concept	Sectoral plans
Process to follow	Each sectoral plan has its own process determined by the relevant legislation. This is illustrated and described in the source document.
The role of the Engineer	The engineer will be requested to submit inputs in the development of the sectoral plans. They are also partially responsible for the implementation and execution of the sectoral plans in the provision of engineering services and transport provision, amongst others.
How it should be implemented	Each sectoral plan are to be implemented by each relevant department. Service delivery, transportation and housing delivery should comply with the objectives and vision included in the sectoral plans.
Consultants to contact for assistance	Town Planner; Land Surveyor; Consulting Engineers; Environmentalists; Government Departments; these consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation including; SDF; IDP; LUMS; ITP; environmental guidelines.

Source: Own synthesis.

5.3 Provision of engineering services

5.3.1 Chapter contents and brief description

This section focuses on the provision of engineering services, such as water, sewer and electricity, amongst others. These services can be provided to individual erven through the use of “mid-block” services provision or “mid-street” services provision. The provision of bulk services should also be considered as this is applicable to large developments such as township establishments.

5.3.1.1 Development guidelines and services design

The Guidelines for the provision of engineering services and amenities in residential township development, 1994 (GESRT) and the Guidelines for Human Settlement Planning and Design, 2000 (Redbook) provides detailed descriptions of the standards and development guidelines regarding the provision of engineering services. This is also briefly discussed and illustrated in the section and includes, amongst others, the sizes of pipes needed for sewerage and water in accordance with the SABS standards. Engineering services should also be provided in terms of Section 49 of SPLUMA (2013) and the various Strategic Infrastructure Projects (SIP) identified by the Presidential Infrastructure Coordinating Commission (PICC) (Dambuza, 2013).

Numerous factors influence the relative cost of internal service provision, thus making it impossible to provide an exact cost. Although the factors that influence cost are often specific to individual service technologies, in general, they can have a great influence on the service costs.

The following factors cause the typical internal service provision costs to vary, and include (Behrens & Watson, 1996:237-244):

- **Site conditions:** Context specific site conditions have a significant influence on the cost of service provision. These conditions include topography, soil type, water table, climate and vegetation;
- **Delivery system:** The manner in which services are delivered influences the cost of provision, thus construction methods and project phase are important to consider;
- **Design standards:** The specifications and standards applied in infrastructure design have a significant influence on the cost of service provision. The design capacity, lifespan and materials are of particular importance;
- **Geometric layout:** The geometric layout of an urban settlement influences the total cost of service provision, including residential density, road and block alignment, reticulation networks;
- **Miscellaneous factors:** Include the economic and business climate, security and other risks and monopoly conditions.

5.3.1.2 Levels of services to be provided

Municipal services each have a minimum level at which they should be provided to the community, including (Department of Provincial and Local Government, 2005):

- **Water:** A basic water supply facility is described as the infrastructure needed to supply twenty five (25) litres of potable water per person per day within two hundred (200) metres from the household and with a minimum flow of ten (10) litres per minute or six thousand (6000) litres of potable water supplied per formal connection per month.
- **Sanitation:** A basic sanitation facility is described as the infrastructure needed to provide a safe, reliable, private, protected (from weather), ventilated, keeping smells to the minimum, easy to clean and minimising risks of the spread of sanitation-related diseases and the appropriate treatment and/or the removal of human waste and wastewater.
- **Roads:** The basic service level for roads is described as an all-weather access within five hundred (500) metres from the dwelling house.
- **Stormwater:** The basic service level is described as open channels along the road.
- **Solid waste disposal:** Refuse removal services should take place at least once a week.

5.3.1.3 Service Level Agreements

This section also includes Service Level Agreements (SLAs) which is used to underline the level of service to be provided from each service provider and the intended consumers. It can address areas such as the availability of services and the responsibilities of the parties involved, while identifying key areas such as targets and minimum level of services to be achieved (SLA

Template, s.a.). A set of criteria or objectives should also be included to determine the service levels that can be whether or not the objectives have been met (Michalsons, 2015).

5.3.1.4 Formalization of informal settlements and case study

This entails the provision of public spatial structures to guide new development. The problem in informal settlements is the provision of a public spatial structure to provide relief from overcrowding thus creating public gathering places and guiding public and private investment and improving the movement systems. In “greenfields”, housing and economic development takes place in and infill development method including spatial structure (upgrading projects, the negotiated relocation of residents and economic activities can possibly be necessary for spatial structure) consistent with the settlement making process (Department of housing, 2005:39).

Formalization of informal settlements consist of five (5) phases, including (GESRT, 1994):

- **Pre-phase:**
 - **Outcomes:** Creation of a proper project plan;
 - **Tasks:** Determine the available funding for the project; create a timeline and detailed schedule; create an estimated budget for the project.
- **Phase 1:** Development of basic cadastral data for the area;
 - **Outcomes:** Determination and identification of the development area;
 - **Tasks:** Aerial photographs; Ortho photos; contour maps with 1 meter contours; ground control points; trigonometry beacons should be collected.
- **Phase 2:** Land-use survey
 - **Outcomes:** Current existing land-use survey and need determination of residents;
 - **Tasks:** Conduction of land-use surveys; determine what is already provided in the local municipality's SDF; determine levels of current services in the area through thorough ground studies and site analysis; conduct community participation meetings for the determination of needs.
- **Phase 3:** Settlement planning
 - **Outcomes:** Proposed settlement plan with the identification of plots, streets and the provision of housing;
 - **Tasks:** Creation of final plans in co-operation with the municipality with the help of community participation meetings; promote certain responsibilities and skills under the residents; Compilation of detailed settlement plans including roads, water and electricity networks, housing, etc.; Determination of principles applicable for the specific project; Conduct all necessary environmental studies.
- **Total:** Duration, costs and final outcomes of the project

- **Outcomes:** Total formalization of the area;
- **Tasks:** Create a final plan with final road networks, electricity cables and networks, water pipelines and sewage systems, numbered and formalized plot identification; Provision of proper low income (high density) housing; Provide in all the needs of the community and the needs identified in the provincial SDF, local municipality's SDF and its IDP.

5.3.2 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Table 5-3: Important knowledge to take note of - Provision of engineering services.

Concept	Provision of engineering services
Process to follow	The following can be seen as the general service delivery life cycle: Phase 1 - Policy National: Development of infrastructure policy and the setting of standards for development systems; Development of sector policies, norms and standards; Local: Service provision policies and bylaws; Sector policies for free basic services. Phase 2 - Planning National: Development of frameworks for National Spatial Development Perspectives (NSDP); Macro sector planning; Provincial: Provincial Growth and Development Strategies (PGDS); Provincial Sector Plans; Local: Includes the IDP; Local sector plans; Project pre-feasibility and feasibility studies and business plans; Phase 3 - Implementation National: Municipal infrastructure programme management, collaboration, mobilising support and monitoring; Monitor the implementation of norms and standards and collaboration around support; Provincial: Monitoring implementation of infrastructure policy, standards and norms and the delivery systems and mobilising with co-ordinating support; Local: Infrastructure delivery systems put in place and project management; Technical department including water and roads to oversee project implementation; project cycle including the implementation of technical norms and standards; Phase 4 – Service provision National: Regulating and overseeing systems and procedures, sectoral norms and standards; Provincial: Systems and procedures support; services provision support; services provision support and intervention;

	Local: Regulating and overseeing sectoral norms and standards; and service provision.
The role of the Engineer	It is the responsibility of the municipal engineer to provide comments on all town planning applications. These comments should include aspects such as: - Roads (maintenance and provision thereof); - Stormwater (possible impact); - Water & sanitation and electricity (sufficiency of capacity for proposed development); etc. - Consideration should be made to aspects including <i>inter alia</i> bulk- and internal services, cost effectiveness, development contributions.
What is important to know	Not all town planning applications are the same; circumstances and applicable legislation differ; SDF's, LUMS and other policies should be consulted for each application and should not be seen as blue prints as some are adaptable and can be changed; illegal developments may warrant the proposed development even though the municipal documentation does not necessarily support the application completely.
How it should be implemented	It is good to provide consequent and rigid comments on applications, it prevents the establishment of precedents, however if the proposed development does not necessarily comply with the policy documents, it should be considered with greater diligence. Engineering comments should be provided in the required timeframe, the delay in the provision thereof, causes a ripple effect in the delay regarding the completion of the applications, resulting in a bottle-neck effect in all municipal departments. Engineering contributions should be explained in greater detail as the developers and owners are not educated in understanding the difference in green- and brown field developments and the difference in contributions.
Consultants to contact for assistance	Town Planner; Land Surveyor; Consulting Engineers; Government Departments; these consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation including SDF; IDP; LUMS; ITP; SIP; Section 49 of SPLUMA (2013); environmental guidelines; SABS Standards. The Guidelines for the provision of engineering services and amenities in residential township development, 1994 (GESRT), the Guidelines for Human Settlement Planning and Design, 2000 (Redbook), Municipal Infrastructure: Roles and responsibilities by the Department of Provincial and Local Government and The Municipal Infrastructure Grand: Basic Level of Services and Unit Costs: A guide for municipalities should also be consulted.

Source: Own synthesis (Department of Provincial and Local Government; 2006:6-7).

6. ENVIRONMENTAL MANAGEMENT AND DEVELOPMENTAL INTERFACE

6.1 Chapter contents and brief description

Environmental management is concerned with the people and their needs, while serving their physical, psychological, developmental, cultural and social interests equitably. Development should be socially, environmentally and economically sustainable, and sustainable development, environmental health, environmental management, to name a few, requires the consideration of certain factors (National Environmental Management Act (NEMA) 107 of 1998).

6.1.1 Developmental interface

The interface between spatial planning, transportation planning and environmental management, are promoted through NEMA (1998) and includes (Schoeman, 2015):

- General objectives;
- Environmental Implementation Plans (EIP's);
- Environmental Management Plans (EMP's);
- Integrated Environmental Management (IEM);
- Environmental Impact Assessments (EIA's);
- Environmental Authorizations (EA's);
- Strategic Environmental Assessments (SEA's);
- Environmental Management Programme (EMP's);
- Monitoring and Performance Assessment (M&PA's);
- Mine Closure Plans (MCP's).

6.1.2 Policy and legislative framework

Various policies, legislation and regulations are utilised in an attempt to improve and maintain environmental management and the influence of human development thereon. Figure 6-1 provides a brief illustration of the legislative framework concerned. Figure 6-2 illustrates some of the policy framework included in environmental management.

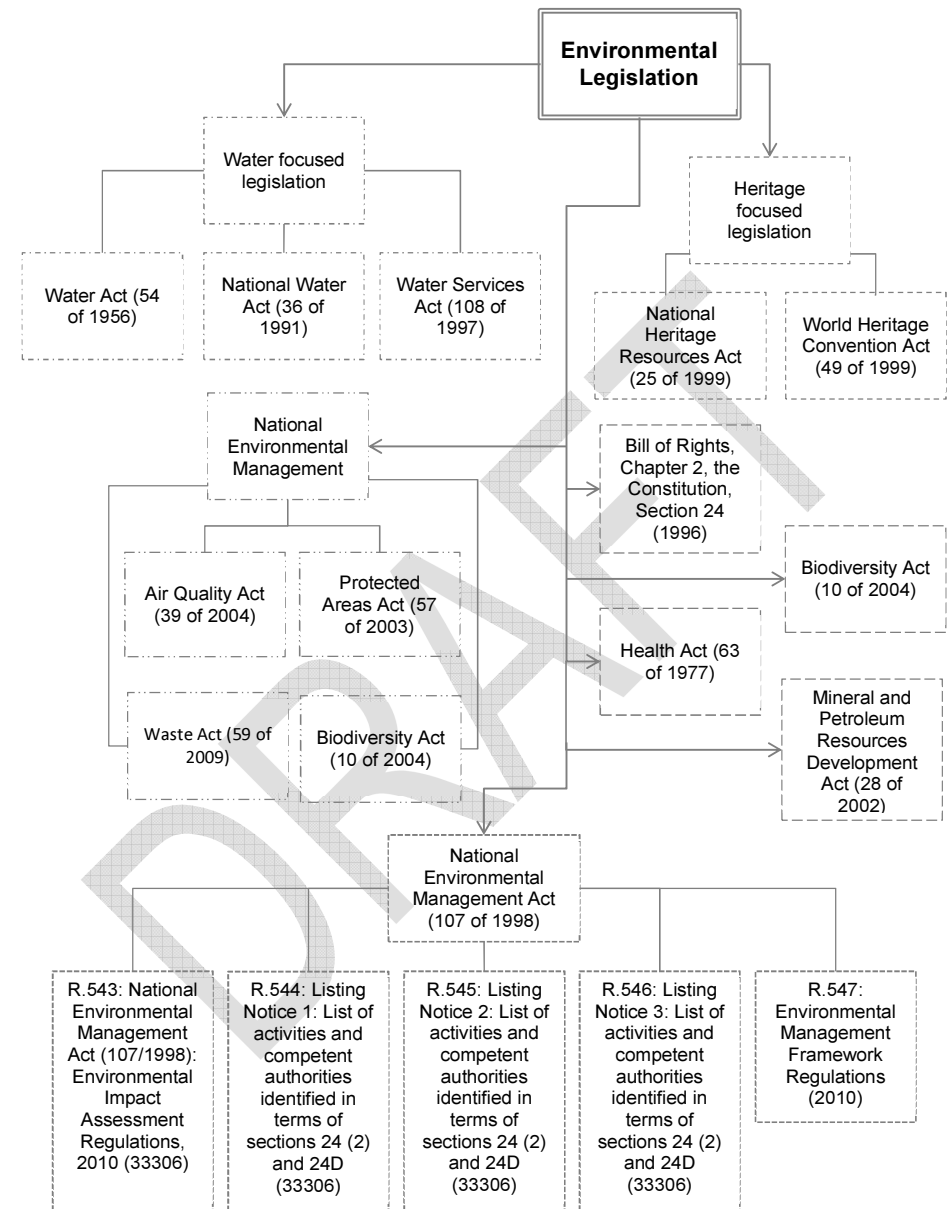


Figure 6-1: Environmental legislative framework – flow chart.

Source: Own synthesis (Schoeman, 2015).

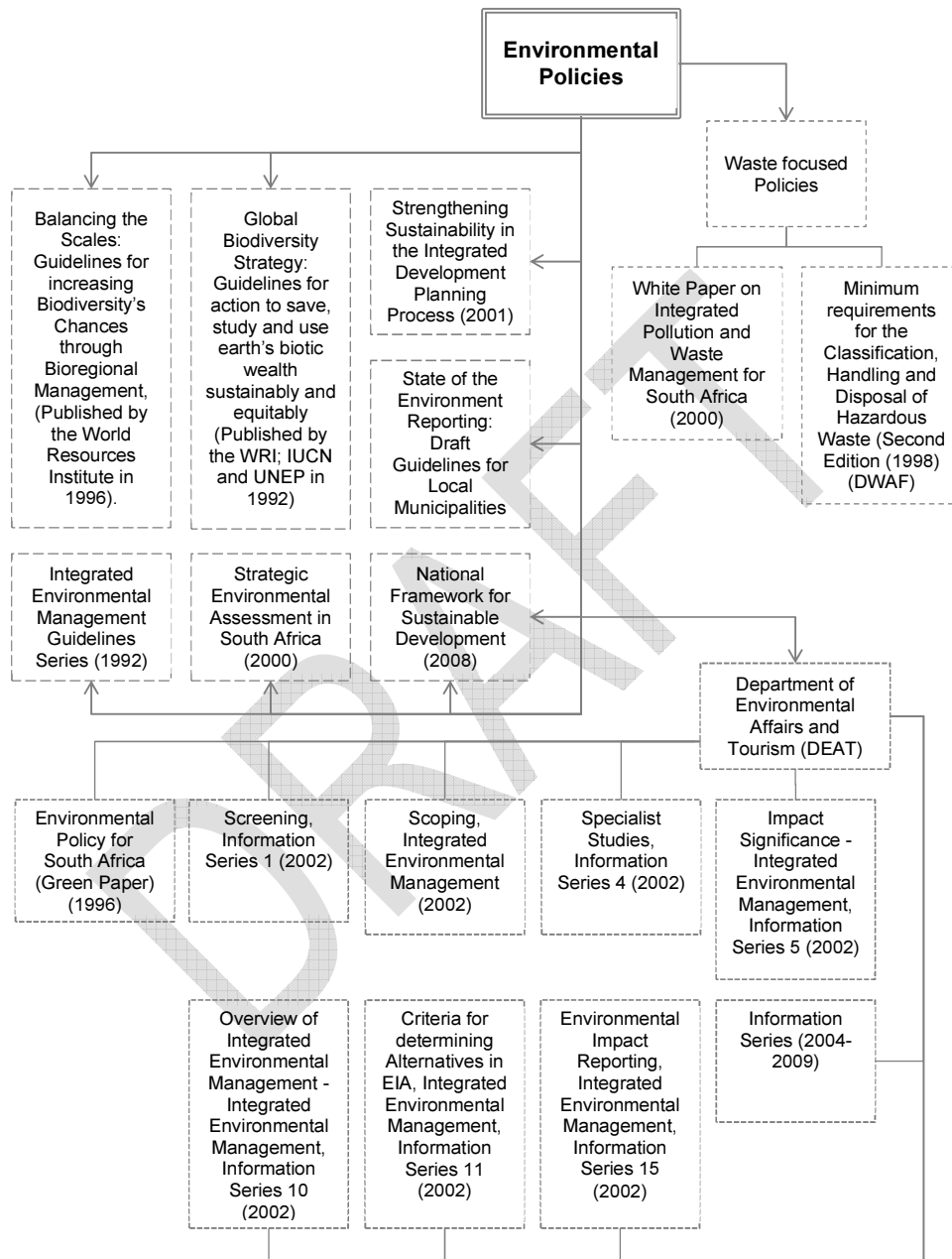


Figure 6-2: Environmental policy framework – flow chart.

Source: Own synthesis (Schoeman, 2015).

6.1.3 Environmental considerations

This chapter further includes brief descriptions of geographical, geological, ecological, hydrological and climatic considerations. These considerations and their effects plays a role in urban development and they should be evaluated with certain measures should be taken as urban development includes land use and planning decisions from a neighbourhood scale to an individual erf scale (Gomez *et al.*, 2006:1).

The current land use, forest area, agricultural area, wetlands and possible landslide areas along with the geological compositions of the intended site should, amongst others, be considered when planning a new development. As a result, careful consideration should be given to (Department of Housing, 2000:261-271; Gomez *et al.*, 2006:2-6; Moreno, 2012:338; Pacione, 2009:3):

- **Geographical considerations** include the socio-economical and physical environment and can have an influence on both cities and the economy. It attempts to explain the distribution of towns and cities and socio-spatial similarities and differences included. It consists of, amongst others, the population density, migration tendencies, demographic distributions, technological changes varying in the geographical scales they apply to;
- **Geological considerations** include the composition of the ground, soil types, ground instabilities such as soil creep should be monitored, contours and the resulting slope of the property concerned and other features on the site that might influence drainage. The possibility of erosion should be considered as well as mitigating actions to prevent such occurrences. Seismic activity, dolomite, mining activities and radioactivity should be identified as this greatly influences the proposed developments;
- **Ecological considerations** include the protection of biodiversity amongst the fauna and flora present on the proposed site. This includes the protection of the habitat of endangered species;
- **Hydrological considerations** include rivers, wetlands, ground water, water tables, stormwater runoff areas and sewerage spills, amongst others. These considerations are important as they can possible influence the proposed development especially with superficial water tables or when the development is proposed on flood plains such as within the flood lines (above the 1:50-year flood line);
- **Climatic considerations** include seasonal changes in averages of precipitation (rainfall) and temperatures and wind direction. The orientation of development should carefully be considered as this can allow for more solar energy gained and improve natural heating and cooling of developments which in turn improves the impact on the environment and the lessen the reliance on electricity. For example living areas such as lounges and bedrooms should face north as this allows large amounts of sun in winter times and the inverse during the summer.

Sustainable development also plays a major role in environmental management as this can contribute to the improvement of climatic considerations and the usage of the environment in its entirety. These environmental considerations can be mitigated through the use of local layout planning strategies (Department of Housing, 2000:260).

6.2 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Concept	Environmental management and developmental interface
Process to follow	The processes for environmental management differs from municipality to municipality, however, these policies are regulated by a variety of legislation which prescribes processes for the geographical, geological, ecological, hydrological and climatic considerations. For example, prior to an industrial development, an Environmental Impact Assessment might be required by the local authority.
The role of the Engineer	Engineering consultants, such as environmental engineers, mostly conduct the investigations required for the various reports and processes. It is the responsibility of the municipal engineer to use these documentations in provide comments on all town planning applications which will affect future roads and service delivery. They can further require adaptations to the original layout planning where the original design does not take the environment into consideration.
What is important to know	Environmental management consist of various aspects that should be considered with each development as this may have an influence on either the construction of foundations or an impact on the electricity usage of a development if climatic circumstances are not considered, for example. In order to promote sustainable development, these considerations need to be kept in mind.
How it should be implemented	Engineering comments should be provided in the required timeframe, the delay in the provision thereof, causes a ripple effect in the delay regarding the completion of the applications, resulting in a bottle-neck effect in all municipal departments. If the engineering department requires certain documentation not prescribed in the requirements by the town planning department, the consultant should be informed as soon as possible and provided with a reason as to the requirements, in order to improve the process of developments. It should be best if the engineering department can coordinate with other departments as to their requirements, this will allow consultants to correctly inform their clients and to complete the process in the minimum amount of time needed before a decision is made.
Consultants to contact for assistance	Town Planners; Geologists; Geographers; Geological engineers; Consulting Engineers; Environmentalists; Sociologists; Lawyers; Government Departments; etc. these consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation including, amongst others, Town Planning Schemes, SDF, IDP, LUMS, ITP and environmental guidelines. SPLUMA Section 7, 12, 14, 21, 24, 25, 42 and 54 includes some development principles where the environmental impact should be considered. The Guidelines for Human Settlement Planning and Design, 2000 (Redbook) should also be consulted.

Source: Own synthesis (Department of Housing, 2000:261-271; Gocmez *et al.*, 2006:4; SPLUMA, 2013).

7. SUSTAINABLE DEVELOPMENT

7.1 Chapter contents and brief description

7.1.1 Background

Sustainable development can be described as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Dixon & Pretorius, 2001:2; SAEP, 2006:1; Sustainable Development Information, s.a.; Pacione, 2009:186 & 683).

Sustainable development as a concept, relates to the relationship between economic growth and prosperity, social inclusion and environmental sustainability (Asefa, 2005:2). This is also known as the three (3) dimensions of sustainable development (Thwaites, 2015). The term was first used by the World Commission for Environment and Development in 1987. However, the various interpretations of the term has limit its potential to be used as a useful guide for development policy (Asefa, 2005:2; Dixon & Pretorius, 2001:2).

7.1.2 The impact of economic policy on sustainability

The chapter further discusses the impact of economic policy on sustainability as well as the impact of transportation which includes the location of work, home and leisure activities along with the usage of various modes of transport and the impact that might have on achieving sustainability.

7.1.3 The impact of transportation on sustainable development

Promoters of sustainable urban development recommends the use of public transport and a more comprehensive approach to planning which will in turn acknowledge the fundamental relationship between transport and the urban form. A common view of sustainable urban development is that greater mixed-use and higher density developments can contribute to the solution to urban transport problems, as well as the integration between transport considerations and land use planning which is aimed at enabling individuals to sustain their mobility while making use of less vehicle trips (Pacione, 2009:276).

7.1.4 Planning for sustainable urban development

Planning for sustainability is also included with reference made to urban sustainability which can be viewed through five (5) dimensions, including (Pacione, 2009: 606-608) economic sustainability; social sustainability; natural sustainability; physical sustainability and political sustainability. The linkage between the dimensions is illustrated in the following image.

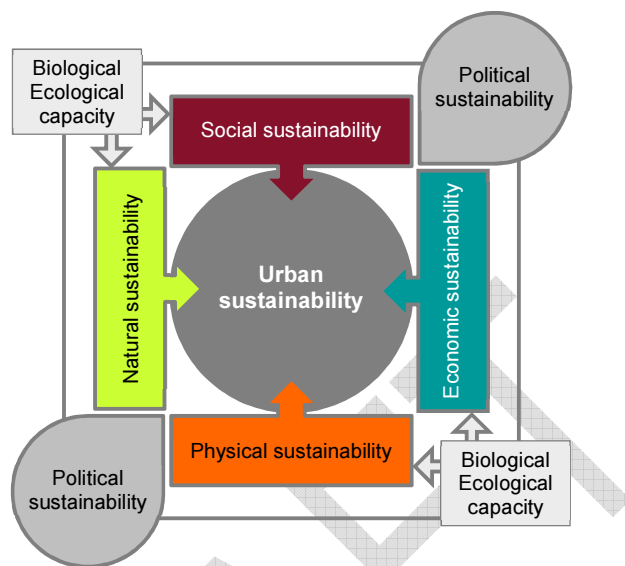


Figure 7-1: Dimensions of urban sustainability.

Source: own synthesis (Pacione, 2009:608).

7.1.5 Resilience and its relationship to sustainability

Sustainability should not be viewed as a standalone concept as resilience also plays a large role in achieving sustainability. The concept of resilience is rooted in ecology, but has an influence in a variety of fields including human geography and urban theory, to name a few. It refers to the ability to 'bounce back' from adversity and the ability to achieve a state that is better than the original. In terms of communities, it can be a verification of the resourcefulness and capacity of the community to mobilise in times of shocks and stress (GGLN, 2014:11).

7.1.6 United Nations (UN) sustainable development goals

On 25 September 2015 the 2030 Agenda for Sustainable Development along with its seventeen (17) goals and one hundred and sixty nine (169) goals was formally adopted and will be implemented during the following fifteen (15) years. This replaces the successful Millennium Development Goals (MDGs) adopted in 2000 and aims to build on the existing building blocks the MDGs achieved over the past fifteen (15) years. The new goals will focus on wiping out poverty, fighting inequality and addressing climate change, they are more ambitious and meant to apply to all countries and not only developing countries such as the MDGs. These goals can also be

seen as universal, integrated and a transformative vision for a better world (The New York Times, 2015; Thwaites, 2015; UN DESA, 2015a; UN News Centre, 2015).

These goals should form the backbone for the agendas and policies formulated by all countries not only developing countries as determined by the previous MDGs and should be implemented from January 2016 (Thwaites, 2015; UN DESA, 2015a).

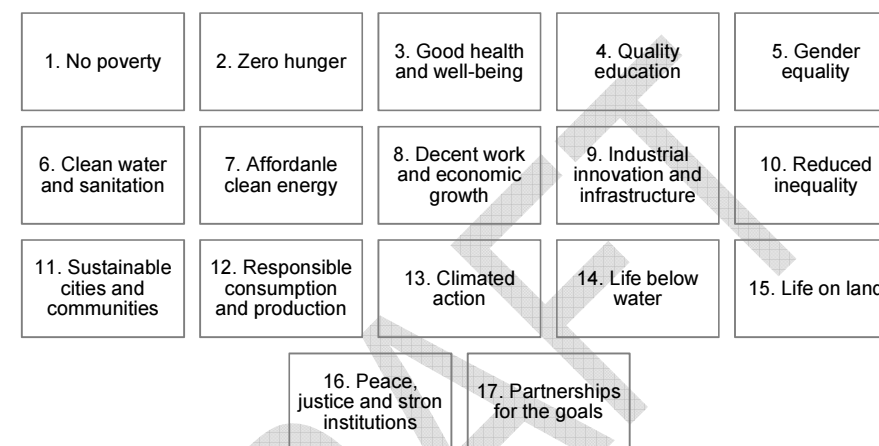


Figure 7-2: 2030 Agenda for Sustainable Development Goals.

Source: Own synthesis (The New York Times, 2015; UN News Centre, 2015; UN DESA, 2015).

7.1.7 Policy and legislative framework

South Africa currently mainly uses the National Framework for Sustainable Development (NFSD), 2008 and the National Strategy for Sustainable Development and Action Plan (NSSD 1) (2011-2014) to guide sustainable development. The former attempts to address the gaps in sustainable development through the provision of a broad framework intended to serve as a basis for the development of a national strategy and action plan (Department of Environmental Affairs and Tourism, 2008:6).

The latter builds on the NFSD (2008) along with other initiatives launched by the business sector, government, NGO's, civil society, academia and other key role players in an attempt to address the sustainability issues of South Africa. It provides an understanding of sustainable development and attempts to provide an explanation for the routes taken. It includes an action plan and indicators used to assess the implementation and performance of the strategy (Department of Environmental Affairs and Tourism, 2011:6).

Other policies and legislation used include the Hazardous Substances Act (Act 5 of 1973); Occupational Health and Safety Act (Act 85 of 1993); South African Constitution (Act 108 of 1996); Municipal Structures Act (Act 117 of 1998); National Environmental Management Act (Act 107 of 1998), to name a few (Nyirenda & Ngwakwe, 2014:79).

7.1.8 Challenges of sustainable development

Achieving sustainable development includes various challenges such as enhancing systems for integrated planning and implementation; sustaining the ecosystems and usage of natural resources efficiently; moving towards a green economy; building sustainable communities; responding effectively to climate change.

7.1.9 Making human settlements and cities sustainable

The integration of urban planning, transport systems, water, sanitation, waste management, disaster risk reduction, access to information, education and capacity-building can ensure the sustainability of cities. This can result in the improved promotion of economically, socially and environmentally sustainable societies and can be supported by universal access to basic services, housing and mobility (UN DESA, 2015b).

7.2 Important knowledge to take note of

The following table should be viewed as a brief description of the concept at hand and should not be seen as a summary of the entire chapter. See the *Source Document* for more information where needed.

Table 7-1: Important knowledge to take note of - Sustainable development.

Concept	Sustainable Development
The role of the Engineer	- Contributing to the development of a sustainable society for both the present and the future; - Applying professional and responsible judgements while taking the leadership role; - Doing more than just complying with legislation and codes; - Using available resources effectively and efficiently; - Seeking multiple views in an attempt to solve sustainable challenges; - Managing risks to minimise adverse impacts on both people and the environment.
What is important to know	The goal of sustainability is not the essential element of market capitalism and will possible encounter oppositions for embedded interests. Sustainable urban development embraces not only the environmental issues, but relies on the implementation of pollution taxes and the promotion of technical developments in an attempt to reduce the energy consumption of cars and

	production processes. In addition, sustainable development aims to develop and maintain prosperous social, economic and ecological systems. These systems are interlinked as human development often depends on services of eco-systems, such as clean water, food production and fuel, for the generation of wealth and the maintenance of security. The inverse is also true, as humans tend to transform eco-systems into more or less desirable conditions. If the human action result in the eco-systems being unable to provide these services, it will impact human livelihoods, vulnerability and security resulting in the loss of resilience.
How it should be implemented	Sustainable development is implemented through various strategic plans implemented in all spheres of government, public entities, civil society, organised labour and business. These documentation should be viewed in collaboration with the international initiatives.
Consultants to contact for assistance	Amongst others, Town Planner; Consulting Engineers; Environmentalists; Government Departments. These consultants, and others, can make significant contributions and should be consulted.
Resources to consult	Policy and legislative documentation including the 2030 Agenda for Sustainable Development Goals, NFSD (2008), NSSD 1 (2011-2014), Medium-term Strategic Framework (MTSF) 2009–2014, the Ten-year Innovation Plan, the revised Industrial Policy Action Plan for 2010/11–2012/13 (IPAP2), the revised Integrated Resource Plan (IRP2) and New Growth Path (NGP). SPLUMA Section 7(b) promotes sustainability through the use of spatial planning and land use management systems. The Guidelines for Human Settlement Planning and Design, 2000 (Redbook) should also be consulted.

Source: Own synthesis (Department of Environmental Affairs and Tourism, 2011:23 & 38; Department of Housing, 2000:260-261; Engineering Council, 2015; Folke et al., 2002:437; Pacione, 2009:186; SPLUMA, 2013; UNSW, 2015?b).

8. CONCLUSION

This document is a summary of the much needed project initiated by the Institute for Municipal Engineers of South Africa (IMESA). It will contribute to reducing the need for capacity building amongst municipal engineers and engineering staff in Urban and Regional Planning.

It is important that this document should not be used on its own as it only provides a summary and brief guidelines for the information included in the *Source document*. It is thus vital to view the sources identified along with the *Source document* in order to gain a better understanding of the concepts included and referred to.

BIBLIOGRAPHY

ADOT. s.a. What Is Traffic Engineering? <http://www.azdot.gov/business/engineering-and-construction/traffic/faq>. Date of access: 18 Oct. 2015.

Acts *see* South Africa.

Ahmadi, F. & Toghyani, S. 2011. The Role of Urban Planning in Achieving Sustainable Urban Development. *OIDA International Journal of Sustainable Development*. 2(11):23-26.

Akbar, D. & Rasul, M.G. 2012. Review of the nexus between Urban and Regional Planning and Engineering education. *Australian Association for Engineering Education 2012 Conference*. <http://www.aeee.com.au/conferences/2012/documents/abstracts/aeee2012-submission-135.pdf>. Date of access: 30 Jul. 2015.

Asefa, S. 2005. The Concept of Sustainable Development: An Introduction. *Upjohn Institute for Employment Research*:1-18. http://research.upjohn.org/cgi/viewcontent.cgi?article=1286&context=up_bookchapters. Date of access: 25 Sep. 2015.

Bale, J. 2010. Redefining Construction Management. <http://www.ciob.org/sites/default/files/Redefining%20Construction%20Management.pdf>. Date of access: 20 Oct. 2015.

Behrens, R.B. & Watson, V. 1996. Making Urban Places: Principles and Guidelines for Layout Planning. Cape Town: Urban Problems Research Unit, University of Cape Town.

CareerPlanet. 2015. Civil Engineer. <http://www.careerplanet.co.za/careers/construction-engineering-and-mining/civil-engineering/civil-engineer>. Date of access: 25 Aug. 2015.

CETA (Construction Education and Training Authority). 2013. Sector Skills Plan Update: 2013/2014. <http://www.ceta.org.za/wp-content/uploads/2014/08/CETA-SSP-FINAL.pdf>. Date of access: 1 Sep. 2015.

Collins, J. 2001. Urbanisation. <http://www.botany.uwc.ac.za/envfacts/facts/urbanisation.htm>. Date of access: 23 Oct. 2015.

CSIR. 1994. Guidelines for the provision of engineering services and amenities in residential township development. Pretoria.

CSIR. 2000. Guidelines for human settlement planning and design. Pretoria: Capture Press.

Dambuza, B. 2013. Strategic Infrastructure Projects (SIP) 18 and related SIPs: briefing by Department of Human Settlements. <https://pmg.org.za/committee-meeting/16437/>. Date of access: 20 Oct. 2015.

Department of Environmental Affairs and Tourism *see* South Africa. Department of Environmental Affairs and Tourism.

Department of Higher Education and Training *see* South Africa. Department of Higher Education and Training.

Department of Housing *see* South Africa. Department of Housing.

Department of Human Settlement *see* South Africa. Department of Human Settlements.

Department of Provincial and Local Government *see* South Africa. Department of Provincial and Local Government.

Department of Transport *see* South Africa. Department of Transport.

Department of Water and Sanitation *see* South Africa. Department of Water and Sanitation.

Dixon, Y. & Pretorius, JG. 2001. Sustainable Development: A South African Perspective. <http://www.helsinki.fi/imua2001/Pretorius.pdf>. Date of access: 26 Sep/ 2015.

ECSA (Engineering Council of South Africa). 2014. University Degrees Accredited as meeting the Educational Requirement for Registration as a Professional Engineer (E-20-PE). https://www.ecsa.co.za/education/EducationDocs/List_of_AccrUniv_E-20_PE.pdf. Date of access: 18 Dec. 2014.

EDTP SETA (Education, Training and Development Practices Sector Education and Training Authority). 2014. Scarce and Critical Skills Guide 2015. <http://www.etdpseta.org.za/live/files/publications/Scarce-and-Critical-Skills-Guide-Web-Version.pdf>. Date of access: 21 Aug. 2015.

Engineering Council. 2015. Professionally registered engineers and technicians are required to carry out their work in a way that contributes to sustainable development, as outlined in the UK Standard for Professional Engineering Competence (UK-SPEC). <http://www.engc.org.uk/sustainability>. Date of access: 30 Sep. 2015.

Estefani, G. 2013. What is Transportation? <http://www.artinaid.com/2013/04/what-is-transportation/>. Date of access: 16 Oct. 2015.

Forbes, J. 2011. An introduction to Municipal Planning within South Africa. [http://www.salga.org.za/app/webroot/assets/files/PLANNING%20BROCHURE\(1\).pdf](http://www.salga.org.za/app/webroot/assets/files/PLANNING%20BROCHURE(1).pdf). Date of access: 25 Oct. 2015.

Folke, C., Carpenter, C., Elmqvist, T., Gunderson, L., Holling, C.S. & Walker, B. 2002. Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations. *Royal Swedish Academy of Sciences*, 31(5):437-440. <http://www.era-mx.org/biblio/Resilience.pdf>. Date of access: 29 Sep. 2015.

GGLN (Good Governance Learning Network). 2014. Community Resilience and Vulnerability in South Africa: Perspectives from civil society on Local Governance in South Africa. <http://ggln.org.za/1solg-publication-2014.pdf>. Date of access: 29 Sep. 2015.

Gocmez, B.D., Cekirge, N. & Vardar, M. 2006. Effects of geological factors on urban planning: An example from the Termal settlement, Turkey. *The Geological Society of London - IAEG*, 2006(749):1-9. http://iaeg2006.geolsoc.org.uk/cd/PAPERS/IAEG_749.PDF. Date of access: 12 Oct. 2015.

Greshman, T. 2011. Civil Engineering vs Urban Planning. <http://work.chron.com/civil-engineering-vs-urban-planning-5572.html>. Date of access: 02 Aug. 2015.

IMESA. 2009. Manual on Town and Regional Planning Practices: Volume 1. (Unpublished).

ITPI (Institute of Town Planners, India). 2015. Institute of Town Planners, India. <http://www.itpi.org.in/>. Date of access: 9 Apr. 2015.

Lovelace, E.H. 1965. The Civil Engineer and the Urban Planner. *American institute of civil engineering*. <http://astro.cornell.edu/~lovelace/pdfs/40.%20The%20Civil%20Engineer%20and%20Urban%20Planning%201965.pdf>. Date of access: 30 Jul. 2015.

Michalsons. 2015. Service Level Agreement or SLA. <http://www.michalsons.co.za/blog/service-level-agreement-sla/4610>. Date of access: 19 Oct. 2015.

Millennium Project. 2006. MDGs: What they are. <http://www.unmillenniumproject.org/goals/index.htm>. Date of access: 02 Oct. 2015.

Moreno, A.L.G. 2012. Integration of Hydrological and Regional and Urban Planning in Spain. *Advances in Spatial Planning*:331-366. <http://cdn.intechopen.com/pdfs-wm/33258.pdf>. Date of access: 12 Oct. 2015.

MSG (Management Study Guide). 2015. What is Development Administration ?. <http://www.managementstudyguide.com/development-administration.htm>. Date of access: 21 Oct. 2015.

National Geographic. 2005. Wat is human migration? <http://www.nationalgeographic.com/xpeditions/lessons/09/g68/migrationguidestudent.pdf>. Date of access: 23 Oct. 2015.

Nyirenda, G. & Ngwakwe, C.C. 2014. Environmental management practices for sustainable development: agenda for harmonization. *Environmental Economics*, 5(1):76-85. http://businessperspectives.org/journals_free/ee/2014/ee_2014_01_Ngwakwe.pdf. Date of access: 29 Sep. 2015.

Opperman, R. 2015. Document 2 (two) of NBR intern education – extracts made from METROBUILD 1997/98. (Unpublished).

Pacione, M. 2009. Urban Geography: A global perspective. 3rd ed. New York: New York.

Pinson, D. 2004. Urban Planning : An 'Undisciplined' Discipline ?. *Futures, Elsevier, Transdisciplinarity*, 36(4) <https://halshs.archives-ouvertes.fr/hal-00789207/document>. Date of access: 30 Jul. 2015.

PLATO (South African Council for Professional and Technical Surveyors). 2015. Registration. <http://www.plato.org.za/4regcouncilfees.php>. Date of access: 25 Aug. 2015.

Practice Group. 2015. Township establishment & development overview. <http://practicegroup.co.za/township-establishment-development-overview/>. Date of access: 22 Oct. 2015.

Rahmaan, A. 2011. The Imperatives of Urban and Regional Planning, 1st ed. United States of America: Xlibris Corporation.

Razaghi, M. & Finger, M. 2013. A multidisciplinary conceptual framework for urban governance studies, insights from social, political and economic theories of governance. http://www.eura2013.org/media/Full_papers_Track_3/184_Razaghi_A_multidisciplinary_conceptual_framework_for_urban_governance_studies_insights.pdf. Date of access: 30 Jul. 2015.

SACAP (South African Council for the Architectural Professionals). 2011. Matrix 1: Registering Persons with Qualifications. http://c.ymcdn.com/sites/www.sacapsa.com/resource/collection/B770721C-AE1C-4B7E-9CE8-29550788D7CA/SACAP_Registration_Matrix_072011.pdf. Date of access: 24 Aug. 2015.

SACAP (South African Council for the Architectural Professionals). 2015. Policy on the Identification of Work for the Architectural Profession. http://www.sacapsa.com/resource/resmgr/News_items_for_website/IDOW_Policy_04062015.doc?hhSearchTerms=%22policy%22. Date of access: 24 Aug. 2015.

SAGI (South African Geomatics Institute). 2015. Land Surveyors. <http://www.sagi.co.za/>. Date of access: 25 Aug. 2015.

SAIA (South African Institute of Architects). 2014. SA Universities. http://saia.org.za/?page_id=303. Date of access: 18 Dec. 2014.

SAICE (South African Institute of Civil Engineers). 2014. SAICE Administration File. <http://saice.org.za/downloads/SAICE%20Admin%20File/#/28>. Date of access: 18 Dec. 2014.

Sapru, R.K. 2002. Development Administration. 2nd ed. New Delhi: Sterling Publishers.

Schoeman, C.B. 2010. Urban and regional planning and the interface with environmental management and transportation planning. Inaugural address (238).

Schoeman, C.B. 2013. SBSS 412 (Integrated housing development) [class notes]. 28 Feb. 2013. Potchefstroom.

Schoeman, C.B. 2014. Conference Questionnaires [email]. 02 Oct. 2014.

Schoeman, C.B. 2015. Contents: Part 1: Orientation and Context. (In Jansen van Rensburg, I. & Schoeman, C.B. 2015. Capacity building guidelines in urban and regional planning for municipal engineers and engineering staff within municipalities. 79th Annual IMESA Conference: Changing the face of the Municipal Engineer, Cape Town, 28-30 October 2015.). (Unpublished).

SLA Template. s.a. What is a Service Level Agreement Information (SLA). <http://www.slatemplate.com/sladeinition.php>. Date of access: 19 Oct. 2015.

South Africa. 1986. Town Planning and Township Ordinance, Ordinance 15 of 1986.

South Africa. 1997. National Housing Act 107 of 1997.

South Africa. 1997. Water Services Act 108 of 1997.

South Africa. 1998. National Environmental Management Act. 107 of 1998.

South Africa. 1998. Skills Development Act 97 of 1998.

South Africa. 2002. Planning Profession Act 36 of 2002.

South Africa. 2009. National Land Transport Act 5 of 2009.

South Africa. 2013. Planning Profession Act 2002 (Act no. 36 of 2002): South African Council for Planners: Rules and Code of Conduct. (General notice no. 1230). *Government gazette*, 37189, 23 Dec.

South Africa. 2013. Spatial Planning and Land Use Management Act 16 of 2013.

South Africa. Department of Environmental Affairs and Tourism. 2008. National Framework for Sustainable Development.

South Africa. Department of Environmental Affairs and Tourism. 2011. National Strategy for Sustainable Development and Action Plan (2011-2014).

South Africa. Department of Higher Education and Training. 2014a. Call for comments on the national scarce skills list: Top 100 occupations in demand. *Government notice*, 380, 23 May.

South Africa. Department of Higher Education and Training. 2014b. List of Occupations in High Demand: 2014. *Government notice*, 863, 4 November.

South Africa. Department of Housing. 2008. Sustainable human settlement planning : a resource book on housing chapters. Pretoria.

South Africa. Department of Human Settlements. 2009. Housing project process guide. <http://www.nwpg.gov.za/HumanSettlements/site/documents/Housing%20Project%20Process%20Guide.pdf>. Date of access: 09 Oct. 2015.

South Africa. Department of Provincial and Local Government. 2005. The Municipal Infrastructure Grand: Basic Level of Services and Unit Costs: A guide for municipalities. <http://www.cogta.gov.za/mig/docs/5.pdf>. Date of access: 19 Oct. 2015.

South Africa. Department of Provincial and Local Government. 2006. Municipal Infrastructure: Roles and responsibilities.

http://www.cogta.gov.za/mig/docs/Municipal_Infrastructure_Roles_&_Responsibilities.pdf. Date of access: 17 Oct. 2015.

South Africa. Department of Transport. 2011. National Transport Master Plan 2005-2050: Consolidated report Phase 4: Action Agenda for implementation. <http://www.busa.org.za/docs/NATMAP%202050%20-%20Phase%204%20May%202011.pdf>. Date of access: 17 Sept. 2012.

South Africa. Department of Water and Sanitation. 2015. Water service institutions. <https://www.dwa.gov.za/IO/wsi.aspx>. Date of access: 18 Oct. 2015.

South Africa. National Development Commission. 2011. National Development Plan: Vision for 2030. <http://www.gov.za/sites/www.gov.za/files/Executive%20Summary-NDP%202030%20-%20Our%20future%20-%20make%20it%20work.pdf>. Date of access: 5 Sep. 2015.

South Africa. Presidency. 2010. New Growth Path. http://www.gov.za/sites/www.gov.za/files/NGP%20Framework%20for%20public%20release%20FINAL_1.pdf. Date of access: 4 Sep. 2015.

Sustainable Development Information. s.a. The Definition of Sustainable Development. <http://www.sustainabledevelopmentinfo.com/the-definition-of-sustainable-development/>. Date of access: 16 Oct. 2014.

The New York Times. 2015. Breakdown of U.N. Sustainable Development Goals. http://www.nytimes.com/2015/09/26/world/breakdown-of-un-sustainable-development-goals.html?_r=0. Date of access: 26 Sep. 2015.

Tissington, K. 2011. A resource guide to housing in South Africa 1994-2010. SERI. http://www.urbanlandmark.org.za/downloads/SERI_Housing_Resource_Guide_Feb11.pdf. Date of access: 17 Oct. 2015.

Thwaites, J. 2015. Explainer: The world's new sustainable development goals. <http://theconversation.com/explainer-the-worlds-new-sustainable-development-goals-47262>. Date of access: 25 Sep. 2015.

Transportation Planning Capacity Building Program. 2015. The Transportation Planning Process: Key Issues. http://www.fhwa.dot.gov/planning/publications/briefing_book/fhwahep15048.pdf. Date of access: 18 Oct. 2015.

UN DESA (United Nations Department of Economic and Social Affairs). 2015a. Open Working Group proposal for Sustainable Development Goals. <https://sustainabledevelopment.un.org/sdgsproposal>. Date of access: 27 Sep. 2015.

UN DESA (United Nations Department of Economic and Social Affairs). 2015b. Sustainable cities and human settlements. <https://sustainabledevelopment.un.org/topics/sustainablecities>. Date of access: 30 Sep. 2015.

UNSW. 2015?a. What is transport engineering?. <https://www.engineering.unsw.edu.au/civil-engineering/transport-engineering>. Date of access: 18 Oct. 2015.

UNSW. 2015?b. What is sustainable engineering?. <https://www.engineering.unsw.edu.au/civil-engineering/sustainable-engineering>. Date of access: 18 Oct. 2015.

Van der Merwe, C.G. & du Plessis, J.E. 2004. Introduction to the Law of South Africa. The Netherlands: Kluwer Law International.

Van Wyk, J. 2012. Planning Law. 2nd ed. Cape Town: Juta.

Vocational. 2015. Skills Education Training Authorities in South Africa SETA. <http://www.vocational.co.za/>. Date of access: 24 Aug. 2015.

Wessel, N. 2012. What is transportation? Why do we need it? <http://cincymap.org/blog/what-is-transportation/>. Date of access: 16 Oct. 2015.

Whitby. 2015. Planning administration. <http://www.whitby.ca/en/townhall/planningadministration.asp>. Date of access: 21 Oct. 2015.

**OFFICE USE ONLY**Form number: Date: _____Qualify: Yes ☐ No ☐ Locality: _____NORTH-WEST UNIVERSITY
YUNIBESITHI YA BOKONE BOHIRIMA
NOORUTHERMUNSTUT
POTCHEFSTROOM CAMPUS
ANNEXURE B**QUESTIONNAIRE****Title of research:** An approach towards skills transfer of Urban and Regional Planning practices and principles for related professions within the Built Environment**Urban and Regional Planning Student:** Ilana Jansen van Rensburg **Student Number:** 22184325**A. DEMOGRAPHIC DATA**

Please provide in the following information and encircle the numbers in the appropriate shaded blocks.

1.	Location:																
2.	Sector:	(a) Private Sector								(b) Public Sector							
		NGO	1	Consultation	2	Research	3	Other	4	National Government	1	Local Government	2	Provincial Government	3	State-owned enterprise	4
		Specify:								Other	5	Specify:					
3.	Occupation:	(a) Occupation								(b) Position							
		(c) Years' experience				< 4 yr.	1	5-10 yr.	2	11-15 yr.	3	16-20 yr.	4	21-30 yr.	5	> 31 yr.	6
		(d) Title				Trainee	1	Manager	2	Dept. Head	3	Other	4	Specify:			
		(e) Professional affiliation															
4.	Education:	(a) Highest level obtained				< Matric	1	Matric (NSC)	2	Diploma	3	Under-Graduate Degree	4	Post-Graduate Degree	5	Other	6
		(b) Describe education obtained								Specify:							
										(c) Institute where obtained							
5.	Gender:	Male				1				Female				2			
6.	Age:	< 25	1	26-30	2	31-35	3	36-40	4	41-45	5	46-50	6	50-60	7	> 60	8

B. SUBSEQUENT QUESTIONS

1. Please provide the level of your knowledge of Urban and Regional Planning as well as its relation to the rest of the Built Environment (encircle the appropriate shaded blocks, 1 being the lowest level of knowledge and 5 being the highest). See the brochure on this study for definitions of topics.

	Topic	Level of knowledge					
		1	2	3	4	5	Not applicable
1.	Definitions & Terminology	1	2	3	4	5	6
2.	Policy & Legislative Framework	1	2	3	4	5	6
3.	SPLUMA (Spatial Planning and Land Use Management Act No. 16 of 2013)	1	2	3	4	5	6
4.	Development Principles; Norms & Standards	1	2	3	4	5	6
5.	Intergovernmental Support	1	2	3	4	5	6
6.	Spatial Development Frameworks	1	2	3	4	5	6
7.	Land Use Management	1	2	3	4	5	6
8.	Related Land Development Matters	1	2	3	4	5	6

9.	Environmental & Developmental Procedures	1	2	3	4	5	6
10.	Transportation Provision	1	2	3	4	5	6
11.	Engineering Services Provision	1	2	3	4	5	6
12.	Housing Provision	1	2	3	4	5	6
13.	Township Related Issues *	1	2	3	4	5	6
14.	Building Management Control	1	2	3	4	5	6
15.	Sustainable Development	1	2	3	4	5	6

* Township related issues include township development, layout planning & design, application procedures and administration.

2. Do you think the Municipal Engineers in South Africa and its personnel have sufficient working knowledge of the domain of Urban and Regional Planning and its processes, to make sufficient comments on the related issues, provide an explanation? Motivate your answer.

3. Do you think it is necessary to broaden the understanding/knowledge of Urban and Regional planning under Municipal Engineers, provide an explanation of what you think they should know more off? Motivate your answer.

4. If you are in a managerial position or oversee the work of your staff members, please provide the structure of the team (department(s)) you manage along with their qualification and duties (in short). Your position and role should also be included. Also indicate the relevant department e.g. Roads & Stormwater. You are welcome to draw a diagram as per illustration.

**OFFICE USE ONLY**Form number:

--	--	--	--

NORTH-WEST UNIVERSITY
YUNIBESITHI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

5. If you were to receive training on this matter, in what way would you prefer it to take place (choose 1 option in each section and mark the appropriate block with an "X", mark Section 3 if applicable)?

Section	Type	Mark "X"
1	1. Seminar with submission of assignment	
	2. Short course with submission of assignment	
2	1. Hard copy	
	2. Soft copy (digital and interactive copy)	
	3. Online (possible to update at least every 2 years)	
3	Other suggestions	

6. If Section 3 was selected in Question 5, please provide an answer if you have any other suggestions or requests that you wish to have included in such a training manual for Municipal Engineers?

Thank you for your participation!

Ilana Jansen van Rensburg 😊

North West University (Potchefstroom Campus) – Faculty of Natural Science – School for Geo and Spatial Science (Urban and Regional Planning)

Email: 22184325@nwu.ac.za

Tel: 083 633 8516

OPTIONAL – PERSONAL INFORMATION

If you would like to receive feedback regarding this questionnaire please fill out the following details. The information gathered during this research project will at all times remain confidential. Information obtained via the research would be used for research purposes only.

Surname, Name & Title			
Contact Number		Alternative Number	
Email address			
Company / Organisation			
Work address		Postal address	

LUCKY DRAW

The prize will include : NIKON D3100 Twin DSLR Camera Bundle



Please complete the accompanying questionnaire & tear slip and drop them in the box at the IMESA information area, before 10:25 on 30 October 2014. By completion of this form you will stand a chance to win the NIKON D3100 Twin DSLR Camera Bundle (including free training, a bag and 2 lenses) during the Lucky Draw held on Thursday, 30/10/2014 at 10:25 during "Refreshments in PPC Exhibition Hall". In order to claim the prize you need to be present at the draw. Note the Terms and Conditions as mentioned at the back of this brochure. You can still submit the questionnaires until 12:00 on 31 October 2014, although this will only be for data collection.

Terms and conditions:

1. The lucky draw is open to all attendees of the IMESA 2014 Conference held between 28 and 31 October 2014.
2. All who have completed the Questionnaires (to be submitted on or before 10:25 on 30/10/2014), jointly handled by IMESA and the North West University (Potchefstroom Campus), will be eligible for this Lucky Draw.
3. The tear slip must have the signature of either Ms. I Jansen van Rensburg or Prof. C.B. Schoeman as confirmation (promoters).
4. The winner must be present at the time of the Lucky Draw during "Refreshments in PPC Exhibition Hall" on Thursday, 30/10/2014 at 10:25, or he/she will forfeit their chance to another conference attendee.
5. IMESA and the NWU (Potchefstroom Campus) reserves the right to amend the terms and conditions of or withdraw this lucky draw if required by the authorities.
6. IMESA and the NWU reserves the right to change the prize to the same or equal value at any time if the prize becomes unavailable.
7. By signing the tear slip you accept the terms and conditions.

Contact Us

Join us, in conversation regarding the project, at the IMESA Lounge.

North West University (Potchefstroom)
School for Geo and Spatial Science (Urban
and Regional Planning)

Miss. Ilana Jansen van Rensburg
083 633 8516
22184325@nwu.ac.za

Prof. Carel B. Schoeman
018 299 2485
Carel.Schoeman@nwu.ac.za

CAPACITY BUILDING GUIDELINES IN URBAN AND REGIONAL PLANNING FOR ENGINEERS AND STAFF WITHIN MUNICIPALITIES

The accompanying questionnaires will serve as the supporting data for the project on the **capacity building** guidelines as mentioned in the title. The content of this brochure will explain the project in short along with the questionnaires.

In association with:



ANNEXURE C



Introduction

Urban and Regional Planning responsibilities have been assumed by newly established and existing local municipalities.. Of these municipalities, many does not have the financial means to employ full-time Urban and Regional Planners to manage these responsibilities.

Recognizing the need for capacity building in physical development planning at all levels, IMESA identified a need for capacity building in physical development planning at all local-, district– and national authorities for equipping them with a user friendly and comprehensive user manual which will assist in carrying out their Urban and Regional Planning duties and associated responsibilities. The project is proposed to serve in this need.

The project is further described by Prof. C.B. Schoeman as:

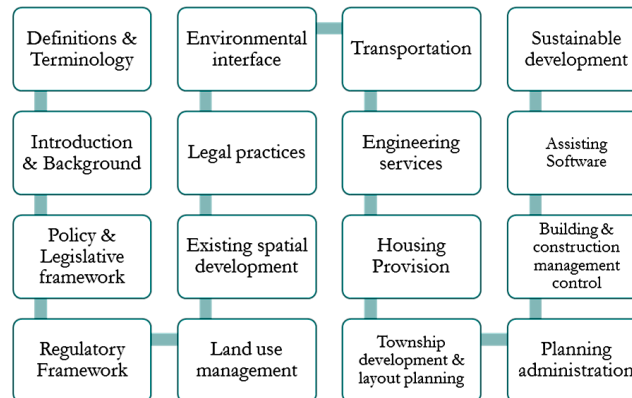
*"The project consists of **capacity building** guidelines to empower municipal engineers and engineering staff to have a basic understanding of the theory, concepts, definitions, practices and procedures underpinning the Profession of Planning. The point of departure is **not to train** engineering staff to become Urban and Regional Planners **but to enable** such members of staff to engage with planning specialists and related applications such as spatial plans, land development applications etc."*

Purpose & Content

The purpose of this document is to provide an understanding of Urban and Regional Planning and associated practices, the policy and legislative framework that it accompanies and the implications it has for spatial development, transportation, environment, land development and layout planning, the provision of engineering services and housing, sustainable development, etc. A basic knowledge of this will build capacity with staff working in related disciplines.

It will also enable an understanding of the processes supporting statutory planning and the content of processes documents required for the development of various categories of land applications to be submitted to all municipalities and tribunals along with an understanding of the engineers' responsibility regarding the scope and extent of their planning related responsibilities.

The document will be made available in an electronic version in order to allow continuous updates, which will decrease the out-dating of the document, whilst keeping it relevant to all current and available data.



The Questionnaires

Reason for questionnaires

- Determine the need for such a program;
- Determine the general knowledge regarding Urban and Regional Planning and associated practices.

Definitions of Topics (*Section B.1*)

1. Definitions & Terminology : can you define and understand the "language" of Planning?
2. Policy & Legislative Framework : previous and current frameworks applicable to Planning.
3. SPLUMA (Spatial Planning and Land Use Management Act No. 16 of 2013) : i.e. when this commences several current legislations will laps.
4. Developmental Principles; Norms & Standards : guidelines such as the Red– and Blue Books..
5. Intergovernmental Support : Focuses on the 3 spheres of government.
6. Spatial Development Frameworks : guidelines for future development and land use patterns.
7. Land Use Management : land development and land use categories and regulation thereof.
8. Related Land Development Matters : Land Use Schemes, land uses and layout planning.
9. Environmental & Development Procedures : EIA requirements according to NEMA, Regulations etc.
10. Transportation Provision : transportation planning, requirements and recommendations.
11. Engineering Services Provision : informal settlement formalization, sewage, water, stormwater & electricity
12. Housing Provision : housing typologies and recommendations for housing provision ..
13. Land Development Issues : Applications including township development, land uses, consent use, etc.
14. Building Management Control : guidelines on building control compiled by the DTL.
15. Sustainable Development : promoting green and efficient development.



NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

QUESTIONNAIRE (B)

Title of research: An approach towards skills transfer of Urban and Regional Planning practices and principles for related professions within the Built Environment

Post Graduate Student for Masters in Urban and Regional Planning: Ilana Jansen van Rensburg Student Number: 22184325

* Required Information

page 1

A. DEMOGRAPHIC DATA

Please provide the following information.

* 1. Choose a location: (Select one option)

- ☐ Eastern Cape
 ☐ Free State
 ☐ Gauteng
 ☐ KwaZulu-Natal
 ☐ Limpopo
 ☐ Mpumalanga
 ☐ North West
 ☐ Northern Cape
 ☐ Western Cape

2. Do you work in the private sector? Choose one of the following: (Select one option)

- ☐ NGO
☐ Consultation
☐ Research
☐ Other (Please specify) _____

3. Do you work in the public sector? Choose one of the following: (Select one option) [Answer this question only if answer to Q#2 is NOT (NGO AND Consultation AND Research AND Other (Please specify))]

- ☐ National Government
- ☐ Local Government
- ☐ Provincial Government
- ☐ State Owned Enterprise
- ☐ Other (Please specify) _____

*** 4. Describe your position:**

*** 5. How many years' experience do you have?** (Select one option)

- ☐ < 4 years ☐ 5-10 years ☐ 10-15 years ☐ 16-20 years ☐ 21-30 years ☐ > 31 years

*** 6. What is your job title:** (Select one option)

- ☐ Trainee
- ☐ Manager
- ☐ Department head
- ☐ Other (Please specify) _____

*** 7. What is your professional affiliation(s)?**

*** 8. If you are affiliated to SACPLAN, please choose the appropriate registration division:** (Select one option)

- ☐ Professional Planner
- ☐ Technical Planner
- ☐ Candidate Planner

*** 9. Highest level of education obtained?** (Select one option)

- ☐ < Matric (Grade 12)
- ☐ National Senior Certificate (Matric / Grade 12)
- ☐ Diploma
- ☐ Undergraduate Degree
- ☐ Postgraduate Degree
- ☐ Other (Please specify) _____

*** 10. Describe education obtained:**

*** 11. Institution where education was obtained:**

*** 12. What is your current age group?** (Select one option)

- ☐ < 25 ☐ 26-30 ☐ 31-35 ☐ 36-40 ☐ 41-45 ☐ 46-50 ☐ 51-60 ☐ > 61

page 2

B. SUBSEQUENT QUESTIONS

Please provide the level of your knowledge of Urban and Regional Planning as well as its relation to the rest of the Built Environment (encircle the appropriate shaded blocks, 1 being the lowest level of knowledge and 5 being the highest). See the brochure on this study for definitions of topics.

13. Level of knowledge for each theme

	1 (Low)	2	3 (Intermediate)	4	5 (High)
(a) Definitions & Terminology (Select one option)	☐	☐	☐	☐	☐
(b) Policy & Legislative Framework (Select one option)	☐	☐	☐	☐	☐
(c) SPLUMA (Spatial Planning and Land Use Management Act No. 16 of 2013) (Select one option)	☐	☐	☐	☐	☐
(d) Development Principles; Norms & Standards (Select one option)	☐	☐	☐	☐	☐

(e) Intergovernmental Support (Select one option)	☐	☐	☐	☐	☐
(f) Spatial Development Frameworks (Select one option)	☐	☐	☐	☐	☐
(g) Land Use Management (Select one option)	☐	☐	☐	☐	☐
(h) Related Land Development Matters (Select one option)	☐	☐	☐	☐	☐
(i) Environmental & Developmental Procedures (Select one option)	☐	☐	☐	☐	☐
(j) Transportation Provision (Select one option)	☐	☐	☐	☐	☐
(k) Engineering Services Provision (Select one option)	☐	☐	☐	☐	☐
(l) Housing Provision (Select one option)	☐	☐	☐	☐	☐
(m) Township Related Issues * (Select one option)	☐	☐	☐	☐	☐
(n) Building Management Control (Select one option)	☐	☐	☐	☐	☐
(o) Sustainable Development (Select one option)	☐	☐	☐	☐	☐

*** Township related issues include township development, layout planning & design, application procedures and administration.**

page 3

14. Do you think the Municipal Engineers in South Africa and its personnel, have sufficient working knowledge of the domain of Urban and Regional Planning and its processes, to make sufficient comments on the related issues, provide an explanation? Motivate your answer.

15. Do you think it is necessary to broaden the understanding/knowledge of Urban and Regional planning under Municipal Engineers, provide an explanation of what you think they should know more off? Motivate your answer.

16. Do you think the Municipal Town Planners in South Africa and its personnel, have sufficient working knowledge of the domain of Engineering and its processes, to make sufficient and valuable comments on the related issues? Motivate your answer.

17. Do you think consultants have sufficient knowledge to provide proper, sufficient and to the point applications with the inclusion of good motivational reports and concept layouts to be meaningful to the Municipal Engineers and to contribute to their decision making processes? Motivate your answer.

18. If you are in a managerial position or oversee the work of your staff members, please provide the structure of the team (department(s)) you manage along with their qualification and duties (in short). Your position and role should also be included. Also indicate the relevant department e.g. Roads & Stormwater. You are welcome to draw a diagram as per illustration.

page 4

*** 19. If capacity building should commencement on this matter, in what form would you prefer it to take place? (Select one option)**

- ☐ Seminar with submission of assignment
- ☐ Short course with submission of assignment

*** 20. If you were to receive a document of this sorts, in what way would you prefer it should be presented? (Select one option)**

- ☐ Hard copy
- ☐ Soft copy (digital and interactive copy)
- ☐ Online (possible to update at least every 2 years)

*** 21. Do you have any other suggestions? If "Yes" please answer the following question. (Select one option)**

- ☐ Yes
- ☐ No

22. If your answer in Question 20 was "Yes", please provide an answer if you have any other suggestions or requests that you wish to have included in such a training manual for Municipal Engineers? [Answer this question only if answer to Q#21 is Yes]

OPTIONAL - PERSONAL INFORMATION

23. If you would like to receive feedback regarding this questionnaire please fill out the following details. The information gathered during this research project will at all times remain confidential. Information obtained via the research would be used for research purposes only.

(a) Title

(b) Full Name

(c) Last Name

(d) Address 1

(e) Address 2

(f) City/Town

(g) State/Province

(h) Zip/Postal Code

(i) Country (Select one option)

☐ Afghanistan

☐ Åland Islands

☐ Albania

☐ Algeria

☐ American Samoa

☐ Andorra

☐ Angola

- ☐ Anguilla
- ☐ Antarctica
- ☐ Antigua and Barbuda
- ☐ Argentina
- ☐ Armenia
- ☐ Aruba
- ☐ Australia
- ☐ Austria
- ☐ Azerbaijan
- ☐ Bahamas
- ☐ Bahrain
- ☐ Bangladesh
- ☐ Barbados
- ☐ Belarus
- ☐ Belgium
- ☐ Belize
- ☐ Benin
- ☐ Bermuda
- ☐ Bhutan
- ☐ Bolivia, Plurinational State of
- ☐ Bonaire, Sint Eustatius and Saba
- ☐ Bosnia and Herzegovina
- ☐ Botswana
- ☐ Bouvet Island
- ☐ Brazil
- ☐ British Indian Ocean Territory
- ☐ Brunei Darussalam
- ☐ Bulgaria
- ☐ Burkina Faso
- ☐ Burundi
- ☐ Cambodia
- ☐ Cameroon
- ☐ Canada
- ☐ Cabo Verde
- ☐ Cayman Islands
- ☐ Central African Republic
- ☐ Chad

- ☐ Chile
- ☐ China
- ☐ Christmas Island
- ☐ Cocos (Keeling) Islands
- ☐ Colombia
- ☐ Comoros
- ☐ Congo
- ☐ Congo, the Democratic Republic of the
- ☐ Cook Islands
- ☐ Costa Rica
- ☐ Côte d'Ivoire
- ☐ Croatia
- ☐ Cuba
- ☐ Curaçao
- ☐ Cyprus
- ☐ Czech Republic
- ☐ Denmark
- ☐ Djibouti
- ☐ Dominica
- ☐ Dominican Republic
- ☐ Ecuador
- ☐ Egypt
- ☐ El Salvador
- ☐ Equatorial Guinea
- ☐ Eritrea
- ☐ Estonia
- ☐ Ethiopia
- ☐ Falkland Islands (Malvinas)
- ☐ Faroe Islands
- ☐ Fiji
- ☐ Finland
- ☐ France
- ☐ French Guiana
- ☐ French Polynesia
- ☐ French Southern Territories
- ☐ Gabon
- ☐ Gambia

- ☐ Georgia
- ☐ Germany
- ☐ Ghana
- ☐ Gibraltar
- ☐ Greece
- ☐ Greenland
- ☐ Grenada
- ☐ Guadeloupe
- ☐ Guam
- ☐ Guatemala
- ☐ Guernsey
- ☐ Guinea
- ☐ Guinea-Bissau
- ☐ Guyana
- ☐ Haiti
- ☐ Heard Island and McDonald Islands
- ☐ Holy See (Vatican City State)
- ☐ Honduras
- ☐ Hong Kong
- ☐ Hungary
- ☐ Iceland
- ☐ India
- ☐ Indonesia
- ☐ Iran, Islamic Republic of
- ☐ Iraq
- ☐ Ireland
- ☐ Isle of Man
- ☐ Israel
- ☐ Italy
- ☐ Jamaica
- ☐ Japan
- ☐ Jersey
- ☐ Jordan
- ☐ Kazakhstan
- ☐ Kenya
- ☐ Kiribati
- ☐ Korea, Democratic People's Republic of

- ☐ Korea, Republic of
- ☐ Kuwait
- ☐ Kyrgyzstan
- ☐ Lao People's Democratic Republic
- ☐ Latvia
- ☐ Lebanon
- ☐ Lesotho
- ☐ Liberia
- ☐ Libya
- ☐ Liechtenstein
- ☐ Lithuania
- ☐ Luxembourg
- ☐ Macao
- ☐ Macedonia, the former Yugoslav Republic of
- ☐ Madagascar
- ☐ Malawi
- ☐ Malaysia
- ☐ Maldives
- ☐ Mali
- ☐ Malta
- ☐ Marshall Islands
- ☐ Martinique
- ☐ Mauritania
- ☐ Mauritius
- ☐ Mayotte
- ☐ Mexico
- ☐ Micronesia, Federated States of
- ☐ Moldova, Republic of
- ☐ Monaco
- ☐ Mongolia
- ☐ Montenegro
- ☐ Montserrat
- ☐ Morocco
- ☐ Mozambique
- ☐ Myanmar
- ☐ Namibia
- ☐ Nauru

- ☐ Nepal
- ☐ Netherlands
- ☐ New Caledonia
- ☐ New Zealand
- ☐ Nicaragua
- ☐ Niger
- ☐ Nigeria
- ☐ Niue
- ☐ Norfolk Island
- ☐ Northern Mariana Islands
- ☐ Norway
- ☐ Oman
- ☐ Pakistan
- ☐ Palau
- ☐ Palestine, State of
- ☐ Panama
- ☐ Papua New Guinea
- ☐ Paraguay
- ☐ Peru
- ☐ Philippines
- ☐ Pitcairn
- ☐ Poland
- ☐ Portugal
- ☐ Puerto Rico
- ☐ Qatar
- ☐ Réunion
- ☐ Romania
- ☐ Russian Federation
- ☐ Rwanda
- ☐ Saint Barthélemy
- ☐ Saint Helena, Ascension and Tristan da Cunha
- ☐ Saint Kitts and Nevis
- ☐ Saint Lucia
- ☐ Saint Martin (French part)
- ☐ Saint Pierre and Miquelon
- ☐ Saint Vincent and the Grenadines
- ☐ Samoa

- ☐ San Marino
- ☐ Sao Tome and Principe
- ☐ Saudi Arabia
- ☐ Senegal
- ☐ Serbia
- ☐ Seychelles
- ☐ Sierra Leone
- ☐ Singapore
- ☐ Sint Maarten (Dutch part)
- ☐ Slovakia
- ☐ Slovenia
- ☐ Solomon Islands
- ☐ Somalia
- ☐ South Africa
- ☐ South Georgia and the South Sandwich Islands
- ☐ South Sudan
- ☐ Spain
- ☐ Sri Lanka
- ☐ Sudan
- ☐ Suriname
- ☐ Svalbard and Jan Mayen
- ☐ Swaziland
- ☐ Sweden
- ☐ Switzerland
- ☐ Syrian Arab Republic
- ☐ Taiwan, Province of China
- ☐ Tajikistan
- ☐ Tanzania, United Republic of
- ☐ Thailand
- ☐ Timor-Leste
- ☐ Togo
- ☐ Tokelau
- ☐ Tonga
- ☐ Trinidad and Tobago
- ☐ Tunisia
- ☐ Turkey
- ☐ Turkmenistan

	☐ Turks and Caicos Islands ☐ Tuvalu ☐ Uganda ☐ Ukraine ☐ United Arab Emirates ☐ United Kingdom ☐ United States ☐ United States Minor Outlying Islands ☐ Uruguay ☐ Uzbekistan ☐ Vanuatu ☐ Venezuela, Bolivarian Republic of ☐ Viet Nam ☐ Virgin Islands, British ☐ Virgin Islands, U.S. ☐ Wallis and Futuna ☐ Western Sahara ☐ Yemen ☐ Zambia ☐ Zimbabwe
(j)	Telephone
(k)	Email Address

ANNEXURE E

Subject: NWU Research Questionnaire

From: SACPLAN Communications (communication@sacplan.co.za)

To: ilanajansenvanrensborg@yahoo.com;

Date: Wednesday, March 25, 2015 4:37 PM

Dear Planner

Ms Ilana Jansen van Rensburg, a Student at the North-West University (Potchefstroom Campus) is requesting your valuable opinion in a survey.

In order to participate, you may either:

1. [Click on this link](#)

or

2. Copy-paste the entire following link between quote marks (NOT including the quote marks) in a web browser

" <http://www.sogosurvey.com/k/SsSVSYTsVsPsPsP> "

Urban and Regional Planning responsibilities have been assumed by newly established and existing local municipalities. Of these municipalities, many do not have the financial means to employ full-time Urban and Regional Planners to manage these responsibilities.

Recognizing the need for capacity building in physical development planning at all levels, the need for capacity building will be determined in physical development planning at all local-, district- and national authorities for equipping them with a user friendly and comprehensive user guideline which will assist in carrying out their Urban and Regional Planning duties and associated responsibilities. The project is proposed to serve in this need.

Reason for survey

- Determine the need for such a program;
 - Determine the general knowledge regarding Urban and Regional Planning and associated practices in engineering and in particular in municipal engineering.

The deadline of this survey is on **Friday, 17 April 2015**. Your feedback will directly and immediately impact product and service related decisions at North-West University. To advance to the survey, please [Click here](#).

We would also like to thank all participants for your feedback. The data collected thus far is invaluable to the research underway.

Kind regards,

Ilana Jansen van Rensburg
North West University (Potchefstroom Campus) - Faculty of Natural Science - School for Geo and Spatial Science (Urban and Regional Planning)
Email: ilanajansenvanrensborg@yahoo.com
Tel: 083 633 8516