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FINAL YEAR PROJECT

PROJECT TITLE:

A GROUNDED THEORY STUDY OF THE IMPLEMENTATION OF SPATIAL DATA INFRASTRUCTURE IN ZIMBABWE; THE PROFESSIONAL IDENTITY PERSPECTIVE

By

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This final year project is submitted in partial fulfillment of the requirements of the Bachelor of Science Honours Degree in Surveying and Geomatics

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DEDICATIONS

This dissertation is dedicated to my mom Loveness Mahiya and dad Ramsay Mahiya. They have been the best parents and companions in my life.

ABSTRACT

Needs for spatial data are increasing due to the different uses it can be put to. Due to the progress in digitalization, the volumes of data in various fields are accumulating quickly at an unprecedented speed. Different types of spatial resources come from different units but they may be integrated effectively through SDI development so that users can easily obtain and apply the shared resources. Spatial Data Infrastructures (SDIs) enable access, sharing and propagation of spatial data needed for complex decision-making processes of the future.

Many countries are introducing SDIs. Zimbabwe has not been an exception. The initial efforts were not fruitful. Therefore, there is need to find out how the multiple professional identities in Zimbabwe. Professional identity, can be defined as one's professional self-concept based on attributes, beliefs, values, motives, and experiences. This research sought to come up with a theory about the implementation of SDIs in Zimbabwe based on the multifaceted survey professional identities. There has been a lot of research on SDIs but there is little research on using Professional Identity as a lens.

The research methodology used was the Grounded Theory research. The author collected data during fieldwork in Zimbabwe at different institutions in private and government institutions using interviews guided by a questionnaire. The data was analysed according to the dictates of this methodology and subsequently a theory was produced.

From the research, it was noted that it is not merely a case of whether or not the frameworks produced before on the implementation of SDIs were suited for a country like Zimbabwe. However, there were others factors that needed to be considered for the SDI initiative to be fruitful. Factors include the pride among professionals as this determines how a person carries out their duties. This pride led to the issue of dominance of one professional identity over others, consequently leaving other professionals feeling inferior. Technology has a great role to play as well because the key role players in the implementation should be aware of their duties as well as how to execute them with the available technology as well as being able to change according to the demands and technological changes involved. All the professionals are aware of SDIs and their importance. However, for the successful implementation, there is need for legislature that recognizes and protects other professional identities within the Surveying profession. This is vital because for the successful implementation of SDIs in Zimbabwe, all stakeholders should play their part. However, this can only be achieved if the Survey professionals feel important thereby leading to them being zealous to see the initiative through. This guarantees the initiative's success.

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CHAPTER 1

1.0 INTRODUCTION AND BACKGROUND

Initiatives to implement Spatial Data Infrastructures (SDI) are emerging at the national and regional level in industrialised as well as developing countries.

Needs for spatial data are increasing due to the different uses it can be put to. Due to the progress in digitalization, the volumes of data in various fields are accumulating quickly at an unprecedented speed. According to statistics, the volumes of data doubles every year and it is estimated that 80% of them are geographic related. How to take full advantages of the available data for a better future will be a challenge that confronts us. However, the advent and establishment of Spatial Data Infrastructures has helped to take full advantage of the data available. The concept of SDIs is to promote sharing, integration and application of digital spatial resources. To realise such sharing environment careful planning and reliable mechanisms are necessary to meet the needs of all participants. Put simply, different types of spatial resources come from different units but they may be integrated effectively through SDI development so that users can easily obtain and apply the shared resources. Through detailed analysis of the scope it sets, SDI assigns proper tasks to the concerned participants and serves as a bridge between resource providers and users for mutual exchange and better sharing. SDI may be classified on the basis of the scope for sharing; it is referred to as National Spatial Data Infrastructure (NSDI) if it shared by a nation under its scope and will be known as Regional Spatial Data Infrastructure (RSDI) when it is shared by a region such as European Union's INSPIRE which is a mechanism for spatial resource sharing among the EU member states. If SDI is accessible to the globe, it is referred to as Global Spatial Data Infrastructure (GSDI). Currently the GSDI Association has been established to promote the affairs related to geospatial information sharing in the globe. A big challenge in promoting SDIs is to gain access to geospatial resources scattered in human resource market.

According to Rajabifard and Williamson (2001), "There are numerous approaches taken through varying SDI initiatives for the relationships defined between people, data and the initiative's objectives. One approach has been the development of strategic partnerships. The influence of the level of SDI and the focus for the technical components have an important influence on the approach taken for aligning components towards the development of SDIs." Rajabifard and Williamson (2001) have said that some countries have already begun work on SDIS at a national level and these countries are Australia, Canada, China, Colombia, Denmark, Finland, France, Germany, Hungary, Italy, Indonesia, Japan, Malaysia, Netherlands, Portugal, Spain, Switzerland, UK, and USA. They also say that some of these SDI initiatives have little to show other than good intentions, while others have already built up a considerable amount of experience in formulating and implementing national SDIs. They also say that in some countries, such as Australia and the United States, there is a growing body of published materials describing different aspects of developing and implementing SDI, including future strategic plans. Rajabifard and Williamson (2001) say, "Many countries are developing SDI at different levels ranging from local to state/provincial, national and regional levels."

There is a developing interest about the study or research of SDIs. Many people have done researches on SDI at different levels. There is no theoretical perspective of the professional identity as a probable factor to trip down the success or implementation of SDIs in Zimbabwe.

The successful operations of SDIs are challenged by many obstacles such as different commercial software formats, different software technologies, partnership among various organisations, etc. challenges at administrative, technical and data levels require a new thinking on the roles and responsibilities of all participating members from an SDI perspective. The surveying profession undergoes evolution at different rates thus installing diverse professional identities (William, 1999). Different countries positions or associates a surveyor with different key competencies. Within one country, different forms of surveyors exist to serve different sectors of data acquisition. Cadastral surveyors await to fulfil cadastral mapping. The protocol of coming up with a fully-fledged cadastral surveyor differs from that one of developing a fully-fledged mine surveyor. Engineering surveyors originate from various disciplines and fields besides surveying. William (1999) postulates that the surveying profession struggles for an identity in both developed and developing countries. Thus there is a need to research on professional identity both at the work place and in general.

Professional identity, can be defined as one's professional self-concept based on attributes, beliefs, values, motives, and experiences, (Ibarra, 1999; Schein, 1978). Indeed the study of professional identity is embedded in the study of personal identity, as defined by Gecas and Burke (1995) who concur that 'the various meanings attached to oneself by self and others'. Gecas and Burke note the importance of identity as fixing an individual's place in society by virtue of the relationships to others implied by the meanings individuals adopt for themselves. By extension, membership in a profession influences self-definition and shapes how others think about an individual. Accordingly, professional identity is defined as the constellation of attributes, beliefs, and values people use to define themselves in specialized, skill- and education-based occupations or vocations (Benveniste, 1987; Ibarra, 1999).It is argued that professional identity is as a result of three factors with first one being, as put forward by Fine(1996) and Hall(1987)"The result of the socialization process and rhetorics where one is provided with information regarding the meanings associated with a profession. Second, researchers suggest individuals adjust and adapt their professional identity during periods of career transition (Ibarra, 1999; Nicholson, 1984). Finally, Schein (1978) suggested that life as well as work experiences influence professional identity by clarifying one's priorities and self-understanding.

In the field of Geomatics, there are different professional identities. There are Geodesists, Topographical Surveyors, Land surveyors, Mine Surveyors, GIS specialists, Remote Sensing specialists, Engineering Surveyors and Photogrammetrists, among others. What is exuded by all these professionals is the sense of oneness that these individuals have with their profession (e.g. mine surveyors, land surveyors) and the degree to which they define themselves as profession members. Currently, in Zimbabwe, it is the Land Survey, Mine Survey and Engineering Survey professional identities that are prevailing within the surveying

profession. However, there are others who are Jack of all trades who are just called surveyors yet they do not have a specific professional identity in the surveying profession.

Surveyors, in general have a lot in common. One of which is the fact that they are all interested in the spatial components of things above, on or below the earth's surface. They work with and construct Spatial Data Infrastructure (SDI).SDIs can be defined as technologies, policies, criteria, standards and people necessary to promote sharing of geospatial data throughout all levels of government, the private and non-profit sectors, and the academic community,(Annoni et al, 2002;Brilis & Lyon, 2006).As Okuku (2014) puts it, "Spatial Data Infrastructures (SDIs) facilitate access, sharing and dissemination of spatial data necessary for complex decision-making processes of the future."

SDIs are mainly for "sharing and reusing" as supported by Strand (2006). What this means therefore is that one uses the data from the SDIs to get whatever information they may require. They then process the data in their own ways and then put it back on the SDIs so that others may also use it. However, in Zimbabwe people have an idea of how different professionals in the various surveying professions do their jobs but no one knows for sure how much competent they are to support these SDIs. It is very important that the Surveyors with a certain professional identity be able to use the SDI. This can be in the form of them being able to program so that they can share the spatial data, retrieve it, analyse, process and upload the processed data back.

Currently the surveying profession is facing the biggest challenge in its modern history. Rapid technological change, micro-economic reform, de-regulation of the professions and the internet are placing pressures on traditional professional operations and structures never previously experienced (Williamson, 1997). This means that the Mine surveyors, Topographical surveyors, Land surveyors, Engineering surveyors and Geodesists, among others in the surveying profession, have to adapt to the changes so as to be competent in the use of SDIs thus guaranteeing the thriving and survival of SDIs.

In Zimbabwe there is a growing interest on creating Spatial Data Infrastructures (SDIs) that makes geo-information data accessible to support governmental decision-making processes. Zimbabwe's efforts to establish country's SDI started with the formation of LIS/GIS committee in the mid-80s‟ which was aimed at harmonizing the collection and distribution of data. (Useya et al, 2014).

According to Useya et al (2014), SDIs in Zimbabwe are non-existent. This is also reiterated by Mavima (2003) who goes on to say, "There is no formal SDI in Zimbabwe. No institutional arrangements have therefore been put in place to facilitate the development of an SDI. However, laws and administrative regulations have been put in place to give exclusive mandates to government departments to carry out some of the activities that contribute to the SDI initiative. Individual efforts are underway to create digital databases through conversion of existing maps into digital format." The initial efforts (to set up SDIs and implement them in Zimbabwe) failed though they have had some measures of success but often they have had minimal impact. This is primarily due to the institutional, political and human dimensions of spatial data management being overlooked (Mavima, 2001).There has not been enough

research on the survival of SDIs in Zimbabwe with regards to the professional identities of surveyors. This research seeks to assess whether Zimbabwe has the key professionals in place to support the establishment, implementation and maintenance of SDIs.

In this research, professional identity of surveyors is being used as a lenses to see if SDIs can survive in Zimbabwe. There is diversity of professional identities in the survey profession. There is need to know if the Survey professional identities are good or bad for SDI and their implementation in Zimbabwe. Finding out the advantages of these different professional identities is important because people could just talk about having SDIs in Zimbabwe when in actual fact there is need to see if it is worth the effort of putting them up.

1.1 JUSTIFICATION

SDIs are important in a country. They are important to the government as well as the surveyors. These are the primary consumers of the data. (Useya et al 2014) say that there are benefits of NSDIs, yet some countries without them are not aware of. NSDI would cut down data production costs, improve spatial data access and use in a country. The issue of establishing SDIs is critical in Zimbabwe because as put by Useya et al (2014), who say that the establishment of SDIs using agriculture-based spatial data improves agriculture production and food security in the country.

In a research done by de Montalvo on Strategies for SDI implementation: A survey of national experiences (De Montalvo, 2001), it is said that dealing with a small number of stakeholders from similar types of organisations can be an advantage for building consensus. In a report about Australia, it was indicated that a good spirit of co-operation exists between the stakeholders (De Montalvo, 2001).

(De Montalvo, 2001) also pointed out that there were also some indications that many changes in the spatial data domain have occurred recently at different rates for each organisation often with different approaches and without vision of SDI. Key stakeholders in the economic recovery equation such as investors require open access to information to build confidence for decision making. This shows how vital the establishment and operation of SDIs is in Zimbabwe.

The key professionals who play a pivotal role in the survival of SDIs in Zimbabwe need to have the adequate competencies to foster the main idea of SDIs of “sharing and reusing” as said by Strand (2006).It is also important to critically look at the different survey professional identities in Zimbabwe as to who these professionals are and their competencies.

It is key to note the characteristics of the professionals that must prevail to support SDIs. As Ibarra (1999) and Schein (1978) concur that one’s professional identity is based on attributes, beliefs, values, motives and experiences, it is vital to find out exactly how these can benefit the need to have SDIs in Zimbabwe since once they are established there is going to be need for their maintenance thereby assuring their survival in the country. Consequently, there is need by the Survey professionals of different survey professional identities to be competent enough to support and maintain the SDIs.

1.2 RESEARCH PROBLEM

Professional identity is an aspect of personal and social identity that develops in professional personnel as a result of their work activities.(Clarke et al) Factors such as career development, membership of professional organizations, professional certification, professional competence, professional development, professional ethics, professional licensing, professional specialization, professional standards, professional supervision as well as role perception contribute to this identity.(Benveniste, 1989)

It is important to study professional identity when establishing change. This is so as to ascertain whether or not there is the required personnel to see the change phase through and be on board with the initiative. Professional identity is important because how one feels about their profession is of paramount importance if they are to fully participate in the initiative. Studying professional identity is imperative because one needs to have a sense of belonging and when one has this then they are most likely to conform to the standards of that profession. This includes everything that they are expected to do as someone who falls within a certain profession.

If we do not study professional identity during establishment of new change then the initiative will die without any success having been recorded. If professional identity is neglected, there will not be a way to ascertain whether the change will be nurtured. This is supported by Rajabifard and Williamson (2001) who say that "In order to take full advantage of change, in this case, SDI, it is important to understand the social system of the community or jurisdiction in which the approach is supposed to be executed." Rajabifard and Williamson (2001) also go on to say that the importance of studying professional identity is that the characteristics of an innovation or change, like an SDI, as perceived by the members of a social system, determine its rate of adoption. The characteristics of the social system have a great influence on the approach adopted to the development of an SDI initiative.

According to Rajabifard et al (2001), "The world as we know it is changing. Economies worldwide are undergoing a process of profound and continuing structural change, and the global village is becoming a reality driven by IT and communication technologies. With this in mind, many countries believe that they can benefit both economically and environmentally from better management of their spatial data assets by taking a perspective that starts at a local level and proceeds through state, national and regional levels to global level. This has resulted in the development of the Spatial Data Infrastructure (SDI) concept at these levels."

However, there has not been adequate establishment and usage of SDIs in Zimbabwe. It is important that the key proficiencies that are needed by the different Survey professional identities are well known if the establishment of SDIs is to be a success. As Mavima (2001) puts it, "The initial efforts (to set up SDIs and implement them in Zimbabwe) failed though they have had some measures of success but often they have had minimal impact. This is primarily due to the institutional, political and human dimensions of spatial data management being overlooked."

Zimbabwe needs the SDIs greatly because of the uncertain and low economic condition it is in at the moment. However, Zimbabwe does not have a functional SDI as the potential

stakeholders are dependent on largely manual systems with undefined information sharing practices. There is no legislation governing the implementation and management of the SDI. There is also no system for discovering the data sets that exist in different organisations and of making them available (Kurwakumire, 2013). This means therefore, that for the successful implementation of SDIs, the different professionals belonging to different survey professional identities are vital as their discretion can determine the survival of SDIs in Zimbabwe.

The non-existence of a National Spatial Data Infrastructure (NSDI) in Zimbabwe brings to light serious issues for consideration (Useya et al, 2014). Zimbabwe's efforts to establish the country's SDI started with the formation of LIS/GIS committee in the mid-80s" which was aimed at harmonizing the collection and distribution of data. (Useya et al, 2014). However, the initial efforts (to set up SDIs and implement them in Zimbabwe) failed though they have had some measures of success but often they have had minimal impact. This is primarily due to the institutional, political and human dimensions of spatial data management being overlooked (Mavima, 2001). Many scholars have attributed the failure of successfully implementing SDIs in Zimbabwe to a number of reasons. Makanga and Smit (2010) say that the academic community is in an excellent position to carry out on going SDI research on the continent and to inform governments and other interested parties about prevalent SDI trends. This includes carrying out researches from different points of view. This therefore validates the need for this research because it seeks to study implementation of SDIs in Zimbabwe based on the multifaceted professional identities prevailing in the country.

Another scholar reiterates that, "There is a clear need to speed up implementation of NSDIs in Africa. In 2003 there were 2 African countries that had established NSDI clearinghouses (Crompvoets & Bregt, 2003) and 5 years later there were only 3. By the year 2014, the two previously established clearinghouses had ceased to be operational. This shows how endangered SDIs implementation in Africa is. The same goes for Zimbabwe. That is why there is need to find out the chances of survival of SDIs in Zimbabwe. In Zimbabwe, human resource is the only resource available; however NSDI being voluntary work, many people are not willing to commit their time for its cause. As a result, deploying people to identified tasks does not yield anything, thus making the task of meeting desired objectives very difficult (Useya et al, 2014).

In Zimbabwe, there is a multifaceted professional identities. These have their advantages to the implementation of SDIs. However, this can also be a threat to the implementation of SDIs as well. In Zimbabwe, it is the Cadastral survey professional identity that is mostly dominant. Usually, when one talks about a "surveyor" they will be referring to Land Surveyors. It is common that when one mentions a surveyor, people quickly assume that it is Land Surveyors that a being talked about. This shows the extent to which this particular survey professional identity is dominant. However, to a lesser extent, Mine Survey also follows in the dominance list followed by the Engineering Survey professional identity.

Identity is important in that it fixes an individual's place in society by virtue of the relationships to others implied by the meanings individuals adopt for themselves, as noted by Gecas and Burke (1995).However, there has not been adequate research on the Survey

professional identities with respect to how these can influence the survival of SDIs in Zimbabwe. Therefore this research seeks to find out if SDIs have a chance of surviving based on the different survey professional identities in Zimbabwe. It will dig out for the threats and opportunities.

Based on the definitions of an SDI, it is suggested that an SDI comprises of a very important component, namely, people. This component includes the spatial data users and suppliers and any value-adding agents in between, who interact to drive the development of the SDI.. Thus it is vital to know whether such knowledgeable people are there in Zimbabwe to help foster the implementation and maintenance of SDIs. Therefore the methodology to be followed is one that has to address and help bring to light the purpose of the research which is to evaluate whether Spatial Data Infrastructures can survive in Zimbabwe based on the Survey professional identities prevailing in the country.

Having said all this, there is now need to assess the chances of survival of SDIs basing on the existing survey professional identities. There has not been enough research to assess the survival of these SDIs through the lens of professional identity. This research will dig out for the threats and opportunities that might be there basing on the different survey professional identities in Zimbabwe. This can help in the determination of the chances of survival of SDIs in Zimbabwe. To do this, the methodology that is going to be followed is the Grounded Theory Framework, which, according to (Mills et al, 2006) is a research methodology that has an enormous appeal for a range of disciplines due to its explanatory power. Grounded Theory follows five basic stages which are; initiating the research question about the chances of survival of SDIs in Zimbabwe; Data selection concerning the type of data needed for the research; Data collection, Data analysis and Conclusion of the research. Grounded theory involves the progressive identification and integration of categories of meaning from data. It is both the process of category identification and integration (as method) and its product (as theory). Grounded Theory has the advantage that for this research, no initial assumptions are made which might lead to a bias in conclusion. For this framework, theory is formulated from the findings. It does not seek to prove already existing theories.

1.3 SCOPE OF STUDY

This research seeks to produce, as an outcome, a novel theory about how multifaceted professional identities play a role in the implementation of SDIs in Zimbabwe.

This research does not seek to produce a framework for implementing Spatial Data Infrastructures in Zimbabwe.

This research does not seek to validate any already existing theory or hypothesis. Instead, the theory constructed as an outcome of this research will be drawn from the data collected and not form any preconceived ideas.

1.4 RESEARCH OBJECTIVES

1.4.0 MAIN OBJECTIVE

To develop a novel theory about the multifaceted professional identities for the successful implementation of SDIs in Zimbabwe.

1.4.1 SPECIFIC OBJECTIVES

1. To formulate the specific research question about the influence of multifaceted professional identity for the implementation or operation of SDIs in Zimbabwe.
2. To come up with a substantive area, sample of substantive population and data gathering tools for the research.
3. To come up with a core phenomenon that explains the link between multiple professional identities and the implementation of SDIs in Zimbabwe.
4. To develop a theory on implementation of SDIs in Zimbabwe.

1.5 RESEARCH METHODOLOGY

In order to meet the objectives, the framework that is going to be used is the Constructivist Grounded Theory framework. In using this framework, a new theory is going to be constructed based on the data collected. Grounded theory was first developed by Glaser and Strauss in 1967, in response to their view that the dominant approach in sociological research was one of theory verification rather than theory generation (McElhinney, 2008). Hypotheses are developed from the data and continually evaluated, and revised through the process of constant comparative analysis to develop a theory grounded in the data from which it is derived (Glaser & Strauss, 1967). It does not follow an already existing theory. Glaser and Strauss (1967) recommended researchers enter the field without preconceived or a priori ideas of the subject area, of what may be discovered, or where it may lead. This framework has, according to Hussein et al (2014), five basic steps which are as follows;

1) Initiating research question,

2) Data selection,

3) Data collection,

4) Data analysis, and

5) Conclusion of the research

When initiating the research question, I will be looking at formulating the research question that is best suited for the study to be undertaken. Data selection involves selecting the type of data to be gathered as well as the substantive area.

Data collection will be directed by theoretical sampling, which means that the sampling is based on theoretically relevant constructs as supported by Strauss and Corbin (2008). I will collect data mostly by interviews and self-structured questionnaires that will be sent to the

relevant substantive group of people by email. This method is backed by Dick (2005) cited in Strauss and Corbin (2008) who says that Grounded theory data collection is usually but not exclusively by interviews or any other activity which yields data.

Data analysis. Grounded theory data analysis involves searching out the concepts behind the actualities by looking for codes, then concepts and finally categories (Ke & Wenglensky, 2010). Following this dictum, I will do the coding whereby I note by arranging the issues brought up by interviewee. It is possible that issue may be mentioned again in the same or similar words. In such case it will be "noted again." (Ke & Wenglensky, 2010). I will form initial categories of information about the phenomenon being studied from the data gathered. This, according to Strauss and Corbin (1990) is the "the process of breaking down, examining, comparing, conceptualizing, and categorizing data."

In Conclusion of the research, the theory will eventually come together. Later, there may be modifications which include taking out irrelevant properties of categories, and adding details of properties into an outline of interrelated categories. There might also be need to generalize the theory more as I continue to make constant comparisons against it. Consequently, the number of categories will be reduced. As Ke & Wenglensky (2010) say, "The researcher needs to generalise the theory and reduce the number of categories in the process."

1.5.1 ADVANTAGES OF GROUNDED THEORY

According to Hussein et al, 2014, Grounded Theory has an intuitive appeal for new investigators because it permits them to get "immersed" deeply within the data. This is because GT is not limited to a specific field, discipline or any type of data (Glaser 1992). GT has informed different areas and has demonstrated a wide range of applicability (Morse, 2009). This immersion is translated practically in the constant comparison, coding and memoing approaches to data analysis. Charmaz (2006) supported this notion and asserts that GT provides novice researchers with the needed principles and "heuristic devices" to "get started, stay involved, and finish the project."

GT fosters creativity because it does not start with testing an existing hypothesis, but uses the empirical data to generate concepts and theories (Glaser, 1978). In other words, it does not bias emergence the theory with a priori assumptions (Glaser, 1978). To ascertain this emergence, investigators are encouraged to avoid "preconceived theoretical data" (Myers, 2009), a suggestion that can be seen as an advantage to enhance creativity and trigger the development of new ideas. Hussein et al (2014). It has the Potential to Conceptualize. According to Stebbins (2012), cited by Hussein et al (2014), the most important component of science is the "concept." The approach taken to study data will eventually influence the generation of these concepts. GT offers a Systematic Approach to Data Analysis. A notable advantage of the GT method is in its systematic approach to data analysis. Glaser (1978) defined GT as "systematic generating of theory from data that itself is systematically obtained from social research" (Hussein et al, 2014)

There is also Data Depth & Richness. As put through by Hussein et al (2014), “The approach used by grounded theorists to collect rich data is another advantage that is substantial (Charmaz, 2006). Rich data will make the “world appear anew” (Charmaz, 2006) because the richness of the data will provide the researcher with concrete and dense fabric to construct a thorough analysis of the data in addition to aiding the researcher to go beneath the surface of the participants’ social and subjective life (Charmaz, 2006). Charmaz (2006) contended that the research adventure starts with “finding data”. Data will unearth the context and structure of the participants’ lives in addition to divulging their feelings, views, intentions and actions (Charmaz, 2006).”

The other advantages of using GT are that, “Grounded Theory avoids making assumptions and instead adopts a more neutral view of human action in a social context. (Simmons, (2006). "Grounded theory provides a methodology to develop an understanding of social phenomena that is not pre-formed or pre-theoretically developed with existing theories and paradigms." (Engward, 2013). As an exploratory method, grounded theory is particularly well suited for investigating social processes that have attracted little prior research attention, where the previous research is lacking in breadth and/or depth, or where a new point of view on familiar topics appears promising. (Milliken, 2010). Other comments gathered from literature are that Grounded theory can identify the situated nature of knowledge, as well as the contingent nature of practice; Grounded theory produces a 'thick description that acknowledges areas of conflict and contradiction; Grounded theory is better at determining what actually happens; As a general theory, grounded theory adapts readily to studies of diverse phenomena; Grounded theory can respond and change as conditions that affect behaviour change.

CHAPTER TWO: LITERATURE REVIEW

INTRODUCTION

This chapter seeks to answer objective 1; to formulate the specific research question about the influence of multifaceted professional identity on the implementation or operation of SDIs in Zimbabwe. The dictum of Grounded Theory is that Grounded theory researchers need an initial research question to focus their attention upon the particular phenomenon they wish to investigate (Strauss and Corbin, 1990). The initial research question serves to identify, but not make assumptions about, the phenomenon of interest.

2.0 THEORETICAL SAMPLING

It is the process of data collection for generating theory whereby the analyst jointly collects codes and analyses data and decides what data to collect next and where to find them, in order to develop a theory as it emerges (Glasser, 1978). This involves collecting further data in the light of categories that have emerged from earlier stages of data analysis. Theoretical sampling means checking emerging theory against reality by sampling incidents that may challenge or elaborate its developing claims. The researcher begins by identifying some key concepts and features which he/she will research about. This gives a foundation to the research.

Theoretical sampling is an important component in the development of grounded theories. The process of selecting "incidents, slices of life, time periods, or people on the basis of their potential manifestation or representation of important theoretical constructs" (Patton, 2001). It involves collecting further data in the light of categories that have emerged from earlier stages of data analysis. Theoretical sampling means checking emerging theory against reality by sampling incidents that may challenge or elaborate its developing claims. While the earlier stages of grounded theory require maximum openness and flexibility to identify a wide range of predominantly descriptive categories, theoretical sampling is concerned with the refinement and, ultimately, saturation of existing, and increasingly analytic, categories. Glaser and Strauss (1967) describe an iterative sampling process that is based on emerging theoretical concepts. This sampling approach has the goal of developing a rich understanding of the dimensions of a concept across a range of settings and conditions. Theoretical sampling is theoretically oriented, and will thus be different for every theory.

The main benefit of theoretical sampling is that it reinforces the rigour of the study if the study attempts to generate the theory in the research area. The application of theoretical sampling affords a structure to data collection as well as data analysis (Coyne, 1997). While the earlier stages of grounded theory require maximum openness and flexibility to identify a wide range of predominantly descriptive categories, theoretical sampling is concerned with the refinement and, ultimately, saturation of existing, and increasingly analytic, categories.

There is no definitive checklist for ensuring credibility. The adequacy of a theoretical sample should be judged on the process of theory generation. Glaser and Strauss (1967) stated that an inadequate theoretical sample would be evident in a theory that is lacking integration and has too many remaining gaps. It would seem then that transparency is a universal concern, common to both grounded theory and qualitative research; the credibility of a theory, or any piece of research, cannot be dissociated from the process by which it is generated.

2.1 THEORETICAL SENSITIVITY

A researcher must be theoretically sensitive so that a theory can be conceptualized and formulated as it emerges from the data being collected. (Glasser and Strauss, 1967) Caution must be taken in order to not limit oneself to specific features of a theory; this will make a researcher blind towards other concepts and aspects of the theory. The main question in this method of sampling is what groups the researcher should turn to next in the data collection process as well as the reason why.

Theoretical sensitivity is what moves the researcher from a descriptive to an analytic level. In grounded theory, the researcher interacts with the data. That is, he/she asks questions of the data, which are in turn modified by the emerging answers. Each emerging category, idea, concept or linkage informs a new look at the data to elaborate or modify the original construct. The researcher engages with the data by asking questions, making comparisons and looking for opposites. This may involve going back to source to collect further data. Data collection and coding are both part of the process of grounded theory analysis. Theoretical sensitivity is important for a research of this kind. This is because, as put forward by Mills et al (2006), theoretical sensitivity is a multidimensional concept that includes the researchers' level of insight into the research area, how attuned they are to the nuance and complexity of the participant's words and actions, their ability to reconstruct meaning from the data generated with the participant, and a capacity to "separate the pertinent from that which isn't" (Strauss & Corbin, 1990).

2.2 CONSTANT COMPARATIVE ANALYSIS

Part of the process of concurrent data collection and analysis is the constant comparison of incidents, codes and categories. It can be comparison between incident and incident, incident and codes, codes and codes, codes and categories, as well as comparison between categories and categories. This procedure is called constant comparative analysis. It is a process that carries on until a grounded theory is fully integrated at the end of analysis. Grounded theory methods are called inductive methods because they are a procedure of building up theory from the collected data itself. Generation of theory is accomplished through continuous comparative analyses of the data. The logic of abduction is also much more apparent in the recent literature about grounded theory methods (Charmaz, 2006). The reasoning takes place at all phases of analysis. However, it is more during the constant comparative analysis of categories to categories which is a run up to theoretical integration. Constant comparative

analysis is very important because the researcher uses reasoning to link things that may not have been linked together, or not having made sense before (Glasser and Strauss, 1967).

2.3 THEORETICAL SATURATION

Theoretical saturation happens when the researcher continues to sample and code data until no new categories can be identified, and until new instances of variation for existing categories have ceased to emerge. At this point, a set of categories and subcategories captures the bulk of the available data. However, theoretical saturation functions as a goal rather than a reality. This is because even though we may (and ought to) strive for saturation of our categories, modification of categories or changes in perspective are always possible. Glaser and Strauss (1967).

Ideally, the process of data collection and data analysis in grounded theory continues until theoretical saturation has been achieved. In other words, the researcher continues to sample and code data until no new categories can be identified, and until new instances of variation for existing categories have ceased to emerge. At this point, a set of categories and subcategories captures the bulk of the available data.

2.4 IDENTIFYING A CORE CATEGORY

According to Jones and Alony (2011), "Developing categories through the process of intermediate coding will increase the level of conceptual analysis apparent in the developing grounded theory. At this time, the researcher may choose to select a core category that encapsulates and explains the grounded theory as a whole. Further theoretical sampling and selective coding focus on actualizing the core category in a highly abstract conceptual manner. This is achieved through full theoretical saturation of both the core category and its subsidiary categories, sub-categories and their properties."

2.5 WHY USE THIS METHOD?

This method is best used when the research focuses on theory and concept development and the research team's goal is to develop theory and concepts that are connected to, grounded in or emergent from real life events and circumstances. Treatment of the data and their analytical outcomes is the main theme of Charmaz's (2000) explanation of how researchers undertake studies using constructivist grounded theory. There is a sense that researchers need to immerse themselves in the data in a way that embeds the narrative of the participants in the final research outcome. This immersion is played out through the use of coding language that is active in its intent and that "helps to keep that life in the foreground" (Mills et al, 2006). Thus Grounded theory is a research methodology that has an enormous appeal for a range of disciplines due to its explanatory power. This power illuminates common issues for people in a way that allows them to identify with theory and use it in their own lives (Mills et al, 2006). "What is important about using this framework is the fact that the researcher can give their insight on the issue as well as draw conclusions." McElhinney (2008). According to MacDonald (2001) Grounded Theory (GT) is characterized by its concrete and structured

guidelines, a feature that helps novice researchers in their investigation. GT offers a practical and flexible approach to interpret complex social phenomena (Charmaz, 2003); and it provides a strong intellectual justification for using qualitative research to develop theoretical analysis (Goulding, 1998).

2.6 LIMITATIONS OF GROUNDED THEORY

Hussein et al (2014 say that), "Myers (2009) embraced the notion that novice researchers can become inundated at the coding level with GT, as open coding is a time consuming, tiring and laborious process. The process of abstracting and encompassing concepts is not an easy task." This means that it is an exhaustive process.

According to Hussein et al (2014), GT has a High Potential for Methodological Error. Charmaz (1989), cited by Hussein et al (2014), contended that novice researchers using GT may tend to blur methodological lines by selecting purposeful instead of theoretical sampling. She further suggested that it is acceptable to start with purposeful sampling. However, the researcher must revert to theoretical sampling where the "process of data collection is controlled by the emerging theory" (Glaser, 1978). Failure to do so will result in a lack of conceptual depth (Benoliel, 1996). Another pitfall the new researcher might face is the use of only one source of data, such as that of interviews. To help circumvent the utilization of one data source, Glaser (1992) recommended undertaking both observations and interviews as part of the data collection process. Other comments gathered from literature are that Grounded theory methods tend to produce large amounts of data, often difficult to manage; Researchers need to be skilful in using grounded theory methods; there are no standard rules to follow for the identification of categories.

Grounded theory has a full and an abbreviated version. In the full version, the researcher collects some data, explores the data through initial open coding, establishes tentative linkages between categories, and then returns to the field to collect further data. Data collection is progressively focused and informed by the emerging theory. The full version of grounded theory allows the researcher to push outwards, to seek out manifestations of categories, negative cases and opposites, until category development is dense, detailed and differentiated. This gives the researcher confidence that theoretical saturation is being approached. The abbreviated version of grounded theory, by contrast, works with the original data only. Here, interview transcripts or other documents are analysed following the principles of grounded theory (i.e. the processes of coding and constant comparative analysis). However, theoretical sensitivity, theoretical saturation and negative case analysis can only be implemented within the texts that are being analysed. The researcher does not have the opportunity to leave the confines of the original data set to broaden and refine the analysis. Consequently, it is used where time or resource constraints prevent the implementation of the full version of grounded theory (Henwood and Pidgeon, 1995). For this research, the Abbreviated version is going to be used.

CHAPTER THREE: METHODOLOGY

INTRODUCTION

This chapter seeks to answer objective 2: Coming up with sample making up the substantive area as well as collecting the data.

3.1 GROUNDED THEORY

The methodology that is going to be used for the research follows the Grounded Theory framework which is suitable for qualitative research. Fig. 3.1 is a flowchart showing the stages of the Grounded Theory. Adapted from Strauss and Corbin (2008), Dick (2005), Ke & Wenglensky (2010) and Hussein et al (2014).

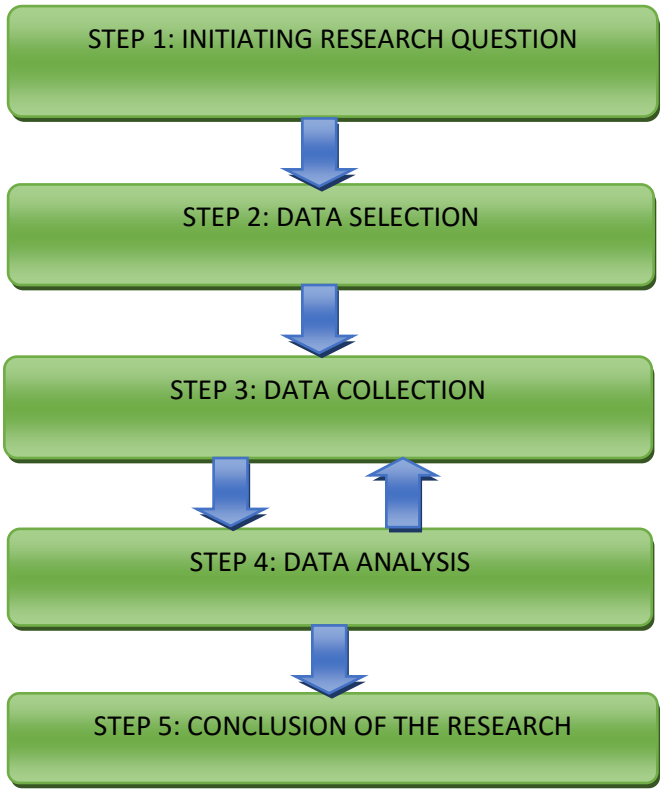

Figure 1: is a flowchart showing the stages of Grounded Theory

Grounded Theory includes the dynamic distinguishing of proof and incorporation of classifications of meaning from information. It is both the process of category identification and integration (as method) and its product (as theory). Grounded theory as method provides us with guidelines on how to identify categories, how to make links between categories and how to establish relationships between them. Grounded theory as theory is the end-product of this process; it provides us with an explanatory framework with which to understand the phenomenon under investigation.

Qualitative research is a broad term encompassing a wide range of research methodologies which have been influenced by a number of different philosophical traditions (Patton, 1990). As McElhinney (2008) puts it, "Qualitative designs are naturalistic. They seek to understand phenomena as they occur naturally in the world, without variable manipulation or predictions regarding research outcomes." A naturalistic study of professional identity development therefore enhances the ecological validity of the findings. Adopting a qualitative design also places this research within the body of existing literature on professional identity development which predominantly utilises qualitative methodologies, due to the nature and complexity of the topic. (McElhinney, 2008).

3.1.1 STEP 1: Initiating research question

When initiating the research question, the researcher looks at formulating the research question that is best suited for the study to be undertaken.

In line with this, the research question was constructed basing on the study to be undertaken. It sought an answer that would address how multifaceted professional identities in the field of survey would affect the implementation of Spatial Data Infrastructures. The research question for the methodology is "what is the perception of survey professionals with different survey professional identities on the implementation of SDIs in Zimbabwe." This question helps to find out the bearing that different factors such as competence and perception has on SDI implementation in the country. Answering this question brings to light issues that may be helpful in analysis of the research.

3.1.2 STEP 2: Data Selection

It involves selecting the type of data to be gathered as well as the substantive area. This includes the instrument used for the data gathering. For this research, the people to be approached for data collection were vetted by the researcher to see if they would provide the required information. The questionnaire was used as the instrument for data collection. It was constructed in such a way that the questions sought answers for the research question. Also the questions were such that they suited the intended respondent.

3.1.3 STEP 3: Data Collection

Data collection will be directed by theoretical sampling, which means that the sampling is based on theoretically relevant constructs. Grounded theory data collection is usually but not exclusively by interviews or any other activity which yields data. Glaser (2008) says that data can be gathered by collecting observations of the substantive area itself and activities occurring within the substantive area, accessing public or private records irrespective of form (e.g. Photographs, diary, painting, sculpture, biography, television broadcast, news report, survey, government or organisational document, etc.), as well as conversing with individuals or a group of individuals, face-to-face or remotely [synchronously (e.g. Telephone, text chat) or asynchronously (e.g. email or wiki)].

For the purpose of this research, data collection was in the form of personal interviews guided by Questionnaires. The questionnaire had open ended questions which meant that the respondents were able to explain in their responses. The sample was made up of registered Land Surveyors in Zimbabwe, Land Surveyors in Training, Engineering surveyors, Survey Technicians, Mine surveyors, Cartographers, representatives of the Zimbabwean Surveyor-General's Office. Some of the above mentioned were in the Government sector and others in the private sector. Academicians were also part of the sample because their input was seen vital during the course of the data collection process. However, it has to be noted that they were not part of the initial group of professionals falling within the substantive population. They were included in accordance with theoretical sampling which allows for inclusion of more relevant participants according to the research progression. The researcher used a combination of Purposive sampling, Convenience sampling and Theoretical sampling methods.

3.1.4 STEP 4: Data Analysis

Grounded theory data analysis involves searching out the concepts behind the actualities by looking for codes, then concepts and finally categories. It is made up of progressively interlinking sub-stages namely Coding, Concepts, Categories and finally theory. Figure 2 is a summary of the analysis stage of Grounded Theory once data has been collected.

Stage	**Purpose**
Codes	Identifying anchors that allow the key points of the data to be gathered
Concepts	Collections of **codes** of similar content that allows the data to be grouped
Categories	Broad groups of similar **concepts** that are used to generate a *theory*
Theory	A collection of categories that detail the subject of the research

Figure 2: shows the analysis stage of Grounded Theory

Coding constitutes the most basic as well as the most fundamental process in grounded theory. Coding can be carried out line-by-line, sentence-by-sentence, paragraph-by-paragraph, page-by-page, section-by-section, and so on.

Open coding and data collection are integrated activities thus the data collection stage and open coding stage occurred simultaneously and continued until the core category was recognised/selected. During Open coding everything was coded exactly as it was. Theoretical sampling came into play during the process of coding. Theoretical sampling is a central part of the grounded theorizing advocated by Glaser and Strauss (1967). This form of sampling did not take place at a single point in the inquiry process but was a recurrent feature. It involved looking for the people it would be worthwhile investigating next in order to develop aspects of the emerging theory. In this way, theoretical sampling was guided by, and helped

to generate, the 'theoretical sensitivity' that is necessary in grounded theorizing, and indeed in qualitative research, as explained by Hammersley.
Eventually the core category and the main concern become apparent. This is where the core category explained the behaviour in the substantive area i.e. it explained how the main concern was resolved or processed.

3.1.5 STEP 5: Conclusion of the Research

In Conclusion of the research, the theory eventually comes together. Later, there may be modifications which include taking out irrelevant properties of categories, and adding details of properties into an outline of interrelated categories.
In this case, the theory, grounded in the data eventually surfaced and conclusions were drawn from there.

3.1.6 JUSTIFICATION FOR USING GROUNDED THEORY

This method is best used when the research focuses on theory and concept development and the research team's goal is to develop theory and concepts that are connected to, grounded in or emergent from real life events and circumstances. Treatment of the data and their analytical outcomes is the main theme of Charmaz's (2000) explanation of how researchers undertake studies using Constructivist Grounded Theory. GT offers a practical and flexible approach to interpret complex social phenomena (Charmaz, 2003); and it provides a strong intellectual justification for using qualitative research to develop theoretical analysis (Goulding, 1998). According to Hussein et al, 2014, Grounded Theory has an intuitive appeal for new investigators because it permits them to get "immersed" deeply within the data. This is because GT is not limited to a specific field, discipline or any type of data (Glaser 1992). "It has the Potential to Conceptualize", according to Stebbins (2012) cited in Hussein et al (2014). There is also Data Depth & Richness Hussein et al (2014). Other comments gathered from literature are that Grounded theory can identify the situated nature of knowledge, as well as the contingent nature of practice; Grounded theory produces a 'thick description that acknowledges areas of conflict and contradiction; Grounded theory is better at determining what actually happens; As a general theory, grounded theory adapts readily to studies of diverse phenomena; Grounded theory can respond and change as conditions that affect behaviour change. The major disadvantage with Grounded Theory is that it is an exhaustive process Hussein et al (2014). According to Hussein et al (2014), GT has a High Potential for Methodological Error. Charmaz (1989), cited by Hussein et al (2014), contended that novice researchers using GT may tend to blur methodological lines by only selecting purposeful instead of theoretical sampling.

3.2. QUESTIONNAIRE CONSTRUCTION

Questionnaire was constructed and pretested to see if it was fit to use for the research. It was used to accompany the interviews that were done during the data collection phase. Interviewees were asked questions based on the questionnaire and the researcher wrote down the responses on the questionnaire. The questions were open-ended. They allowed the

respondent to answer freely without any bounds or limitations. Where there were anymore issues raised within the answering, the issues were taken note of. This is because there were situations where the researcher needed a further explanation of the responses given for better understanding of the issues raised. The researcher carefully took note of how the respondents behaved when answering the questions. This was a helpful technique as it brought out the power of carrying out the interview in Grounded Theory.

3.3 SAMPLING METHODS

3.3.1 PURPOSIVE SAMPLING

Purposeful/purposive sampling is widely used in qualitative research for the identification and selection of information-rich cases related to the phenomenon of interest.
Purposeful sampling requires access to key informants in the field who can help in identifying information-rich cases. (Harsh, 2011)
However, combining sampling techniques may be more suitable to the aims of carrying out a research. It is more consistent with recent developments in quantitative methods. To this effect, purposeful sampling was used in combination with other sampling techniques such as convenience sampling and theoretical sampling.

3.3.2 CONVENIENCE SAMPLING

Convenience or opportunity sampling is the most common type of sampling in L2 studies where the only criterion according to Dörnyei (2007) cited in Farrokhi and Mahmoudi-Hamidabad (2012) is the convenience of the researcher. Groups that are chosen by convenience sampling are conducive to self-selection, number of the years of exposure and many other influences that help in the research.

3.3.3 THEORETICAL SAMPLING

This type of sampling is very vital in the use of Grounded Theory . Glaser comments that “all is data” meaning just that: “exactly what is going on in the research scene is the data, what-ever the source, whether interview, observations, documents. It is not just what is being, how it is being and the conditions of it being told, but all the data surrounding what is being told” (Glaser, 2001).

The selection of our initial participants was based on the knowledge that the researcher already had based on his exposure to the surveying field. Some of the participants approached were contacted beforehand to set up appointments with them. These appointments were necessary as these people were generally high profile. It was both well-mannered and convenient to secure an appointment before interviewing the participants. Following the guidelines of Theoretical Sampling (Glaser, 1978), each participant was asked to suggest some people who they thought might be of help in satisfying the expected needs for theoretical sampling. Through this examination of the possible insight they might add to the study, the researcher could determine whether they would be suitable according to what the

researcher thought they could add to the study in relation to the data that was being obtained. Some people were not able to be interviewed due to various reasons, most of them it was because the person was busy working or they were not available at their offices. The first set of interviews were held in the same week at different places. These first interviews went from 120 to 210 minutes each, while yielding rich information. The data were of high value that practically all of it was used in the study. After these interviews, succeeding interviews became more and more shorter as the study went ahead, with the final interviews running for almost 45 down to 10 minutes. Glaser and Strauss (1967) actually clarify that it is normal for interviews to run in such a manner.

The participant making up the first interview group were each asked the same set of questions. These questions were open-ended and it allowed for significant expression in the responses. During the interviews extra notes were taken, which enabled the researcher to recall certain expressions and body language that would convey information pertinent to the participants' intended meaning. However, the researcher failed to use a digital voice recorder. This was because the participants felt the issues were too sensitive and they expressed concern that once they were recorded in real time they would not be able to fully express themselves. Not using the voice-recorders turned out to be fruitful because the respondents later on took a "no holds barred" approach to answering questions and ended up pouring their hearts out on all the issues brought up.

CHAPTER 4: PRESENTATION of RESULTS AND DATA ANALYSIS

4.1 INTRODUCTION

This chapter aims to address objective 4 which is, "To come up with a core phenomenon that explains the link between multiple professional identities and the implementation of SDIs in Zimbabwe."

When using Grounded Theory, the analysis follows a process. The process starts with Open Coding, followed by Axial Coding, Selective coding then lastly, Theory Write-up. The analysis stage involves "keeping the codes active using the constant comparative method" (Glasser, 1978). The researcher keeps asking questions that help in analysing the results, thus coming up with the theory. These set of questions, according to Glasser (1978) are, "What is actually happening here? Under what conditions does this happen? What is this data a study of? What does the data suggest? From whose point of view? What category does this incident indicate?" Strauss and Corbin (2007) also go on to say the researcher must also ask "When, how, and with what consequences are the participants acting?"

This is all vital as it leads the researcher in the right direction and not stray or confuse the responses as he/she is doing the examination. This brings forward the concept of memoing. Glaser (1978) refers to memoing as "the core stage in the process of generating theory, the bedrock of theory generation". He also says that "Memos have four basic goals: they should develop ideas and codes, these ideas should develop freely, should be stored centrally and should be linked to the data." It is also advised that when recording memos, researchers should reflect on the data but the reflection should not be solely confined to just the data. Everything is an important reflection. Fig. 4.1 illustrates the process of results analysis using Grounded Theory

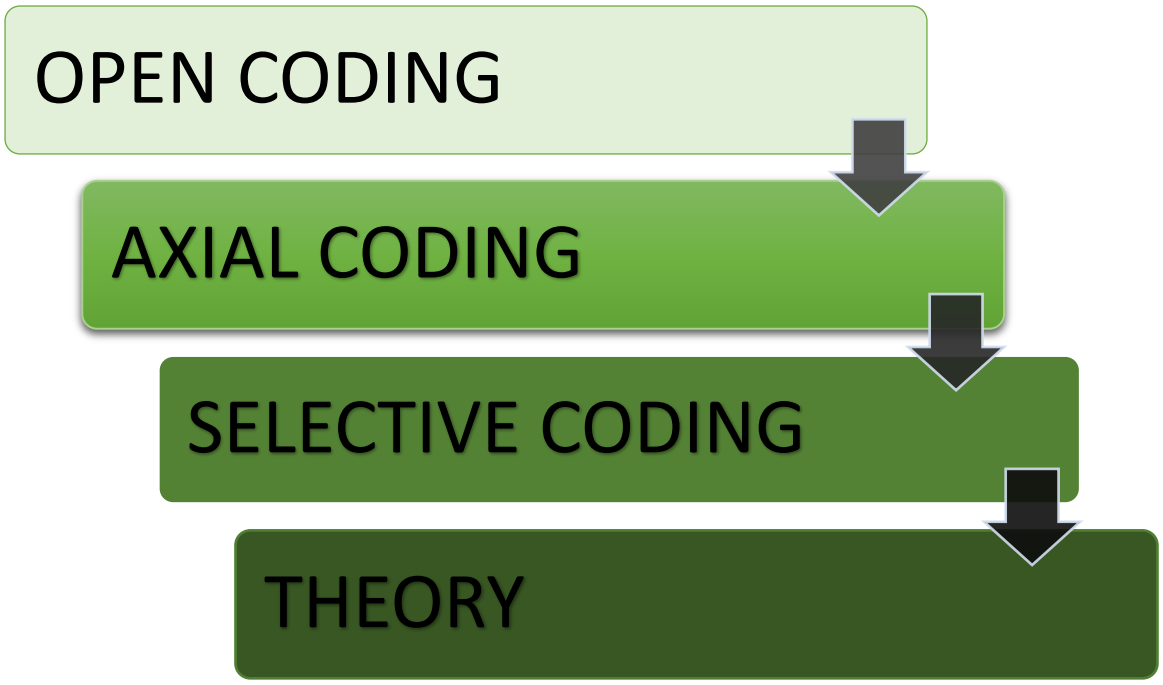

Figure 3: shows the process of results analysis using Grounded Theory

4.2 OPEN CODING

Glasser (1967) defines Open Coding as "the process of naming or labelling things, categories, and properties." A researcher can do the coding formally and methodically or rather informally. In grounded theory, it is generally done relatively informally. For example, according to Glasser (1967: 2001), "if after coding much text, some new categories are invented; grounded theorists do not normally go back to the earlier text to code for that category." It is nevertheless, useful to maintain an inventory of codes accompanied by their descriptions. This is the same as creating a "codebook" that goes along with indicators to text that contain these codes. At this juncture, the transcripts/raw data are scrutinised and then coded through a process which fractures the interview into distinct threads of data. These data are organized and this mounts up categories of similar phenomena. During open coding, the codes do not necessarily make sense to anyone else since these are not accompanied by an explanation. They range from single words to phrases. A meaning is however attached to them when they are put into categories which are linked in the Axial Coding phase. Section 4.2.1 up to section 4.2.39 indicates the coding exercise of phenomena as guided by Glasser (2001) for a sample of three (3) transcripts.

4.2.1 Question 1: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: what is your position within the organisation Responses: • Chief Land Surveyor (Southern Region)/ Head of Office (S-G) • Bottom section Mine Surveyor • Land Surveyor and Company Director	**Professional identity** **Professional identity** **Professional identity**

4.2.2. Question 2: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question from the demographic data: Sector Responses: • Government • Private	**Sector** **Sector**

4.2.3. Question 3: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: Years in Service Responses: • 9 • 9 • 23	**Experience** **Experience** **Experience**

4.2.4. Question 4: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: Years of service in current position Responses:	
• 2 years 6 months • 7 • 23	**Experience** **Experience** **Experience**

4.2.5. Question 5: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: Qualifications Responses:	
• Degree in Surveying	**competence**

4.2.6. Question 6: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: Membership to any organization Responses:	
• Survey Institute of Zimbabwe/ Council of Land Surveyors/ former Executive member of Zimbabwe NSDI	**Professional membership**
• Association of Mine Surveyors of Zimbabwe	**Professional membership**
• Survey Institute of Zimbabwe/ Council of Land Surveyors	**Professional membership**

4.2.7. Question 7: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: Discuss your main job functions Responses:	
• Land surveying field work/ CAD drafting/ database management	**Data extraction // spatial data production**
• CAD drafting	**Data extraction**
• Land surveying field work/ CAD drafting	**Data extraction // spatial data production**

4.2.8. Question 8: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: If someone asks who you are, how do you identify yourself to them? How can you best describe your profession to another person based on your job functions? Responses: • Registered land surveyor/ examiner of survey records/ administrator/ sub-accounting officer/human resources manager/ commissioner of oaths/ civil servant • Mine surveyor • Land surveyor/ engineering surveyor/ topographic surveyor	**Single P.I** **Single P.I** **Multiple P.I**

4.2.9. Question 9: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: What do you do as part of your daily work? Responses: • Write reports on function of Surveyor-General's Office/ produce cadastral diagrams • Mine layouts/ updated surface plans within the mine area/ claims plans/ tailings plans • Diagrams/ topographical maps	**Spatial data production** **Spatial data production** **Spatial data production**

4.2.10. Question 10: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: How does your organisation use spatial data? Responses: • Diagram generation/ geospatial analysis/ map making/ spatial data modelling • Map making/ spatial data modelling • Diagram generation/ map making	**Spatial data production** **Spatial data production** **Spatial data production**

4.2.11. Question 11: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: How do you store your data? Responses: • Hard copy/digital format • Hardcopy /digital format in compliance with legislature • Hard copy/digital format	**2 formats of data storage** **2 formats of data storage // legislature** **2 formats of data storage**

4.2.12. Question 12: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: How would you change the way you store it? Responses: • Continuous updating of information e.g. maps using Google Earth./ make it all digital • This is the best method ever. There is no need of changing it. • We want to make it all digital for easy storage. And also store it in backup disks such as flash and CDs	**Advance with technology** **Contentment** **Change data storage to single format // backup storage**

4.2.13. Question 13: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: What software do you use in your day to day operations? Responses: • AutoCAD, Surpac, ArcGIS, Model maker, QGIS, business centre for Trimble • Microstation, Surpac, datamine studio 3, Aegis for ring designing. • Surpac, AutoCAD, TopSurv	**Basic survey software** **Exclusive mine survey software** **Basic survey software**

4.2.14. Question 14: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: What are the major functions you use your software for? Responses: • Map production • Surpac for calculations and contour generation as well as DTM volume calculations. Microstation for major plans updating. • Production of maps and diagrams e.g. General Plans and land parcel diagrams.	**Spatial data production** **Spatial data production** **Spatial data production**

4.2.15. Question 15: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Questions: are you competent in any survey software e.g. AutoCAD, Surpac, Microstation etc. yourself? Responses: • Yes. Business centre, AutoCAD, Surpac, QGIS, ArcGIS and model maker. • Yes. Microstation, AutoCAD, Surpac, Aegis, datamine studio 3. • Yes. Surpac and AutoCAD. But the juniors know how to use TopSurv for GPS.	**Competence** **Competence** **competence**

4.2.16. Question 16: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: If yes, how do you rate your level use? Responses: • Above average • High • High	**High level of software usage** **High level of software usage** **High level of software usage**

4.2.17. Question 17: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: How do you rate your level of competency in the software Responses: • High • Above average • Above average	**High level of competence** **High level of competence** **High level of competence**

4.2.18. Question 18: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: do you have a cartographic/database/ spatial information system in use in your organization? Responses: • Yes • Yes • No	**Spatial database** **Spatial database** **No spatial database**

4.2.19. Question 19: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: Explain how you implemented your system Responses: • Scan all maps then georeference them and then digitise the maps. We go in phases. It is a data collection system. • I got employed when the system was already in use and we are just continuing with the system.	**Data extraction // spatial data manipulation //spatial data production** **Embrace system**

4.2.20. Question 20: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: How would you change it or you are satisfied with the way it is? Responses: • Happy with the progress but not satisfied. We have to move with time • We want a 3D modelling in microstation then the rest of the software will be done away with. • We want to have a database for our spatial products but at the moment we don't have the expertise.	**Contentment // no satisfaction // advance with technology** **Advanced software // discard old software** **Develop spatial database // lack of expertise**

4.2.21. Question 21: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: How has the economy affected the way you operate? Responses: • Backdated machines, dilapidated equipment, lack of funds. • We are failing to buy a package in microstation that does 3D as well as the training. We are also failing to buy the state of the art survey machinery we want. • Lack of projects means we can't perform our tasks to the fullest. We also want newer equipment but we can't afford it.	**Outdated machinery // lack of funds** **Lack of funds // lack of training personnel // not advancing with technology** **Task execution // advance with technology // lack of funds**

4.2.22. Question 22: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: How is technology affecting the way you operate or do your things? Responses: • Our things are backdated • Not much as we are trying to upgrade ourselves though at a slower rate than what technology is doing. • We are now forced to change the way we gather data e.g. move over to newer total stations than use the T2 theodolite. We also have to produce data more quickly for our consumers.	**Not advancing with technology** **Slow to change // not advancing with technology** **Advance with technology // service delivery**

4.2.23. Question 23: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: do you feel compelled to change the way you do your things because of changes in technology? Responses: • Yes • No • Yes, we need to move with time but people also have to understand the basics of surveying so they should also use old equipment.	**Advance with technology** **No change** **Advance with technology // reservations**

4.2.24. Question 24: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: What do you know about SDIs Responses: • It is a national thing, it has to be all-encompassing. There must be many participants. • It is important for Zimbabwe. It stands for Spatial Data Infrastructure • They are a platform for sharing information that is spatial in nature. Plus most countries are introducing them.	**National thing // all-encompassing // many participants** **Importance of SDI** **Data sharing // other countries have SDIs**

4.2.25. Question 25: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: What do you think are the advantages of SDIs in Zimbabwe? Responses: • Information is found in one place and it saves money from repeating surveys of what has been done already. • It is a quick guide and analysis of earth related queries. • Quick sharing and access to information. They help development in the country at a fast rate.	**Access to data // money saving // duplication of effort** **Access to data // data manipulation** **Data sharing // access to data // development**

4.2.26. Question 26: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: What do you think are the advantages or benefits of SDIs to you and your organization? Responses: • Saves money (you don't repeat what has been done before). You get data in one shop. • It reduces the level of fieldwork especially on surface jobs. We only do it for ground trothing. • They save money. No repetition of what has been done before.	**Money saving // duplication of effort** **Task execution** **Money saving // data duplication**

4.2.27. Question 27: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: Why do you think SDIs in Zimbabwe were a failure in the first place? Responses: • Marketing was not good enough. Dedication was not good. Platform for forming SDIs was a problem. Surveyors hijacked the project but lacked knowhow. • Government through its ministries failed to spearhead the initiative yet it is the custodian of the data. • There was poor marketing. The participants were not fully cooperative.	**Poor marketing // poor dedication to tasks // lack of expertise** **Government commitment** **Poor marketing // participants cooperation**

4.2.28. Question 28: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: do you feel any threat from introduction of SDIs in Zimbabwe Responses: • No • Not at all • Not at all. I think they are good for us land surveyors	**No threat perceived** **No threat perceived** **No threat perceived**

4.2.29. Question 29: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: Which stakeholders or key role players do you think is responsible for the successful implementation of SDIs in Zimbabwe? Responses: • Academic institutions, Surveyor-General's Office, surveyors. • All surveyors both land and mine, Surveyor-General's Office, government through the ministries responsible for the above mentioned. All those in remote sensing and GIS. • Land surveyors, Surveyor-General's Office and government through funding the project.	**Academic institutions // spatial data producers and consumers** **Spatial data producers and consumers // government** **Spatial data producers and consumers // government**

4.2.30. Question 30: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: What do you think is your role in the implementation of SDIs in Zimbabwe? Responses: • I'm source of spatial attribute data. Custodian of the NSDI and the law. Control the NSDI. • Embracing the technology and using it on a day to day activity. • Providing the data that is accurate.	**Data provision // data custody // control** **Advance with technology** **Data provision**

4.2.31. Question 31: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: What do you think is your role in the maintenance of SDIs in Zimbabwe? Responses: • Provide data and group the data according to level of accuracy. • Supply updated georeferenced data with its attributes. • Updating data.	**Data provision // standardization** **Data updating** **Data updating**

4.2.32. Question 32: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: What weaknesses and threats do you see in your profession? Responses: • Unruly behaviour in the profession, lack of jobs and legislation not moving with time. • It is not recognised in this country. Its service provision is disregarded by many unless it is made mandatory by legislature as well as a unitary reporting body at the mines. • Too many young surveyors with questionable competencies, lack of projects are threats and a lack of new equipment in our firms is a weakness.	**Lack of professionalism // legislature // not advancing with technology** **Lack of professional recognition // legislature** **Reservations // competence // lack of projects // not advancing with technology**

4.2.33. Question 33: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: what strengths and opportunities do you see in your profession? Responses: • Opportunities will be seen when development starts because surveyor is the first person on the ground. Tight legislation gives powers to the surveyor. • Opportunities are outside the country where it is purely recognised. There is no strengths since anyone with some appreciation of this geo data can do it. • If the economy is right or gets better, there will be more projects and more money. Therefore, better service delivery and better quality of data	**Optimism // development // legislature** **Opportunities out of country** **Optimism // motivation // service delivery // data quality**

4.2.34. Question 34: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: do you have any regrets about the type of profession you are in? Responses: • No regrets • Yes • Not at all	**No regrets** **Regrets** **No regrets**

4.2.35. Question 35: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: Why do you regret (if you do)? Responses: • In Zimbabwe it is not purely recognised as being very important and very few people know the relevance of a surveyor.	**Lack of professional recognition**

4.2.36. Question 36: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: what can be done to make your profession better? Response: • Need for professional bodies that continuously develop • Create legislative unitary hierarchies which cannot be abused by other higher authorities. • People should recognise us as being more important than they think of us now. Because people think lawyers are more important than us.	**Development of professional bodies** **Legislature // professional recognition** **Professional recognition**

4.2.37. Question 37: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: where do you see yourself profession-wise in 10 years from now? Responses: • Senior management • Change of profession • Senior management	**Goal** **Goal // bitterness // pity** **Goal**

4.2.38. Question 38: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: Do you think your organization can foster change in the way you as an individual operate/ do your job/ your system? Responses: • Yes. But organisation has to adhere to the law and its mandate. • No, it has its own systems that once not approved by engineers and geologists that's the end. • Yes. Because I'm the boss. I do what I want.	**Change // legislature** **No change** **Change // pride**

4.2.39. Question 39: (Appendix1 (Transcript 1)-Appendix 3 (Transcript 3))

Question: what are the challenges you may face in implementing? Responses: • Organisation can pull you back. Adherence to change needs authority from organisation. For you to be successful in an organization, you need to move along with the organisation. You face resistance from management. It is all about the leadership's vision. • People are resistant to change and you may not be accorded the resources to implement it. • Lack of funds	Human resistance // vision / **Human resistance // resource availability** **Lack of funds**

4.2.40 Constant Comparative Analysis

Researchers constantly compare data to the categories to determine consistency in coding the data. , Pride, Dominance, Spatial Data, and Competence, Hindrances, Technology, Spatial Data Infrastructure perception, Professional Identity, Change, Legislature and Key role players

The core categories are as follows;

1. Pride
2. Dominance
3. Spatial Data
4. Competence
5. Hindrances
6. Technology
7. Spatial Data Infrastructure perception
8. Professional identity
9. Change
10. Legislature
11. Key role players

Constant comparative analysis was done in this research so as to be consistent in noting down the categories. This is because some of the codes would be similar to the ones already categorised but seemed to belong in some other category. This ensured that no new categories

were formed unnecessarily and no same codes were entered under different categories or no different codes were entered in the same category.
This procedure of constant comparison was done throughout the analysis stage from the initial open coding part until literature was combined during the theoretical development stage. During interviews, data was compared through the process of coding within interviews and between interviews. The aim was to do a comparison on collections of data to each other. This was so as to gauge their resemblance or differences. After that they were compared to existing categories to look if they fitted the categories and whether they were confirming the current data or not.

4.2.50 Memoing

When memoing, "The rule is to write down everything – no matter how bizarre or nonsensical – and to interrogate one's feelings and thoughts constantly." (Glasser, 1978)
As data started to accrue into categories, there was great need to reflect on what was developing from it. This process of reflection was greatly enriched through the use of memos. The memos progressively become rich and reflective as the categories filled enhanced by constant comparison and constant reflection. Memos proved to be an imperative part of the Grounded Theory procedure as they aided the researcher to become reflective early in the research, whilst there was ample time to fine tune the data collection. For example, the researcher was able to add independent individuals and academicians as part of the respondents in addition to the initial group.
In this case, what the participants were saying was examined. Comments were made on conflicts and discrepancies and also noted when there were consistencies as well as the degree to which respondents were passionate in their narratives. For example, when the first Land Surveyor interviewed was talking about his job functions and job title, he showed pride when narrating about 'how' and 'what' he does in his day to day activities as well as the people he meets and provides services to. This high level of pride in his narration was taken note of and encompassed in all related codes and categories. This later became a very important notation which was witnessed in other Land Surveyors when they talked about situations alike.

4.2.51 Reliability of Open coding

"The process of open coding examines the data without limitations in its scope and without the application of any filters, thus all data are accepted and none are excluded. This allows the researcher to look for patterns that may lead to social processes which may be of eventual interest." (Glasser 2001). In relation to this research, the above mentioned labels refer to things like pride, information gathering, relationship and social standing. They are the nouns and verbs of a conceptual world. A portion of the analytic procedure is to ascertain the additional general categories that these things are instances of, for example, institutions, work activities, social relations and social outcomes. To add on to that, as codes were developed, it was useful to write memos, also referred to as code notes that discussed the codes. Consequently, these memos are relevant for later development into reports. It is imperative to

have relatively abstract categories in addition to ones that are very concrete. This is because the abstract ones help to generate general theory.

4.2.51.1 Benefits of Open Coding

Open Coding proved a vital process in that it was a building block as the concepts emerged from the raw data and these were later grouped into conceptual categories during the Axial Coding process. This is because goal was to build a descriptive, multi-dimensional preliminary framework to be used for analysis at a later stage. The process itself ensures the validity of the work since it builds directly from the raw data gathered.

4.2.51.2 Problems with Open Coding

Even though Open Coding is an imperative tool for Qualitative Data Analysis, it is correspondingly a very time consuming and tedious task. From time to time it was tough to decide when to stop line-by-line coding, and as Glasser and Strauss (1967) emphasise, "if the researcher misses any important concept, he/she may have to restart the boring task again." This was true to this research.

4.2.52 Conclusion

As mentioned in the previous chapter, the Questionnaires were constructed and pretested to see if they were fit to use for the research. After venturing into the field for data collection, the responses were combined; and carrying out open coding, the initial codes where 124. These codes were then linked together in the Axial Coding phase.

4.3 AXIAL CODING

Axial coding is the separation into smaller parts of core themes during qualitative data analysis. According to Strauss and Corbin (1990, 1998), "Axial coding in Grounded Theory is the process of relating codes (categories and concepts) to each other, through the use of a combination of inductive and deductive thinking. During Axial Coding, the researcher looks for relationships between categories. This is a build up from the Open Coding stage. By now the data has been coded and initial categorization done. During the Axial Coding stage one compares the categories and explores the relationships between them. Glasser and Strauss (1967) suggest that a model should be shown about the relationships diagrammatically.

During axial coding, the researcher came up with 11 core categories. These core categories came up from the coded data. The concepts were linked to see what they had in common as well as what relationship they had. The core categories were as follows, Pride, Dominance, Spatial Data, and Competence, Hindrances, Technology, Spatial Data Infrastructure perception, Professional Identity, Change, Legislature and Key role players. From there it was seen that these also had links between them as some of the same concepts would be used in explaining the relationship between these categories. Fig. 4.2 shows the connection between the core categories.

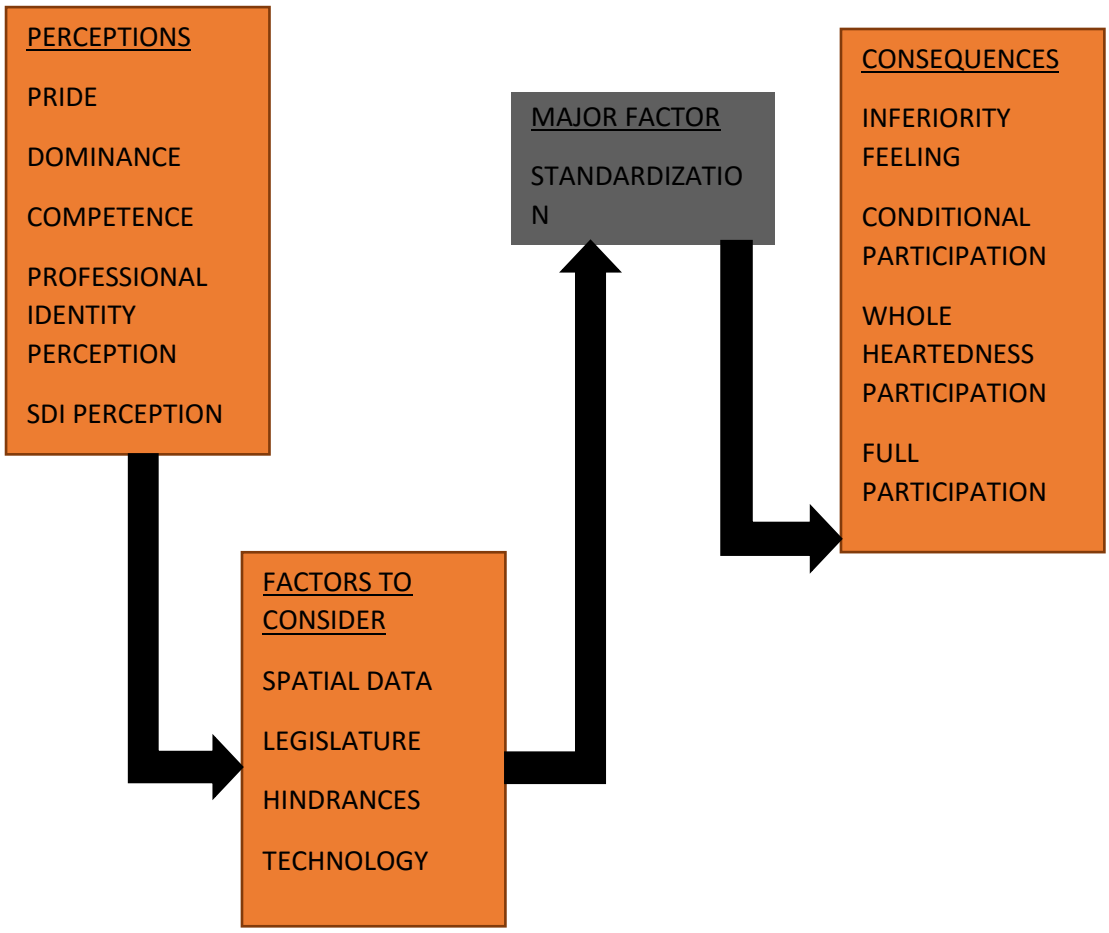

Figure 4: shows the connection between core categories

4.3.1 The Core Categories

"The Proud". These were participants who showed pride in their jobs, how they do it as well as their perceived worth by the general public and their peers. These people included the registered Land Surveyors, Land survey technicians and Land Surveyors in Training. They had every reason to be proud because research showed that they enjoyed the largest slice of the professional recognition pie. It is also these same people who showed that they had multiple Professional Identities. Though they are generally referred to as Land Surveyors, they claimed that they were competent in Engineering Surveying, Cartography, as well as Topographical Surveying. Most of them actually referred to themselves as "Spatial data specialists". Suffice to say, some of them admitted to not being able very competent in the latest survey software and equipment. However, some said they were competent in these. Most of them blamed the poor economy as the reason why they did not have such equipment and software at their organizations. There were others who were NOT proud at all. These actually professed to be regretting their choice of profession. They perceived "lack of professional recognition as a threat."

"Dominance". This was a hot issue as some professionals felt shadowed by their counterparts in the Surveying profession. Mine Surveyors and Cartographers felt that the surveying profession was dominated by Land Surveyors in terms of recognition and general public importance rating. They were justified by the responses the researcher got from the general public that was later on approached for interviews. The independent people generally showed that they knew or were familiar with Land Surveyors. The reasons being that some of them had had their land parcels surveyed by Land Surveyors or they had seen billboards or Sign-post advertising them. Most of these people also went on to say that they also knew them because most of the Survey Firms bore the Names of the Surveyors. Next on the dominance list were the Mine surveyors. Most people were not sure but they used reasoning that mines surveyors so there ought to be mine surveyors in the survey profession. The researcher found this a bit funny. However, some of them really knew who mine surveyors were. Some of them had worked with them while others knew them in different ways. NONE knew anything about Geodesists though some claimed to have heard "in passing" about GIS Specialists. Most people thought that Land Surveyors made maps. No one knew who Cartographers were. This supported what the Cartographers claimed during their interviews with the researcher that "people think that we are all about Land Surveying yet we also do equally important things such as map making…..most people do not know what cartography is." They felt that Land Surveyors were overshadowing them.

"Spatial Data". Under this category falls data provision, data updating, data storage, access to data, spatial data production, data extraction, spatial data manipulation, access to data, data usage and data sharing. All of the survey professional identities deal with spatial data. All of them perceived their roles in the implementation and maintenance of Spatial Data Infrastructures to be data provision and data updating respectively. These people also stored data in different formats and at different places, some claiming that their data was not for everyone therefore it was an "organisation's secret." This meant that the data was not easily accessible to anyone outside of the organisation. The data produced, some claimed, was only relevant to them so and that they manipulated data according to convenience. Some of the respondents also said that the data they extracted, manipulated, processed, produced and stored heavily depended on the available equipment. This meant that technology had a huge role to play in the quality of their data. Some of the respondents firms were and others were not moving along with technology and this meant that the data was not standardised. The data's quality was "according to the situation" type of data. Some people with the same professional identity such as Land Surveyors had different equipment and they claimed it was because of the current economy and that legislature was not tight enough to govern the type of equipment to be used for specific tasks. Also, all the primary respondents, in this case, Land Surveyors, Cartographers, Land Surveyors in Training, Mine Surveyors, Land Survey Technicians and Engineering Surveyors showed that they knew that Spatial Data Infrastructures heavily depended on Spatial Data from all of them. However, they all claimed that they would provide data only that is convenient to them and that people who needed the data had to make do with what would have been produced.

"Competence." This category encompasses what kind of knowledge the different professionals with different professional identities possess. This is so because SDIs are on a "use and share" basis thus competence is vital if someone is to be able to foster the implementation of SDIs in Zimbabwe. Incompetence was mentioned by the respondents as being one of the causes of failure of the SDIs initiative in Zimbabwe. Some respondents, including Land Surveyors said that the "Land surveyors who hijacked the initiative lacked knowledge about it." The respondents also claimed that the land surveyors were not well vested in technological advancements thus they failed to nurture the SDI initiative in Zimbabwe. The issue of standards comes into the picture because competence in different machines of differing accuracies compromise the quality of data. The data would not be standard. Some "old" Land Surveyors professed to not being competent in most of the latest survey software and equipment such as AutoCAD, Model Maker, TopSurv, etc. as well as GPS respectively. For successful implementation of SDIs, the respondents said, "All the geospatial practitioners should move along with technology and be competent in the latest survey software and equipment." It is also vital to mention, however, that most of the respondents claimed to have high levels of competency in software usage as well as high frequency of software usage. The competency is only rated along their line of work, for example Land surveyors are highly competent in the Cadastral function Surpac, whilst Mine Surveyors are highly competent in the Mining function and Engineering Surveyors, in the Engineering aspect likewise.

"Hindrances" Hindrances are defined by the Merriam Webster dictionary as "a person or thing that makes a situation difficult". In this research, this core category came about as respondents were bitter about data gathering, processing and presentation techniques in their organization. They pointed out to different factors as being the stumbling blocks in their quest for bringing or embracing CHANGE in their respective organizations. Some of them pointed out to the poor economy as well as human resistance as being the deterrents to moving along with time and producing quality things that are of a set standard. Participants blamed the poor economy for them not being able to purchase new equipment and latest survey software even though they badly needed it. They said they were faced with a lack of funds to buy the machinery they needed, to go for machinery and software training workshops as well as to maintain the dilapidated equipment they had in their organisations. They also cried foul over the fact that they faced human resistance in trying to acquire the much needed stuff that goes along with their line of work. Some of the participants went on to say that the management's vision is different from theirs therefore if one was to go against management, they were only spelling doom for themselves. Other hindrances also came up as being the Government failing to foster the implementation of SDIs in Zimbabwe. Respondents also mentioned it as being among the reasons for the initiative's failure in the first place. Poor marketing was also one of the causes of failure of SDIs initiative in the country. The participants felt that there was not adequate marketing of the initiative by those who took positions in the Zimbabwean NSDI committee. And to mention, the participants who were part of the committee feel that if there is to be a reintroduction of the NSDI, they

will not be part of it as they feel that there is need for new independent people to look for mistakes they made and correct them. Another hindrance is the fact that there were no clear standards on the data provision and accessibility part. Participants claim that there was no legislation in place to guide the standards therefore anyone did what they deemed fit according to what suited them.

"Technology". Participants all claimed that they wanted to move along with technology regardless of their professional identity or their different job functions. Some of the participants who had overlapping professional identities showed that they were competent in some of the software used in some of their professional identities but had no idea about how to operate the software used by other professional in their overlapping professional identities. For example, Land Surveyors who claimed to be engineering surveyors, cartographers as well as topographical surveyors had no idea as to how to use software such as AutoCAD, GoogleEarth and Microstation yet these are the software that Cartographers say they use in their day to day activities. They showed that they were not embracing technology as much as other participants such as mine surveyors, cartographers, etc. the Land Surveyors in Training had no kind words for the "old" registered Land Surveyors whom they labelled as being "Anti-Technology" and failing to move with time and not embracing technology. The land Surveyors, however, claimed that they appreciated Technology but had reservations about its usage in their organization or in other practitioner's organisations. It was clear to the researcher that there was a "war" between the "old" registered Land Surveyors and the "young" Registered Land Surveyors teaming up with the Land Surveyors in Training. Meanwhile, all the respondents felt that advancing with technology was vital for the success of having SDIs at a national level in Zimbabwe. Most respondents also said that they were not entirely satisfied with the way they stored their data and the way they were implementing their system at their organisation. They said they needed to change it to move along with the latest trends in technology. Those that were content with the system, however, also felt that improvements needed to be done and these also included the need to move along with time and technology. Therefore it is safe to say that all respondents felt that they had to move along and embrace changes in technology. The respondents also pointed out that task execution was being negatively affected by the outdated equipment. From what has been mentioned above, it is evident that there is a very close and visible link between the Technology Category and the Competence category.

"Spatial Data Infrastructure Perception." Participants voiced their concerns, expectations, anticipations and perceptions about Spatial Data Infrastructures' implementation, maintenance and survival in Zimbabwe. The respondents all claimed responsibility for their success in the country. They all knew what they were, how they functioned and their importance to the country. They also showed an awareness of the presence of SDIs in other countries. All survey professionals feel that SDIs are important to them in different ways, most of which is the money saving part and that SDIs ensure that there is no duplication of effort by repeating surveys that have already been done before as the data would already be available. All respondents do not feel threatened by the introduction of an NSDI in

Zimbabwe. However, most of them feel that there are certain things that need to be put in place to ensure their survival, some feel that there should be legislation that guides the use of the NSDI whilst others feel that there ought to be a well-choreographed marketing strategy for the full participation of all stakeholders. Now there comes into play the issue of the key role players knowing their position and responsibilities in this initiative. There were suggestions by most of the participants that a person should be highly competent in the professional identity they claim to belong to and not claim to belong to many survey professions yet be a master of none. For example, Cartographers said that if Land Surveyors claim to be cartographers as well, then they should know how to use the software and the task execution and not jeopardise the initiative by taking on roles they cannot fulfil due to incompetence. Generally, all the respondents felt mentioned the same people as being the key role players responsible for the success implementation of SDIs in Zimbabwe. Some, however, felt that Academic institutions also had a role to play through research and provision of a platform. This was mentioned participants who were part of the failed Zimbabwe NSDI initiative. When approached by the researcher some of the academicians responded by saying that they felt that their role was to research on SDIs as well as helping with the SDI policy crafting. However, some of them felt they had no role to play in the maintenance of SDIs in Zimbabwe. Whether this is an educated perception or sheer ignorance of one's role in society, no one knows for sure. The respondents who were part of the executive in the failed initiative feel that initially people took roles for "glamour" and failed to deliver the expected results. Thus if there is going to be a reintroduction of NSDI in the country, the people entrusted with running the initiative should be given roles based on merit, qualifications and competency.

"Professional identity". During the data collection phase, this proved to be a heated issue as participants poured their hearts out when asked about their profession. Participants were asked their positions in their organisations as well as to describe how they would identify themselves to people based on their main job functions. This was to ascertain their professional identity. According to Gecas and Burke (1995) professional identity is 'the various meanings attached to oneself by self and others'. Gecas and Burke (1995) also note the importance of identity as fixing an individual's place in society by virtue of the relationships to others implied by the meanings individuals adopt for themselves. Some participants showed pride in their professional identity, these are the Land surveyors, Land Surveyors in Training, Land Survey Technicians. All other respondents i.e. the Mine Surveyors, Engineering Surveyors, Topographical Surveyors and Cartographers had no pride in their professional identity because of different reasons that they mentioned to the researcher. They all felt that their professional identity was recognised for its importance in the organisations or by the general public. They all claimed to be shadowed by other professional identities such as the Land Survey professional identity. The Engineering Surveyors felt that it was better if they changed their name from Engineering Surveyor to Construction Surveyor because the "Engineering" part got them confused for Civil Engineers whilst just being called a Surveyor at the construction site got them confused for Quantity Surveyors. Therefore they said that no one knows who they really are. The Mine surveyors

were also bitter about what they called lack worth at the mine companies they work for. They also feel their importance is not felt by other people as they cannot move up the organisational decision making ladder. They actually claimed that in ten years' time they would have changed their profession altogether. One Mine Surveyor actually said "the profession is a failed profession." They feel that their identity is not known and that they are not perceived as much as they feel themselves. The cartographers said that they were overshadowed by Land Surveyors and that people actually thought Cartography is just a small discipline within Land Surveying yet it is a stand-alone profession that is equally as important. With regards to this matter, from the research, the researcher found out that land surveyors have multiple professional identities yet not well vested in all of them. The research confirmed that there is a problem of professional identity within the Survey profession with professionals not very sure where they belong to as well as having overlapping professional identities. Also, other professionals in the survey profession feel inferior to others and are not sure of their roles and responsibilities. However, some of this can be attributed to the current situation as most of these professionals only see opportunities in their profession outside the country. Thus these participants want change in the legislature so that their professional identity can be ascertained in the country. This change provides a link to the professional identity category and another category "Change".

"Change". This category came up after the respondents mentioned about diversity and moving over from one way of doing things to another different way. This encompasses moving along with technology and changing one's system of doing things. Reintroduction of a national SDIs initiative in the country has been seen as change. This means that the way things were done before will now be different. Respondents have shown that they want change in their organisations in terms of technological advancement but mention different factors as being the hindrances to that. Among them are human resistance, lack of funds and poor economy stopping them from attending workshops to learn about how to implement the change or to learn about how to use advanced software and latest version of survey equipment. All the respondents with different professional identities showed enthusiasm to move over and change the way they do things. Most of them actually feel that their organisations' management should embrace change. The respondents took the idea of reintroduction of an NDSI as a welcome development. Change also came up when other respondents pointed out that they were contemplating a change of profession. They had their reasons to change profession. Further fact finding techniques by the researcher revealed that these reasons were justified. The respondents also felt that there was need for a change in legislature to protect their social status in the country at large and at their workplaces.

"Legislature". This issue came up several times during the interviews. Everyone acknowledged the importance of legislature in everything. Some talked about legislature when highlighting the importance of the Surveyor-General's Office in the implementation of SDIs as being the mandated custodian of all spatial data in the country. Others felt that had there been legislation guiding the NDSI initiative; it would have been a success story today. Others pointed out to legislature being important in outlining the standards expected of every

professional. This is because most respondents, especially those into Land Surveying said that their profession was now compromised because of unruly behaviour being exuded by other land survey professionals.

"Key role players." These are the key role players that the respondents felt were responsible for the successful implementation of SDIs in Zimbabwe. The key role players identified are Land Surveyors, Cartographers, Mine Surveyors, Engineering Surveyors, Academic institutions as well as the government through the responsible ministries under which all the above mentioned fall under.

4.3.2 Reliability of Axial Coding

Axial coding is very important in the build up to the theory generation. It allows for the core categories to be linked together. This process makes sense of the categories. Linkages and relationships between categories are shown. The categories are explained in detail helping to explain what is going on within the categories and the data itself. During this process, every aspect of the data is looked into and explained. This gives a clear picture of how the categories actually link together around a core phenomenon or phenomena.

4.4 SELECTIVE CODING

The third stage, selective coding, is reached when core categories become apparent. "A core category is a category that has developed through densification and that explains most of the variation which represents the participants' major concern. The core category should be an issue upon which the basic social process is centered. It should relate meaningfully and easily to other categories. It should have clear and grabbing qualities." (Glaser, 1978; Glaser & Holton, 2004).

According to Jones and Alony (2011), Selective coding "allows the researcher to filter and code data which are deemed to be more relevant to the emerging concepts. Therefore, only the most pertinent passages of a transcript are used and coded. To facilitate this, interview questions are continuously reformulated to encompass the new and more focused direction of the research."

In this research, the core category was formulated from various sub-categories to form one core. All of the participants who had been interviewed up to this time, had expressed concerns which related to this core concept and the concepts which were grouped into this category. It is this amount of saturation, which led to its selection. An issue which was repeatedly mentioned, emphasized, and related to by the participants was that of Standardization. Standardization was portrayed as being crucial for the success of a project, in this case, a National Spatial Data Infrastructure. Emerging sub-categories included the different factors, situations, and conditions (part of which was the professional identity perception) impacting on the success and failure of Standardization.

Through coding the researcher was able to accumulate data into categories which were most relevant to the study. Where data collected most solidly, the researcher started to focus on a core category. Interview questions became more focused and the follow up interviews shorter whilst containing wealthier data. These interviews were also written down and coded. However this time, the researcher used selective coding because the direction of investigation was known.

By making use of selective coding, only relevant data from the texts was picked out and these were only added to the core category only if they added value. Due to this, many of the categories building the core category became saturated. The additional data collected generated no new intuitions or phenomena. It was now safe for the researcher to assume that the core category was empirically mature (Glaser & Strauss, 1967). To ensure that this was the case and to ensure that the categories were wide enough to encompass all relevant phenomena, the researcher acquired second source data from literature about Spatial Data Infrastructures and coded these data into the emerging procedure and in the process, looked for concepts that would fill gaps in the model.

4.5 THE THEORY

Through the process of constant comparative analysis a theory was derived from the data in which it was grounded in. according to Glaser & Strauss (1967), the theory comes about from the data that has been analysed and the theory is an explanation of how the phenomenon works.

From the research, the data showed that the implementation of Spatial Data Infrastructures in Zimbabwe is imperative to various reasons such as the fact that people are able to access relevant data as SDIs allow for people to share and use data; there will not be data redundancy since no extra data will be extracted from the field once it is known to be already available; there will not be duplication of effort by going into the field for a survey that has already been done before; SDIs are money saving since no surveys are repeated thus no unnecessary costs are incurred by repeating surveys; they are a one stop shop for all spatial data. For an NSDI initiative to work in Zimbabwe, there ought to be cooperation from the key stakeholders such as Geospatial practitioners, academic institutions and the government through the relevant ministries under which the above mentioned fall.

In Zimbabwe there are multifaceted survey professional identities. Though these are seen as an opportunity for the survey professionals, there is also an issue that there is dominance of one professional identity, i.e. the Land Survey professional identity; and this makes other surveying discipline professionals feel inferior. It has been seen that the Land surveyors have overlapping job functions. Therefore there is need for these professionals to be competent in all their job function requirements for the successful implementation of SDIs in Zimbabwe. More often than not, they have been cited as the main cause for the failure of the initial SDI initiative in Zimbabwe as some took roles for glamour claiming to be what they were not and in the end failing to meet expectations and deliver the required results as they were crippled

knowledge-wise. On a more positive note, however, they have shown willingness to foster the survival of a NSDI in the country. Other professionals such as Mine Surveyors, Cartographers and Engineering Surveyors have also shown that they too are in the same boat with the Land Surveyors on the issue of fostering a NSDI for Zimbabwe. However, there are some issues that have to been addressed for these to fully dedicate themselves into the initiative. For example they feel that they are not well recognised and their importance is not appreciated by the general public and at their workplaces Therefore, Legislation should intervene and cater for their recognition otherwise they will not execute their duties Wholeheartedly.

Standardization of the NSDI components is important. This issue came up because the multifaceted professional identity professionals stored data in different formats; different type of data is produced and in different formats. This includes storing data in vector format, raster format, digital and hardcopy formats. Also, some of the data is produced in a way that not all people are able to interpret it. Therefore there should be standardization of data as well as standardization of operations. The issue of different spatial data products is not a hindrance to implementation of SDIs in its entirety but there needs to be conventional formats used for the data representation and storage so that all participants will be able to use it as well since it would make sense to them. Application of standards is seen everywhere in information field, for example, we can use the browser of any company to open HTML-based web pages developed by different units Such as Google Chrome, Mozilla Firefox, Opera Mini and Internet Explorer; even though there is no substantial relation between the web page designer, web publishing software developer, browser software developer and users. This is because HTML is a commonly accepted technical standard and operations can be fulfilled successfully as long as different role-playing members complete their work according to their assignment in the application. Thus formulation of SDI standards in Zimbabwe allows members to communicate with each other without contact. Instead, the structures that do not comply with standards create barriers against sharing inevitably. The rapid growth of GIS market is supported by various data formats and software technology from different GIS vendors. Though the use of single GIS software is often easy, problems may occur when heterogeneous data from different resources are integrated in user's applications, for example, data cannot be opened, contents cannot be read or data require special processing, etc. All these would present an obstacle to implementation and promotion of SDI in Zimbabwe. Therefore multifaceted professional identities can pose a problem to establishment of NSDI in Zimbabwe unless they all agree or follow a set of standards that would enable data sharing and usage, as this is what SDIs are all about. As supported by Strand (2006) who says that SDIs are mainly for "sharing and reusing". Standards allow overall development to be promoted towards the uniform structure and avoid the cases where everyone acts in his/her own way without mutual communication. Therefore the promotion of Standards increases the interaction of different domains.

CHAPTER 5: DISCUSSION

INTRODUCTION

This section seeks to expose the findings to the existing literature. During the past decade, a considerable body of literature has emerged on Spatial Data Infrastructures in Zimbabwe and beyond its borders. This section will also look at the gaps in literature through the guidance of Grounded Theory as a methodology for different research purposes. The research literature contains a mix of large and small-scale studies. It is made up of four subsections namely Spatial Data Infrastructures, Professional Identity, Grounded Theory on Survey Profession in Zimbabwe and Conclusion

5.1 SPATIAL DATA INFRASTRUCTURES

Geographic data are expensive and time consuming to produce. In recent years nations have made unprecedented investments in both information and the means to assemble, store, process, analyse, and disseminate it. Thousands of organisations and agencies (all levels of government, the private and non-profit sectors, and academia) throughout the world spend billions of dollars each year producing and using geographic data (FGDC 1997, Groot and McLaughlin 2000) cited in Rajabifard and Williamson (2001). This has been particularly enhanced by the rapid advancement in spatial data capture technologies, which has made the capture of digital spatial data a relatively quick and easy process. In the Zimbabwean case however, most organisations still do not have the information they need to solve critical problems. Most organisations need more data than they can afford. Organisations often need data outside their jurisdictions or operational areas. In addition, information needed to solve cross-jurisdictional problems is often unavailable also data collected by different organisations are often incompatible.

Different scholars have contributed different views and solutions to implementation of SDIs in different countries. Rajabifard and Williamson, (2001) postulates that "Under current circumstances, governments of different nations, and organisations within each nation should reach agreement on what fundamental datasets are required to meet their common interests, to what standards they should be collected and maintained, and what the priorities are for their collection." This is because it is necessary to integrate a number of datasets that may have been produced by different agencies within different nations for specific purposes, to their own specifications and priorities, and with little regard to the needs of other users. This narrow focus, whilst understandable, leads to inefficiencies and duplication of effort. With this background, many countries believe they can benefit both economically and environmentally from better management of their spatial information. SDI allow the sharing of data, which is extremely useful, as it enables users to save resources, time and effort when trying to acquire new datasets by avoiding duplication of expenses associated with generation and maintenance of data and their integration with other datasets. These are some of the reasons why different professionals with different professional identities in Zimbabwe see SDIs as a welcome development. By reducing duplication and facilitating integration and

development of new and innovative business applications, SDIs can produce significant human and resource savings and returns.

Makanga and Smit (2010) say that, “In Africa, SDI are being implemented, although in some instances this is done using a different name There is an obviously evident lagging behind of formal NSDI activity in Africa although there is a lot of informal activity that will contribute to the formal NSDI once governments are fully willing to participate in and take ownership of NSDI initiatives. Examples of a project and organisation that informally contribute to NSDI development are FAOSwalim (Somalia) and SADC Regional Remote Sensing Unit, respectively. Although the above project and organisation are making critical contributions to SDI development, they don’t have the legal mandate to officially sanction SDI activity and brand them with a formal national character. This is mainly because of the fact that these projects are done by non-governmental organisations (NGOs) and have defined timelines to completion. There is therefore a high risk that once the projects have been terminated all the effort will go to waste because of a failure to have well-defined strategies to takeover and maintain the data.” Makanga and Smit (2010).

However, from the research, it was found that though NGOs can sponsor the initiative, the main sponsor should be the government. That is why everyone wants the government to come on board and foster the implementation of SDIs in Zimbabwe. As Rajabifard and Williamson (2001) concur, “It is vital that all stakeholders, including politicians and technical people, should be aware of the potential and advantages of SDIs.” Once the advantages are realised, then all stakeholders will work towards the success of SDIs. On a positive note, geospatial specialists in Zimbabwe are aware of the various advantages of SDIs and none of them perceive SDIs as a threat to them. The organisation responsible for an SDI initiative must help to raise this awareness. The development of an SDI is a matter of cooperation and partnerships between all stakeholders. The involvement of those politicians concerned with the SDI development is essential. The politicians’ support provides legitimacy and encourages the necessary financial investment for the SDI development. It is vital that knowledge about the types of data, its location and quality be known. It is also important to provide access to the data as the measure of success of the SDI will be the widespread use that is made of it and an appreciation by its users that it is providing the promised benefits which were the justification for establishing the SDI. The Surveyor-General’s Office in Zimbabwe can see to it that this knowledge is made available since it is the statutory custodian of spatial data as mandated by the law.

People are the key to transaction processing and decision-making. Oloo et al (2015) say that amateurs and individuals are not target user groups of contemporary SDI. Therefore there needs to be people who are well vested in the field to know how to use them. In Zimbabwe, the survey professionals who are there can foster the successful implementation of SDIs.

There are numerous approaches taken through varying SDI initiatives for the relationships defined between people, data and the initiative’s objectives. Rajabifard and Williamson (2001) say that, “One approach has been the development of strategic partnerships. The influence of the level of SDI and the focus for the technical components have an important

influence on the approach taken for aligning components towards the development of SDIs. In the country partnerships are of paramount importance. However, in the failed SDI initiatives in Zimbabwe, partnerships were created but not all the stakeholders were fully participating in it. This is because one of the issues concerning the use of SDI is the different perception the provider and the user have on space and spatial components (Oloo et al, 2015). A solution to overcome this difficulty and attract a higher number of users may be the involvement of users in the process of data provision. It was noted during the study that the earlier efforts were mainly hinged upon individuals' personal commitments. This was one of the major reasons why the initiatives did not go very far. Other phases were also punctuated by adverse economic conditions, thus it can also be observed that there is indeed need for financial support. According to Oloo et al (2015), "The stages of developing national spatial data infrastructures (NSDI) in most developed countries are different. The factors behind their success can be linked to high levels of technology, availability of funds, trained personnel and political support." Thus in Zimbabwe, there is also need for the above mentioned factors to realise a successful NSDI.

In Tanzania, according to Kasuga (2005) the SDI initiative was internalized in the Ministry of Agriculture, starting with an awareness seminar of officials and policy makers on February 20, 2004. The meeting acknowledged the need to establish agricultural SDI to be able to collate and organize huge volumes of spatial data scattered all over the country to be readily accessible to support decision-making. A steering committee for the National Spatial Data Infrastructure (NSDI) has been formed. It has been a success story because the government is committed to the implementation of SDIs the country.

For the success of SDIs in Zimbabwe there is need for "formalising SDI initiatives and realising them as part of the national agenda" (Makanga and Smit, 2010). There should be legislation to support it. However, Apart from section 7 of the Land Survey Act, there is no other known legislation that controls spatial data. Standards need to be set for SDI operation. This functionality of the standard, of providing guidelines and characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context, links the standard to metadata. In fact the metadata needs to follow or to have a standardized way of describing the data (e. g. content, quality, condition, resolution, scale, time of collection, other times it was collected, areas of coverage, ownership, and other characteristics of the actual data). Although much data and information are available for Zimbabwe, they are scattered in various formats among several ministries, local agencies, research institutes and universities. There is no central repository (e. g. Nodes) or access point using website (e.g clearinghouse) for geographic data in Zimbabwe. The major challenges that face Zimbabwean institutions for the moment in data sharing are the following: The institutions are too protective for their data and they hide data to people who are outside of their respective institutions, there is no policy for data distribution. Zimbabwe experiences data duplication because there is no partnership between data producers.

Looking at professional identity was very helpful because it exposed something critical to implementation of SDIs i.e. people. This looked at how those survey professionals perceive their roles to be, as well as well as their attitude and support for SDIs in Zimbabwe. It was

vital to note that most survey professionals are for the idea of having SDIs and a NSDI in Zimbabwe. However, it came up from the research that these people are giving conditions to their participation. They all talk about professional recognition through legislature.

5.2 PROFESSIONAL IDENTITY

In Zimbabwe, it is land surveyors who have a distinct professional identity. Licensing is only done for Land Surveyors. Other professionals within the surveying field feel that theirs too should be licensed. They feel that anyone with an appreciation of geospatial data manipulation can claim to be an Engineering surveyor or a cartographer. This creates a cloud of confusion because these people may not even be competent in most of the things that make up these professional identities. In Zimbabwe licensing requirements can be selective, applying to some tasks but not related ones. For example, while there are plenty of surveying tasks that unlicensed land surveyors are allowed to perform, only a registered Land Surveyor can sign off on certain kinds of land surveys. To further explain the point, a nurse can take one's blood pressure, but only a licensed physician can prescribe one's blood pressure medicine. Anyone can help design a bridge, but the bridge can be built only after the plans have been signed and sealed by a licensed civil engineer. Therefore, people also want recognition so that they are credited with work that they would have done e.g. mine surveyors. They only sign on tasks as risk transference to them by their peers so that if anything goes wrong then they are to blame.

Some Land Surveyors complain that there is unprofessionalism by many of their colleagues because they are only interested in making money at the expense of professionalism, in Zimbabwe. The code of ethics on professionalism according says that a professional has to act in a morally acceptable manner. Within a certain range of cases a client gets to decide what is in their best interests and the professional is duty bound to defer to that choice. But if a client insists that a professional provide him/her with services that the professional in question deems in violation of the profession's standard of "due care," the professional may be required to refuse and possibly may have to terminate his/her relationship with the client. Other professionals in the survey profession want strict measures to be taken on those that do not adhere to standards. The standards are only there in theory but are not enforced at all. Some Land Surveyors are claiming that their colleagues are in the habit of changing fees based on how much the client has been charged by others. They make their services cheaper and the client usually ends up getting services from the cheaper guy. This has an effect in that the standards of work and the products rendered to the clients are cheap. This degrades the value of survey work. There are other Land surveyors who feel that their work is worth a lot of money but their counterparts reduce prices such that the standard fees would seem too exorbitant.

Professional identity is not a stable entity; it is complex, personal, and shaped by contextual factors. Thus there was need to find out how professionals feel about themselves. This is because professional identity also looks at how a person perceives his/her worth to the public. Most survey professionals such as Mine Surveyors and cartographers are not recognised by

the public. Most people assume that everyone within the surveying field is a Land Surveyor. Also, Mine surveyors are not recognised in terms of their worth at their workplaces. This leads to the professionals being bitter to such an extent that most of them regret ever choosing their respective professions. Due to this, there comes into play the issue of identity formation. Identity formation is a process involving many knowledge sources, such as knowledge of affect, human relations, and subject matter (Beijaard et al. 2004). (Lundell and Collins 2001) say that people construct their social selves within the everyday realities that they inhabit. This includes how they are treated by their workmates and management at the workplace. To this effect, Organisational socialisation has received substantial research attention as a means of understanding how organisational professionals come to identify and understand the norms and expectations of their profession (Austin and McDaniels 2006). Research has shown that individuals' networks influence career outcomes including job satisfaction and attainment (Podolny and Barron 1997). Due to this, people need their peers to give them as much respect and appreciate them as much as they feel so that they can be satisfied with their professional identity. In Zimbabwe, someone's professional identity goes beyond just having a career. This means that when a person has a professional identity that they are proud of, they act according to the standards expected of them by their profession's code of ethics. Gee argues that someone's identity is them being recognised as a certain 'kind of person' in a given context (Gee 2001). In this way the identity of an individual is both how that individual identifies herself as well as how others actively identify him/her in the social fields he/she is active. Engineering surveyors and others have said that they feel their profession is not recognised as it gets confused with other professional identities.

The research uncovered that there are cross boundary professionals who perform translational functions. These are the professionals with overlapping identities. They perform many tasks. They cannot identify themselves as having one professional identity. Due to this, their workmates are not sure as to how to address them. They end up being called by the umbrella term surveyor since they do not affiliate to one distinct profession. In the end, they cry foul over a lack of identity by their peers.

In Zimbabwe, professional identity is determined by legislation. For example, land surveyors adhere to the Land Survey Act. And it is because of this that their duties and responsibilities are laid bare. However, there is no legislation or governing body that clearly articulates the roles and responsibilities of Cartographers, Mine Surveyors, engineering and Topographical Surveyors as bound by law. Professional identity is affected by how a person is perceived at the workplace. Lack of identification affects professional identity because socially people need to be appreciated by their peers. Thus peers influence professional identity of an individual. Public perception and individual perception also influences one's professional identity. It is also imperative to note that having pointed out what influences and affects professional identity, there is need to make it clear that one's qualifications determines their professional identity. The curriculum of moulding a cartographer is different from that of moulding an Engineering Surveyor. This shows that qualifications offer a process of identity formation at the learning level for future professionals. Figure 5 shows the conceptual mind map of factors affecting, influencing and process professional identity.

Figure5: Conceptual mind map of factors influencing Professional Identity

5.3 GROUNDED THEORY ON SURVEY PROFESSION IN ZIMBABWE

During the results' analysis stage of the research, eleven (11) key core categories came up. The link between these categories helps to explain the survey profession in Zimbabwe.

There were participants who showed **pride** in their jobs. They claim to be competent in many surveying disciplines. However, not all of them are competent in the things that make up the other disciplines. Some of them actually rely on their employees or juniors to carry out the tasks that they claim to be well vested in. Some of them do not even know how to use the latest machinery and equipment. The issue of competence is a serious one in the implementation of SDIs. Makanga and Smit (2010) say that SDI initiatives in Africa and specifically Zimbabwe fail because they are sponsored by Non-Governmental Organisations NGOs and the handing over leads to failure due to lack of funds. However, they did not mention the fact that the competence of those taking over the projects is also vital. It is one of the causes of failure of these initiatives. This is because the people taking over do not possess the needed knowhow for the successful implementation of these SDIs.

There is **dominance** of one professional identity over others. In Zimbabwe, Land Surveyors are more dominant than other professionals in the surveying field. Some people do not even know who Cartographers are and what they do. When someone mentions the word "surveyor", random people are quick to think that it is Land Surveyors being talked about. Very few think about Mine Surveyors and fewer still, about Engineering surveyors. This has an effect on the success of SDIs because those that feel inferior may not participate fully in the initiative as the Land Surveyors are the ones who are quick to grab tasks that they might not even be well vested in.

The issue of **Spatial Data** is important. Rajabifard and Williamson, (2001) postulates that "Under current circumstances, governments of different nations, and organisations within each nation should reach agreement on what fundamental datasets are required to meet their common interests, to what standards they should be collected and maintained, and what the priorities are for their collection." However, there are **hindrances** that are not pointed out here. For example, data gathering, processing and presentation techniques in various organizations is different. Also, they did not mention that **technology** in an organization has a bearing. Spatial data may be agreed upon but the big question is "do the organization have adequate equipment to produce the quality of data agreed upon?" In Zimbabwe, though to a lesser extent, some organizations do not have up to date equipment and software.

For the success of SDIs in Zimbabwe there is need for "formalising SDI initiatives and realising them as part of the national agenda" (Makanga and Smit, 2010). There should be **legislature** to support it. This view by Makanga and Smit (2010) is supported by this research because for the initiative to work, legislation is vital. Legislation is vital for stating the standards and mode of operation of these SDIs. What they did not say is that legislature should also apply to the **professional identity** of survey professionals as well. There should be legislature that recognises the different survey professional identities as well as their duties

and roles and responsibilities. Having such things in place means that the SDI operation is protected and that the professionals also feel recognised. When their professional identity is recognised, they then feel important. This leads to them participating in the country's initiatives whole heartedly because they feel appreciated.

It is vital that the **Key role players** in SDI initiatives be aware of their roles and responsibilities. As Rajabifard and Williamson (2001) concur, "It is vital that all stakeholders, including politicians and technical people, should be aware of the potential and advantages of SDIs." When this happens, then SDIs could survive. People are an important part in success of SDIs. These are the spatial data producers and consumers. However, Rajabifard and Williamson do not lay bare the advantages themselves. They also do not show or give an insight on the advantages. When the key role players know the advantages then they can fully commit themselves to the initiative. The other thing that Rajabifard and Williamson (2001) missed is the fact that **Spatial Data Infrastructure Perception** of the key role players is vital for implementation of SDIs. In Zimbabwe, Land surveyors, Engineering surveyors, Mine surveyors and Cartographer have a positive perception on the use of SDIs in the country. This is a good sign since they are part of the stakeholders.

These stakeholders are not afraid of **change**. However, this cannot be said for some of the Land Surveyors who have been in the profession for more than 17 years. They feel that they are in a better position to know what systems work and which ones do not. They are supported by Oloo et al (2015) who say that amateurs and individuals are not target user groups of contemporary SDI. However, Oloo et al (2015) does not clearly point out what constitutes the "amateurs" because the "young turks" in the surveying profession can be called "amateurs" but they are the ones who are for the idea of change. Of which change, in this case, SDI, needs support. Therefore, in as much as there needs to be people who are well vested in the field to know how to use them, these people must also be able to embrace and foster change.

Shoko and Njike (2011) recommend that "A top down mixed with the existing bottom up approach may be a more ideal model. Influential SDI related organizations worldwide can take the responsibility to globally sell the benefits and try to influence countries at national leadership level by working hand in hand with bodies of organizations like the United Nations, African Union or trade bodies." However, they do not mention the fact that politics has a role to play in the adoption of a NSDI in a country. In as much as these large organizations are helpful and influential, they cannot come into a country and closely monitor how SDIs are being implemented if there is no legislature that makes it mandatory to prioritise these initiatives. Zimbabwe is faced with a tough economic climate, funds are needed for implementation of SDIs. However, survey organizations are also feeling the pinch of the economic situation and are failing to purchase the much needed equipment for successful implementation of SDIs in the country.

Scholars give recommendations and strategies for adoption of SDIs in Zimbabwe. For example, Paradzayi (2005) says that "a key strategy is justifying SDI and getting governments and civil organizations to adopt SDI as a platform for developing information

resources and enhancing capacity to use information for knowledge based policy development, Planning, monitoring and decision making." In as much as this is an acceptable strategy, there is need to know first whether or not the key Geospatial specialists are in place to support these SDIs. There is nothing more embarrassing than getting the government to support the initiative only to realise that the people who are supposed to be the data producers and providers cannot play their part due to "issues" they may have about the SDI.

5.4 CONCLUSION

It has been shown beyond any doubt that SDIs are important to a country, especially a developing country like Zimbabwe. Many scholars are interested in studying about SDIs, their benefits, implementation because of these advantages. Zimbabwe greatly needs an SDI. It has the key survey professionals in place. What is left is for the government to come on board the initiative as well as for legislature to be put in place to protect the professional identity of some of the survey professionals as well as to act as a controlling tool for the SDI operations in the country.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The contribution Grounded Theory has to offer to Professional Identity research is revealed in this paper. This paper also aims to provide explained guidelines for using Grounded Theory in Professional Identity research. The paper elucidates the latent worth Grounded Theory offers. The provision of a comprehensive explanation of the steps taken throughout Professional Identity research, the theoretical foundation for these steps, and a demonstration of the discoveries coming up from each step is the main focus of discussion in the research.
The researcher has adopt a non-traditional state of mind so as to use Grounded Theory successfully. Fernández and Lehmann (2005) cited in Jones and Alony (2011), provided a list of seven principles, drawn from Glaser, to assist researchers in their adoption of Grounded Theory. These are;

1. Tolerate confusion—there is no need to know a priori and no need to force the data;
2. Tolerate regression—the researcher might get briefly 'lost' before finding his/ her way;
3. Trust emerging data without worrying about justification—the data will provide the justification if the researcher adheres to the rigor of the method;
4. Have someone to talk to—Grounded Theory demands moments of isolation to get deep in data analysis and moments of consultation and discussion;
5. Be open to emerging evidence that may change the way the researcher thought about the subject matter, and to act on the new evidence;
6. Be able conceptualize to derive theory from the data; and,
7. Be creative—devising new ways of obtaining and handling data, combining the approach of others, or using a tested approach in a different way.

There has been research on professional identity of teachers, nurses and engineers, among others. While many authors advocate the types of research methodology that should be used in such investigations, few question how academics come to possess the constructs and ideas that inform their professional identity. For this research, GT was worthwhile because it helped produce the required results. There are some contentious issues over carrying out a literature review when doing a Grounded Theory study**.** Glaser (1998), says that Grounded theory's very strong dicta are a) do not do a literature review in the substantive area and related areas where the research is to be done, and b) when the grounded theory is nearly completed during the sorting and writing up, then the literature search in the substantive area can be accomplished and woven into the theory as more data for constant comparison. For this research, a review of existing researches was done so that knowledge gaps could be identified. In support of this action, a scholar named Dunne carried out a grounded theory study of intercultural relations between students in higher education (Dunne, 2011). Having read in depth on grounded theory, taken workshops by experts in the field and discussed concerns with researchers experienced with the methodology, two discrete approaches to

engaging with *International Journal of Social Research Methodology* 119, Dunne ultimately adopted existing empirical research and existing theoretical concepts. Prior to commencing data collection – in this case qualitative interviews – Dunne engaged extensively with existing empirical studies relating to intercultural relations and student diversity in higher education, as well as literature on the internationalisation of higher education, in order to identify what work had been done, which issues were central to these fields, and what knowledge gaps existed. This review of existing research facilitated a familiarity with what McMenamin (2006, p. 134) cited in Dunne (2011) terms the 'geography of a subject', and was central to the formulation and justification of the research questions and, importantly, for this research, helped to identify an area of focus which previously had been largely overlooked. This means that literature was not forgotten altogether.
Indeed, Charmaz (2006) suggests that delaying the literature review can help 'to avoid importing preconceived ideas and imposing them on your work. Delaying the review encourages you to articulate your ideas'. Thus the literature review done by the researcher did not infringe on the research but it was just a brush through.

Grounded Theory is better suited for researchers who are able to conform to these principles, as opposed to those who would rather use a more structured, absolute and possibly, more constrained approach. Embracing Grounded Theory research into the field of Professional Identity widens the already existing points of view in the discipline. This provides a richer, and positively more reliable accounts of the situation on the ground. (Jones and Alony, 2011).

6.2 OBJECTIVES

The objectives were crafted from the main objective which was "To develop a novel theory about the multifaceted professional identities for the successful implementation of SDIs in Zimbabwe." The specific objectives were 1) To formulate the specific research question about the influence of multifaceted professional identity for the implementation or operation of SDIs in Zimbabwe. 2) To come up with a substantive area, sample of substantive population and data gathering tools for the research. 3) To come up with a core phenomenon that explains the link between multiple professional identities and the implementation of SDIs in Zimbabwe. 4) To develop a theory on implementation of SDIs in Zimbabwe based on the multifaceted professional identities.

6.2.1 Objective 1: "To formulate the specific research question about the influence of multifaceted professional identity for the implementation or operation of SDIs in Zimbabwe."

"To formulate the specific research question about the influence of multifaceted professional identity for the implementation or operation of SDIs in Zimbabwe." This objective was crafted according to the dictum of Grounded Theory methodology which requires a research question for the methodology. The research question was "what is the perception of survey professionals with different survey professional identities on the implementation of SDIs in

Zimbabwe." This question helped to narrow down the research to specific phenomena on what the attitude was on SDIs in Zimbabwe.

6.2.2 Objective 2: "To come up with a substantive area, sample of substantive population and data gathering tools for the research."

"To come up with a substantive area, sample of substantive population and data gathering tools for the research." The substantive area was the area of interest that best answered objective 1. It was made up of Land Surveyors, Cartographers, Engineering Surveyors, Mine Surveyors, Geodesists, Photogrammetrists and the Surveyor-General's Office. As the research went on, it later on encompassed Academicians and the General public to fine tune the findings and answer some of the questions that arose during the analysis stage. However, Photogrammetrists and Geodesists failed to make it into the respondents list because they could not be located. This was due to the fact that there is no board in the country that registers them and according to a high ranking officer at the Surveyor-General's Office, these professionals are out of the country as a result of the brain drain that is bedevilling the country at the moment. This was a drawback because, according to Muparari (2013), "Fewer views result in a smaller breadth of variability and information". Thus their input was greatly needed. However, those that made the list were helpful in the research.

6.2.3 Objective 3: "To come up with a core phenomenon that explains the link between multiple professional identities and the implementation of SDIs in Zimbabwe."

"To come up with a core phenomenon that explains the link between multiple professional identities and the implementation of SDIs in Zimbabwe." This objective was met in the analysis stage of the research. It came up as a result of the coding and categorization process.

6.2.4 Objective 4: "To develop a theory on implementation of SDIs in Zimbabwe based on the multifaceted professional identities."

"To develop a theory on implementation of SDIs in Zimbabwe based on the multifaceted professional identities." According to the Oxford dictionary, in one of its many definitions of what a theory is, a theory is defined as "A supposition or a system of ideas intended to explain something, especially one based on general principles." The theory about how the multifaceted professional identities influence the successful implementation of SDIs in Zimbabwe was formulated. It included how the professionals felt about their identity both at the workplace and in their day to day lives. It also showed their perceptions about SDIs in Zimbabwe as well as conditions to be met for their full participation in the initiative if a NSDI was to be reintroduced in the country.

6.3 PERSONAL REFLECTION ON GROUNDED THEORY

Choosing Grounded Theory as a research methodology in this study was advantageous. First of all, Grounded Theory allowed the researcher to venture into the field to discover the phenomena that was of greatest importance to the participants. The researcher had been struggling for some time, failing to come up with suitable research questions that would

permit the carrying out of more conventional research. Grounded Theory extended to the researcher, the chance to move forward with the research. Secondly, Grounded Theory also made more sense to the researcher. The way the research progress is logical and very practical and understandable. The researcher starts with only an idea of the area that the research is intended to be done, but as the research gains direction, focus and momentum, the researcher commences a gradual sensitization with extant literature (Suddaby, 2006). Nevertheless, the literature does not inform the research but it is just a reality check that is used for comparative purposes.

Thirdly, the researcher loved the guiding structure that Grounded Theory provides. There was definite comfort in the analytical stage making use of its methods of coding and constant comparison. This is due to its methodical and detailed structure. The researcher also found the principle of theoretical sampling practical and useful. Other methods do not provide as much structure in this area. Finally, the researcher felt that Grounded Theory gave the research a considerably more substantial end product, the theory. Most methods are designed to test theory, only a few actually build theory (Glaser & Strauss, 1967). For this research, the intention was to build theory.

6.4 RECOMMENDATIONS

The researcher carried out this study with an open mind and not an empty head. To this effect, everything that was brought up or observed during the interviews was taken note of and helped in building the theory. SDIs are very important especially for a country like Zimbabwe more so during this time of economic uncertainty. It is recommended that SDIs be implemented in Zimbabwe as soon as possible. Also, legislature has to be amended so as to cater for the grievances and "taints" that Geospatial practitioners have and see, with regards to the current legislation respectively. It is also recommended that all Geospatial practitioners embrace technology and move along with time and acquire the latest versions of Survey software and equipment. This makes work easier, faster and it also helps if there is to be high standards and quality of spatial products. It is also recommended that there should be regulatory bodies that register and control the operations of all different Survey professions. An absence of these has led to other professionals feeling inferior about their professions with others getting to the extent of contemplating changing profession. An establishment of these regulatory bodies will ensure that there are set standards for operating and professionalism of the members. This includes ethics and general behaviour to be exuded by the professionals.

There is need for a research on the most appropriate framework to be followed for the implementation of Spatial Data Infrastructures in Zimbabwe now that the survey professionals' perception of the implementation of SDIs has been laid bare, thanks to this research.

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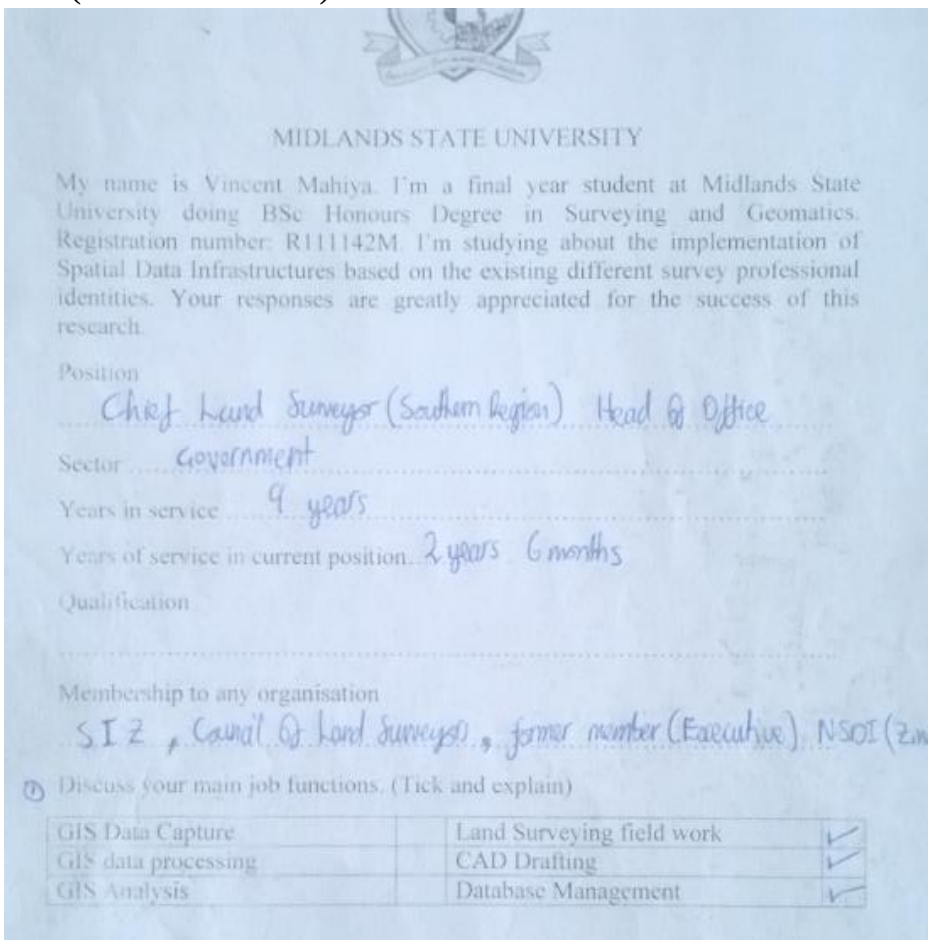
APPENDIX

APPENDIX 1 (TRANSCRIPT 1)



MIDLANDS STATE UNIVERSITY

My name is Vincent Mahiya. I'm a final year student at Midlands State University doing BSc Honours Degree in Surveying and Geomatics. Registration number: R111142M. I'm studying about the implementation of Spatial Data Infrastructures based on the existing different survey professional identities. Your responses are greatly appreciated for the success of this research.

Position: Chief Land Surveyor (Southern Region) Head Of Office

Sector: Government

Years in service: 9 years

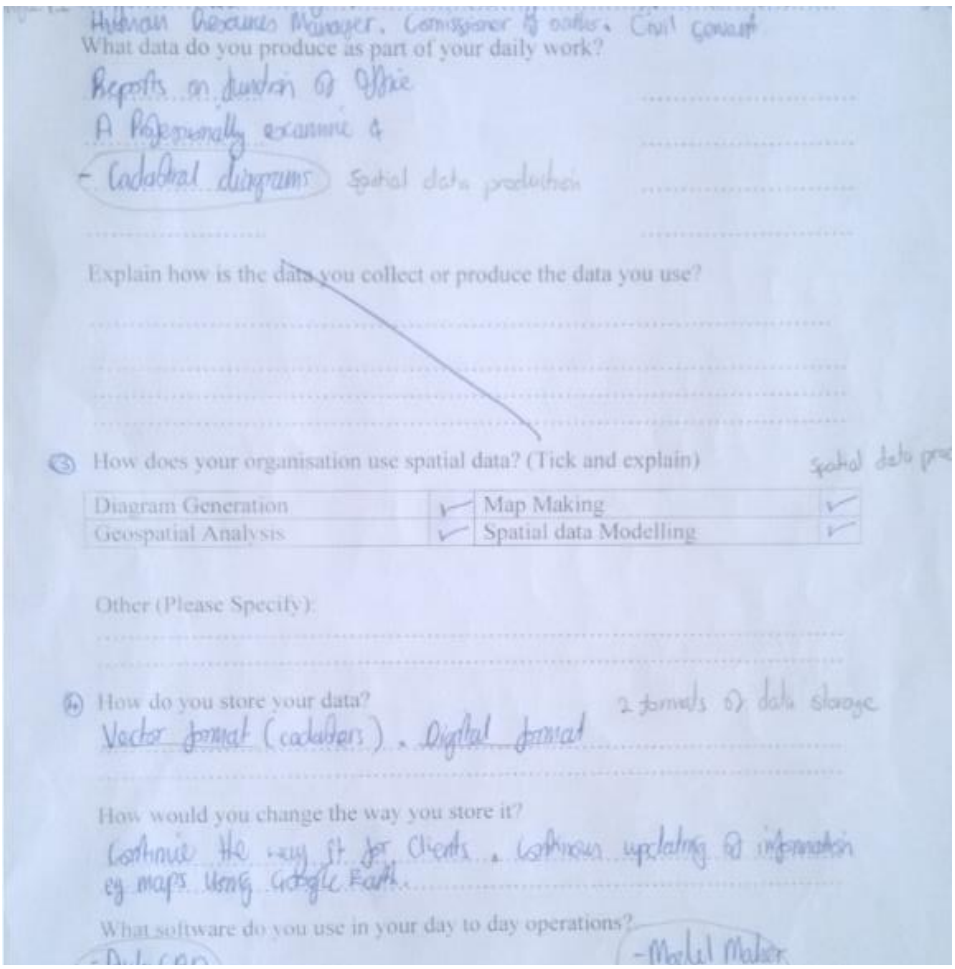
Years of service in current position: 2 years 6 months

Qualification:

Membership to any organisation: SIZ, Council Of Land Surveyors, former member (Executive), NSOI (Zim

① Discuss your main job functions. (Tick and explain)

GIS Data Capture		Land Surveying field work	✓
GIS data processing		CAD Drafting	✓
GIS Analysis		Database Management	✓



Human Resources Manager. Commissioner of oaths. Civil servant

What data do you produce as part of your daily work?

Reports on duration of Office

A Professionally examine &

- Cadastral diagrams Spatial data production

Explain how is the data you collect or produce the data you use?

3. How does your organisation use spatial data? (Tick and explain) Spatial data pro

Diagram Generation	✓	Map Making	✓
Geospatial Analysis	✓	Spatial data Modelling	✓

Other (Please Specify):

4a. How do you store your data? 2 formats of data storage

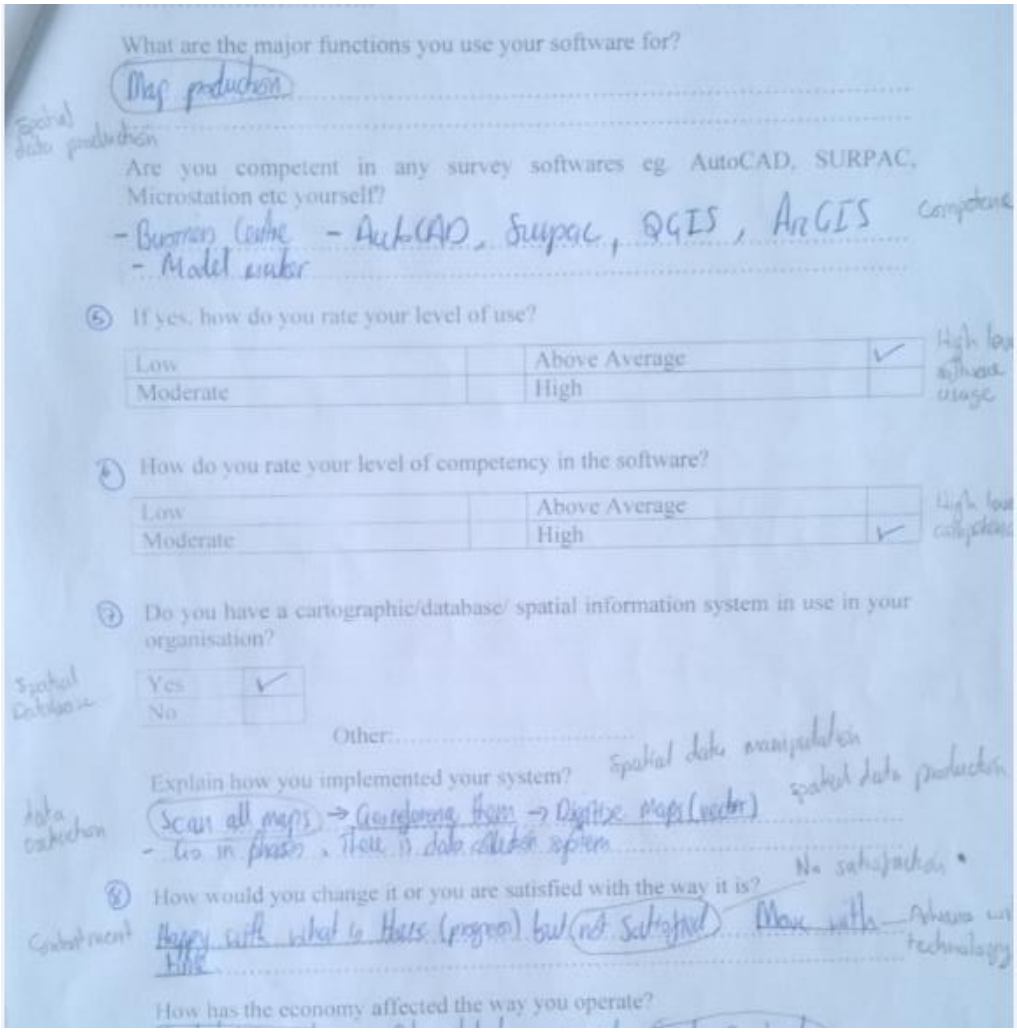
Vector format (cadastres). Digital format

How would you change the way you store it?

Continue the way it for clients. Continues updating of information eg maps using Google Earth.

What software do you use in your day to day operations?

-Model Maker



What are the major functions you use your software for?

Map production

Are you competent in any survey softwares eg AutoCAD, SURPAC, Microstation etc yourself?

- Buoman Centre - AutoCAD, Surpac, QGIS, ArcGIS
- Model water

⑤ If yes, how do you rate your level of use?

Low		Above Average	✓
Moderate		High	

⑥ How do you rate your level of competency in the software?

Low		Above Average	
Moderate		High	✓

⑦ Do you have a cartographic/database/ spatial information system in use in your organisation?

Yes	✓
No	

Other:

Explain how you implemented your system?

Scan all maps → Georeferencing them → Digitise maps (vector)

- Go in phases, Have a data collection system

⑧ How would you change it or you are satisfied with the way it is?

Happy with what is there (progress) but not satisfied

How has the economy affected the way you operate?

How is technology affecting the way you operate/do your things?

Our things are backdated. Not advancing with technology

Do you feel compelled to change the way you do your things because of changes in technology?

(Yes) Advance with technology

What do you know about SDIs?

all encompassing*

many participants

*National thing

- It is a national thing. Has to be all encompassing. There must be many participants. -

What do you think are the advantages of SDIs in Zimbabwe?

money saving

access to data

- Information is found at one place and it saves money from repeating surveys of what has been done already.

Duplication of effort*

What do you think are the advantages/benefits of SDIs to you and your organisation?

Money saving

- Save money (you don't repeat what has been done before)

- Get data in one shop.

duplication of effort

(12) Why do you think SDIs in Zimbabwe were a failure in the first place?

Poor dedication to tasks*

Poor marketing

- Marketing was not good enough. - Dedication was not good

- Platform for forming NSDI was a problem. Surveyors hijacked the project but lacked knowledge

lack of expertise

Do you feel any threat from introduction of SDIs in Zimbabwe?

No threat perceived

No

Which stakeholders or key role players do you think is responsible for the successful implementation of SDIs in Zimbabwe?

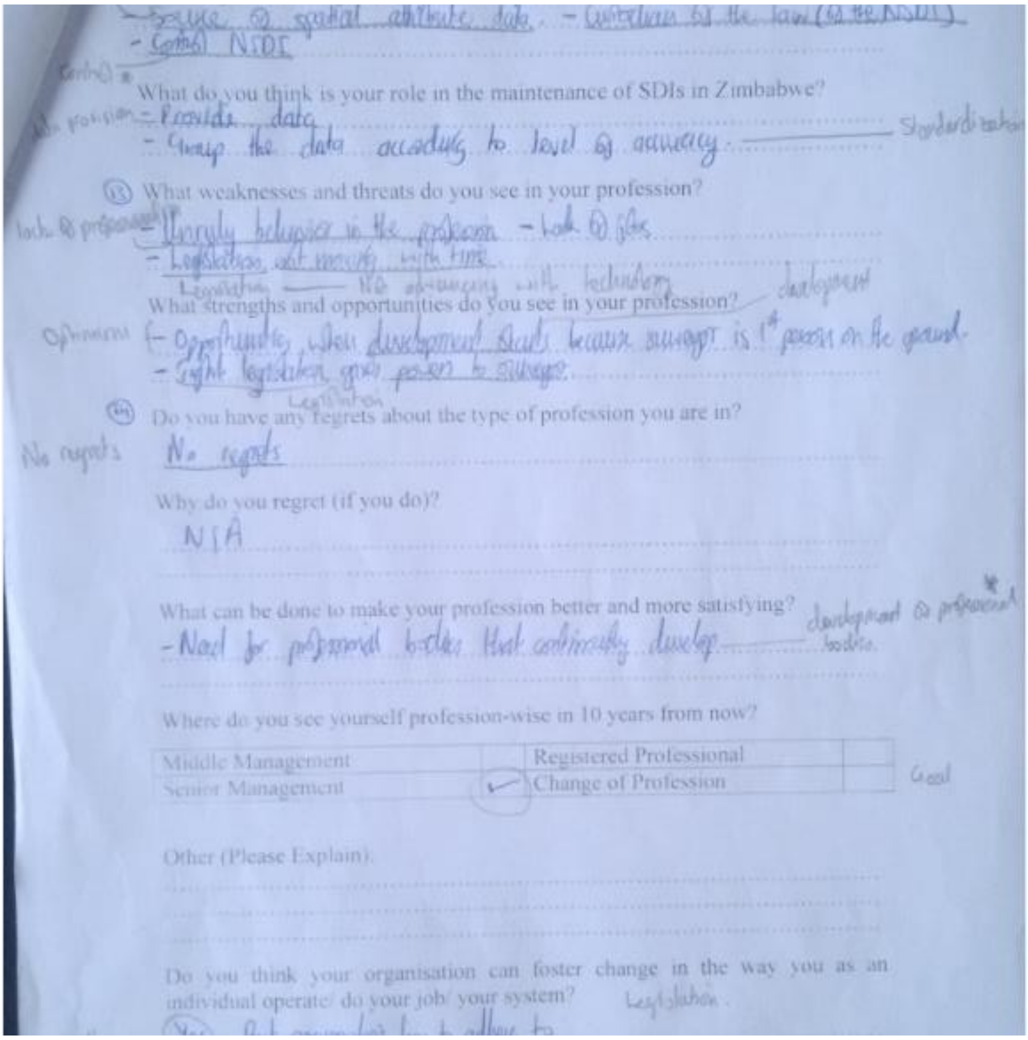
- Institutions (Academic)

Academic institutions

- Surveyor-General's office

- Surveyors

Spatial data producers and consumers



- Control NSDI

What do you think is your role in the maintenance of SDIs in Zimbabwe?

- Provide data
- Group the data according to level of accuracy.

(13) What weaknesses and threats do you see in your profession?

- Unruly behavior in the profession
- Legislation not moving with time

What strengths and opportunities do you see in your profession?

- Opportunities when development starts because surveyor is 1st person on the ground.
- Tight legislation gives powers to surveyors.

(14) Do you have any regrets about the type of profession you are in?

No regrets

Why do you regret (if you do)?

N/A

What can be done to make your profession better and more satisfying?

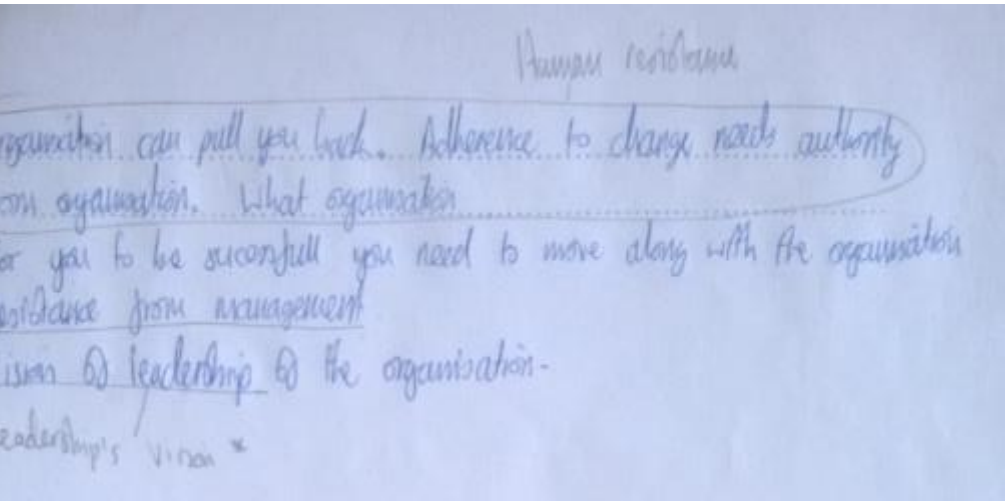
- Need for professional bodies that continuously develop

Where do you see yourself profession-wise in 10 years from now?

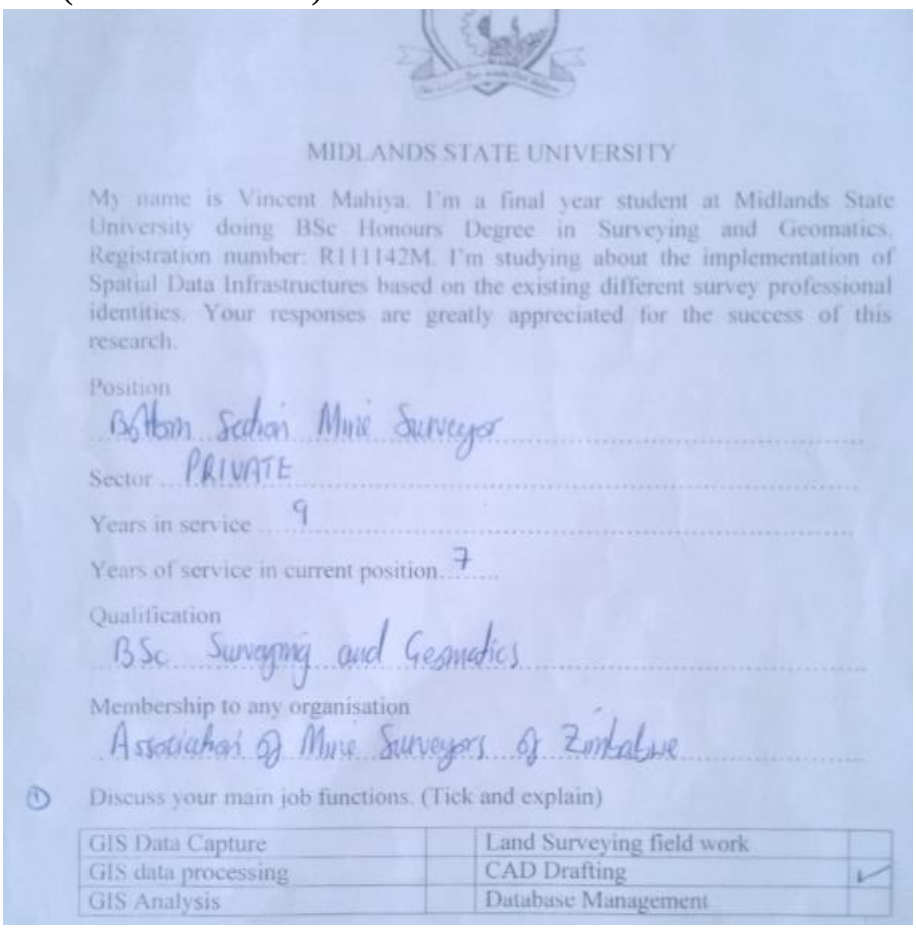
Middle Management		Registered Professional	
Senior Management	✓	Change of Profession	

Other (Please Explain).

Do you think your organisation can foster change in the way you as an individual operate/ do your job/ your system?


Human resource
organization can pull you back. Adherence to change needs authority
from organization. What organization
for you to be successfull you need to move along with the organization
assistance from management
vision of leadership of the organisation-
leadership's vision

APPENDIX 2 (TRANSCRIPT 2)



MIDLANDS STATE UNIVERSITY

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Position
BSc Hons Section Mine Surveyor

Sector PRIVATE

Years in service 9

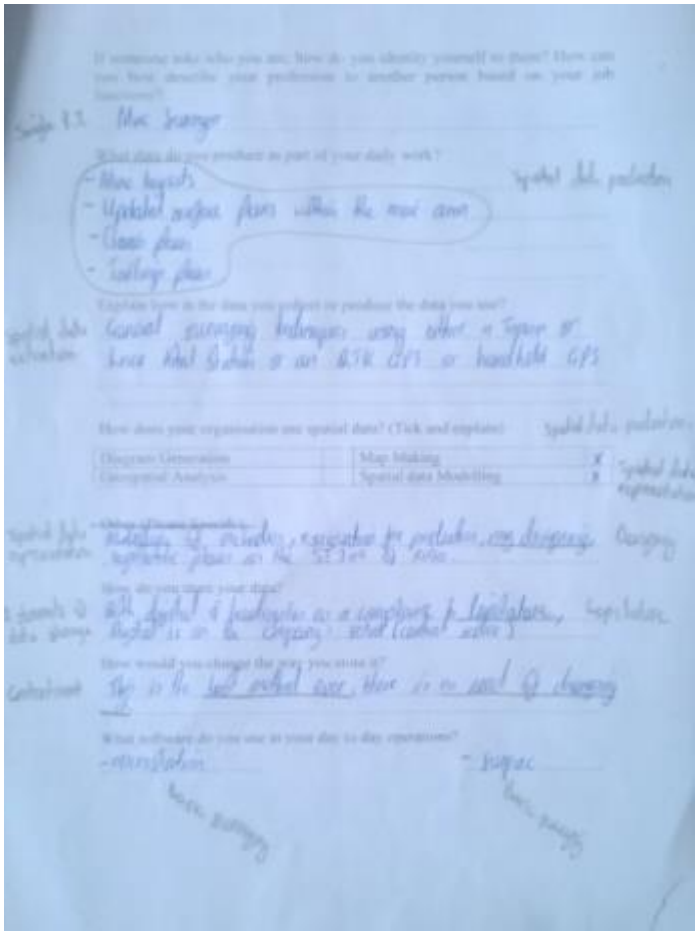
Years of service in current position 7

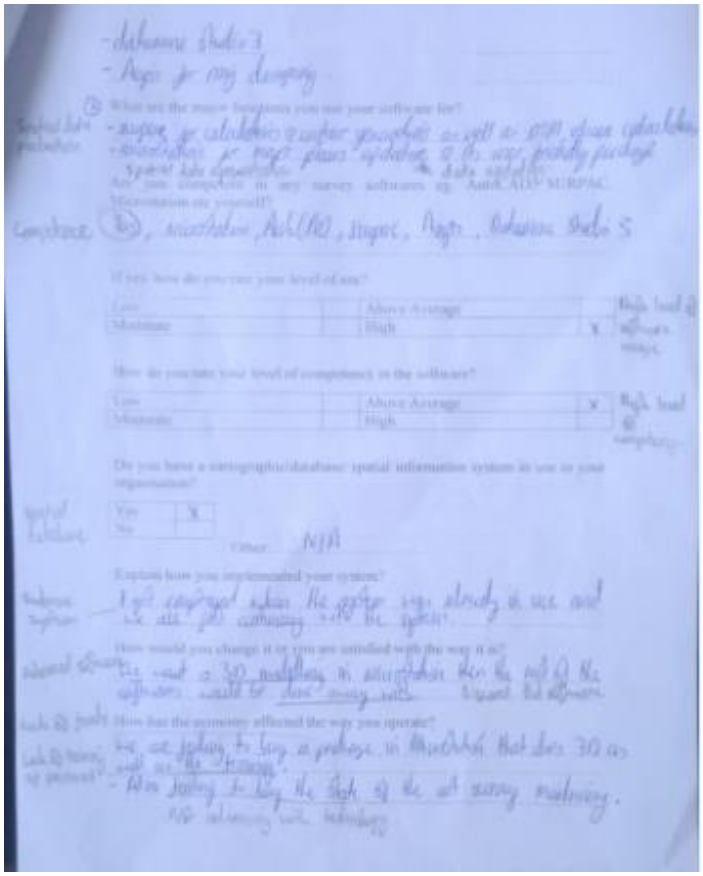
Qualification
BSc Surveying and Geomatics

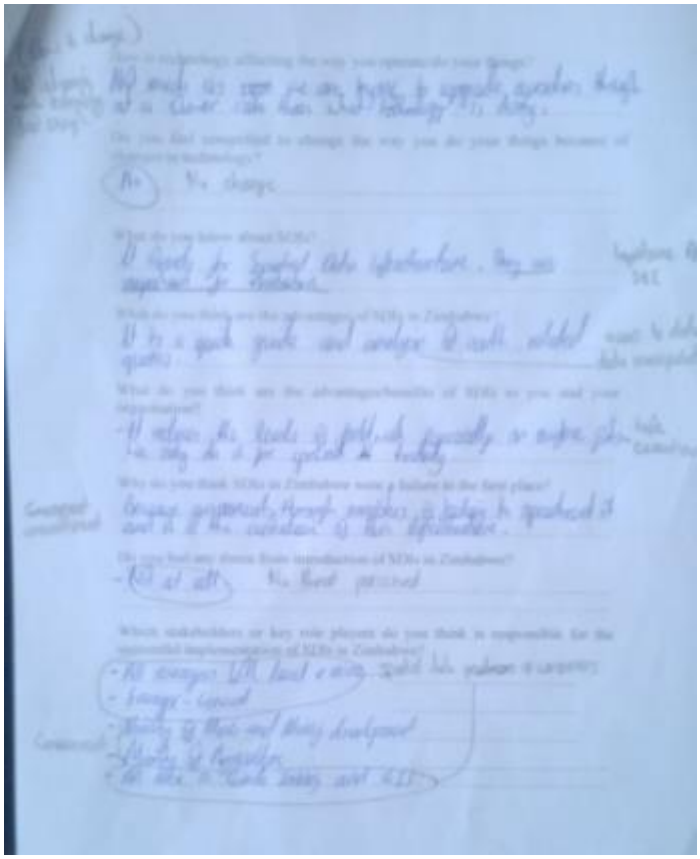
Membership to any organisation
Association of Mine Surveyors of Zimbabwe

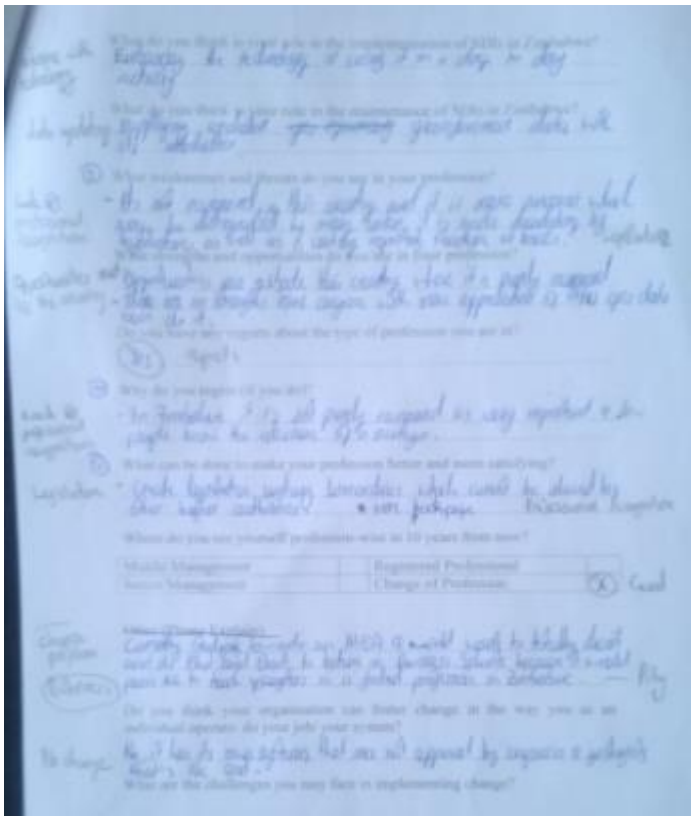
① Discuss your main job functions. (Tick and explain)

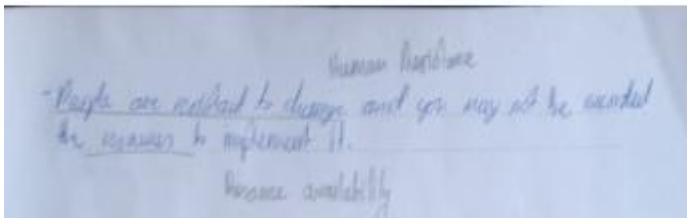
GIS Data Capture		Land Surveying field work	
GIS data processing		CAD Drafting	✓
GIS Analysis		Database Management	











APPENDIX 3 (TRANSCRIPT 3)

MIDLANDS STATE UNIVERSITY

My name is Vincent Mahiya. I'm a final year student at Midlands State University doing BSc Honours Degree in Surveying and Geomatics. Registration number: R111442M. I'm studying about the implementation of Spatial Data Infrastructures based on the existing different survey professional identities. Your responses are greatly appreciated for the success of this research.

Position: Land Surveyor and Company Director

Sector: Private

Years in service: 23

Years of service in current position:

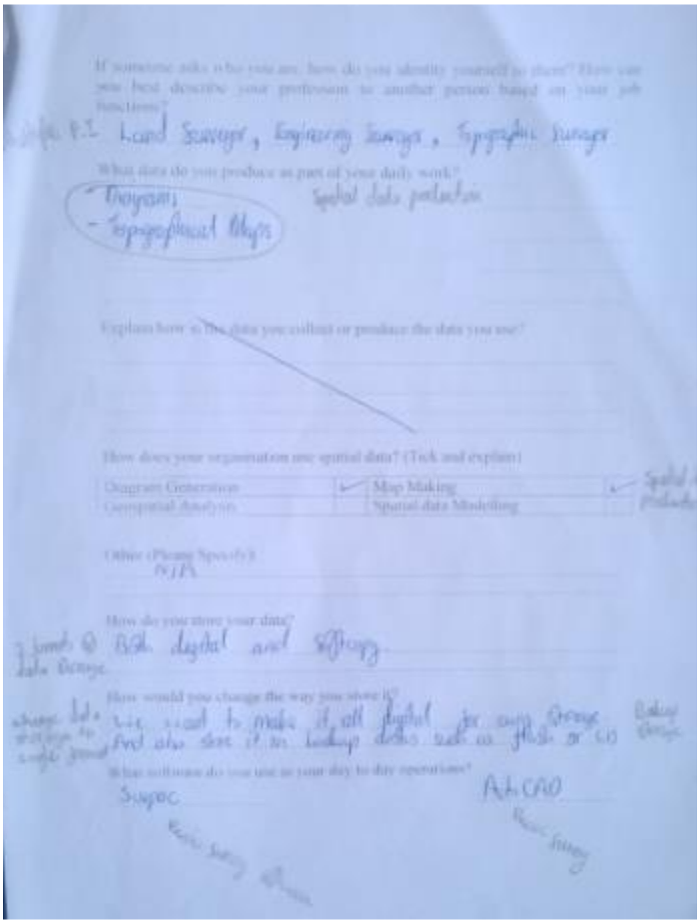
Qualification: BSc Degree in Surveying

Membership to any organisation: SIZ, Council of Land Surveyor.

Discuss your main job functions. (Tick and explain)

GIS Data Capture		Land Surveying field work	✓
GIS data processing		CAD Drafting	✓
GIS Analysis		Database Management	

Other (Please Specify):



If someone asks who you are, how do you identify yourself to them? How can you best describe your profession to another person based on your job functions?

Land Surveyor, Engineering Surveyor, Topographic Surveyor

What data do you produce as part of your daily work?

- Diagrams
- Topographical Maps

Spatial data production

Explain how is the data you collect or produce the data you use?

How does your organisation use spatial data? (Tick and explain)

Diagram Generation	✓	Map Making	✓
Geospatial Analysis		Spatial data Modelling	

Other (Please Specify)

N/A

How do you store your data?

Both digital and hardcopy.

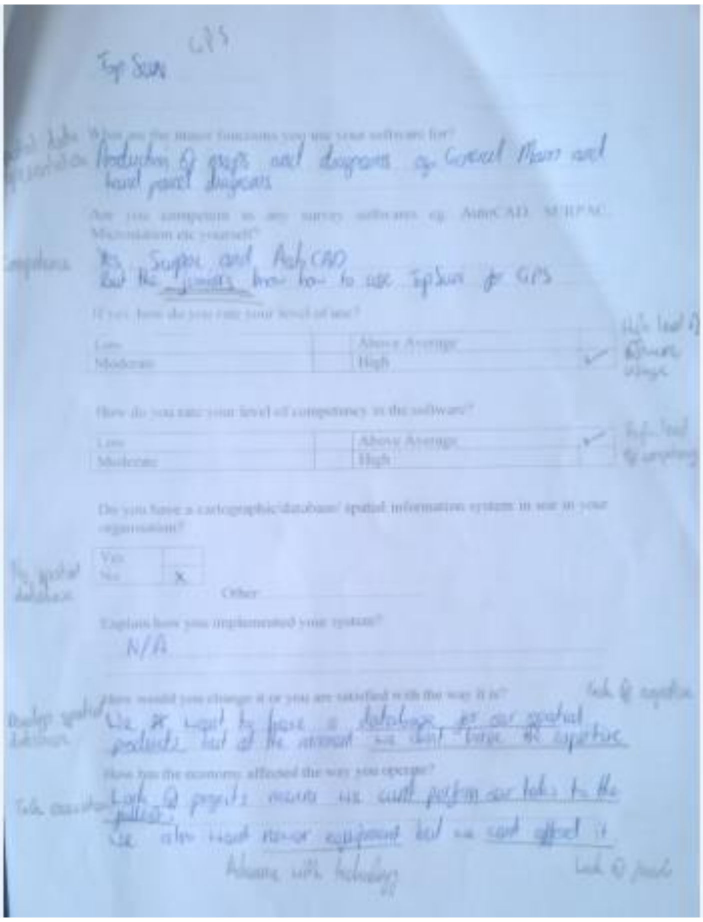
How would you change the way you store it?

We need to make it all digital for easy storage. And also store it in backup disks such as flash or CD

What software do you use in your day to day operations?

Surpac

AutoCAD



Top Surv

GPS

What are the major functions you use your software for?

Production of maps and diagrams eg General Plans and land parcel diagrams

Are you competent in any survey software eg AutoCAD, SURPAC, Microstation etc yourself?

Yes, Surpac and AutoCAD

But the [illegible] know how to use TopSurv for GPS

If yes, how do you rate your level of use?

Low		Above Average	
Moderate		High	✓

How do you rate your level of competency in the software?

Low		Above Average	✓
Moderate		High	

Do you have a cartographic/database/ spatial information system in use in your organisation?

Yes	
No	X

Other

Explain how you implemented your system?

N/A

How would you change it or you are satisfied with the way it is?

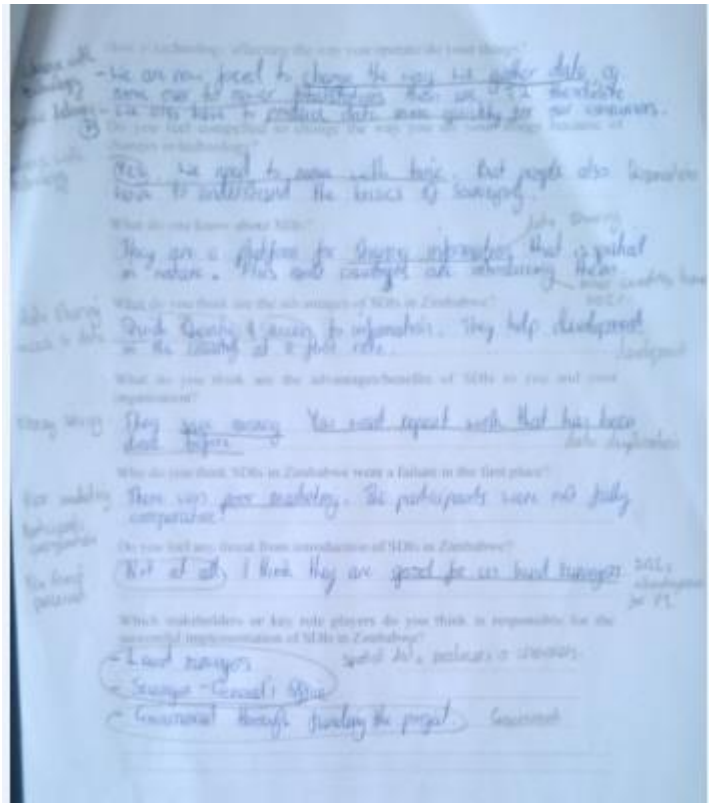
We [illegible] need to have a database for our spatial products but at the moment we don't have the expertise

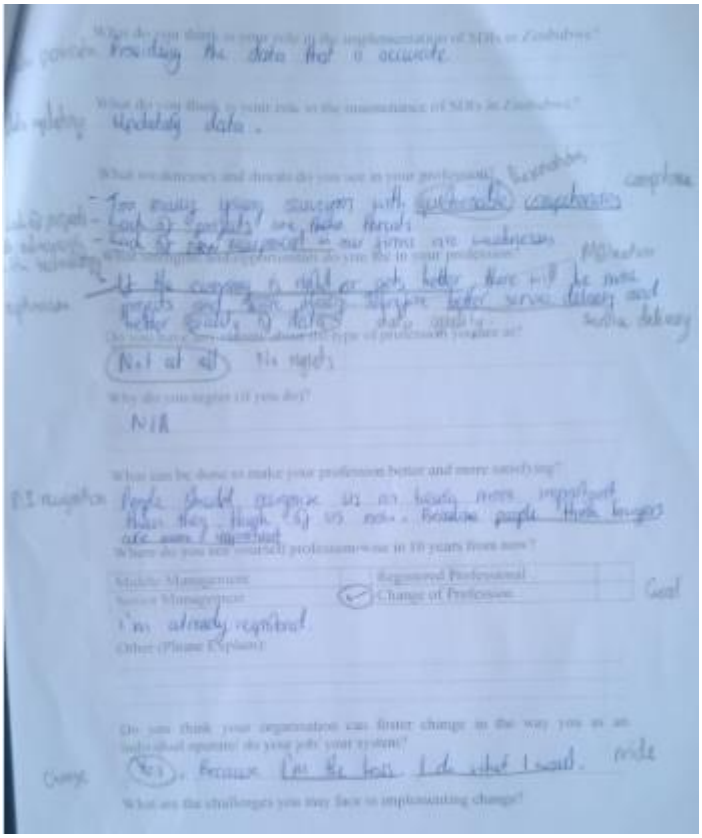
How has the economy affected the way you operate?

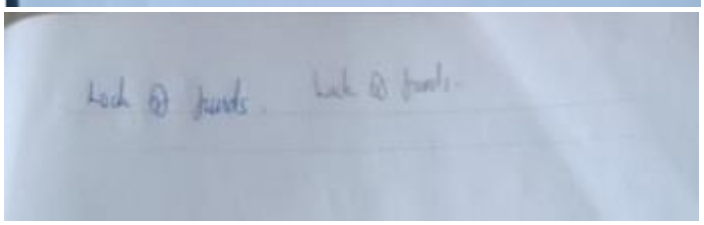
Lack of projects means we can't perform our tasks to the fullest.

We also need newer equipment but we can't afford it

Advance with technology







APPENDIX 4 (QUESTIONNAIRE)

MIDLANDS STATE UNIVERSITY

My name is Vincent Mahiya. I'm a final year student at Midlands State University doing BSc Honours Degree in Surveying and Geomatics. Registration number: R111142M. I'm studying about the implementation of Spatial Data Infrastructures based on the existing different survey professional identities. Your responses are greatly appreciated for the success of this research.

Position

…….

Sector …….

Years in service …….

Years of service in current position……..

Qualification

……..

Membership to any organisation

……..

Discuss your main job functions. (Tick and explain)

GIS Data Capture	Land Surveying field work
GIS data processing	CAD Drafting
GIS Analysis	Database Management

Other (Please Specify):

……
……
……

If someone asks who you are, how do you identity yourself to them? How can you best describe your profession to another person based on your job functions?

…….

What data do you produce as part of your daily work?

…….. ……

…….. ……

…….. ……
…….. ……
Explain how is the data you collect or produce the data you use?
…….
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……
How does your organisation use spatial data? (Tick and explain)

Diagram Generation	Map Making
Geospatial Analysis	Spatial data Modelling

Other (Please Specify):
……
……
How do you store your data?
……
……
How would you change the way you store it?
……
……
What software do you use in your day to day operations?
……. ……
……. ……
……. ……
What are the major functions you use your software for?
……
……
Are you competent in any survey softwares eg. AutoCAD, SURPAC, Microstation etc yourself?
……
……
If yes, how do you rate your level of use?

Low	Above Average
Moderate	High

How do you rate your level of competency in the software?

Low	Above Average
Moderate	High

Do you have a cartographic/database/ spatial information system in use in your organisation?

Yes

No

Other:…….

Explain how you implemented your system?

……
……

How would you change it or you are satisfied with the way it is?

……
……

How has the economy affected the way you operate?

……
……

How is technology affecting the way you operate/do your things?

……
……

Do you feel compelled to change the way you do your things because of changes in technology?

……
……

What do you know about SDIs?

……
……

What do you think are the advantages of SDIs in Zimbabwe?

……
……....

What do you think are the advantages/benefits of SDIs to you and your organisation?

……
……

Why do you think SDIs in Zimbabwe were a failure in the first place?

……
……

Do you feel any threat from introduction of SDIs in Zimbabwe?

……
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Which stakeholders or key role players do you think is responsible for the successful implementation of SDIs in Zimbabwe?

…… ……...
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What do you think is your role in the implementation of SDIs in Zimbabwe?

……

……

What do you think is your role in the maintenance of SDIs in Zimbabwe?

……

……

What weaknesses and threats do you see in your profession?

……

……

What strengths and opportunities do you see in your profession?

……

……

Do you have any regrets about the type of profession you are in?

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Why do you regret (if you do)?

……

……

What can be done to make your profession better and more satisfying?

……

……

Where do you see yourself profession-wise in 10 years from now?

Middle Management Registered Professional

Senior Management Change of Profession

Other (Please Explain):

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……

……

Do you think your organisation can foster change in the way you as an individual operate/ do your job/ your system?

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What are the challenges you may face in implementing change?

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