CROWDSOURCING FOR LAND ADMINISTRATION: THE VIEWS WITHIN NETHERLANDS CADASTRE

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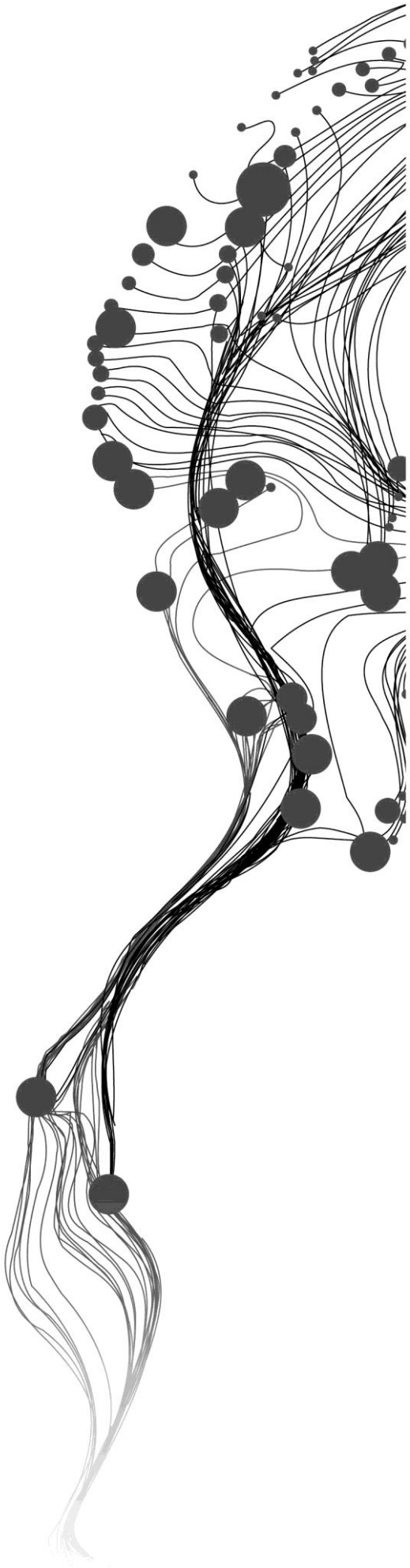

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Enschede, the Netherlands, [February, 2012]

Thesis submitted to the Faculty of Geo-Information Science and Earth Observation of the University of Twente in partial fulfilment of the requirements for the degree of Master of Science in Geo-information Science and Earth Observation.
Specialization: Land Administration

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ABSTRACT

This research focuses on the views of cadastral organisations on crowdsourced land information. The research problem centres on the proliferation of crowdsourcing and the impact it might have on cadastral systems. It is argued that cadastral organizations and professionals should embrace the opportunities provided by crowdsourced land information. This involves understanding how cadastral organizations might need to change in terms of processes, operations, and also culturally. Currently, however there are no empirical studies that describe how cadastral organizations and professionals view crowdsourced land information. Therefore, this research aims to provide insight in this knowledge gap. Thus it was compelled to investigate how a cadastral organisation officials' view crowdsourced land information. To achieve the above, this research was based on a single case study analysis of which the Q methodology was used to answer the research questions. Sixteen participants were selected to carry out the sorting. The Q statements were derived from a comprehensive literature study. The results revealed the contemporary perceptions of crowdsourced land information across a modern land administration organisation. These understandings are potentially beneficial for crowdsourced land information, related strategic decision-making.

ACKNOWLEDGEMENTS

I am very grateful to Almighty God for his protection, love wisdom and provision; through him all things are made possible.

This work was made possible because of the support from various people and organisations

First and fore most I would like to extend my sincere gratitude and acknowledgement to the Netherlands Fellowship Programme (NUFFIC) for their sponsorship at ITC to pursue this programme. Also I would like to extend my appreciation to ITC admission board for selecting me to take the course. Further, I extend my appreciation to the National Housing Corporation General Director, his authorization to let me follow studies in the Netherlands.

Secondly, I express my sincere gratitude to my supervisors Ir. Walter DeVries and Dr. Rohan Bennett for their valuable guidance, time commitment during my research work. The encouragement and support has and their belief in me had made it possible for me to undertake the research with more confidence and strength.

I also extend my gratitude to the ITC staffs, especially Students affairs and Land Administration staffs; Kees Bronsveld, Mrs Jacqueline Mol for their administrative support and all the lecturers who have provided me with the wonderful knowledge in the field of Land Administration with the GIS and Remote Sensing.

I am in debt with the great support of the Netherlands Kadastre staffs especially Peter Laarakker and Hanny De Ree for the support they have extended during the entire period of field work and organisation of the interviews.

To all my friends in ITC/UT community, for making me feel at home and your moral support, friendliness and encouragement has given me a wonderful time here in the Netherlands. My classmates (Arnold Thumba, Georgina Rockson, Al Amin Juma, Robert Hackman Antwi, Byung Yong Kwak, Susheel Dangol, Nneka Chiedozie-Udeh, Shanti Basnet, Olawale Ojikutu, Tran Hai Phuong, Zhi Wang and Emmanuel Ngalandji) and my Tanzania friends here in the Netherlands and Germany. I thank you all for the wonderful, happy time we had together.

Lastly to all my friends in the ITC Christian fellowship; together we worshiped and prayed. And to all who have contributed in one way or the other to my wonderful stay here in the Netherlands as well as to my studies.

Eliaisa Marie Keenja
13th February, 2012
ITC/UT, Enschede, the Netherlands

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1. CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.1. Introduction:

Crowdsourced land information also known as volunteered geographic information (VGI) is the way in which ordinary citizens can create digital spatial data and maps, individually and collectively (Elwood, 2008). Crowdsourcing is mainly used to provide additional information to general base map information. Crowdsourcing technology allows users to create their own content by marking locations of events and certain features which are not in these maps. Information provided by crowdsourcing has contributed to more up-to-date information sources in several sectors. In the health sector it has helped in strengthening emergency response efforts. In disaster relief it helped to gather information relevant for activities without actually being physically present on site. Through crowdsourced land information, disaster management was more easily handled and managed in the areas where maps and spatial information were unavailable example the Haiti case(Sharma & Haklay, 2010). Volunteered information became particularly important in catering for the increased demand for online maps. It is an extension of critical and participatory approaches to geographic information systems, where people use the web technology to map their immediate or known environment. The development of information and communication technologies (ICTs), such as the increasing capabilities of a combined use of internet and mobile phones, has significantly modified the context of how geospatial datasets can be populated (Devillers, Gervais, Bédard, & Jeansoulin, 2002). It has also opened up a potential increase in the collection of land information. With this increase the role and positions of cadastres could change. If crowdsourcing is largely done by private untrained citizens, the data may not be as accurate as within current conventional cadastres. Yet, the collective database may present a dramatic innovation that will have a profound impact on land information systems(Goodchild, 2007). Nevertheless, in many cases the quality of the resulting geospatial data is rather good (Heipke, 2010).

Crowdsourcing in the cadastral mapping world is however still confronted with a number of obstacles. It has not yet taken off because cadastral mapping has historically been rooted in rules and regulation (Laarakker & deVries, 2011). Statutory policies operate on how the data are acquired, analysed and organised. These systems are very much under control of the government agencies. Cadastral agencies have the responsibility to carry out all the tasks (Kaufmann & Steudler, 1998) on the spatial data from land professionals acquiring data based on firm standards for quality and accuracy. The term professional as described by (Goodchild, 2009) conveys a sense of care, attention to detail and adherence to rigorously applied standards. In many countries cadastral systems have a long history and a broad range of use in taxation, land registration, land development, urban planning and design of infrastructures (Lemmen & Oosterom, 2001). Modern cadastral systems face challenges which arise from a pragmatic context of emerging user demands and technology push, and the problematic situation in meeting user requirements for faster procedures for land transfer, good access to land data, guaranteed reliable data, fast distribution channels (Lemmen & Oosterom, 2001). Given these challenges, crowdsourced land information may both be a solution and a threat. How to solve this dilemma is the key underlying premises of this research

1.2. Justification of study and Problem statement

1.2.1. Justification of study

There are no empirical studies that show whether crowdsourcing is important or not in relation to cadastral systems. (McLaren, 2011) provides a summary of opportunities and challenges in relation to the topic. The work is an important contribution; however, it illustrates the lack of empirical evidence in the area. Therefore this research investigates the perceived interests of cadastral officials on VGI.

1.2.2. Research problem

If the use of crowdsourced land information increases, it will have impact on cadastral systems and organisations. Therefore, cadastral organizations and professionals must prepare for, or acknowledge the possibility of, process change. This requires them to have a comprehensive view of what VGI can do and cannot do. The research problem is therefore framed as follows:

> *Currently there is no information on how cadastral professionals view VGI. This impedes the design of change processes within cadastral organizations and institutions.*

1.3. Research Objectives and Questions

1.3.1. Aim

In response to the research problem, this research aims to fill the knowledge gap. The overarching objective is to investigate how cadastral organisation officials view crowdsourced land information. Is it perceived as a threat? Or is it considered as a useful contribution to cadastral operations and strategy? Understanding such views can help in designing organizational policy and change responses. In summary:

> *The aim is to understand which views cadastral staff members currently have about crowdsourcing.*

At a more practical level, the research aims to collect public organizations officials' views on crowdsourced land information. A systematic and comprehensive method will be required to identify and classify these views. In summary the aim is to understand which views cadastral staff members currently have about crowdsourcing, and to assess how these views could potentially influence the (future) organizational strategies of cadastres.

1.3.2. Objectives

This research is based on the single case study which is the Netherlands cadastre. The research aims to collect public organizations officials' views on crowdsourced land information. As such there is a need to rely on a systematic and comprehensive method of identifying and classifying views. Furthermore, the research aims to position the role of crowdsourcing in the context of other organizational threats and opportunities. It will incorporate the different issues which land organisation perceive as threats and opportunities, and will need to place crowdsourcing in the overarching set of future goals of these organisations.

1.3.3. Research Questions

In response to the main aim, the overarching question was generated:

> *What are the views of crowdsourced land information by professionals working within public cadastral organizations?*

There are three components in this: crowdsourced land information, views of cadastral officials on crowdsourcing and organizational strategies of cadastres. Investigating the combination of these three leads to the sub-questions:

1. *What is the contemporary definition of crowdsourcing?*
2. *How are views about crowdsourcing perceived by public officials from Netherlands cadastre organizations?*
3. *Which views of the public officials have strong influence on cadastral systems? (Why?)*

4. *Do professional backgrounds of cadastral officials influence their viewpoints about crowdsourcing in the Netherland cadastral organizations?*

1.3.4. Hypothesis:

An overarching hypothesis was also generated to assist in designing an appropriate research methodology:

Crowdsourcing is viewed as a threat by public cadastral organizations and their staff.

1.4. Research design and methodology

To answer the research questions, respond to the hypothesis, and achieve the overarching aim, a research methodology was required. The methodology is described and justified in detail in Chapter four. However, it can be stated here that the systematic and comprehensive method for identifying and classifying views utilised a method known as Q methodology.

1.5. Conceptual framework

This research is aimed at answering the views of the cadastral officials on crowdsourced land information. Figure 1 below conceptualizes the three main areas underlying the research. The grey areas depict the areas where knowledge gaps currently exist. Additionally, they show the methods that will be used to fill those knowledge gaps. The area shaded yellow depicts the nexus of all studies or knowledge gaps. As such, it is considered to be there area where this research contributes to knowledge.

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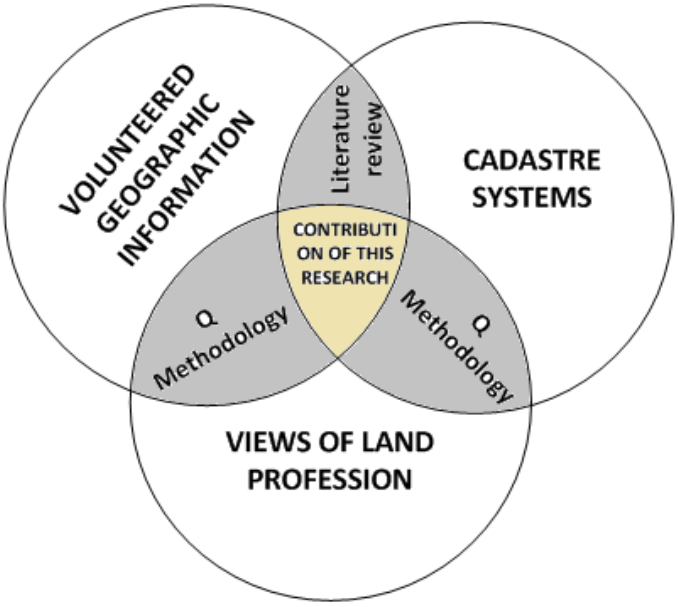

Figure 1: Conceptual Framework

From a process perspective, Figure 2 again demonstrates the three areas of inquiry and how they are combined through the research. The focus is on the views of cadastral officials in relation to the cadastre systems. Linking the different views on cadastre systems with the views on crowdsourced land information and the relationship between crowdsourced land information and cadastre as illustrated in the figure below.

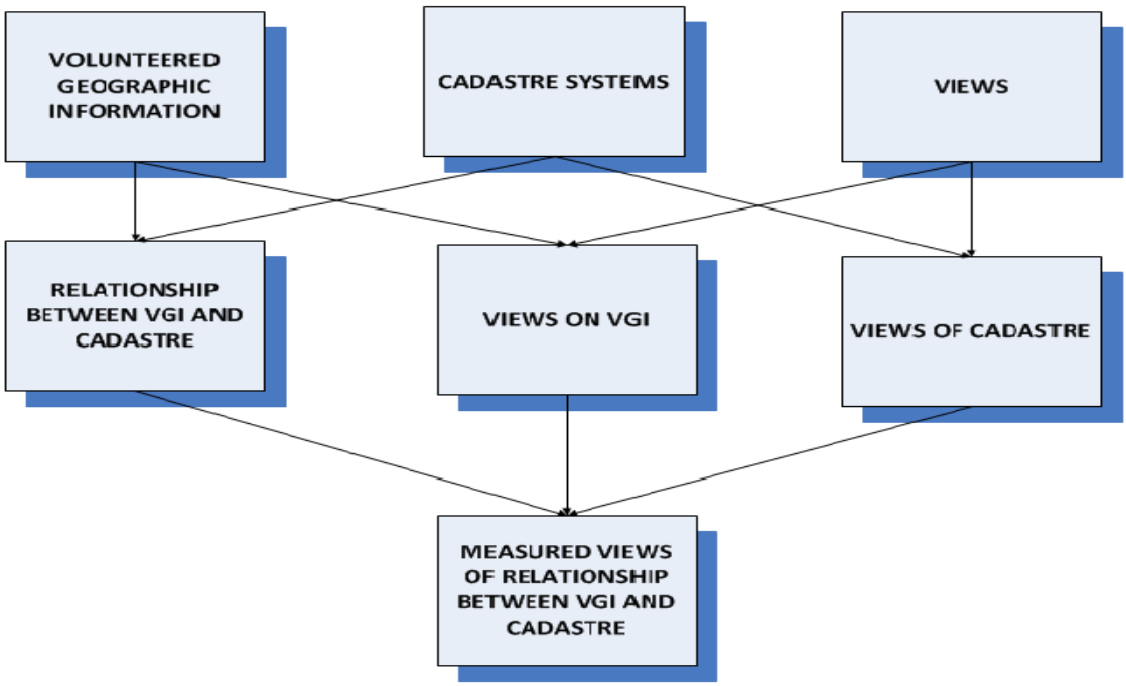

Figure 2: The illustration of conceptual framework

1.5.1. Structure of the thesis:

The research is structured in six main chapters. Chapter one is the Introduction and, as seen, consists of the research statements, objectives, research problem, research objectives and research questions. The justification of the research and approach to which the research is going to be accomplished is also discussed in this chapter. Chapter two contains the existing background theory on crowdsourcing land information which is a literature review of different views of scholars in crowdsourcing. What scholars have discussed and understanding of crowdsourcing and cadastre systems. Chapter three describes the research design and methods. In this the Q methodology is selected to examine the subjectivity of the cadastral officials and to answer the research questions. Chapter four discuss analysis of results and interpretation while chapter five will discuss the conclusions.

1.6. Conclusion

In summary, crowdsourcing has already shown utility in many different parts of society. Though, it has not yet taken off in cadastral mapping due to a number of obstacles. As such, this research is going to contribute to the area. It will assess the gap in knowledge regarding cadastral organizations and how they view crowdsourced land information.

2. CHAPTER TWO: THEORY ON CROWDSOURCED LAND INFORMATION

2.1. Introduction

This chapter examines the different context of cadastral systems and crowdsourcing from the perspective of technological developments, government rules and regulations that affect cadastre systems, and the way society is able to contribute to cadastre systems.

2.2. Concepts of cadastral systems and current practices

A cadastre is normally a parcel based, and up-to-date land information system containing a record of interests in land (e.g. rights, restrictions and responsibilities). According to (Dale & McLaughlin, 1999) cadastre is a combination of technical records of land with authoritative documentary records embodied in appropriate associated registers. The Land Information system help in supporting urban and regional planning, infrastructure developments and monitoring of environment(Dale & McLaughlin, 1999).It usually includes a geometric description of land parcels linked to other records describing the land interests, the ownership or control of those interests, and often the value of the parcel and its improvements(Williamson & Ting, 2001). The cadastre is a public land information system and should therefore be managed or supervised by the Government (FIG, 2011). The heart of a cadastre is the parcel which are usually surveyed, mapped and indicated by a number (identifier). These parcels are demarcated by boundaries either general or fixed (Henssen, 1995). From the unique Identifier and parcel number, the parcel is registered and the holder secures deed or title of the land. According to (Larsson, 1991) Napoleon (The historical Emperor of French)had a view that, "A good cadastre will be the best complement of civil law code to achieve systematic order in the area of real estate property" which means in order to have good registration of cadastre systems, the system must be coupled with civil law to provide secure guarantee of land ownership. These systems have been beneficial to the national economy, social and environments (Silva, 2005). The cadastre has played an important role to societies (Zevenbergen, 2004) and is used not only to enhance the deeds registration but also to facilitate the change from the deed to the title registration system and property markets. Generally the cadastral system comprises the map, Cadastral Register and Land Register.

Cadastral systems or land administration systems (Cagdas & Stubkjær, 2008)are the fundamentals of land administration which encompasses recording and ascertaining land rights which answer the questions of who owns what? Where? as well as how?. Historically cadastre systems started as land records to serve as 'fiscal' records, primary for the public sector for land taxation and as 'legal' records, for private sector for ownership and other land rights (Larsson, 1991). The cadastral systems (whether existing or new) of different countries have faced different challenges and have not being successful in overcoming them. (Bogaerts & Zevenbergen, 2001) have highlighted the limitations of the current cadastral systems, one being lack of knowledge of the local experts in the field of Land administration and two; the foreign consultants tend to implement their country knowledge to the receiving countries. In their work they further highlighted different alternatives to cadastral systems. This has brought about to constant reforms of these cadastral systems(Steudler, Rajabifard, & Williamson, 2004). (Van der Molen, 2002) has observed that keeping the cadastre systems up to date is more of a challenge because of the dynamics of the societal developments.

For quite a number of years accuracy has been sensitive issue to land surveyors(Bennett & van der Molen, 2011), this is costly, complicated and has slow down the survey procedures, and quite difficult to keep up-

to-date(Arko-Adjei, 2011). The precisely fixing of boundary "imaginary" line and a land mark to establish its existence indicating its position of legality(Dale & McLaughlin, 1999) has been a key issue in respect of keeping the registers systematically .Due to slowness and expensive the traditional cadastral systems are, in responding to the changing of societal needs(Steudler, et al., 2004), which has called up on integration of participation of society to the cadastre systems (Dale, 2000). This form of public participation in land information systems is called the Participatory Geographic Information (PGIS). This new approach have been traditionally established and controlled either by, or with, the assistance of someone with skills and knowledge in organizing and presenting spatial information.

2.3. Concept of crowdsourced land information

Crowdsourced land information is not new, but it has emerged gradually from efforts in areas such as participatory GIS (PGIS) through GIS portals (McDougall, 2009). On the other hand, crowdsourced land information is generated by amateurs who are not from entirely well-established academic and professional boundaries of GI Science (Tulloch, 2008).

The concept behind crowdsourcing encompasses the technology of modern web map interfaces or Web 2.0. The base data, the contributed data (Mash-ups) and the participants (Volunteers) who are contributing to the media are all components. Current web technology has enabled a massive collection of spatial data by volunteered individuals. The participants in contemporary web mapping environments are both the users and producers (Coleman, Georgiadou, & Labonte, 2009). The role of individuals as producers holds a wealth of geographic information (GI) by capturing and utilizing the knowledge from those who are closest to a specific phenomenon with geographic knowledge. The trend increased after Google, Microsoft, Yahoo! and other social networks made their web mapping application programming interfaces (APIs) to the public. These gave rise to a new concept in the geo-information science which carries different names across the world of geographic and social sciences, namely 'crowdsourcing', 'Neo-Geography', 'cyber cartography', 'Volunteered Geographic Information', 'User Generated Content' etc.(Budhathoki, Bruce, & Nedovic-Budic, 2008).

Before understanding the potential impact of VGI, it is necessary to understand the characteristics of VGI itself. Simply speaking, VGI contains two basic elements: 'Geographic information (GI)' and 'voluntarism'. Both of these elements create opportunities and risks, which leaders of public and private mapping organizations world-wide are now considering (Coleman, Georgiadou, & Labonte, 2009). Researchers such as (De Longueville, Ostländer, & Keskitalo, 2009) have categorized these opportunities and risks. VGI has a certain degree of vagueness, as they describe only a spatiotemporal and thematic snapshot of the entire phenomenon. Whereas (Heer & Bostock, 2010) views is concerned with the credibility and lack of expertise. (Ganapati, 2011) has a view that Public agencies can take advantage of volunteered geographic information (i.e., mount their data on third-party servers) to provide spatial information .While (Heipke, 2010), views Volunteered information is carried out largely by untrained users, which is in clear contrast to mapping activities pointing out the quality is questioned for "fitness for use"(Goodchild, 2008; Goodchild & Glennon, 2010) as they stress that since volunteered information is asserted and carries none of the assurances that lead to trust in officially created data. While, blogs such as TongalBlongal, with the title "Crowdsourcing and the Evolving Perception of "Quality"" has looked on the quality issues and posed a question of "what is good enough?" They had assumption that people and businesses that make a living on the old process of creating content have one of two quick reactions to Volunteered Information: 1) quick to dismiss it as amateur, or 2) quick to embrace it with a caveat. It is important to understand and know the views of public officials on VGI, if it can be used as contribution in cadastre systems. This study will provide a better understanding of the current views of cadastral officials on VGI.

2.4. Current practices relating to cadastres and crowdsourcing

In many countries different organisations store spatial data in duplication: each agency creates its own data, which other organisations already create and maintain (Tuladhar, Radwan, Kader, & El-Ruby, 2005). There is a lack of interoperability of data. Moreover, there are privacy controls in place that mean organizations are unable to share data even if they are willing either due to the storage of data in manual base form or due to the standards sets for interoperability of the dataset. In order to minimise the duplication of data the issue of reliability and accessibility of data to all user is of great importance.

Land organisations created their own spatial information with the use of GIS to cater for their services. In 1990s, the United States proposed the plan of national information infrastructures and national spatial data infrastructures which was the strategy for enablement of digital earth (Shao & Li, 2009) and in July 2004 the European Commission proposed INSPIRE which is a directive setting the legal framework for the establishment and operation of an Infrastructure for Spatial Information in Europe. All these had one intention to have interoperability of spatial data from different land organisation and implement on internet for the access and exchange of geospatial resources (Nebert, Reed, & Wagner, 2007). The government organisations have tried to improve their technology by using Spatial Data Infrastructures (SDI) to increase efficiency, improve service delivery with focus on increased efficiency, improved service delivery (standards and interoperability) (Georgiadou, Bernard, & Sahay, 2006).

2.4.1. Technological developments

Technology has been changing with time, this has made it possible for the land administrator to carryout it tasks with more efficiency and effective manner from manual (paper based) to automatic (computerised). The same has been to surveying from plane table surveying on the open fields to the innovation of the Navigation Satellites Timing and Global Positioning System (NAVSTAR GPS) which was originally planned as navigation system for military and civil use has made it possible to determine positions within a few centimetres or less (Larsson, 1991). This led to digital spatial data which has widely applied to geographically oriented computer technology integrated systems for mapping and automated geographic data processing. These are central principles of Geographical Information Systems (GIS) (Pickles, 1995). GIS introduce methods and environments to visualize, manipulate, and analyse geospatial data (Yeşilmurat & İşler, 2011)and decision support. GIS has been defined as digital computer applications to capture, store, manipulate, analyse and display geographic information(Treiblmayr, Scheider, Krüger, & von der Linden, 2011). The value of GIS relies upon its coverage and the strength to represent diversity, on its truth within a constrained definition. GI technology facilitates analysis and continues to evolve rapidly, especially in relation to the Internet.

2.4.2. Changes in technology and cadastre systems

The World Wide Web (WWW) is one of the information revolutions potential that exist to bring society and wider community in decision making process and participation to a new level of effectiveness (Williamson & Ting, 2001). Digital Geographic Information is among the technologies that will enable new design elements of future vehicles and their applications (Harding et al., 2009). However, in the recent years there have been a proliferation of volunteered information via Web applications and other geospatially enabled devices (Seeger, 2008). The acquisition and compilation of geographic data has become vastly easier as technology has advanced.

The rise of the geoweb is associated with shifts in the processes and power relations of spatial data creation and use (Elwood, 2010), which has changed dramatically the use of internet and (WWW) followed by the rapid technological developments (Haklay, 2010),and user paradigms which enhanced interoperability of components and modularity of the platform (De Longueville, et al., 2009) in combination with increased bandwidth and the ability to provide better tools for collaboration(Haklay & Weber, 2008) with recent technological developments, citizens can report events in real-time via Internet (De Longueville, Annoni,

Schade, & Whitmore, 2010). Today's smartphone is a powerful computer. It is equipped with a range of sensors, a gigahertz-range CPU and high-bandwidth wireless networking capabilities of distributing human interaction. Open Street Map (OSM) follows the peer production model that aims at creation of a set of map data that's free to use, editable, and licensed under new copyright schemes(Haklay & Weber, 2008).

Increasingly, maps are being produced with the aid of desktop mapping systems and GIS and the wide availability of affordable GPS receivers, home computers, and the Internet has enabled mass-market mapping (Haklay & Weber, 2008)by users unfamiliar with cartographic design principles. This is handled with the built in intelligent systems of cartographic knowledge to explore a comprehensive functionality specification for cartographic design to assist in producing satisfactory maps (Forrest, 1999) The trend increased after Google, Microsoft and Yahoo! made their web mapping application programming interfaces (APIs) public (Budhathoki, et al., 2008). However, there is a need to understand the changes created with the crowdsourcing which is of more importance to the usability of the GI rather than the technology behind it (Harding, et al., 2009).

According to (Georgiadou, Budhathoki, & Nedović-Budić, 2011) citizens' submissions in crowdsourcing do not need to be limited, they could also participate as active partners of government in the process of making policy. Public participation is of vital importance in decision making concerning their environment and issues that affects them directly and stimulate discussion about local knowledge. Citizens who contribute their local knowledge may feel a sense of self-worth and/or empowerment as they contribute to their cadastral organisations.

2.5. Development of views on Crowdsourcing

The different views discussed above, and others not included directly in the review, can be grouped into three schools of thought: hierarchical, market, and information. The reasons for creating such groupings are explained in the subsequent chapter. The three schools of thought are discussed, explained, and categorised in the Table 1 below. These views were developed through different literature reading and perceived information of the land administration and crowd sourcing.

Table 1: belief systems

Belief systems		Main views per belief system	Exemplary Statements for each view	References
Hierarchical	Core view on institutions	Strong government and enforcement of rules are crucial for development	Cadastral systems are of national importance for tenure security. Only government can create and manage cadastral information	(Forrest, 1999)
	Core view on technology	Technology can only develop right, if the government has a strong role in setting the rules and standards for technology.	Without national rules on spatial data quality in terms of data acquisition, processing and sharing, the use of spatial data will be a mess!	(Forrest, 1999)
	Core view on economics	Government should play a key role in regulating prices and price setting	Crowdsourcing will lead to fraud, erroneous and misleading information, unwise decisions and increased costs.	(Chapman, 2005; Genovese & Roche, 2010)
	Secondary view (how to achieve the core view) on institutions	Governance and development rely on laws and long-term policy plans	The quality of crowdsourced land information is fit for social network applications only	(Chapman, 2005)
	Secondary view on technology	Laws (such as an NSDI law) can guide and steer the technological development.	I do not trust the quality of crowdsourced land information. It lacks metadata.	(Craglia et al., 2008; Janssen & Dumortier, 2007))
	Secondary view on economics	Government controls the prices of cadastral information through a pricing scheme.	Only government can set and manage the prices for cadastral information products	(Georgiadou, et al., 2011)
	Policy view (with which practical tools and	Control and regulation relies on a regulatory system of licenses	Volunteers in geographic information are not qualified for cadastral data collection	(Goodchild, 2008; Parker, May, & Mitchell, 2010)

	instruments can one implement the secondary views) on institutions	maintained by the government		
	Policy view on technology	The use of standards is a good way to steer development	Adoption of a new mapping technology in our organisation should only occur when national standards are in place	(Huff & Munro, 1985; Jorgenson & Stiroh, 1999)
	Policy view on economics	The economic value of information products depends on a system of government guarantees	Crowdsourcing provides some great opportunities, however, the its data have little economic value	
Market	Core view on institutions	Free supply and demand create the market for information	Because of competition, the private sector can create much better cadastral information than the government sector	(McDougall, 2009)
	Core view on technology	Technology which most organizations buy and adopt is the best	If crowdsourced land information technology is competitive to other technologies organizations should adopt it	(Adlington, 2011)
	Core view on economics	The market of willing buyer willing seller determines which technology has the highest value	crowdsourcing can create a much more competitive market of quality cadastral information	(McLaren, 2011)
	Secondary view (how to achieve the core view) on institutions	The amount of rules on information production should be as minimal as possible	Governments should ensure that all private sector and citizens can sell cadastral data to each other without too many restrictions	
	Secondary view on technology	The role of the private sector is to advance the technology	All new information technologies and information products derive from the private sector	(Jorgenson & Stiroh, 1999)
	Secondary view on economics	The market should be used to determine the utility of VGI.	Cadastres can only adopt new technological developments (including crowdsourcing) if they have financial autonomy	(Kaufmann & Steudler, 1998)
	Policy view (with which practical tools and instruments can one	All legal data sharing restrictions should be deleted	The market determines which data people use and which data people do not use	(Janssen & Dumortier, 2007)

	implement the secondary views) on institutions			
	Policy view on technology	There should be no restrictions on technological development	As crowdsourcing data collection is cheaper than proprietary software it is a better and more efficient solution for cadastral data collection,	(Adlington, 2011)
	Policy view on economics	All prices for information products are negotiable	Everybody has the right to ask any price for their own information products	
Information commons	Core view on institutions	Freedom of information is the highest goal and people can be self-organizing	Crowdsourcing land information empowers citizens to govern themselves	(Heipke, 2010)
	Core view on technology	Technology and technological development should be open to all citizens	Using voluntary technology will enhance the capacity of ordinary people to use the geographic technology	(Goodchild, 2009)
	Core view on economics	All information should be for free.	Cadastral data should be free. This will stimulate its use.	(Martín-Varés, 2011)
	Secondary view (how to achieve the core view) on institutions	There must be freedom of access laws as a tool to achieve the main goal of information freedom	Everybody should get access to source codes; this will advance the development of technology	(Martín-Varés, 2011)
	Secondary view on technology	Open source technology is a way to implement the freedom of access laws	I prefer open source technology over proprietary technology	(Budhathoki, et al., 2008)
	Secondary view on economics	Laws should enable free access to all data.	Agencies which charge for any of their data should receive financial sanctions.	(Martín-Varés, 2011)
	Policy view (with which practical tools and instruments can one implement the secondary views) on institutions	All agencies should adhere to open source standards.	Incorporating crowdsourced land information would stimulate the security of our IT systems	(Laarakker & deVries, 2011)
	Policy view on technology	Free access to technology will create more sophisticated technology	Incorporating crowdsourced land information will result in a more up-to-date and spatially accurate cadastre	(Ganapati, 2011)

			database	
	Policy view on economics	Free access to technology will create more valuable information	Open street Maps are freely available, and this offer a good alternative for those without money	(Georgiadou, et al., 2011)

2.6. Summary

This chapter explored different scholar's perspectives on the crowdsourced land information and cadastral systems. The chapter has given a historical perspective of mapping technological developments and the development of crowdsourcing. It discussed the elements of crowdsourced land information and cadastral systems. The perspectives discussed earlier have helped in developing and formulation of Q statements which will be sorted out by the Q participants in the Netherlands cadastral offices.

3. CHAPTER THREE: METHODOLOGY AND RESEARCH DESIGN

3.1. Introduction

As outlined in Chapter 1, this research is based on the single case study analysis. It utilises the method known as Q methodology to answer the research questions and to assess how Netherlands Kadaster officials' view crowdsourced land Information within land administration organizations(Brown, Durning, & Selden, 1993; Webler, Danielson, & Tuler, 2009). This method is designed to elicit participants' ways of thinking about a topic. It resembles in many ways the other public administration research methods. It is in particularly useful when different viewpoints exist, yet when the policy outcomes of these viewpoints are unknown. It relies on Q statements and Q sorts of Q participants who are also regarded as P sample.

3.1.1. Data source matrix

The table 2 below shows different methodologies of data collection techniques and data sources to answer the research questions. It further shows the expected output of each research question with the method used.

Table 2: Data Source Matrix

part	Research Question	Methodology	Data collection Technique	Data Sources	Expected Output
1.	What is the contemporary definition of VGI?	Concourse Analysis (as part of Q methodology) /Literature review	Selecting relevant books, chapters, articles from political sciences; selection through using Web of sciences, ScienceDirect,	Web of science; science direct; PA journals; conferences proceedings from journal, European Group for Public Administration (EGPA) conferences	Classification
2.	How are views about VGI perceived by public officials from Dutch cadastral organizations?	Q methodology	Q sorts	Staffs of the case study area (Netherlands Cadastre)	Q statements
3.	Which views of the public officials have strong influence on cadastral systems?	Case study analysis	surveys with closed-ended questions/Face-to-face interviews and questionnaire and reading relevant literatures	Staffs of the case study area (Netherlands Cadastre)	Q statements showing elements of crowdsourcing according to criteria important to participants (or mean values)

4.	Do professional backgrounds of cadastral officials influence their viewpoints about crowdsourcing in Netherlands cadastre organizations?	Case study analysis	surveys with closed-ended questions/Face-to-face interviews and questionnaire and reading relevant literatures	case study area (Netherlands cadastre) and Web of science; science direct; PA journals; conferences proceedings from journal, European Group for Public Administration (EGPA) conferences,	Q statements showing elements of crowdsourcing according to criteria important to participants (or mean values

The 1st part of the Table 1 above is to establish different viewpoints. Formulation of Q statements from literature reviews together (See Chapter 2, Table 1) with discussion with experts in the field of Land administration.

The second part to the fourth part of the Table 1 is carried out by the Q sorting of the participants ranking the Q statements to answer the relevant research questions.

The Q methodology is used for its widely acceptance as a scientific method to collect and analyse people's subjectivity, and policy views points (Brown, 1996; Webler, et al., 2009). It is in particular useful when different viewpoints exist, yet when the policy outcomes of these viewpoints are unknown. It relies on Q statements and Q sorts of Q participants who are also regarded as P sample. The selection of participants is designed to make sure that the full range of opinions and positions are represented(Brown, et al., 1993). By clustering Q sorts, it is possible to derive common and diverging views of Q participants (Webler, et al., 2009). In this case the Netherlands cadastre Officials is treated as key Q participants. The number of participants was determined by the number of different views this research is going to research. The Q statements were derived from a comprehensive literature study. In the analysis of survey data, statistics are used to find patterns of responses across respondents(Webler, et al., 2009). According to (Steelman & Maguire, 1998) Q-methodology can (1) identify important internal and external constituencies; (2) define participant viewpoints and perceptions; (3) provide sharper insight into participant preferred management directions; (4) identify criteria that are important to participants, (5) explicitly outline areas of consensus and conflict; and (6) develop a common view toward the policy. The methodology encompasses a broader philosophy of how subjectivity can best be studied.

3.1.2. Justification and analysis:

Upon completion of the Q sorts, the researcher will analyse the completed Q sorts. The statistical analysis will be carried out by correlating the Q sorts, followed by factor analysis of the correlation matrix and factor rotation. It will take into account a distinct feature of the Q sort data using the PQ method software, which is statistical software tailored to the requirements of Q Methodology. Specifically, it allows to easily entering data (Q-Sorts) the way they are collected, i.e. as 'piles' of statement numbers. By clustering the results, it is possible to derive the primary factors affecting future policies, or in this research, future organizational strategies with regards to VGI. Subjectivity, or an individual's personal point of view, is often thought to be difficult, if not impossible, to study with any degree of precision (Steelman & Maguire, 1998). Also (Brown, et al., 1993)state that the Q methodology can be used to explore a phenomenon of interest to gain insight into it and to generate and test hypotheses.

3.2. Formulation of Q statements

To begin the Q method the researcher collected diverse suits of statements from literature materials, then modified and creates a Q sample. The Q methodology has two ways in deriving to the Q statements. One is through the collection of divers suit of statements about the topic of interest from the participants and those of similar background(Brown, et al., 1993; Webler, et al., 2009) and the latter is to derive the statements through comprehensive literature study (Neff, 2011). In conducting this study the researcher collected statements through comprehensive literature study which was due to time constraints and availability of resources.

3.3. Selection of Q sample/participants

The next stage is administering the Q survey to participants. The most important criterion in Q participant selection is that all type of views is covered, because the Q method is designed to identify and characterise ways of thinking and not to have representative of the population, it is in particular useful when different viewpoints exist. Staffs from different departments of cadastre offices Zwolle and Apeldoorn have been selected to participate in the interview. A minimum number of 10 participants from each cadastre office are required. Each section/department has provided one or two participants to participate in the interview. Each participant will take approximately 25 minutes to complete the Q-sorting.

With the aid of the representative of Netherlands(Dutch Kadastre), the selection criteria has based upon those likely to know about VGI and have a view about how it fits the organization such as managers from mapping department (at least 2); IT people from mapping department (at least 2) Likely to know about crowdsourcing, but maybe do not have a view about how it fits in the organization - operational staff from mapping department (at least 2) Likely not to know about crowdsourcing, but have a strategic view about the Cadastre (as organization) - (strategic) managers of Cadastre (at least 2 - one from Apeldoorn; 1 from Zwolle) Likely not to know about crowdsourcing, and likely not to have a strategic view about Cadastre (as organization) operational staff from Cadastre (at least 2).

3.4. Q sorting/ranking

A sort is the result of selected persons to place the statements written in separate print cards in rank order of "most agree" to "most disagree" (Beginning with -3 and end with +3 with 0 as midpoint) as elaborated by (Brown, et al., 1993; Neff, 2011). The number allowed in each category is as follows: 2, 3, 5, 7, 5, 3, and 2(sum is 27).

Following the ranking exercise the researcher has first conducted interview testing on the representative of the Netherlands cadastre taking notes in order to uncover his reasoning. This will help the researcher to modify and amend the sample statements. Then, the researcher will conduct a one on one interview with the selected officials of Netherlands cadastre for 25 minutes and taking notes while recording and later transcribed to further uncover individual ways of reasoning.

The Ranking test that was carried out prior data collections as Figure 3 & Figure 4 below shows. Figure 3 shows the rankings of statements on the table in skewedness from most disagree to most agree, While Figure 4 shows the numbered rankings after the interviewee's sorted the statements.

Figure 3: Picture showing the Q sort test

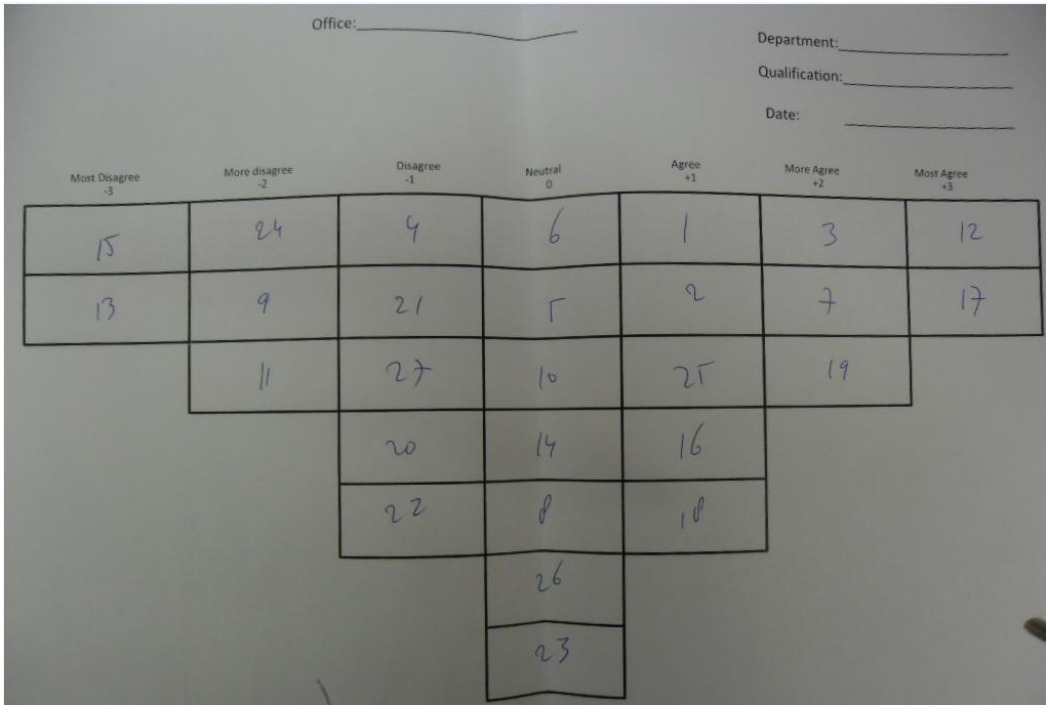

Figure 4: Picture showing the numbering of the Q-sorts

3.5. Summary

The methodology used in the case study area to reveal the views of the cadastre officials on crowdsourced land information within land administration organizations. The methodology is on a single case study and the Q methodology has been explored to answer the research questions. The different stages of using the method have been explained in details. The creation of the Q statements, selection of participants, testing of the Q statements, data collection and analysis such as sorting methods and the use of PQ method.

4. CHAPTER FOUR: DESCRIPTION AND SUMMARY OF DATA COLLECTION RESULTS AND ANALYSIS

4.1. Introduction

This chapter addresses the core research question and the subsequent research questions which stipulate how views about crowdsourcing are perceived by the Netherlands cadastre officials. The chapter also addresses which of the views have strong influence on the cadastral systems and the reason behind as well as whether professional background experience of cadastral officials influence their view points about crowdsourcing.

4.2. Summary of data collection results

The data was collected in two offices of the Netherlands cadastre, one in Apeldoorn and the other in Zwolle. To identify the prevailing views on crowdsourcing, the Q method was employed to sort/rank statements closely to participants own reasoning. For all statements, a seven-point (-3- most disagree, 3 - most agree) was used to rank. The scores were interpreted as follows: -3 are the lowest possible score, which represents a very strong negative view, while the 3 is the highest possible score which represents a very strong positive view refer to Table 4 which shows the factor loadings of statements and their rankings. All responses which are negative are on the disapproval of the statement at hand. The responses which are positive indicate favour on the statement. And the responses which are zero indicate neutral approach to the statement.

Participants were also interviewed alongside to seek clarification to their responses on their views on the statements. A total of 16 cadastral officials (Apeldoorn=11, Zwolle=5) provided their views on crowdsourcing. The 16 officials came from 4 different divisions of the Netherlands Kadastre offices. Data collection lasted between 25 minutes and 50 minutes. Interviews were recorded and later transcribed. Table 3 below gives a general overview of the participants who responded to the statements and were interviewed. The names which are used in this paper are fictitious names assigned to protect anonymity.

Table 3: Participants in different categories in the Netherlands Cadastre

Names	Division	No of participants	percentage4
Baas Pieters Simon Torn	Managers from mapping and IT	4	25.0
Rob Erik Bart	Operational staff in Mapping	3	18.75
Jan Teun Chris Bjorn	Strategic and Policy	4	25.0
Petra Susan	General operational Staffs	5	31.25

Laura Mike Dennis			

To analyse the Q sorts, and extract the underlying Q sorts, the PQ Method software package was used. The resultant factor analysis was rotated to a 'simple structure' (using varimax rotation) to extract eight factors. The significance of a factor was determined statistically by employing the eigenvalue criterion. By convention, factors with eigenvalues greater than 1.00 were considered significant except for factor five which did not have any statements. Table 4 shows the Q statements and their factor ranking. For example, the first extracted factor (marked '1') has statement 2 registered as -2 (i.e. more disagree), while the second extracted factor (marked '2') has statement 2 registered as -3 (strongly disagree), etc. This means these factors do not agree to free access to all data (including crowdsourcing data); indicating that there should be a fee on accessibility of information or any data.

Table 4: Q Sort statements and their factor rankings

		Factor ranking			
No	**Statements**	**1**	**2**	**3**	**4**
1	the market should be used to determine the utility of VGI	0	0	-1	0
2	laws should enable free access to all data	-2	-3	-1	1
3	free access to technology will create more valuable information	1	1	0	-2
4	control and regulations relies on a regulatory system of licenses maintained by the government	-1	0	-2	0
5	all prices for information products should be negotiable	-2	-2	-2	2
6	technology can develop right if the government has strong role in setting the rules and standards for technology	0	0	1	0
7	there must be a freedom of access to laws as a tool to achieve the main goal of information freedom	2	0	0	0
8	the amount of rules on information production should be as minimal as possible	1	3	-3	-1
9	free access to technology will create more sophisticated technology	3	2	0	-3
10	governance and development rely on laws and long-term policy plans	1	-3	2	-1
11	technology which most organizations adopt is the best	-2	-1	-3	0
12	technology and its development should be open to all citizen	3	1	0	1
13	economic value of information products depends on a system of government guarantees	0	1	2	-1
14	open source technology is a way to implement the freedom of access laws	0	-1	-1	-2
15	all legal data sharing restrictions should be deleted	-3	-2	-2	3
16	government should have control on prices of cadastral information through a pricing scheme	-1	-1	0	0
17	freedom of information is the highest goal and people can be self-organizing	0	-1	3	-3
18	market of willing buyer willing seller determines which technology has the highest value	-1	0	0	-2
19	laws can guide and steer the technological development	0	1	1	-1
20	all agencies should adhere to open source standards	-1	0	-1	1
21	there should be no restrictions on technological development	2	-1	-1	2

22	free supply and demand create the market for information	1	2	1	-1
23	all information should be for free	-3	-2	3	3
24	strong government and enforcement of rules are crucial for development	-1	3	2	2
25	the use of standards is a good way to steer development	1	1	1	1
26	the role of private sector is to advance the technology	0	2	0	0
27	government should pay a key role in regulating prices and price setting	1	0	1	1

Table 5 provides the factor scores for each of the 16 individuals and Table 6 the various statements that were identified in each factor.

Table 5: Reordered factor matrix

Participant			**Factors**			
Name	**Division**	**Role**	**1**	**2**	**3**	**4**
Factor 1						
Pieters	Managers from mapping and IT	Manager GEO- ICT	0.66X	0.19	-0.08	-0.12
Chris	Strategic and Policy	Advisor	0.78X	0.23	0.14	0.09
Bjorn	Strategic and Policy	Consultant	0.84X	0.13	0.01	-0.04
Factor 2						
Simon	Managers from mapping and IT	Director	0.01	0.73X	0.48	0.14
Susan	General operational Staffs	Human Resource Manager	0.04	0.72X	-0.21	-0.46
Mike	General operational Staffs	Advisor	0.23	0.88X	-0.02	0.09
Factor 3						
Torn	Managers from mapping and IT	Head of Geo-Information	0.04	-0.02	0.83X	-0.20
Factor 4						
Dennis	General operational Staffs	Customisation Manager	0.08	0.03	-0.13	0.88X
Laura	General operational Staffs	Human Resource Advisor	0.26	0.14	0.10	-0.56X

* Factor Matrix with an X Indicating a Defining Sort

To identify the views of the cadastral officials, responses of 18 out of the 27 statements were selected as high loadings on the extracted factors after an exploratory factor analysis. Table 6 shows the factors with their respective items ranked under them; and also the category of the views:

Table 6: Factor loadings of participants and view categories

Factors		**Statements**	**RNK**	**Score**	**View category**
1	7	There must be a freedom of access to laws as a tool to achieve the main goal of information freedom	2	1.390	institution
	9	free access to technology will create more sophisticated technology	3	1.416	technology

	12	technology and its development should be open to all citizen	3	2.124	technology
	17	freedom of information is the highest goal and people can be self-organizing	0	0.406	institution
	15	all legal data sharing restrictions should be deleted	-3	-1.660	institution
	21	there should be no restrictions on technological development	2	1.243	technology
	23	all information should be for free	-3	-1.989	economics
	24	strong government and enforcement of rules are crucial for development	-1	-0.708	institution
2	2.	laws should enable free access to all data	-3	-1.827	economics
	8	the amount of rules on information production should be as minimal as possible	3	1.831	institution
	10	governance and development rely on laws and long-term policy plans	-3	-1.526	institution
	23	all information should be for free	-2	-1.173	economics
	24	strong government and enforcement of rules are crucial for development	3	1.983	institution
	26	the role of private sector is to advance the technology	2	1.121	technology
3	8	the amount of rules on information production should be as minimal as possible	-3	-1.828	institution
	11	technology which most organizations adopt is the best	-3	-1.828	institution
	17	freedom of information is the highest goal and people can be self-organizing	3	1.828	institution
	23	all information should be for free	3	1.828	economics
4	5	all prices for information products should be negotiable	2	1.219	economics
	6	technology can develop right if the government has strong role in setting the rules and standards for technology	0	0.000	technology
	9	free access to technology will create more sophisticated technology	-3	-1.828	technology
	14	open source technology is a way to implement the freedom of access laws	-2	-1.828	technology
	17	freedom of information is the highest goal and people can be self-organizing	-3	-1.828	institution
	20	all agencies should adhere to open source standards	1	0.609	institutions
	23	all information should be for free	3	1.828	economics
	27	government should pay a key role in regulating prices and price setting	1	0.609	economics

Economic view is related to marketing economies and finance; technology view involves innovations, development training and implementations of new technologies and institution view includes government's national rules, standards, policies and regulations. Figure 5 below shows a distribution of the cadastral view type as were perceived by the participants of the study. It also shows that the institution view was the most ranked compared to the other. This seems to suggest that views of the cadastre officers that mattered most to crowdsourcing had to do with structures or mechanism of social order and cooperation governing the behaviour of crowdsourcing community.

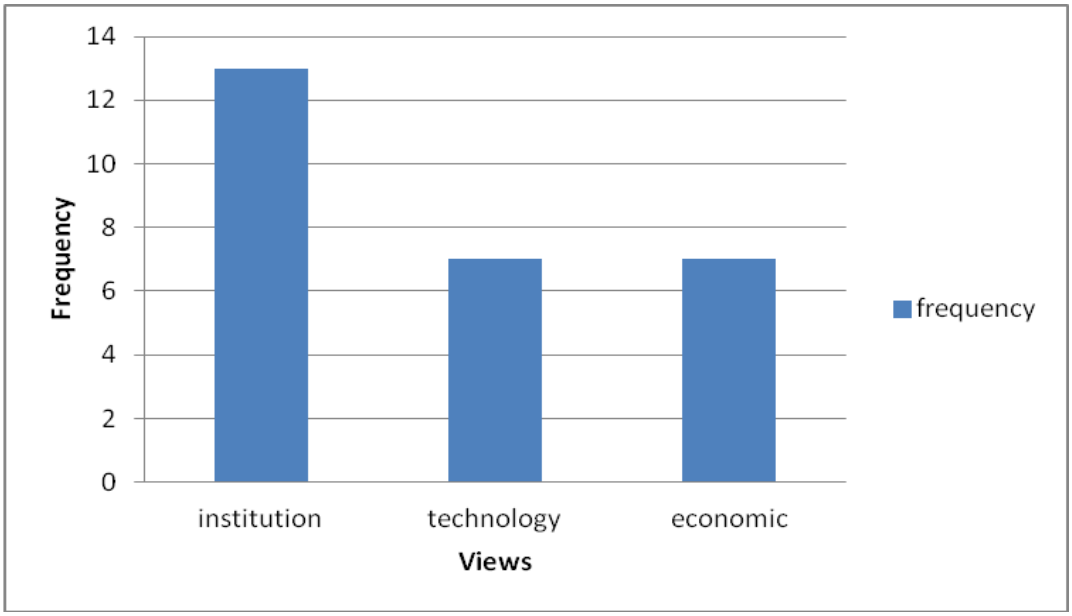

Figure 5: Distribution of view type by the respondents

4.3. Distinguishing statements per factor for the 4 categories of Netherlands cadastre officials

The four factors extracted from the study, as interpreted from the statistical analysis, are discussed in this section. In discussing these factors, interview data from the participants were also useful. Interviews of participants who loaded highly on a factor were revisited to help assign meaning to the factor analysis results. Based on Table 6, items in factor 1 reflected *Technocratic views*; factor 2, *Policy and Political views*; factor 3, *Anti Social support views* and factor 4, *Anti-technologism, information flow views*.

4.3.1. Factor 1: Technocratic Views

This factor emphasizes on technological development of crowdsourcing, that technology and its development should be open without any restrictions to promote the use and up-date of cadastre data to all. To achieve this, institutional frameworks should be in place to give access to laws as a tool for information freedom while market conditions should be regulated to control the information which people access and use. The following statements were found to be particularly important on the agreement side 7, 9, 12, 21; while on disagreement, statements no. 15 and 23 were important. Interview responses confirmed results from this analysis. The participants argued that it is good to have laws which allow flow of information. They also argued that for citizens to get access to technology, open source is of importance. Particularly Chris (an advisor from the strategic and policy division) indicated that, "Information is produced with cost which someone has to pay for and that not all information should be provided for free". Bjorn (from strategic and policy division) also reiterated that, "Though more information is currently provided for free, there are still some information that cannot be accessed for free". They all agree that it is not good for the business if all information is provided for free.

A case in point was with regards to statement No. 15 *"all legal data sharing restrictions should be deleted*" in which all the staff had exceptionally strong negative views. They do not agree on deleting all data sharing because of privacy of information such as personal information which is secrete and should be protected by law. Figure 6 shows a distribution of participant's responses on the statement. This has implications on views on privacy of information; that some information and data should be made secret and protected.

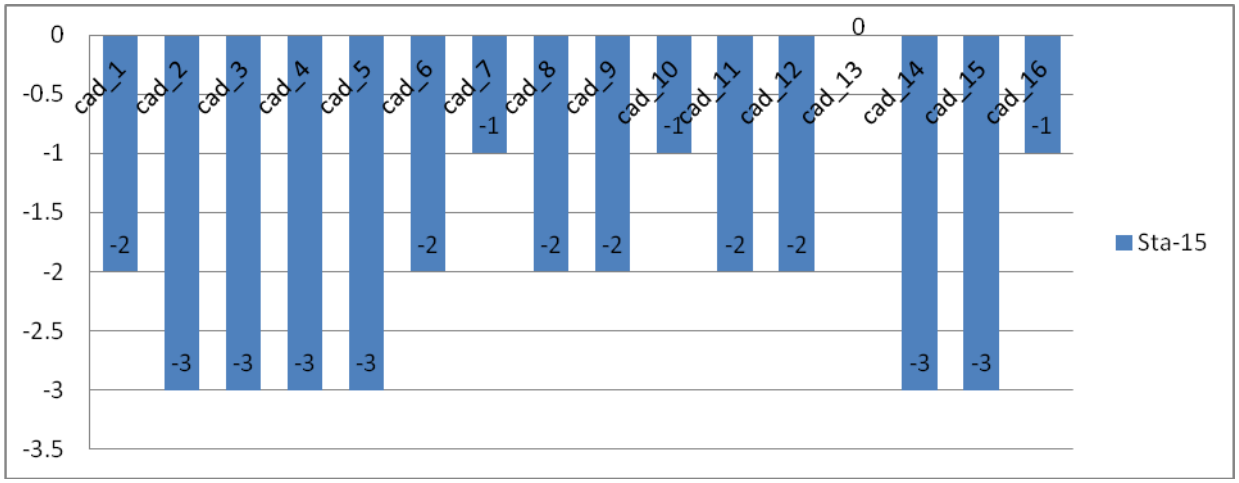

Figure 6: Ranking of statement No. 15

It appears most people had negative views on statement 15 due to various reasons. Whiles some people focussed on market reasons, others were concerned on privacy. For instance Pieter a staff from the management of mapping and IT division indicated during the interview that "There should be limitations of use of certain data as it affects some individuals; authorisation of certain data is crucial."

4.3.2. Factor 2: Policy and political views

This factor describes policy and political settings for regulating information. It stresses on restrictions of free flow of data. The participants of this group believe that all land information and crowdsourcing activities should be controlled by government. They see big business in production and selling of information and that free access of data has economic impact on their organisations and could lead in losing their businesses. The statements most influential for this factor are: 8, 24, 26 on agreement, while on disagreement statements 2, 10, 23 are particularly important. These views were also supported by participants during the interview. Their responses indicate that there should be minimal rules on information technology. They argued that rules are important though many rules are not good for information production to support technological development, the government should therefore enforce rules to achieve control over information dissemination. Mike said "government is important driver to support private sector for innovation of technology, it is important to have government rules and legislations at hand to make possible for the innovations, the few rules that are set by the government can help promote technological development". He further said "though the private sector has a role to make advancement in technology, the public should help in the innovation of technology". Thus partipants believed that there should be information pricing on land data which is against crowdsourcing information. This was reiterated by Susan who said, "There is nothing for free because free does not exist; information has a cost in its production". She also said "Not all information can be provided for free and that personal information cannot be accessible with everyone; it is secret".

4.3.3. Factor 3: Anti-Social support

For factor 3, the most important statements are: agreement, 17, 23; disagreement, 8, 11. This factor stresses that crowdsource data is meant for social networks only; and it should not be incorporated with cadastral data because they don't trust the quality of crowdsourced data and to facilitate that, the cadastral data should be made for free. While the view supports the use of technology, they emphasize that the government does not always use/adopt the best technology. Torn said, "the technology that government adopt might be the cheapest and after sometime it is no longer suitable for use and needs to be changed". It appears this is always the case when new technological advancement has occurred. The old technology deemed no longer fit. Torn added that, "Information provided by the government is the best as the quality

of it is assured, so it should be provided for free to the citizens to use". Thus the views support that information should not be for sale, this will facilitate the society to use government information rather than the crowdsourced data which quality is not assured.

4.3.4. Factor 4: Anti-technologism, information freedom

The following statements were considered to be particularly important: agreement, 5, 23; disagreement, 9, 14 17. This factor combines some economic and technological views. This factor stressed negatively on views about open sources of technology as a way to implement freedom of access laws but support freedom of information as the highest goal for people to govern themselves. The group also support positive economic views on information in the market settings. Views in this factor were also confirmed by some interview data. The participants in the interview believed that people can be self organised if they have the right information, and they can do things better. Denis explained during his interview that "it is not clever to have free access to technology, it is naive to do so; it is not clever to let everything be open," The group also believe that is not good to set prices, the market should set prices for products. The views support the idea that for some essential information, the government should set prices for them to be accessible to all citizens.

4.4. Differences among factors based on professional experiences of cadastral staff

In this section further analysis beyond the ranking of Netherlands cadastre views on crowdsourced land information was conducted. A more in-depth quantitative descriptive was done to determine which of the four factors (Technocratic views, Policy and Political views, Ant-Social support and Anti-technologism, information freedom) have strong influence on cadastral systems and to explore whether professional backgrounds of the cadastral officials influence their viewpoints about crowdsourcing. For all four factors the sums of the factor scores (generated from the Q methodology) of cadastral participants belonging to the same division (or having the same professional background) was first found and the average determined. Table 7 shows the scores for the four factors based on professional backgrounds of the Netherlands cadastral officials.

Table 7:Differences among factors based on professional experiences of cadastral staff

	Managers from Mapping and IT (MIT)	**Operational Staff in Mapping (OSM)**	**Policy and Strategic Managers (SPS)**	**General Operational Staff (GOS)**	**All Staff**
Factors	Score[a]	Score[a]	Score[a]	Score[a]	Score[a]
Technocratic	0.35	0.16	0.53	0.15	0.30
Policy & Political	0.15	0.04	0.12	0.44	0.19
Anti-Social support	0.31	0.06	0.11	-0.03	0.11
Anti-technologism, information freedom	0.03	0.08	0.03	-0.02	0.03

[a] Scores are based on the average factor score of cadastral respondents within each professional division

Figure 7 gives a pictorial representation of the various views as were perceived by the Dutch cadastral officials.

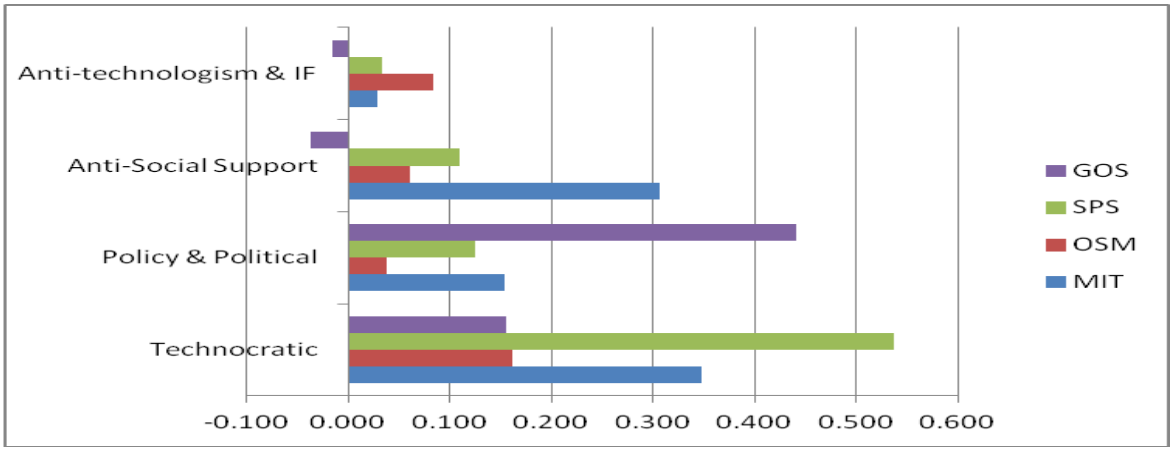

Figure 7: Netherlands Cadastral official views based on professional background experience

Table 7 shows that overall, the technocratic view (score=0.30) was the highest followed by views on policy & political and anti-social support respectively. The relative high score on technocratic views of the cadastral officers indicate that they support technological development without government interference. This was particularly the case for strategic and policy staffs (these are people who are not likely to know about crowdsourced land information, but have strong background on government strategies and policy implementation in their organizations) and somehow supported by staff from management and IT division. These participants were flagged with relatively high score loadings with respect to this factor (see Table 5 and also section 4.3.1).

Regarding policy and political view (score=0.19), the general operational staff (GOS) might have influenced the overall mean view score of this factor (See figure 7, section 4.3.2 and table 7). These staff had strong belief on government rules, regulations and control of all land information activities. These are people who are likely not to know about crowd sourcing and how it fits the organization. Their fear is that, uncontrolled market of information will lead to public organizations (such as cadastre) to lose their business.

The staff from management of mapping and IT division (people likely to know crowdsourcing but may not know how it fits the organization) unlike general operational staff had strong views on anti-social support; they are of the view that the quality of crowdsourced data cannot be assured and that should be used for social networks. This means spatial information should be provided by the government for free to support citizens who seek land information. Though they believe in free flow of information by government (as IT managers, information flow might have been important endeavours in their professions and might have informed their decisions), they indicate that the government should be flexible in adopting new technologies as a way to achieve the goal of providing free spatial data.

The Anti-technologism, information freedom factor was least supported by the cadastral officials (see Figure 7). It had opposing views by General Operational Staff, however was supported most by operational staff in mapping (OSM) division who have strategic view about cadastre organizations. Table 7 shows that the views on this factor were least supported because the average factor score close to the zero (0).

4.5. Summary

The analysis was conducted using the PQ Methodology software. The analysis came up with four factors of the cadastre officials. The factors were technocratic, policy and political, anti-social support and anti-

technologism, information flow views. The results showed that technocratic was perceived as most influential over cadastre activities. The result also confirmed that difference existed between the views of the cadastre officials. These differences could be attributed by the professional background experiences of the officials in the study.

5. CHAPTER FIVE: ANALYSIS OF BELIEF SYSTEMS ON CROWDSOURCING

5.1. Introduction

This chapter revisits each of the research questions. It uses the results to help answer the research questions. It is aimed at reporting the views that Netherlands cadastral staff members hold about crowdsourcing, and how these views could potentially influence future organizational strategies of these cadastre offices as were analysed in the previous chapter.

5.2. The contemporary definition of crowdsourcing

A critical factor of the evaluation posed a question of what crowdsourced land information stands for. (Goodchild, 2007, 2009) have given a clear definition which is used across the theme of Volunteered geographic information and crowdsourcing. The definition lies in the realm of using the web map technology to disseminate geographic information provided voluntarily by untrained citizens compared to the traditional mapping systems carried by the professional in cartography. (Heipke, 2010) did not diverge much from the definition provided by (Goodchild, 2007) by defining that crowdsourcing is about people using and creating their own maps, sharing location information with friends and visitors through the knowledge they have of place with the use of open source maps API and affordable navigation devices. In general crowdsourced land information is the use of open source technology which allow users (volunteers) through the Application programming interface (API) and affordable navigation devices to disseminate land information through World Web Wide (www) which can be uploaded, edited, manipulated by other users. The crowdsourced land information has fundamentally enhanced geographic data, created a great impact on GIS, and yet prompted concerns in regards to its quality, reliability, and overall value (Flanagin & Metzger, 2008), such kind of concerns has brought up this research on the views of cadastral official on crowdsourcing.

5.3. The views about crowdsourcing as perceived by public officials from Netherlands cadastre organizations

In the study, the Netherlands Cadastral viewpoints about crowdsourcing were categorized into four factors Technocratic, Policy and Political, Anti social support and Anti technologism, information flow views (see **Table 1Table 6**). The technocratic view factor emphasizes on technological development of crowdsourcing; in that the view support the idea that technology and its development should be open to update cadastre data for all; however government institutions should not be made to restrict crowdsourcing activities. Rather such institutional frameworks should be in place to give access to laws as a tool for information freedom while market conditions should be controlled.

Thus although the view is in support of more information flow, there are still some reservations in absolute access of free flow of information. For instance the participants had exceptional strong negative views on the statement No. 15 *"all legal data sharing restrictions should be deleted*". Apparently they do not agree on deleting all data sharing because of privacy of information such as personal information which is secrete and should be protected by law. This was reiterated by some participants explaining that some restrictions were quite necessary for privacy and security reasons, just in line with the Netherlands privacy laws; and adding that allowing everything to happen without control will jeopardise the security of a country or its people. This brings the privacy issues of a concern in the information technology where

people can access unprecedented amount of information from social feeds. The privacy issues have raised concern previously on the Netherlands and a law was enacted to protect personal privacy.

The Policy and political view of the cadastral officials stresses on the active participation of the government and enforcement of policies to regulate activities of crowdsourcing. These factor stresses on strong belief of government rules, regulations and control of all land information activities and supports restrictions of free flow of data. The view supports the notion that free access of data has economic impact on cadastral organisations and could lead in losing businesses.

Views on Anti-social support is in favour of the notion that crowdsourced data could be useful for social networks only; and does not support that such data be used with cadastral data because the quality of the data is not guaranteed. It supports the notion that spatial information should be provided by the government for free to support citizens who seek land information. This can only be achieved if government adopt flexible and new technologies.

The Anti-technologism, information freedom factor was least supported by the cadastral officials (see Figure 7).This factor combines some economic and technological views. This factor stressed negatively on views about open sources of technology as a way to implement freedom of access laws.It explains that people can be self organised if they have the right information, and they can do things better. The views however cautions excessive freedom of information and support the idea that for some essential information, the government should set prices for them to be accessible to all citizens.

5.4. Which views of the public officials have strong influence on cadastral systems? (Why?)

The views of the public officials that seem to have the strongest influence on cadastral systems was the technocratic view. Cadastral officials might have ranked this view relatively higher than others because of the different dimensions it covers. The view spans from technological development of crowdsourcing, that including government involvement; yet with without strict restrictions and views on regulated market conditions. Unlike other views, it appears this factor provides a wide scope given cadastral officers opportunity to address different concerns of crowdsourcing activities.

5.5. Do professional backgrounds of cadastral officials influence their viewpoints about crowdsourcing in the Netherland cadastral organizations?

A major aspect of the study was also to explore whether professional background of cadastral officials had significant influence on their viewpoints about crowdsourced land information in the Netherlands cadastre organizations. As was observed (see figure 7), the study provided enough evidence to show that views of crowdsourcing differ among cadastral officials based on their professional experience or background. For instance strategic and policy staffs had strong positive views on technocratic factor indicating technological development of crowdsourcing with limited government involvement. This also seems to be the case for staff from the management of mapping and IT division, however was not the case for operation staff in mapping and general operation staffs. Similarly the general operational staffs seem to hold very positive views in favour of active participation of the government and enforcement of policies to regulate activities of crowdsourcing. For example government should have control on the market, technology and its development. In the same way, the analysis showed that staff from the management of mapping and IT division had strong views on anti-social support factor whiles operational staff in mapping supported anti-technologism, information flow compared to staff from other divisions.

5.6. Crowdsourced information: threat or opportunity?

Following from the above discussion, we can now answer the hypothesis that states, *"Crowdsourcing is viewed as a threat by public cadastral organizations and their staff"* For the professional who believed that some data are produced with cost, it appears that free access to data have economic impact on their organizations and could promote losing businesses. Thus they believe that free crowdsourced data have serious implications on cadastral organizations business. This is an indication that the cadastral organizations are sensitive to the pricing and marketing of their product; and that if market conditions are not regulated there will be strong implications on the future and existence of cadastral organizations. This study therefore supports the contention that crowdsourcing is viewed as a threat by public cadastral organizations.

5.7. Summary

This chapter has addressed the questions that were raised in the study. Specifically issues relating to views of Netherlands cadastre officials, the most influential views and whether the professional backgrounds influence viewpoints of cadastre officials have been addressed. The hypothesis regarding views of crowdsourcing by cadastral officials; whether as a threat or not has also been addressed.

6. CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

The study aimed at exploring the views that Netherlands cadastral staff members hold about crowdsourcing, whether the perceived views were influenced by cadastral profession background or experience and to assess how these views could potentially influence future organizational strategies of these cadastre offices. Data was collected from sixteen officials from two offices of the Netherlands cadastral. These officials/staffs were from various sections in the cadastral offices with different professional experiences. They were managers from the mapping and IT division, Operational staff in mapping, strategic and policy staff and general operation staffs. In the context of the study, different people expressed different views about what defines crowdsourcing as perceived by public officials from Netherlands cadastre organizations. In so doing, they drew upon four factors which were revealed through the Q methodology analysis. The factors were technocratic, policy and political, anti-social support and anti-technologism, information flow. Although the technocratic view of the public officials seem to have the strongest influence on the Netherlands cadastral systems, dramatic differences existed among the views (see figure 7). A major reason which explained the different viewpoints about crowdsourced land information was the professional background experiences of cadastral officials. The fact that such differences exist suggest important challenges for cadastral practitioners and policy makers responsible for cadastre activities in the Netherlands and other similar context. Thus although the findings can only be judged in the context of the case studied, it can be applied in many other parts because many concepts addressed in the case were not unique.

6.2. Recommendations

After knowing the views of the Netherlands cadastre officials it is of important to know whether the citizens are also ready to volunteered geographic data to their land organisation as they do to the social networks (Parker, et al., 2010), understanding their willingness to contribute in cadastre offices. In January, 2010 The U.S. Geological Survey (USGS) held a workshop which brought representative from various public and private firms which have engage successfully on the use of volunteers' data collection. The workshop was to gather information on the potential use of volunteered geographic information as part of The National Map to envisage the possibility of crowdsourced land information to integrate with authoritative data.(U. S. Geological Survey, 2011). The workshop focused on the integration of crowdsourced data with authoritative data as a way on the future implementation of crowdsourced data with authoritative datasets.

6.2.1. Policy makers

For decades governments have tried to find solutions to help cadastral agencies to overcome the challenges of cadastre systems by constant land reforms (Steudler, Rajabifard, & Williamson, 2004). The analysis showed different school of thoughts regarding government involvement with crowdsourcing activities. have believe that active involvement of government and enforcement of rules are crucial for development of cadastral activities; and advocate that government intervene to protect the society to decide what is right for the society to use; others caution that too much interference by the government on crowdsourcing activities could hinder creative and innovations of technology which will result in retarding development. It is therefore important that policy makers to come up with useful policies which will enhance activities of cadastral organization to start rethinking of the flexibility of changing technology.

6.2.2. Cadastral practitioners

This study supported the contention that crowdsourcing is viewed as a threat by public cadastral organizations. It is therefore paramount that cadastral organizations place crowdsourcing in the overarching set of future goals of their organisations. The practitioners have to understand the motivation behind crowdsourcing and set their goals accordingly. Furthermore, since the views of cadastral officials differ with professional experiences, it is quite relevant to rely on a systematic and comprehensive method of identifying and classifying views when implementing new strategies in the organisation such as integrating crowdsourced land information with cadastre data; to know which professionals within the organisation will support and those likely not to support and hinder the implementation thereof.

6.2.3. Future research

Future studies can explore on the willingness of volunteers to contribute to the authoritative datasets of cadastre organisations. (Parker, et al., 2010) has explored the motivation for contributing and using volunteered data. (McDougall, 2009)has highlighted a range of both government and private still limit the potential for sharing of spatial information, he further researched on the motivation for sharing data through social networks and the trends in sharing data across open portals. Still there is a gap on the research of how willing are the volunteers on government databases as they are on social networks.

A comparative study can be carried out to study how useful can crowdsourcing help the land information systems of the developing countries where there is lack of land information systems or the systems are not well functioning.

A research on the business model on crowdsourcing for land administration; keeping up dating the cadastre systems can be a novel contribution to the land administration domain.

6.3. Limitations and pitfalls

During the research a number of limitations has emerged which could one way or the other hinder the output of this research

6.3.1.1. The study

It was limited to one case study due to the time constraint. This brings about discrepancy of views from other land organisations which are located in different areas with different circumstances. Example the Spanish cadastre systems (Martín-Varés, 2011) allows users to use freely the information from the cadastre to both commercial and non-commercial users. In such they will come up with different views on crowdsourced information. This is also a case to other organisations which have no well-established land information systems example the developing countries. So the information in this research cannot generalise that the situation will be similar in other land related organisations.

6.3.1.2. The Q Methodology

Although the Q methodology provided an advantage of relatively few participants, and Q sorts, which allowed for in-depth analysis of the individual cases generating statistically meaningful results, in terms of the sample size sixteen (16) participants used in the study does not provide enough grounds for generalizing the results of the study.

6.3.1.3. Language barrier

Other limitation or challenge was on the language barrier. Some of the interviewees complained and suggested that they could have responded well if the mode of language was in Dutch. They argued that they could easily express themselves in their local language and better understand or explain their views

clearly when responding to the statements. This brought about silence rankings on the part of participants in elaborating their reasoning behind ranking of the statements while others could not express themselves clearly. For betterments of the outputs from the interviews, they should be carried out on the local language for clear and getting the understanding and opinion of the participants. This could be assisted with the people familiar or know better the language in that particular region.

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