ASSESSING THE MOTIVATION TO SUBMIT VGI:CASE STUDY OF A HUMAN SENSOR WEB IN ZANZIBAR

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February, 2011

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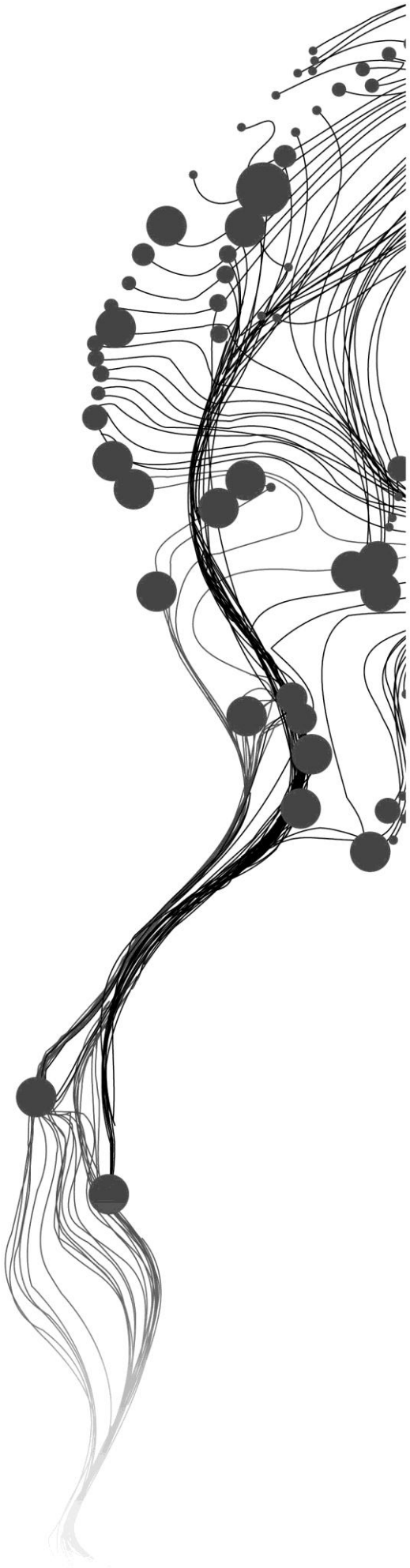

ASSESSING THE MOTIVATION TO SUBMIT VGI: CASE STUDY OF HUMAN SENSOR WEB IN ZANZIBAR

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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.
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ABSTRACT

Volunteered Geographic Information (VGI) can be defined as a Web phenomenon wherein users (largely untrained people) can generate content or access information and add records to such databases by completing geographically-referenced forms (Goodchild, 2007a). This definition in line with Maue (2007) where VGI refers to Geographic information which is created in collaborations with users who usually do not have special skills in handling spatial data. Although in certain cases, it is shown that trained professionals also play major role in contribution of VGI (Budhathoki, et al., 2010; Haklay & Weber, 2008). Furthermore, Tulloch (2008) strengthens the definition of VGI into the type of data and the function of the application which people, either individually or collectively, use to voluntarily collect, organize and/or disseminate geographic information in such manner that the information can be used by many others. The phenomena also shows that the potential use of VGI can be scalable into many forms.

This research tries to determine the motivational factor that governs people's participation in grievance reporting system. The Human sensor web project on Zanzibar is taken as a use case to illustrate this. Human sensor web is facilitated-VGI, which was set up for testing innovations in water and sanitation monitoring and seeking to put in place powerful and effective monitoring systems on a global scale. The vision is not only to provide tools which service providers can use to better manage services, but also to create a platform, in the public domain, by which citizens can access meaningful information on service provision and so enter into dialogue with service providers on their improvement (h2.0, 2011). As there are accessibility problems with safe drinking water on Zanzibar (Shah, 2003; Yussuf, 2010), the expectation is that people would be motivated to report by using Human sensor web reporting system. In practice however, within the testing environment of human sensor web, there are less reports made in HSW than expected(h2.0, 2011).

The results show that potentially the system of HSW project can satisfy the need of local people in complaining, helping, curiosity and fun. But reality shows that not many people are participating. This is caused by certain barriers that prevent people from participating in HSW. These barriers are the existing complaint system, existing in organization to solve water problems, imperfect procedures, accessibility problems, and the socialization barrier. To make local people participate some barrier should be removed such as better socialization and improved procedures.

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1. INTRODUCTION

1.1. Background

1.1.1. Volunteered Geographic Information (VGI)

In the past, most maps were being produced by definite company such as government organization or private company. But since the era web 2.0 many people start to produce their own information. Then the information advanced into geographic information, where the information is not only mere textual but also there is position in it. The phenomena become bigger in results when many people want to share their information about the place and produce a map of their own such as Openstreetmap.

Volunteered Geographic Information (VGI) can be defined as a Web phenomenon wherein users (largely by untrained people) can generate content or access information and add records to such databases by completing geographically-referenced forms (Goodchild, 2007a). This definition in line with Maue (2007) where VGI refers to Geographic information which is created in collaborations with users who usually do not have special skills in handling spatial data. Although certain study case in Opensteetmap VGI, shows trained people or organization (professionals) also play major role in contribution in that VGI (Budhathoki, et al., 2010; Haklay & Weber, 2008). Furthermore, Tulloch (2008) strengthen definition of VGI into type of data and the function of the application which people, either individually or collectively, voluntarily collect, organize and/or disseminate geographic information and data in such manner that the information can be used by many others.

According to definition of VGI above, it mentions about user that can generate data or information. Indeed talking about user, potentially there are over 6 billion persons in this world that can act as a sensor (Goodchild, 2007a, 2007b). Some of the VGI already has successes in gathering many information from contributors, such as, Google mash up, Openstreetmap, Flickr, Wikimapia, Panoramio, Tomtom mapshare (David J. Coleman, Georgidaou, & Labonte, 2009; David J Coleman, Sabone, & Nkhwanana, 2010; Flanagin & Metzger, 2008). And others try to expand the phenomena into more specific use such as VGI for disaster report, emergency report, testimony and many more. Hence, According to VGI website alone there are already hundreds of VGI which is functioning in the internet and many more VGI website specific to citizen science ("VGI inventory statistics," 2011). The phenomena also shows that the potential use of VGI can be scalable into many forms.

Indeed, geographic information is the main information, but technically, the contributor may not or does not have to realize that they send geographic information, because the system can re-code the textual information that they send into geographic information. Many people build their own VGI and put their own geographic information (e.g. Google map mash up). Whereas some do not build on their own but only contribute to the VGI (e.g. http://www.openstreetmap.org, http://www.oilspill.labucketbrigade.org). Seeger (2008) coined the terminology facilitated-VGI (f-VGI) to refer to the VGI which has already been built to send information based on pre-defined criteria and VGI refers to the one developed based on his/her own information.

Openstreetmap and Oilspill are example of an f-VGI. Openstreetmap has a purpose in creating and providing free geographic data where most maps considered "free" actually have legal or technical restrictions on their use. The website has a system that allows people to edit the map of the whole world freely. This website allows us to view, edit and use geographical data in a collaborative way from anywhere

by using the internet. By 2010, its contributor almost reached 200 thousand (Budhathoki, 2010). Oilspill was built for the citizens of the Gulf Coast to send the testimony from the people about oil spill and visualize it transparently on the web. To send the information, this web site is not only using internet connections (through http://www.oilspill.labucketbrigade.org, Twitter, e-mail) but also utilize other means such as SMS. In the first year (2005), until 2010, this website can gather thousands of participants ("Oil Spill Crisis Map," 2010).

1.1.2. Type of VGI

As mentioned before there are f-VGI and VGI. Other authors also try to distinct in VGI in many ways. Goodchild (2008) differentiates VGI into simple VGI where the information which is gathered not so much need an expertise behind it and Complex VGI where if individual wants to contribute, s/he needs special knowledge about the subject.

Sample of VGI such as Wikimapia where people wants to contribute about place name does not need much expert background from contributor, although the quality of the information need to be questioned since at that site there is no correction immediate consultation or others in local area. But with *crowdsourcing* method to edit and correct the information, information quality is maintained by the people who want to change it (Heipke, 2010).

Complex VGI such soil map, need expertise such as soil knowledge to contribute to VGI. A VGI such as Christmas bird count (http://www.audubon.org/bird/cbc/) and Globe (http://www.globe.gov) need expertise if people want to contribute to such VGI. A way such as train the contributor or knowing the back ground of education of contributor being implemented to judge the quality/trust of the information(Goodchild, 2007b).

Furthermore Grira et al (2010) distinct VGI with two dimensions which are power and capability, where power represent authoritarian or volunteer type of social relationship and capability represent the nature of the action about how to performing spatial data. Because these dimensions, they differentiate VGI into four components which are volunteered with full capability, authoritarian with full capability, volunteered with limited capability and authoritarian with limited capability.

Volunteered with full capability means that contributors do not have any control on standardization, product mechanism and quality control or in other words it does not need any skills just to contribute. Authoritarian with full capability means mapping agencies have full control on production mechanism, specifications and quality control. Volunteered with limited capability means volunteer actors have no authority on the output, production producers and specification. Authoritarian with limited capability means actors are consuming data which is used only for consultation. VGI such as Google map mashup, NAVTEC, Openstreetmap belongs to first three components respectively.

Nevertheless these distinctions also show how broad and big VGI need to be studied in different point of view. Furthermore Elwood (2008) said more studied of VGI is needed not only in technological case but also social, political, limitation and implication of VGI. Indeed, many researches about specific use of VGI now were conducted nowadays. Such as f-VGI for early warning system, f-VGI for disaster management and f-VGI for grievance system become new scalable use of f-VGI than merely for geo tagging.

1.1.3. Motivation in VGI

To look so many contributor or reporters produce spatial information at those websites, it is important to know why people want to contribute and their motivation behind it. There are some studies concerning the motivation of contributor in VGI.

Budhatoki et al (2010) created a conceptual framework about motivation of contributors of VGI, and they also specifically discuss about motivation of contributor in Openstreetmap VGI. David J Coleman et al (2010) mentioned about linking motivations specifically to certain program characteristic. These studies aimed to analyze the motivation behind the production of information through f-VGI.

For all f-VGI which are already been in the internet. Pragmatically, some of them have many contributors in it but some of them do not succeed that much in the number of contributors/people participation. Hence, type of motivation at different f-VGI may be different with one to another (Budhathoki, et al., 2010).

Example showed that vernal pool f-VGI has few respondent because of complicated procedure (Tulloch, 2007). There are other examples which has success in engaging contributor such as Wikimapia, Google map, Openstreemap, Flickr (Flanagin & Metzger, 2008).

To improve f-VGI function to keep intake with the society, it needs more study to know what people want and need for the service (f-VGI) and what f-VGI offer to the society or more study of supply-demand relations (Verplanke et al., 2010). In other words, when ICT is being implemented in the real world situation, the factor that should be envisaged is not only on the side of information technology but also the characteristic of the social environment in which the technology applied (Homburg, 2008).

Related to what people want and need, several researches approached to behavioural analysis. Becker & Knudsen (2005) used uncertainty theory to explain the role of routine inside the organization. Specific to ICT-behaviour relation, Hendriks (1999) mentioned about motivation in using ICT related to knowledge sharing from the user.

Related to uncertainty, most of them explained the concept uncertainty and the fact that people try to look for information to reduce uncertainty condition and after that they behave or take action as they are (Anselme, 2010; Becker & Knudsen, 2005). Although many researcher try to explain uncertainty – information- behaviour, Anselme (2010) can explain uncertainty-information-behaviour clearly. By this theory, I am hoping it can explain about improving f-VGI such as what things to attract new contributor, what to keep new contributor, what the things that make people stop contributing.

1.1.4. The human sensor web project in Zanzibar

Goodchild (2007a), distinguished three type of sensor network which are static network sensor, human carried sensor and human as a sensor. Specifically, human as a sensor is equipped with some working subset of the five senses and with the intelligence to compile and interpret what they sense, and each free to rove the surface of the planet. With help of web, the value of interpretation from human interpretation can be shown in the internet.

The human sensor web project (HSW) is part of the h20 initiative where it defined as testing innovations in water and sanitation monitoring and seeking to put in place powerful and effective monitoring systems on a global scale. The vision is not only to provide tools to better manage services from service provider side, but also to create a platform, in the public domain, where citizens can access information on service provision and so enter into dialogue with service providers on their improvement (h2.0, 2011). As any other f-VGI the contribution of local participation is needed.

Unlike any other f-VGI that use website platform to input the information, HSW has a system that uses cell phone to gather information by using SMS as a gateway to input information. The information then automatically is being visualized on the website. HSW is used as an illustrative case study in this research

1.2. Research problem

As there are accessibility problems with safe drinking water on Zanzibar (Shah, 2003; Yussuf, 2010), the expectation is that people would be motivated to report by using Human sensor web reporting system. In practice however, within testing environment of human sensor web, there are less reports made in HSW than expected(h2.0, 2011). This research therefore tries to determine the motivational factor that governs people's participation in reporting system such as HSW. Coleman, et al (2009) suggest that further research need to done to answer about keeping the existing contributor, how to attract new producer and about the cycle of contributor. This research therefore aims to assess what would motivate people to participate as a human sensor to improve the water service on Zanzibar.

1.3. Research objective

The main objective of the research is to assess the motivational factors that govern participation in facilitated-VGI.

1.4. Research question

The approach is to achieve the main objective by answering these research questions:

1. What kind of motivational factors are working in facilitated VGI?
2. What barriers exist for participating in an f-VGI reporting system?
3. How can barriers to participation in f-VGI successfully be removed?

1.5. Research phase

The research uses qualitative analysis to answer the research objective. Qualitative analysis is an approach to get insight of human behaviour to know uniquely what people behave. There are three phases and a conclusion

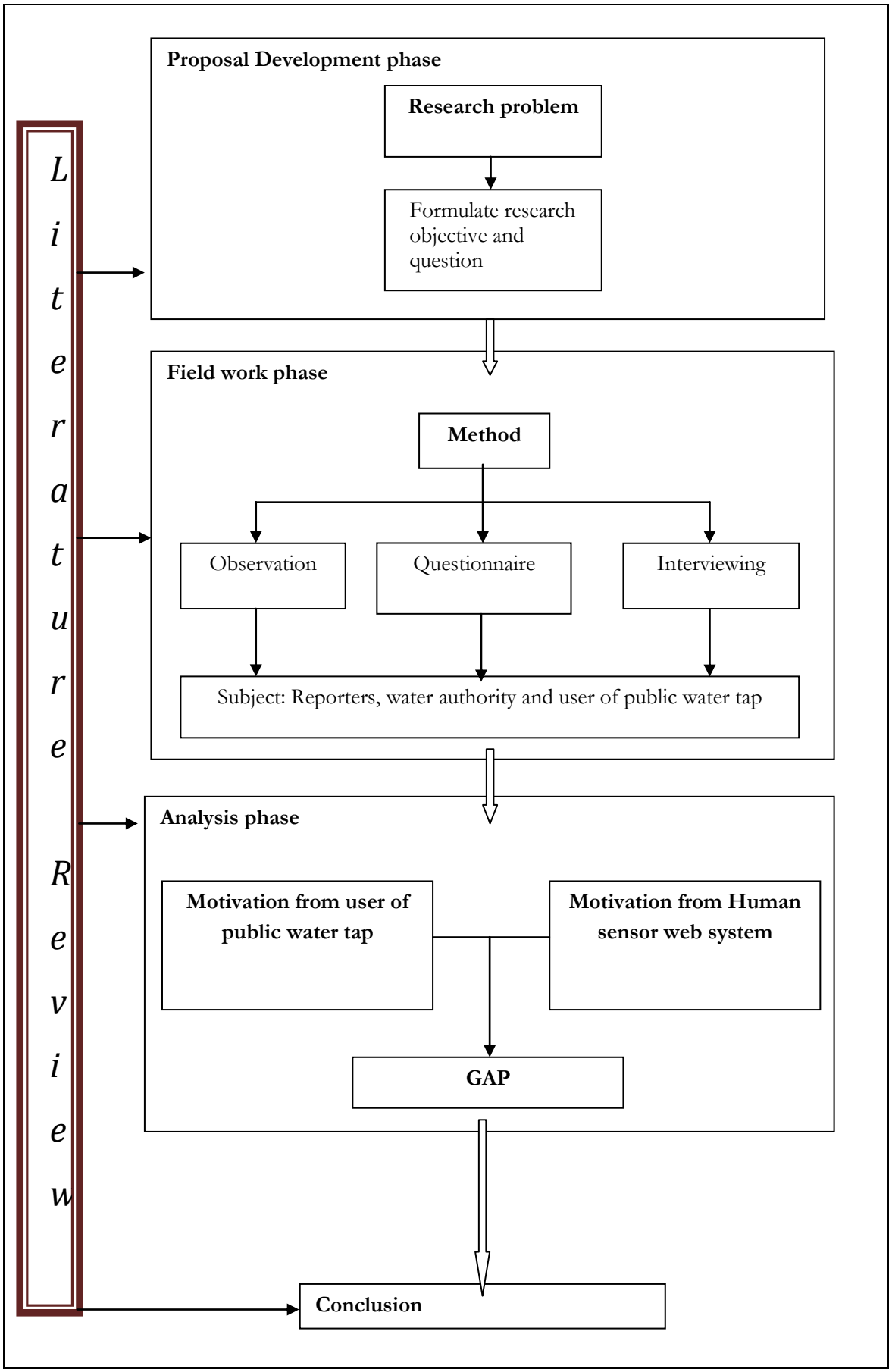

Figure 1-1: Research phase

Phase I: Proposal Development
This phase has main purpose to develop initial research objective and question and methodology with based from literature review. In this initial stage, initial interview question and questionnaire were also being made. Base line to formulate the initial question is from uncertainty theory of motivation. Though after field work there are some changes in research questions but part or field work phase and methodology of data gathering are the same.

Phase II: Field work phase
This phase is related to data collection phase. This research used questionnaire, interview, and observation as a methodology for data collection. At this stage questionnaire and interview were refined based on field experience such as from open question to closed question questionnaire, technique to interview at field and question that should be questioned. The detail for data collection that was made in phase one has changed in the field.

Method for data gathering was made in many ways to get better insight of the situation at field. Each method has its own strengths and weaknesses to gather information from the local people. To get objective data, questionnaire was being held and to get to real situation about local people opinion, interview was being held such as unexpected condition in the field where certain indicator emerged before it was prepared before. Observation also was made to know about the real situation and attitude of local people at field.

Phase III:
Result and analysis were conducted based on data collection. The analysis was done to know motivation that really happen at local area such as personal reason, social relation, and technological reason that would make them to participate in HSW projects and what makes them hinder to participate it.

Conclusion:
Conclusion is made based on data analysis to answer research objective about the real situation at the field specific to research objective.

1.6. Thesis structure

This thesis is organized into seven chapters as follows:

Chapter 1: Introduction

This chapter consists of general information about background of Volunteered geographic information (VGI) and specifically about f-VGI and motivation behind it in introduction, research problem, research objectives, Research questions, Research phase.

Chapter 2: Framework for assessing motivational factors in f-VGI
This chapter consists of the literature about, VGI in detail, motivation specific to VGI, motivation in general and designing framework for the research.

Chapter 3: Methodology.
The chapter will explain how to assess the motivation in VGI base on personal, social and technological approach and how to assess motivation base on the system.

Chapter 4: Motivation and participation in HSW
This chapter describes the data that has been found in the field such as understanding about signboard, usual behaviour of local people, reason to become a reporter, reason stop sending SMS.

Chapter 5: Motivational factors governing participation in f-VGI
This chapter analyze the motivation that come from personal, social and cultural from perspective of user of water tap and potential motivation that system can give. This chapter also analyze what factors or barriers that make individual hinder to participate in HSW
Chapter 6: Conclusion & recommendation
This chapter presents the summary and draws the conclusion. Some recommendations for further research in this field are also presented

2. FRAMEWORK FOR ASSESSING MOTIVATIONAL FACTORS IN F-VGI

2.1. Introduction

In this section there are literature review about previous research about motivation in VGI, existing conceptual framework about motivation in VGI, purpose of VGI & motivation of user, theory of motivation, and uncertainty theory of motivation. From these literature reviews, design of conceptual framework to meet the criteria in answering research questions was made.

2.2. Previous research about motivation in VGI

Goodchild (2007a), specifically explain about motivation of people building VGI and f-VGI users at specific website such as Openstreetmap, Wikimapia, web 2.0, and Flickr. From his point of view self promotion is behind why people create their own VGI. As for participation of f-VGI such as Openstreetmap, the motivation would be personal satisfaction that people can see their work directly after contributing. For web 2.0 user, the motivation is as a convenient way of making it available to friends and relations.

McDougall (2009) mentioned about reason of organization sharing information is to increase the benefits to society that comes from the availability of spatial data and to create connection in a dispersed databases.

Tulloch (2007) explained the example of vernal pool f-VGI (http://www.dbcrssa.rutgers.edu/ims/vernal/) and Second Life at Landing Lights Park. Lesson learned that the vernal pools project shows how barriers to participation such as complicated procedure to participate can quickly limit contributions while the Second Life example limit the contributor that only youth and young adults will be actively engaged in the gaming environment.

Coleman, et al, (2010) mentioned about altruism, professional or personal interest, intellectual simulation, protection or enhancement of a personal investment, social reward, enhanced personal reputation, outlet for creative and independent self expression and pride of place to categorize motivation in contributing VGI. The paper studied contributors' motivations from Victoria DSE and editing service, USGS national map, and Tom tom mapshare.

Coleman, et al (2009), mentioned some of motivation which is adopted from Wikipedia and open source software community that also apply as motivation in VGI. Motivation such as altruism, professional or personal interest, intellectual stimulation, Protection or enhancement of a personal investment, Social Reward, Enhanced Personal Reputation, Provides an Outlet for creative & independent self-expression, Pride of Place , mischief, agenda, criminal intent. In their paper they also mentioned about negative motivation like mischief, agenda and criminal intent to emphasize that there are also drawback in motivation in contributing VGI.

Specific to motivation in VGI, Budhathoki, et al, (2010) has established conceptual framework of motivation that specifically for. It said that the conceptual framework based on 3 arenas (motivational – Action – Outcome arena), each of them represents origin of motivation- norm or rule and action related to VGI - and the shape of the contribution respectively (see figure 2-1).

Although all previous research mentioned about motivation to contribute VGI, but only budhatoki's et al mentioned the method how to decide that a person belong to certain motivation and derive the motivation in VGI based on theory of motivations like intrinsic and extrinsic motivations.

2.3. Motivational conceptual framework for VGI

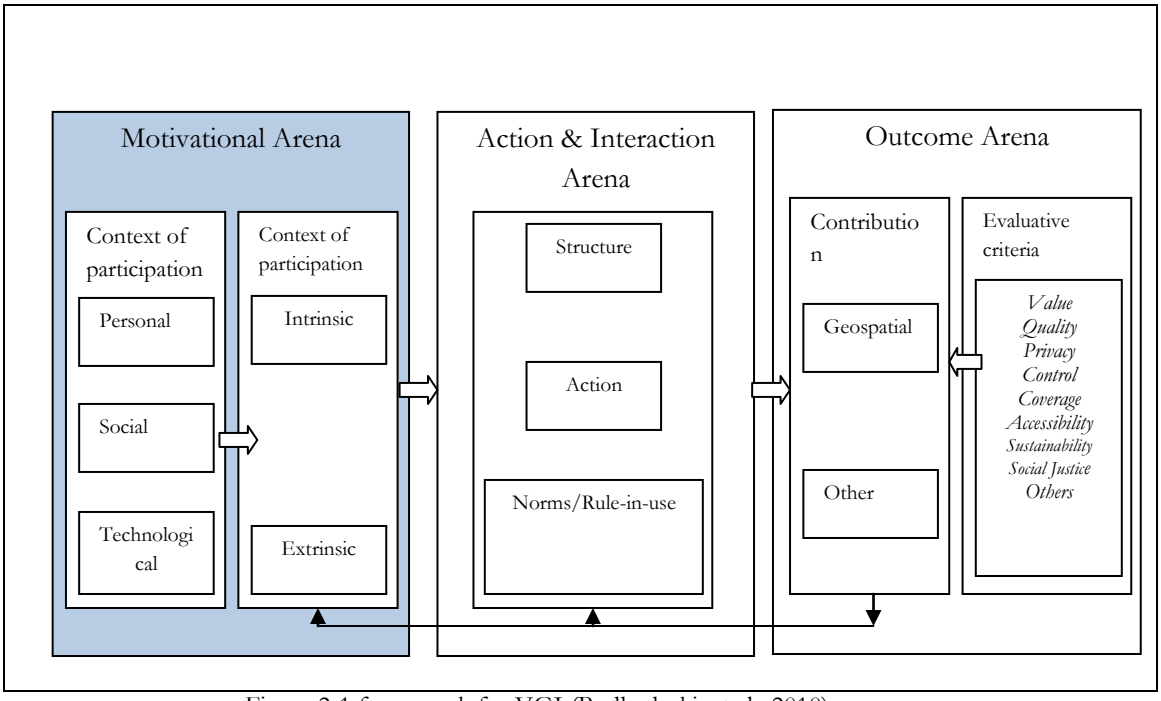

Figure 2-1 framework for VGI (Budhathoki, et al., 2010)

Motivational arena is the arena where the reason of contributing VGI is happening. Action and interaction arena is the arena where behaviour realization from motivational arena specifically to VGI. As it can be seen from the figure, the action and interaction can be participating, make the rule or structure of how to do it. Specific to Openstreetmap, he said the motivation behind the contributions of contributor is project goal, Altruism, Instrumentality of local knowledge, learning, self need, social/show off and monetary (Budhathoki, 2010).

The next arena is outcome arena where the contribution can be geospatial or other form. Geospatial means the outcome is geographic input. Other form can be non geographic. By this outcome it is also explained about the approach to evaluate the outcome such as value, quality, privacy, control, coverage, accessibility, sustainability, social justice and others.

This research, focusing on motivational arena where try to see motivation specifically at study case in HSW project. It is said that motivation (intrinsic and extrinsic motivation) came from 3 contexts of participations which are personal, social and technological. Personal means motivation come from human thought, social means it come from status gain and Technological context mean motivation come from technical affordance enable people to freely create and share knowledge. These three contexts plays important role in shaping the motivation to contribute to VGI.

Specific to motivation research of VGI, it can be seen from table 2-1 that most of authors generally think the same thing about motivation in contributing VGI the difference is in specific context of their paper.

Goodchild think in general motivation while Budhatoki et al more specific to Openstreetmap and coleman et al more to authoritative database.

Goodchild (2007)	Budhatoki et al		Coleman et al (2009)	Coleman et al (2010)
Motivation creating VGI: 1. Self promotion Motivation of user f-VGI 1. Personal satisfaction 2. To make friends and relation	Intrinsic motivation: 1. Unique ethos 2. Learning 3. Personal enrichment 4. Self actualization 5. Self expression 6. Self image 7. Fun 8. Recreation 9. Instrumentality 10. Self efficacy 11. Meeting own need 12. Freedom to express 13. Altruism	Extrinsic motivation: 1. Career 2. Strengthen social relation 3. Project goal 4. Community 5. Identity 6. Reputation 7. Monetary return 8. Reciprocity 9. System trust 10. Networking 11. Socio-political	1. Altruism 2. professional or personal interest 3. intellectual stimulation 4. Protection or enhancement of a personal investment 5. Social Reward 6. Enhanced Personal Reputation 7. Provides an Outlet for creative & independent self-expression 8. Pride of Place 9. Mischief 10. Agenda 11. criminal intent	1. personal investment 2. social reward 3. enhanced personal reputation 4. self expression 5. pride of place

Table 2-1: Previous research about motivations in VGI

To look motivation of VGI from the author, most of the VGI use same platform which is web platform. At glance it can be seen from different author, more or less the motivation is same. Related to the outcome platform and motivation behind it, it is also can be seen, potentially, almost all of the motivations emerge also because they can see the result from the platform and indeed all of the researches were conducted with study case where specifically to web platform. For example it is fun to see your effort at the web (Budhathoki, et al., 2010), or to have self promotion. Perhaps altruism, project goal, and socio-political can emerge even though the result cannot be seen directly through web platform.

2.4. Purpose of VGI and motivation of user

Motivations behind participation of user can be many (Gouveia & Fonseca, 2008). The purpose of the f-VGI and motivations from participant point of view is not always in line. Hence, motivation from contributor may not be the same as the purpose of f-VGI.

The purpose Openstreetmap is to make free spatial data by using community as source of spatial data. From this purpose, it supposes to be people who want to participate have the same way of thinking with the purpose of Openstreetmap. Hence, the motivations of participants emerge not always the same as the purpose of f-VGI but also for other things. In other words the purpose of the sites may not in straight-direct connection with participant thought. For example there are people who want to contribute because they want to make free spatial data collaboratively (in line with the purpose of the site), but many people also contribute because they want to learn about sites or platform itself or such site that can see the result of the participation immediately makes people fun, want to learn more, or since the site mentioned a name of the contributor, makes people wants to be known by the society globally, or it is just simply altruism or project goal. Previous research shows that contributor of Openstreetmap is not thinking as complicated as the purpose of Openstreemap. In fact, the motivation behind the contributor is more simple such as fun, learning, monetary, self need (Budhathoki, 2010).

Other successful VGI is Tomtom mapshare. It has a purpose as a tool to help drivers contend with the frustration of unexpected road changes, and to be used between map updates. With user friendly interface and recognition from the provider many customer participate to this VGI. It is also can be known that motivation can be emerged if there is recognition after participating from the platform. The type of recognition technically it can be many form, it can be written the name of contributor, it can be email respond, graphical respond, or need some actual respond instead being only satisfied with digital respond.

As it can be seen, that actually the function of platform also play major role as a motivating factor beside the main purpose or objective from the platform itself. Lesson learned from the case study that volunteer, contributor clearly wants recognition of the contribution and contributor want the contribution being used immediately. (David J. Coleman, 2010; David J. Coleman, et al., 2009). Furthermore, contributor will decrease if contributor does not satisfy with the result. More scalable to the use of ICT, Homburg (2008) mentioned that the evaluation of ICT about who use is needed. In general, this also can be mean that what people want or need with what service can give (supply-demand) must to be researched more (Verplanke, et al., 2010). (David J. Coleman, et al., 2009) also mentioned cultures, policy and process are important matters to accommodate VGI.

2.5. Universal Theory of motivation

Theories of motivation exists to explain how organisms can behave, while taking into account multiple influences from their physiological state, knowledge about the environment, and the opportunities they have to act. In a sense, motivation is the 'conductor' of behavioral (and cognitive) flexibility, which depends on the individual's ability to process and articulate information from different sources and indeed, Budhatoki etal specifically explain motivation in contributing VGI base on intrinsic and extrinsic motivation. To get more understandable of motivation, in this sub chapter explanation about theory of motivation is explained.

In the first half of the twentieth century, the drive theory of motivation was established. This theory said a drive providing the 'energy' required to trigger, maintain, and direct behavior for an organism to achieve its need-related goals—e.g. eating, drinking, copulating. However, energy concepts do not tell us why organisms behave as they do, because these concepts tautologically suggest that the expression of an activity involves the activation of its drive without allowing an independent measure of that drive. (Anselme, 2010).

Another theory that emerge was incentive theory of motivation where stated that motivation as a parameter responsible for change in an animal's receptiveness to specific environmental stimuli rather than as fuel for behavior are traditionally referred to as incentive theories (Berridge, 2004). Furthermore,

an experiment was being conducted about habits as results automaticity of goal-directed behavior. It is said that even habitual behavior comes from goal – directed behavior at first, then by frequency of particular action which is done repeatedly then the action become habitual behavior (Aarts & Dijksterhuis, 2000).

Incentives theory of motivation explains about motivation based on goal-directed behavior in organism. This theory does explain very specific about why people choose particular behavior than the other by judging the degree of pleasure of each behavior. But this theory does not say much about the other possibility of behavior where the person has a goal but did not do the behavior that can reach the goal (e.g. a person in novel environment may want to find some food but he/she does not straight buy the food to certain place but instead check to different places to see environment).

Other theory is intrinsic and extrinsic motivation. Many psychologist use this term to explain motivation(Oudeyer & Kaplan, 2008). Intrinsic motivation can be defined as do certain activity for its own satisfactions and extrinsic motivation an activity that whenever is done some separable outcome need to be attained (Ryan & Deci, 2000). Though based on definition it seems very clear the difference among the two but in reality to define motivation behind certain behavior it is very difficult to attain(Oudeyer & Kaplan, 2007). For example, at case from motivation in VGI it said from certain person that "it is fun to see my work published at web". At first fun is intrinsic motivation but when it is looked closer, actually it is fun because the result can be seen at web (extrinsic). May be if the person cannot see the result at web it is not fun anymore to contribute to VGI. This theory also cannot explain if there is two different motivated behaviors which can results the same thing and has the same motivation behind it but in the end the person decide one behavior instead of another. In other words motivated behavior is more complex than just one straight forward reason.

In 2010 Anselme refines Incentives theory and made a new concept which is called Uncertainty process theory (UPT) where motivation is an information processing system whose role is to reduce uncertainty about psychologically significant events where the behaviour can be positive or negative. The theory also can explain that for motivation to occur not only to look for inline causative like hunger then organism search for food, but it can explain that motivation arise base on organism cognition to reduce the uncertainty. For example, organism decide turn left than right because by turning left it will have more chance to survive than turn right or the motivation is survival. In this case, among two behaviours, the organism makes another cognitive strategy or reason to choose the left side.

2.6. Uncertainy theory

Specific to Uncertainty process theory, it explains step by step of how motivated behavior occurs, from event – uncertainty – anticipation & attention – motivation specificity – seeking behavior. The theory tells it very clearly about the event that makes people seems to uncertain (psychological effect), and after that the brain start to gather information for anticipation (base on previous experience) and attention (added value for that specific experience), after that motivation specificity is created (toward specific goal) and finally organism realize it in sort of action that this theory call it as seeking behaviour (see figure 2.2). But this theory in general has been criticised sometime a person do something not because to reduce uncertainty but to increase uncertainty (Oudeyer & Kaplan, 2008). Although there are some critics about the theory but in context of VGI especially for human sensor web, where there are many way to fetch water from complaining first, or just go to other location to fetch water. This theory can explain more than the other theory of motivations.

According to figure 2-2 when I apply it to the condition of UPT theory in context of VGI, it appears that the uncertainty in the event of the environment will be water availability and water purity. Human mind

than take part that event for the uncertainty of that event. And for this reason the brain starts gathering the information about anticipation and attention to reduce this uncertain feeling which results motivation specificity to seek behaviour. This theory is suitable for this research because it can explain environment (real life) - human interpretation – action (behavior) with psychological approach.

Although theory motivations have many approach, but at some points there are connection between the theory (Oudeyer & Kaplan, 2008). They mentioned that such as theory of motivation about intrinsic motivation with uncertainty theory of motivation actually try to explain the same behaviour although the emphasize of the context is different. For example to determine intrinsic motivation researcher has to know where the type of motivation come from (intrinsic or extrinsic) while uncertainty theory does not look that way but the theory look what things that make a person uncertain. In conclusions the result of motivation in uncertainty theory may have the same with intrinsic theory.

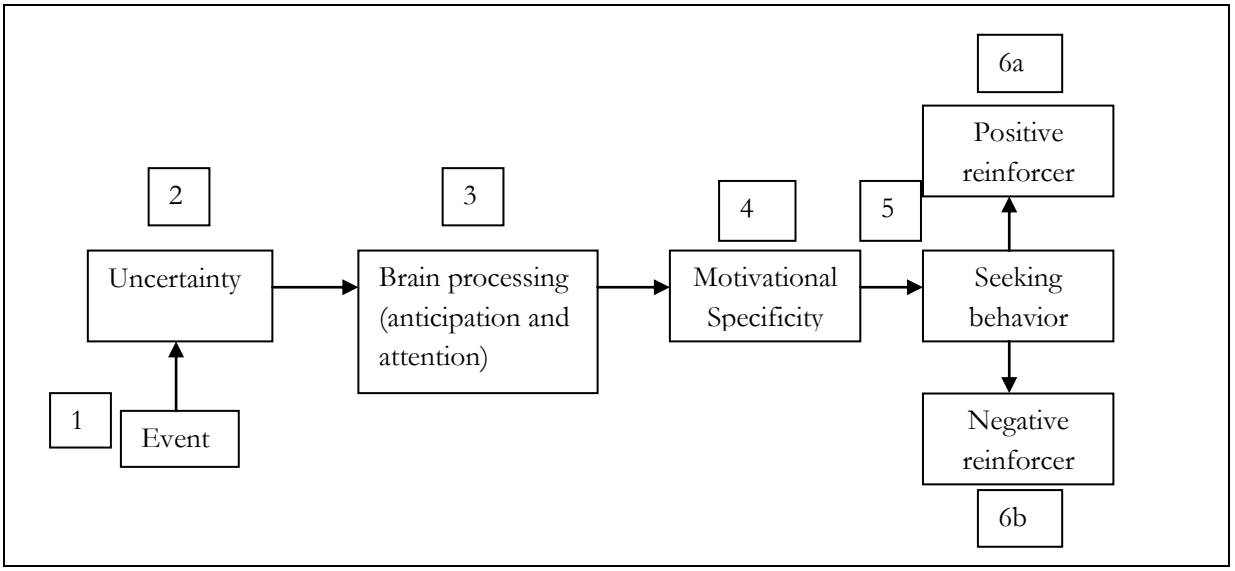

Figure 2-2: Uncertainty process theory (Anselme, 2010)

2.7. Framework

2.7.1. Method in determining motivations

To measure human behaviour, scientists used indicators that suitable to answer their hypotheses. From habitual behaviour to motivated behaviour, they have the same root which is all come goal-directed behaviour although from the indicators may have some variations.

Aarts & Dijksterhuis (2000) in their experiment used travel goal and transportation action as based assumption to research habits, with hypotheses that goals can activate habitual transport behaviour automatically. They used time indicator to answer habitual behaviour. One of the technique to determine motivation is the respond to answer the question it said the faster the respond after questioned were delivered it means that the activity already become habitual activity.

Specific to uncertainty theory, Becker & Knudsen(2005) make question about uncertainty related to specific work at the office. They used questionnaire to let respondent answer the question about uncertainty. They used scoring system from "strongly disagree" until "strongly agree" although the question that they created seems to be very formal and not easy to understand because they use word uncertain explicitly in the question to emphasize for uncertain situation.

Furthermore, to determine motivation based on specific behaviour (e.g. participating in VGI) (Budhathoki, et al., 2010). He used grounded theory to analyze motivation from talk pages, and interview with contributor.. Grounded theory is method to generate theory from the field instead of using existing theory (Strauss & Corbin, 1998).

In conclusion, the method to acquire motivation behind specific behaviour can use many techniques to achieve it such as observation, questionnaire, textual opinion, or survey.

Anselme (2010) also mentioned that motivation not always in straight line in achieving certain goal but also there are other reason why people choose certain behaviour compare it to another. To strengthen his theory he also mentioned about habitual which can be broken if the goal is not achieved in the end, then after that organism try to search another behaviour to look for goal.

2.7.2. Designing framework

There are many universal theories about how to explain motivations. Each of them has its own strength and weaknesses. Some researchers indeed mentioned about motivation specific to VGI without explaining the motivation theory behind it while some explain it. Specific to conceptual frame work about motivation relative to VGI, Budhathoki, et al (2010) made the list of motivation from intrinsic-extrinsic motivation which is universal.

As mentioned before each universal theory has its own strength and weaknesses in explaining the motivations. To determine Intrinsic and extrinsic motivation there are difficulties whether it intrinsic or extrinsic (Oudeyer & Kaplan, 2008). The questions which are also emerged are not only what motivates local people but also what makes them un/less motivated to participate.

To assess motivation behind people contributing VGI in Openstreetmap, Budhatoki used conversational text among Openstreetmap Users (talk pages) and surveys with open-ended questions and used grounded theory to define the motivation behind the contribution (Budhathoki, et al., 2010). To develop personal, social and technological behind contribution of VGI they used previous research about motivation and try to implement it in VGI context.

Specific to assess motivation of people in contributing f-VGI Openstreetmap, it was found 7 motivations behind the contribution people participating in Openstreetmap. In summary, the motivations are, project goal, altruism, instrumentality of local knowledge, learning, self need, social/show off and monetary.

In the case of motivational conceptual framework the motivation can be assessed by asking directly to respondent who participate to f-VGI. But in the study case about the human sensor web, the situation is rather different. The f-VGI system is already running and works but local people still yet not much participation in it, although the fact that there is water availability problem at Zanzibar(Shah, 2003).

Therefore, the subject of this research is not only for people who has participated f-VGI (sending SMS) but also try to get insight to local people to know what makes them not/less or want to participate in HSW project. Because of slightly different situation, it needs adaptive design from Budhatoki et al conceptual framework to meet the objective of this thesis (figure below).

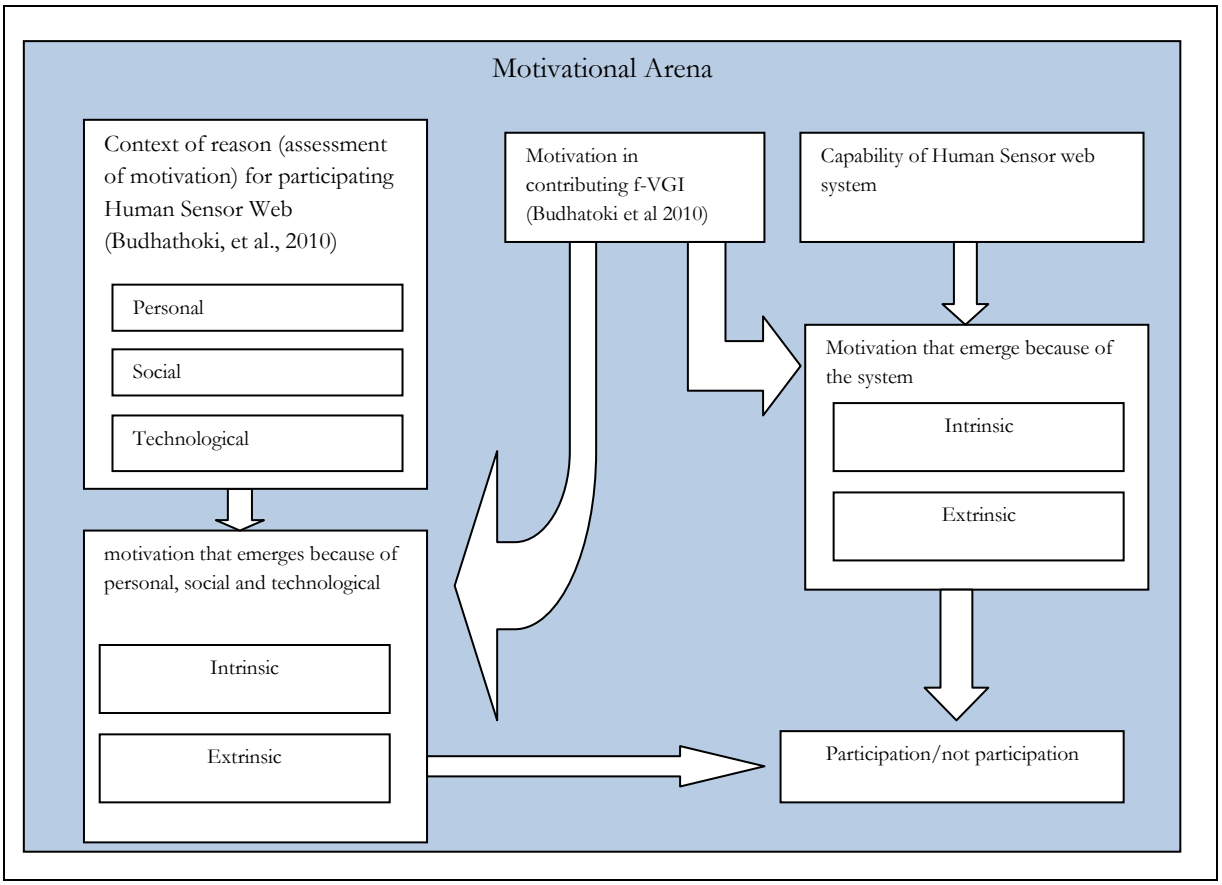

Figure 2-3:Adaptive Conceptual framework to assess motivation from Budhatoki et al 2010

In this conceptual framework from Budhatoki et al about motivation will be the list of motivations that will be used to assess motivation from fieldwork and from the system. As it mentioned from the literature review motivation can be emerged because of many things. The stimulation can come from inside and outside a person mind (Anselme, 2010; Berridge, 2004; Oudeyer & Kaplan, 2008; Ryan & Deci, 2000).

In this research, context of motivation specifically discuss about potential reason for participating HSW project. This research tries to distinct potential motivation that comes from fieldwork (environment) and potential motivation that comes from the system (Figure 2-4). The reason is to know what potentially people will be motivated from HSW project and what motivation can give because of the system. from literature review about motivation it was known that behaviour can occur because many reason whether it from insight stimulation of from outside stimulation

From the environment, to assess motivation is divided into three main factor which personal, social, and technological (Budhathoki, et al., 2010). After the reason from the field work is found, the reason is translated into intrinsic or extrinsic motivation in VGI based on budhatoki's et al classification (Details, see section 3.8.1). From the side of the system, lesson learned from Openstreetmap, tomtom Mapshare, most of the motivation may emerge because of technological/system aspect that can satisfy participant. From this perspective, this research wants to find the potential motivation that can emerge because of the system, intrinsically and extrinsically. To assess the motivation because of the system, it needs to know the capability of the system.

3. METHODOLOGY

3.1. Introduction

Research design of this research is case study of f-VGI which is Human sensor web project (HSW project) with single case. A case study research is a research strategy which focussing on understanding the dynamics present with single setting (Eisenhardt, 1989). In data collection, a case study typically combines data collection such as written text, interview questionnaire and observation to find grounded evidence.

Human sensor web is part h20 initiative where it defined as testing innovations in water and sanitation monitoring and seeking to put in place powerful and effective monitoring systems on a global scale. The vision is not only to provide tools which service providers can use to better manage services, but also to create a platform, in the public domain, by which citizens can access meaningful information on service provision and so enter into dialogue with service providers on their improvement (h2.0, 2011).

Since October 2009, Zanzibar water authority (ZAWA) with cooperation of google.org and UN-Habitat has built facilitated volunteered geographic information (f-VGI) particularly for water information system (ITC, 2010). The system design of this f-VGI has been built based on *top-down* approach to gather information from the people.

With integration of cell phone and web based technologies, people of Zanzibar can report information about water availability and quality by using short message services (SMS) as gateway to f-VGI. With this integration, people of Zanzibar are controlling a web based sensor of water availability and quality acting as sensor in Zanzibar. And based on water supply monitoring system, terminology human as sensors are called as reporters (Jürrens, Bröring, & Jirka, 2009).

The source of information of human sensor web project in Zanzibar is very depending on the people or society contribution. For almost one year this project running, the number of reporter only reach less than few participants. The Zanzibar experience has shown that just making the system available is by way not enough for success (h2.0, 2011). In order to optimize the function of human sensor web, more investigation of why few participants report through SMS to human sensor web need to be assessed and also the motivation behind it.

3.2. Research area

The area of the research was planned in Zanzibar, Tanzania, where the project of human sensor web is being held. 50 signboards were placed at specific locations at Zanzibar where people can fetch water freely (Figure 3-1). From 197 distiricts (Shehias) in Zanzibar, 25 Shehia administrations becomes a place of the signboard where it connects reality and the system of HSW project.

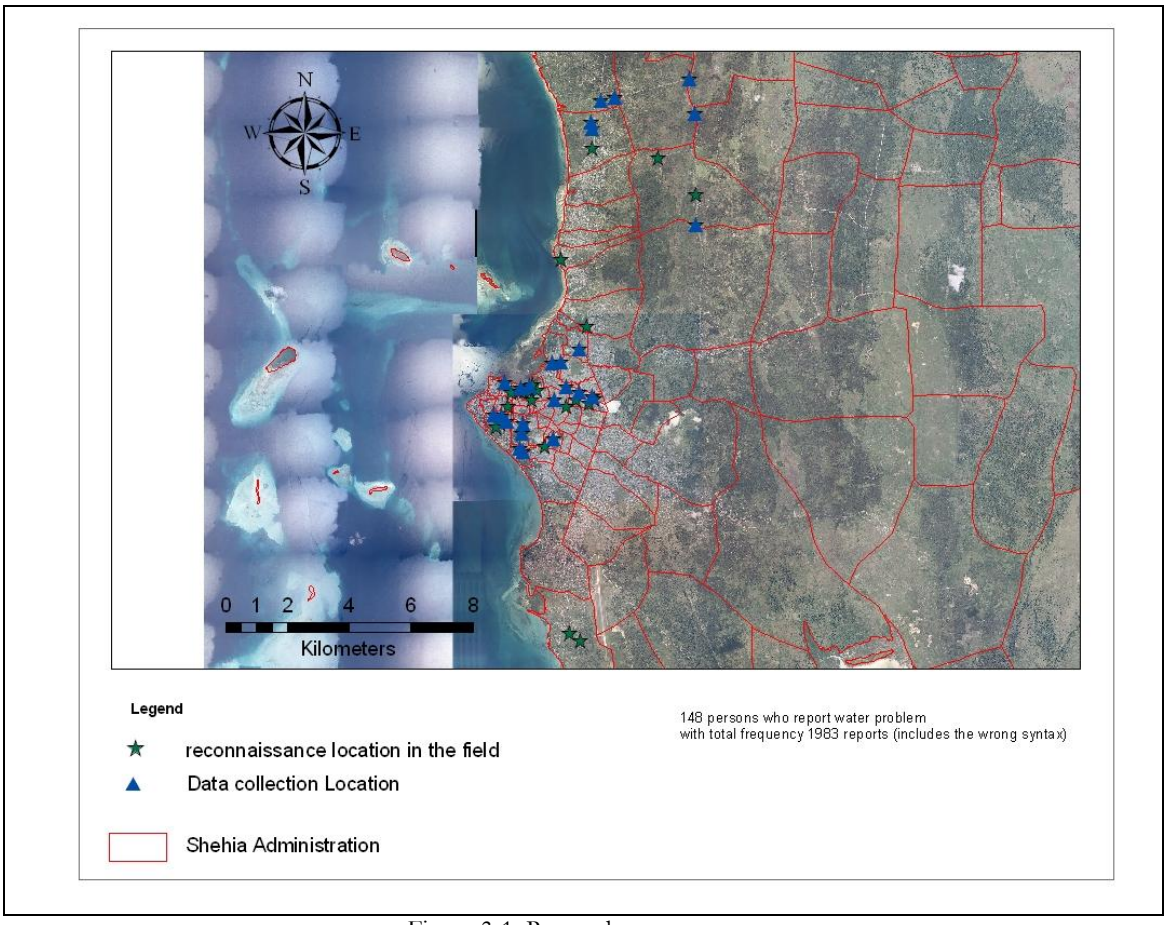

Figure 3-1: Research area

3.3. Field work procedure

At fieldwork phase, procedure is created to make survey as effective as possible. It is started with reconnaissance survey, Initial physical observation, create sample criteria and do the data collection (Figure 3-2). The tools to do the fieldwork are Digital camera with GPS, pens, notebook, cell phone and a map.

Fieldwork starts with location reconnaissance. Location reconnaissance has a function to know the location which wants to survey. Object of location of the reconnaissance are water tap location, water authority office & other offices, base camp, surrounding and transportation to get to location. Picture and coordinate location was taken to get know physical condition for making criteria for sample location.

Physical observation was done while doing reconnaissance survey. There are no fixed standard to judge the physical observation, for instance about water tap location the observation indicator are

the sign board and the tap and for transportation is the route to go to location while for the location of the office is transportation and contact person.

Sample criteria were done after location reconnaissance and information about physical information being conducted. In this case sample criteria are used to determine sample location generally. By examining similarities and difference of physical condition, it will determine qualified sample that will be surveyed.

Data collections were conducted to gather information about behaviour and reason behind it at specific location and to get more insight in real situation at field. Primary and secondary data was conducted to get information related to the research need. There are three methods to conduct primary data collections, observation, interview and questionnaire. Observation was conducted to know the activity of local people when they fetch the water.

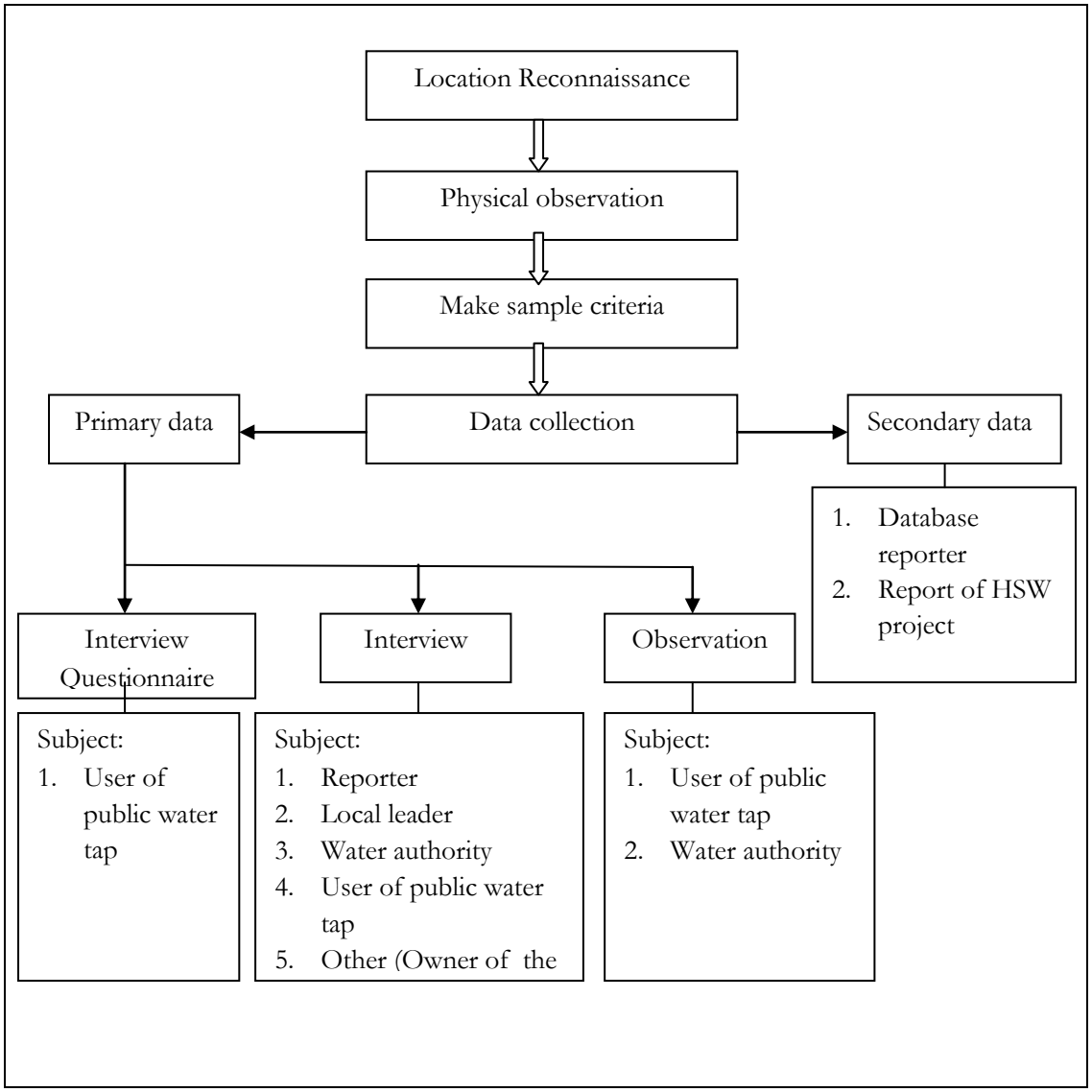

Figure 3-2: Field work procedure

3.4. Data collection methods

Silverman (1997) mentioned about observations, text, talk and interview to interpret qualitative data. This research used interview questionnaire, interview and observation as base of data collection. Further explanation about type of data collection specification is as follows:

Structured Interview
As it can be seen from figure 4-2, the subject of structured interview is local leader and reporter. Structured interview is used with open question to get deeper understanding with the answer. The scope of the question with local leader was to know the behaviour of the surrounding of local people and the reason behind it. The question also wants to know the problem and obstacle in general related to human sensor web project.

Interview with reporters were done mainly to assess the motivation behind sending SMS through HSW project by asking the reason why they sending the SMS. It also wants to know the usual behaviour before the HSW project running and other supportive question related to HSW project and water such as other source water, the reason stop sending SMS and about the incentive.

Unstructured interview
Unstructured Interview was used for user of water tap and water authority. Usually unstructured interview was being held along with questionnaire data collecting at field where there were some people from location who want to make more conversation. The conversation then developed into asking and answering question.

Unstructured interview also was used to other participant which unexpectedly arisen in the field. A person such as owner of the private become part of subject of research because there are special condition in the field that have to interview these people to get more insight of the condition.

Interview questionnaire
The subject of questionnaire is the users of public water tap that not yet becoming reporter. Questionnaire has an advantage of saving time in doing field work (Kumar, 1999). Indeed, the purpose of building questionnaire with closed question is to save time in the field because people were busy fetching the water and sometimes answering open question might get the answer which un-expected/unused for analysis purpose. Of course there is possibility that the answer of the question was not congruent with the reality but with initial interview with local people the reliable questionnaire can be made to represent reality.

Observation
The observation was used during four weeks of work in Zanzibar. Observation is needed to get additional information about the situation. The purpose of using this technique was to observe activities and attitude of user of public water tap and water authority in dealing with HSW project specifically and water problem generally.

3.5. Subject of research

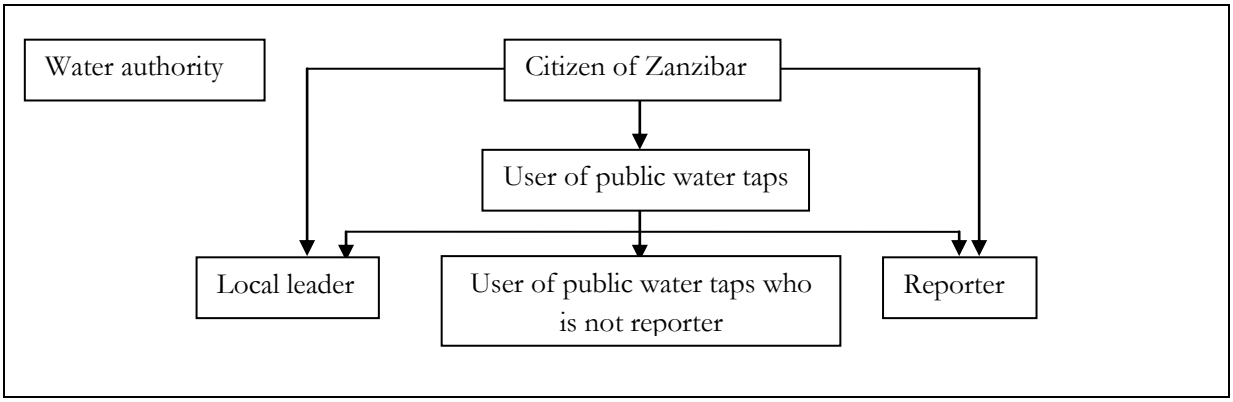

Figure 3-3: Subject of the research

Subject of research were divided into four parts as follows (Figure 3-3):

a. Water authority is an organization that has a function to maintain water service provision where in Zanzibar is called ZAWA (Zanzibar Water Authority)
b. User of public water taps who is not reporter.
c. Reporter is a person who report water problem by sending SMS through HSW project (Jürrens, et al., 2009).

3.6. Field work activities

3.6.1. Location reconnaissance, physical observation & sample criteria

According to location reconnaissance, from fifty locations of HSW locations from HSW report (Kimara, 2010) and from the website (http://itclx01.itc.nl/zanzibar/), forty-seven locations were found in the field in 4 days. The reason it took 4 days because the activity was searched based on project coordinator knowledge about the location because the initial information about coordinate of location in the field was not all entirely correct.

While doing location reconnaissance, physical evidence was gathered by using pictures and notes. From forty-seven locations which were surveyed, there was condition in location where the tap was gone, the signboard was gone, the tap was not function anymore and other physical conditions.

From physical condition from each field, criteria were made in order to decide which location that suitable for a survey. The criteria are as follows (Figure 3-4):

a) The location has a signboard
b) The signboard has a code written in it to send the SMS
c) The water tap is not gone

From the criteria it was found there 38 locations are suitable for the requirement/criteria. Method of random sampling was used to choose sample from 38 locations to choose 12 locations in the field. From these locations, water also has to flow by the time survey was conducted. And other location which water did not flow to get deep insight of the environment.

Specification of public water tap with human sensor web

Figure 3-4: Criteria condition for sample location

3.6.2. Data collection

Primary data result

Before starting the interview, some of respondents were informed about the purpose of research and were asked whether they allow taking documentation such as recording or video streaming. Some respondents refuse it.

From fieldwork, data was gathered as follows:

Number of respondent	Subject of research	Type of data collection	tools
168	User of public water tap	Interview questionnaire	Camera and notes
54	Reporter	Structured interview	Cell phone
3	Water authority	Unstructured interview	notes
4	Local leader	Structured interview	Video recording and notes
11	User of public water tap	Unstructured interview	Video recording and notes

Table 3-1: list of respondent that successfully gathered at field

Secondary data collection

Secondary data that were successfully gathered as follows:

a. database of reporter from date 2009-10-03 until date 2010-09-27
b. Reports of HSW project
c. Digital map

3.7. Designing question for interview and questionnaire

Access to data is a key element to understanding citizen involvement in VGI (Grira, et al., 2010). For this research to get to know the motivation of reporter participate in VGI and motivation of local people, two key players, reporter and user of water tap were surveyed at the field. To get systematic point of view, the unstructured and structured interview and questionnaire were used based on motivation conceptual framework in contributing VGI and then try to relate it with the situation at field with personal, social and technological approach to assess the motivation potentially.

The data were collected by using questionnaire at the field and interview by phone. There are two main subject of this research, persons who use the water tap at location at the time we surveyed/user of water tap (questionnaire) and persons who have already sent the SMS/reporter (interview). User of water tap is a person who use public water tap in the field while reporter is a person who may use public water tap and in some event also sending the SMS through human sensor web.

Process of building questions (Figure 3-10)
Before doing fieldwork I made preliminary questions to respondent at field to answer my research questions. All of the questions were made open in order to get deep information from respondent and to know the situation at the field. The question was developed from uncertainty theory of motivation.

These preliminary questions then were tested in the fieldwork couple of time to get results, to know the understandable of the respondent about the question and to know the time to do the effort. In results, there are some parts in the question that some people hard to understand and need to be revised. For time effort, it took 40-50 minutes to conduct question to the respondent if the question remain open while the longest time people have to wait for water only 35-40 minutes in average and many of these respondents come back and forth to fetch water. For that reason, it is decided to make closed question questionnaire with open answer in the last multiple choice and advice in the end.

In question building, information from local leader (*Sheha*) was used to refine the questions and to generate suitable multiple choice. Four local leaders were interviewed to refine the questions (figure 4-4). And after questions were revised, I started again data collection but nevertheless the questions were still can be revised again as there was condition in the field that has to revise again the questions such as additional questions.

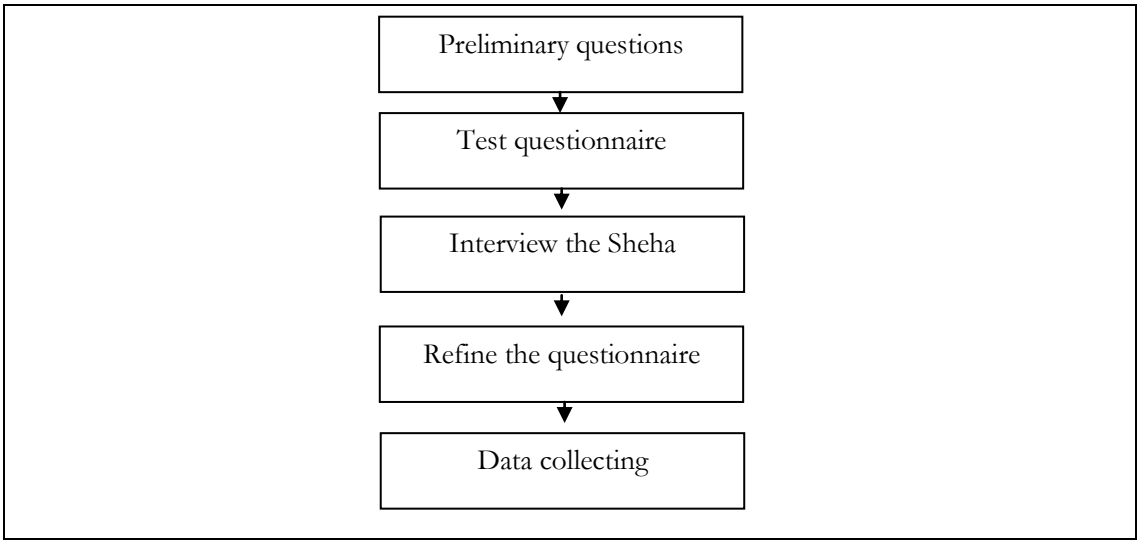

Figure 3-5: Process of making questions

3.8. Data analysis methodology

3.8.1. Analysis methodology

According to oxford dictionary, Assessment is the action of assessing something while evaluation is the action of appraising or valuing ("Oxford english dictionary," 2010). Homburg (2008) used the term assessing and evaluating interchangeably to discuss the use ICT in organization and indeed many authors also use these term interchangeably. But according to (Baehr, 2010), one difference about assessment and evaluation are assessment is to make judgment while evaluation is to improve performance. In this research assessing motivation to submit VGI is a way to define motivation to submit f-VGI.

There are 3 ways to cope with case study analysis approach: categories approach, similarities and difference approach and data by data approach(Eisenhardt, 1989). In this research, the method that is used for analyses is data by categories approach. This method can deals better insight analysis from different type of player and try to know whether the evidence between types of player are in line or there are conflict in it and nevertheless this research try to compare it with previous work from literature.

In order to answer research questions and objective, method of analysis are shown in this sub chapter to get clear process in answering research questions.

3.8.2. Method to assess motivational factors that are working in facilitated VGI

To answer research question number one, there are some process in analysis that has to be fulfilled. To answer this question the system capability of HSW project and behaviour of local people are assessed to get potential motivation.

Why the system and local people? Because, from literature review it was told that to engage people participating in f-VGI, the system has to entertain the user such as recognition, immediate results. Furthermore, other authors also mentioned about motivation that emerge because of the system. But motivation also can come not only because of the system stimulation but also can come from the individual or environment stimulation. For this reason behaviour and motivation of local people is assessed that potentially can be satisfied with the behaviour of participating in f-VGI. Nevertheless, since HSW project already running and indeed some local people already participating, this can be used to make confirmation about what motivation that works at HSW project and for f-VGI in general.

To answer first research question, there are three methods have to be followed:

a. Assessment of motivation from behaviour that potentially can be replaced by participating f-VGI
b. Assessment of motivation that comes from capability of the system
c. Assessment of Motivation in participating f-VGI

These three assessments in the end will result kinds/type of motivation that works in Human sensor web potentially and actually (figure 3-6).

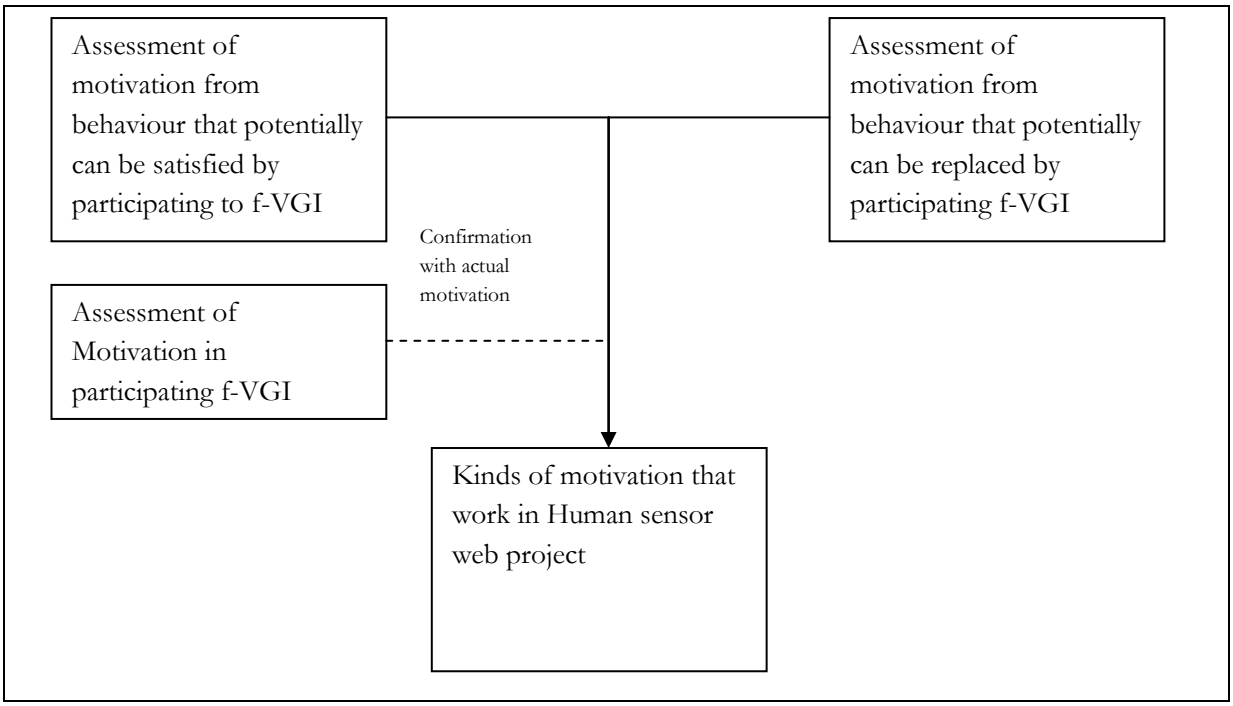

Figure 3-6: Assessment analyses for motivation that works in human sensor web project

3.8.2.1. Assessment of motivation from behaviour that potentially can be satisfied by participating f-VGI

To assess behaviour that can be satisfied by participating in HSW project, the method was adapted from Budhatoki, et al conceptual framework in motivation arena (Figure 3-7).

It is start with type of behaviour that potentially can be satisfied with f-VGI (HSW project). This behaviour was found in the field either by using questionnaire, unstructured interview and observation. After behaviour was found, assessment take start to ask the reason behind local people does such behaviour. From the reason categorizing take part to know from which categorize the reason belong to. And with motivation lists in participating f-VGI, the reason and categorize were assessed to know type of motivation in the list.

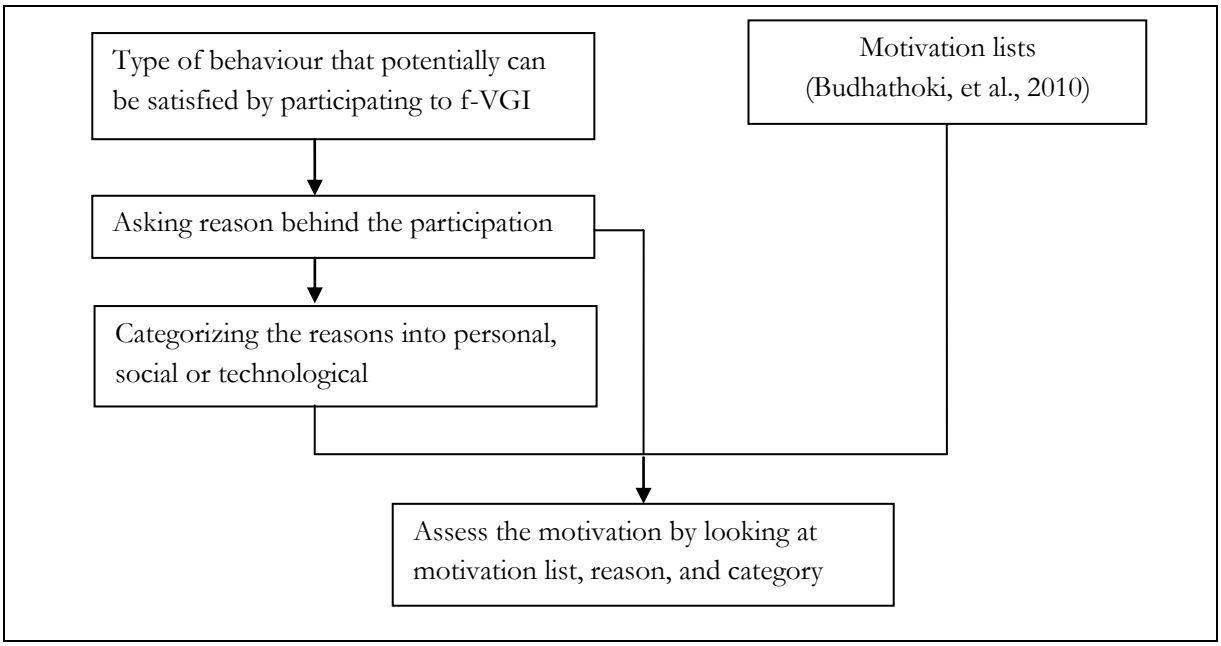

Figure 3-7: Assessment process of motivation from behaviour that potentially can be satisfied by participating f-VGI

3.8.2.2. Assessment of motivation that comes from capability of the system

To assess motivation that can emerge because of the system, there several steps to follow. The method was developed from literature review that mention about motivation that comes because of the system.

Each f-VGI has its own system to deal with participation. Hence, it may have different capabilities in each f-VGI. By listing and explaining capabilities of HSW project and Assessing it with motivation list which are caused by the system, the assessment of motivation can be analyze (Figure 3-8).

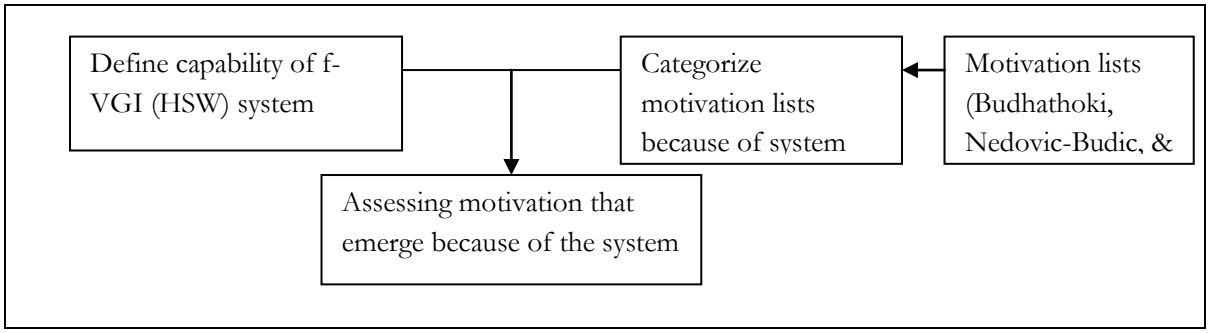

Figure 3-8: Assessment process of motivation that emerge because of the system

Explanation as follows:

a. Define capability of f-VGI (HSW) system: listing all capabilities in HSW project
b. Motivation lists: a list of motivation about f-VGI from Budhatoki, et al
c. Categorize motivation lists because of system: define or categorize motivation list from Budhatoki et al that emerge because of the system
d. Assessing motivation because of the system: search for similarities of capabilities between HSW project and motivation list because of system

3.8.2.3. Assessment of motivation in participating f-VGI

To assess behind participation in HSW project, there are process to be followed (Figure 3-9). This method was adapted from Budhatoki, et al conceptual framework in motivation arena (see literature review).

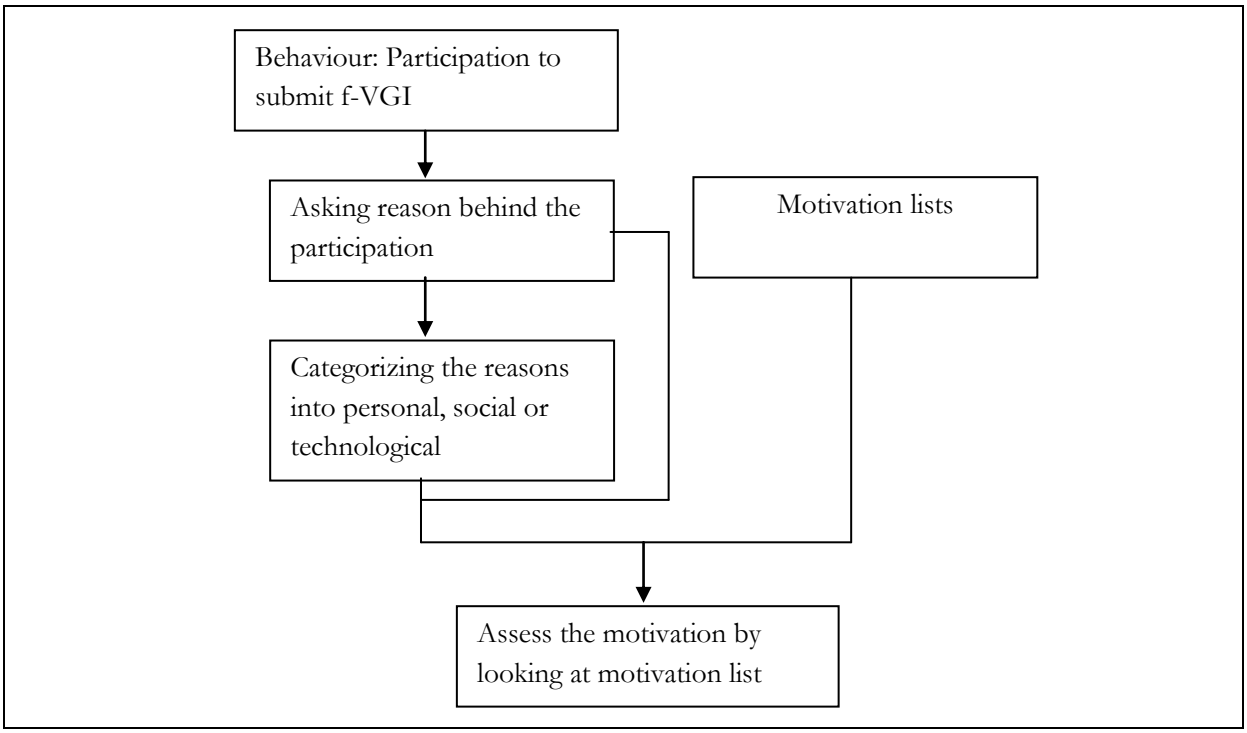

Figure 3-9: Process of Assessment of Motivation in participating f-VGI

First, it is known already that the behaviour of individual is participating in f-VGI (HSW) project. Second, researcher asked about the reason behind participating in f-VGI. Third, analyze the reason by categorizing the reason into personal, social or technological context. Fourth, assess the motivation by analyzing reason and categorization with motivation lists.

3.8.3. Method to answer what barrier exist for participating in an f-VGI reporting system

To answer research question number two, there are some processes in analysis that has to be fulfilled (Figure 3-10). To answer this question behaviour of local people not sending SMS and reporter stop sending SMS are assessed.

Why use the term behaviour not sending SMS at local people and stop sending SMS at reporter? Because at local people, it is not clear yet the reason whether it is direct causative, indirect causative or complex causative while in reporter the reason was asked while doing interview explicitly. Furthermore, it is hard to tell one causative law in social science even though it is told explicitly (De Vaus, 2001), what can be told is inference or probability based on fact.

To answer research question number two, there are several process that has to be followed. First, knowing that user of water tap was not a reporter. This can be known by asking whether he/she have participated or not or it can be inferred from the awareness from unstructured interview. For reporter, the behaviour can be known by asking direct question about stop sending SMS and hear what kind of answer that reporter has.

Second, there are several methods to know the reason why user of public water taps not participating in f-VGI (HSW project). It can be found by checking the answer from questionnaire, answer from unstructured interview with local people at field, and notes in activity observation. From questionnaire it can be found the answer from number five about other source of water, some answer from questions number three about cell phone, some answer from question number thirteen about existing system and some answer from question number twenty. It has to be said "answer" because not all of the answer have close inference for context of analysis. From unstructured interview in the field, the inference reason can

be found by asking local people about other source of water, about the awareness. From observation, it can be known about how spontaneity/quick individual answer about other source of water and the gesture while answering. Third, categorizing reason based on literature review.

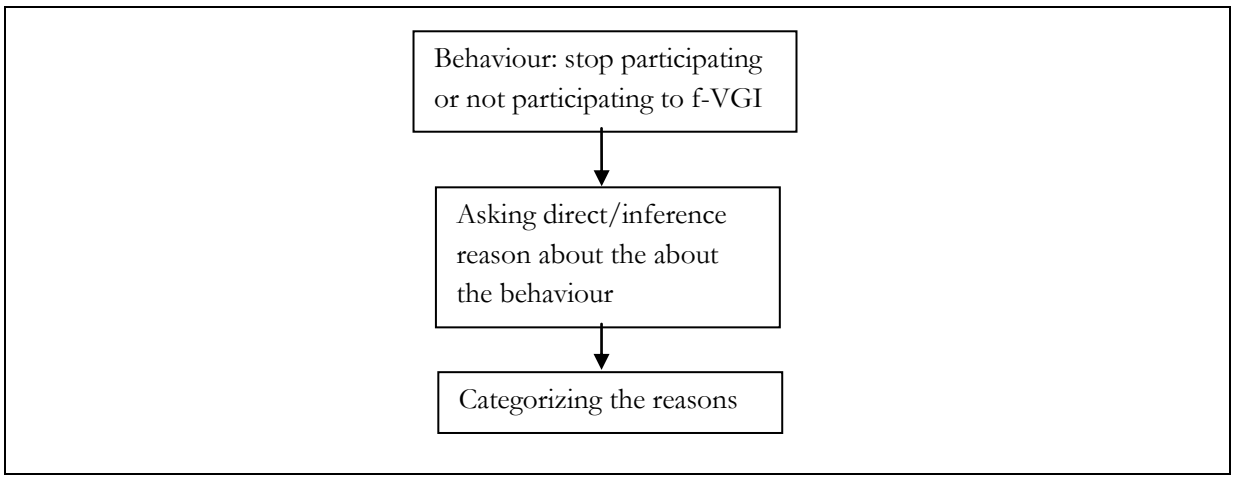

Figure 3-10: process assessment of inference reason of user of the tap about not participating f-VGI

3.8.4. Method to answer research question number three

To answer research question number three, several questions were delivered to user of water tap who is not reporter and to reporter. To answer this question a direct question in questionnaire and interview were delivered.

For users of tap who is not reporter the question were delivered directly about kind of incentives that individual want to make individual participate in HSW project. And for reporter the question were delivered about kind of incentives that individual want to participate in HSW project even though there is no physical respond after sending SMS.

4. MOTIVATION AND PARTICIPATION IN HSW

4.1. Introduction

In total there are 168 respondents that being interviewed at location where all of them is the user of public water. 54 respondents were answering the interview from total 98 phone numbers from reporter database.

4.2. Human sensor web system

4.2.1. Purpose of HSW

As mentioned in section 3.1, HSW has purpose as a monitoring system on a global scale for service provider and citizen. To scale this purpose into local area, at the signboard it is said that the purpose is to improve water service provision or technically, when someone send SMS to the number that is shown at the signboard (see figure 3-8), water service provider will try to follow up the SMS to improve the service or basically is tool for complaining about water problem.

4.2.2. Visualization capability

The system has map and image visualization capability that can show the map and the real situation from satellite Imagery. Inside the visualization there is information that can be used as monitoring as follow:

1. Water taps location. This capability can monitor which area that have water problem.
2. Type of water problem. This capability can show kind of water problem happened in specific location based on the complaint report.
3. Time of report and time series recording at every location. This capability is very useful because the report is recorded with timestamp and the timestamp is time series which means every complaint can be tracked down from the beginning.

In checking the capabilities, some of water tap locations are in correct location where others may not represent the same locations (see Appendix). In terms of time of report there is time difference with Zanzibar local time.

4.2.3. SMS Reply capability

After sending SMS to specific numbers there are replies that mention gratitude for reporting water problem. The SMS reply is free but not the reporting SMS. It cost around 50 Tanzanian shilling per SMS. According to reporter interview there is evidence that the reply is wrong. Indeed, at some location the code is un-recognizable to the system that made the system send different reply.

4.2.4. Physical respond capability

According to the system and water authority it should be there is physical respond for people who send the SMS, because at initial instalment of the project. The responds being taken physically by going to location where problem occur. But according to fieldwork checking, there was no people coming to check the situation after someone send the SMS

4.2.5. Subscriber capability

According to water authority, the subscriber is functioning if you want to get report about water problem. It has a function as a SMS report where it can get latest information about water problem

4.3. User of water tap

4.3.1. Gender and cell phone availability

Overall, majority of users are man, but looking at each location, from 12 locations of public water tap, 5 locations the dominant of users are men while 7 locations are women. From cell phone availability, 102 users claimed that they have cell phone while another 66 user do not have cell phone. Furthermore from gender point of view, 67 from 95 men has cell phone while from women side 35 persons have cell phone from total of 73 users.

4.3.2. Water availability

From question number 10 and 11(see Appendix 1), it was found people has experienced water problem. Specific to location of the tap, from 12 location samples, only one location in sample (code 802a) water problem rarely occur. Only few respondents mentioned that they claimed having experienced water problem in this location. This phenomenon was confirmed to water authority that in location with code 802a water problem actually never occur since at that location water always flowing naturally.

It is always flowing because the source of that tap is from water spring that flows water by only use gravity (natural). If there was a problem mentioned by local people it is only because there are trucks filling water from the same source of water. These trucks fetch water about 2-4 tons in a very shorts time by using generator. While these trucks were filling the tanks, at other tap in the same location will not running or the pressure is gone. It is an irony for this condition where people needs water on different area while in one area people can get water easily and fast.

From the type of water problem, lack of water or water is not running was major problem. 132 respondents mentioned that they had experienced water problem. Other problem is the availability of clean water, it is about 29 from 168 respondents mentioned that they had experience this type of water problem. According to physical observation in the field, it was also found that water pressure is also major problem at most of the locations. From the interview with authority and report about water problem, the time to fill 20 litres bucket in each area is vary from one minute into half an hour.

It was also found out that 27 people from 168 respondents have their own water tap at home but still fetching water from public water tap. According unstructured interview, and some answer in the questionnaire it mentioned that water at their home is not running for so long because water authority close the line, this problem become deeper when a person mention they do not want to pay for water every month since water is not running 24 hour they want to pay that if it is at least the schedule are stable. According to water authority this conflict has been going for long time. Because at that area there is no water meter in the house that can count a litre of water so the price was flat every month while the water flows less than 24 hours and not stable. Other prove was also known within the report in HSW project that some false SMS mention about water payment instead of water problem and some report about unexpected problem such as water leaking in specific area.

According to overall findings, water problem is not mere lack of water or clean water it is also about pressure of water and even about payment of water bills. Related to the signboard it is said that people can report if there is no water or water is not pure but the signboard not mentioning about water pressure or other problem such as payment and leaking.

4.3.3. Understanding about the signboard

From the awareness of user about the sign board, most of respondents do not aware about the sign board. From unstructured interview with a local people was also known that by the time instalment of the signboard there was no notification from local people, suddenly the signboard was plugged. This opinion has been proven by the fact that there are three locations that actually the water source is not from water authority or in other word the water is belong to private well.

From all of three locations, two locations were surveyed when water was running. At these locations, one location can be known about the knowledge by looking at schedule of water that most people said from certain society (not belong to water authority) while other location the knowledge of people can be known by doing the interview with the owner of water to get more understanding about the people.

Most of users at tap with code 135 know that the source of water is from private, water which been maintained by the society of that area, many people questioned about the purpose of the sign board at this area, especially about the use of the sign board. Other location is a tap with code 810 where the source of water is from Mr. Fakihi. The owner said he already has the schedule to run the water at that tap. He said the sign board was plugged in that without any notification first. The owner also said that if there is no water at that tap the people usually called him to run the water not by sending SMS.

Another tap is 084 but it was surveyed when water did not flow. After we do the interview from local people it can be found that the water is from certain person at the area, a local people also said that there are already certain mechanism about that tap that if local people want to use, she has to pay certain amount of money (5000 Tanzanian shilling/month) but when we confirmed it the owner of the water, he claimed that the water is for free and he confirmed it that the water is come from his private well. This information also in line with zero reporters at station 135, 0 reporter at 810 and 1 report at 084.

According to questionnaire about 87 respondents understand about the purpose of the sign board for making report complaint if there is water problem while 81 respondents do not understand the purpose of the signboard. It means around 50 percent respondent understand about the purpose of the signboard. To strengthen the argument from simple conversation in the field most people also does not aware about the signboard. One person tries to make conversation about the reason of the signboard. He said that why water authority build this kind of service while the authority itself the one who stops the water. he said again that by the time of premiere installation of JICA, people can have water 24 hours in a month but after that the water stop by only few hour per day. And know water authority want us to send the report about if there is water problem while authority is the culprit to make water in this area stops.

To understand about the signboard does not mean that they how to do it. According to data 15 (20%) women claimed that they know how to do it, while 58 (80%) women do not understand how to send SMS. 24 (25%) men claimed they know how to do it while 71 (75%) men do not know how to do it. In general, many people cannot do the correct SMS, this is also proven in the reporter database that many of SMS messages is wrong. It is a bit irony, because even though there are some agent who has job to report water problem and already trained about this kind of activity but still some of these people send the wrong SMS.

I also took simulation in at 12 locations while respondent fetching water. Respond from local people is very positive. Around 10 respondents smile and interested with the simulation and tried it once again with his/her cell phone or use researcher cell phone. And they said that they want to contribute. But, not in every location respond was so warming because at certain location with code 802, 824, 053 people were angry because they thought I am as a representative of water authority that want to know how suffer they are. The respondent said that water problem in their area has been happening too long, some of them said

years and months to express their madness. They also said that the service is useless because what they want is water not service. After the explanation about blaming and shaming and report can be seen in the internet most local people tend to calm and said that that they will think about it about becoming a reporter or not because to them that signboard is belong to water authority. And it is true that in the signboard there is label of local water authority there, and from previous socialization about HSW project, it is mention explicitly that they report to water authority.

Another conversation with group of people while fetching water also explain that they already have complained with phone call, paper, and going to water authority office directly but there is no change in condition, they still got water only few hours per days. These conversations contradict with explanation of 4 local leaders that all of them said that if he complaint directly to water authority after few days water will run again.

4.3.4. Schedule of water tap

Many users claimed that they knew about the schedule but according to water authority it was said that there is no fixed schedule for each area. It is true that some area has stable water availability but still there is no fixed schedule for each location except for the location with code 802 a. This also has been proven by no report about schedule or rationing schedule from water authority.

73 respondents claimed that they do not know about the schedule of tap while 95 respondents claimed that they knew about the schedule. Further question was asked to know from where they knew about the schedule and it is found out that 62 respondents know about the schedule from local friend, 16 respondents because of experience, 10 respondents know because of society group, 4 respondents know because friend who works at water authority, 7 respondents know because local leader.

As it can be seen from the numbers, that local people feel confidence about the schedule by knowing it from local people. It also can be inferred that the social connection to help each other is running. From mini conversation with one local people also it was known that they know the schedule the friend and experience.

4.3.5. Behaviour if water problem occur

From questionnaire it is known that many form of behaviour occur if there is water problem occur. Although the water is the main goal, technically there are different behaviours to reach it (table 4-1).

Type of behaviour	Number of respondent
1. Go straight to another location	90
2. Report it to Sheha and search for another source of water	16
3. Go to Zawa office to report it	8
4. Call or Send a letter to Zawa	3
5. Do nothing/wait until the problem is gone by itself	42
6. Fix the problem	1
7. Report it to society group leader	8

Table 4-1: Behaviour of respondent if water problem occur

According to data, majority of local people go straight to other location or do nothing instead of report it first to water authority or local leader. This data also shows contradictive result with interview with local leader that said that usually local people will report to local leader or straight go to water authority if water problem occur. It can be inferred that there is other location available to fetch water that makes them do not want to report about water problem.

According to the simple conversation and from observation in the fieldwork these people have already had other mechanism to fetch water. The interesting mechanism is by using pipeline from local mosque to local house. The plastic pipeline can reach hundreds of meters and it connects with the bathroom of the local house. Other mechanisms are going straight to other location which is easy to fetch water, such as hotel or a big factory. From simple conversation with local people about other source of water in specific area (location 825) he was mentioned the other source very quickly that in the same time pointed a finger into soda factory. It can be inferred from the respond that he was very sure that he will get water from that place. From observation it was found out other source of water about half meter from public water tap with the sign board (location with code 057).

Other answer which is interesting answer from the table is answer number 5 that mentions that most people prefer do nothing and wait until tomorrow if water problem occur. It can be inferred from the answered that people believe that water will flow again tomorrow which mean that the schedule is mostly stable. It is indeed from 4 weeks field work. In some area I repeatedly saw public the same public water tap and the tap always flowing the water at the same time such as public water tap in Kilimani district the water relatively stable although it run only in the third day of the week.

Other anomaly is also found in behaviour number 6 and 7 where people try to fix the problem or report the problem society group leader. To answer the anomaly it will be explained in next sub chapter about the reason why they choose specific behaviour.

4.3.6. Incentive to make local people participate in HSW project

This question was delivered to know what if it is possible to engage people participation in f-VGI looking to the actual situation that happens in local area. The question and the multiple choice answer were made very closely to the reality based on local leader information about incentives.

From the results it was found that 118 respondents actually want to become reporter if the SMS is free. According to some of them by sending 50 shiling for nothing is stupid and too expensive because no physical respond to fix the condition. This reason was also strengthened with observation of local people that actually having a real physical fight because of 50 Shiling. 26 respondents also want to be paid by getting extra SMS after sending SMS and 9 respondents want to be paid monthly. 10 respondents do not want to be paid because they know that water is free.

In summary, respondents actually want to be a reporter because the fact that majority of respondents only want free SMS instead of getting benefit from HSW project. This question was delivered after the explanation that HSW project is not belongs to water authority.

4.3.7. Reason why local people choose specific behaviour

Data shows that there are many reasons behind certain behaviour, it does not mean that the reason should be the same to produce the same behaviour, there is always magnitude in making decision to certain behaviour that depending to cognitive of every individual (table 4-2). This also in line with theory of motivation in general that said the reason for certain behaviour is very depending on the knowledge of individual (Anselme, 2010; Berridge, 2004).

Reasons for certain behaviour if water problems occur
1. Go straight to another location **Reason:** a. It is faster (58 respondents) b. The other tap is near (1 respondents) c. It has no cost (2 respondents) **2. Report it to Sheha and search for another source of water** **Reason:** a. It is faster (4 respondents) b. Local leader will complaint directly to water authority (8 respondents) **3. Go to Zawa office to report it** **Reason:** a. It is more face to face to water authority (6 respondents) b. The person knows people from water authority (2 respondents) **4. Call or Send a letter to Zawa** **Reason:** a. It is more face to face to water authority (3 respondents) **5. Do nothing/wait until the problem is gone by itself** **Reason:** a. It is faster (10 respondents) b. The person need to reserved the tap for tomorrow (2 respondents) c. It is the simplest way and no cost in it (3 respondents) d. It will run again (13 respondents) e. Society will fix it (2 respondents) **6. Fix the problem** **Reason:** a. It is not belong to water authority (1 respondents) **7. Report it to society group leader** a. It is faster (8 respondents) 8. Irrelevant answer (13 respondents) 9. Excluded data (32 respondents) because water problem never occur at code 802

Table 4-2: Reason for doing certain behaviour

From the table it can be seen that many people choose faster result as a reason doing certain behaviour in relation to certain behaviour. From the interview with local leader it was found that most people will go straight to water authority office because it is more face to face with water authority or report it to local leader because local leader will complaint straight to water authority. The data from location is not the same or contradictive with the explanation of local leaders. Majority of users prefer go to another source immediately or do nothing than have to report it to water authority or to local leader.

At behaviour number six and seven it can be concluded that the water is not belong to water authority. It is true that the tap is in public place but the water comes from private well. From the questionnaire local people asked the purpose of the signboard if it true that if water problem occur at that station water authority will come and try to fix it although the water is not come from water authority

4.4. Reason given by reporter

From the interview and from the SMS, event at the environment that happen that makes people send SMS is not always about water problem but also about other thing such as water payment and pressure (table 4-3)

Reason send the SMS	Number of reporter
1. Water was not running	32
2. Water does not have enough pressure	3
3. Water was not pure	5
4. Payment of water	6
5. Test the signboard	7
6. To inform there is no number at the signboard	1

Table 4-3: Reason to send SMS

The reason about reporting the event it does not always mean that people will use HSW project as a medium form reporting a problem for this case another questioned was asked to know the reason why they send the SMS instead what they usually do. According to finding, most of all send the SMS instead of doing something else is because they saw the signboard for this case they want to try the sign board whether the sign board can solve the problem or not the other reason because they said that they feel tired about water problem so they try a new way to solve the problem (by sending SMS to HSW project).

From table 4-4 it is known about the reason is to test the signboard. 13 reporters send SMS more than once while 41 reporters only send once and it is also means after they know the result, they do not send the SMS. From the interview it is known that they do not have problem at all with water or in other they do not use that public water tap as a main source of water

Unfortunately most of them felt that their SMS is useless because there is not physical respond about how to fixed the problem. From the data it can be inferred that most of them stop sending SMS at the second time because there is no actual respond from water authority to solve problem (table 4-4).

Reason stop sending SMS	Number of reporter
1. No reply	19
2. Test the signboard	5
3. Wrong reply statement	4
4. No action or change	23
5. Number is not available	1

Table 4-4: Reason stop sending SMS

As it can be seen that many people need physical respond in order to satisfy them. Nevertheless actually HSW indeed has a system that physical capability can check water problem immediately after the SMS being send. From the interview with water authority, indeed there was one event about the report that being responded by water authority physical capability and water authority try to fix the problem. But according to physical observation in the field, physical respond did not show up after people sending SMS. It was about three time real report and being checked immediately to location but no one come from water authority.

5. MOTIVATIONAL FACTORS GOVERNING PARTICIPATION IN F-VGI

5.1. Motivation for participation in f-VGI

5.1.1. Introduction

From literature review it was mentioned that motivation participating f-VGI can be anywhere while other author said that system have to entertain participant if want to engage participant. From these point of view methodology were made to judge motivation that can potentially can emerge because of the system capability and to assess motivation from individual that potentially can be satisfied by f-VGI where in this case is specific to HSW.

5.1.2. Personal

According to chapter 4, indeed there are water availability problem in Zanzibar. Result from section 4.3.2; it was known that most in the surveyed area only 1 location which has relatively the most stable schedule from all of samples the other area are prone to water problem. This evidence was also strengthened with the confirmation of water authority that mentioned about the lack of fixed schedule about water (fixed rationing). From this situation, some people indeed report water problem either through local leader, called water authority or went straight to water authority (section 4.3.5). By these evidence it is clear that complaint about unsatisfactory of water should be the main reason potentially people will report to water problem through SMS (HSW project). Furthermore, from section 4.3.2, the complaint is not only for water availability but also about water payment, water pressure. There were evidences from the SMS that people send SMS because they want to make payment complaint at their house. The evidence also in the same direction in reporter point of view that most of them actually have sent SMS because want to complaint about water problem only eight people have sent SMS not because of complaint (see table 5-3). But nevertheless, according to universal theory of motivation, motivation is not always just going in straight line with goal achievement it depend also on personal cognitive value. This is also proven that HSW project as medium to complaint is suitable for the condition in the field where there is water availability problem in that area. Potentially HSW project can be a system that can motivate local people to become reporter. From complaint and personal categorization the motivation is to meet own need (intrinsic).

Another personal reason is the continuation of complaint which is for blaming and shaming. Specifically at location, there were one or two people getting mad by the time researcher come to location (section 4.3.3). These people said that water problem has occurred even before the sign board was plugged. Local people thought that we are representative of water authority that wants to see local people suffer because of water. In their opinion the signboard is useless because what they want is not service but water. But after some explanation about blaming and shaming, they can send their voice to water authority local people can accept it. From anger and personal categorization the motivation is self expression (intrinsic).

There are other reasons that may not have straight relation to complaint or blaming or even has connection to human sensor web, the reason is monetary reason (section 4.3.6). It is known from the questionnaire and interview by phone that local people want to become a reporter as long as there is money return in it. According to the questionnaire, local people want to be a reporter if there is money benefit in it such as to gain more free SMS after they send SMS to human sensor web. From this

statement most people wants just monetary return like free SMS and others want monetary benefit from sending SMS. From money return and personal categorization the motivation is monetary return (extrinsic).

5.1.3. Social

Potential reason that people would want to send the SMS is also about social matter. The evidence is found at questionnaire and some unstructured interview with local people that there is no fixed schedule about the water tap (section 4.3.4). These people know the schedule by experience and by other friend informing the situation about the tap. By mean of knowing by other friend it means they use text message or phone call to invite their friend to fetch the water. Some people indeed wants to become a reporter just for the sake of reporting what happen in the field. There was an evidence in human sensor web that one reporter acknowledged the reason he send the SMS just to inform water authority about the missing code at the signboard in his local area or just want to say that there are leaking pipe at certain area. From helping each other and social categorization the motivation is altruism (intrinsic)

5.1.4. Technological

From technological point of view, many respondents became stimulated or interested by the time. We were showing the simulation of sending SMS through cell phone, many people being amazed or happy about the reply respond but many people also do not like it (section 4.3.3).

In term of amazed face, usually it was shown at location where water problem less happen and usually young individual, but at the area where water availability only 3 or 4 hour a day these people always complaining that the signboard is useless unless after sending the send the SMS water there is people come to bring water.

Curiosity also become part of the reason of local people wants to send SMS. There are about 5 participants that explicitly mentioned that the reason they send the SMS because they want to know what happen after they send the SMS (section 4.4). Most of these reporters are 1 time reporter it means after they know the result they do not send the SMS. From the interview it is known that they do not have problem at all with water or in other they do not use that public water tap as a main source of water. From curiosity and personal categorization the motivation is learning (intrinsic).

5.1.5. Capability of the system that can satisfy motivation in users

Before comparing potential motivation from fieldwork with motivation conceptual frame work, first the HSW system must be assessed by existing VGI conceptual framework to get motivations which are suitable for the system (table 5-1). And predict the closest relevance with the system base on case study.

motivation	Relevance to f-VGI (HSW)	System that can satisfy the motivation
Meeting own need to solve water problem	Individual want to solve water problem by complaining through VGI	Physical respond capability
Altruism	Individual want to help and want to helped by each other	Subscriber and visualization capability
Learning	Individual want to learn about the new reporting service	SMS reply capability and Visualization capability
fun	Individual feel satisfied if the individual can see the result immediately	SMS reply capability and visualization capability
Socio political	By contributing SMS and data is	Visualization capability

	shown in time series, in long term there is change in water availability	

Table 5-1: Motivation that emerge because of capabilities of the system

In general Visualization capability and SMS reply capability can satisfy motivation in learning, altruism, fun and socio-political motivation. Meeting own need to solve water problem can be satisfied by physical respond capability and altruism can be satisfied in subscriber capability.

5.1.6. Discussion

To resume, the analysis the motivation from the individual in the field are to meet own need, altruism, monetary reason, learning, and fun. Almost all of the motivation from the individual can be satisfied by system. Only monetary return and self expression are not in the list of system yet, because until now to send SMS about water problem the SMS is not free. And about self expression, there is no capability that can explicitly satisfy self expression. In conclusion it also can be said that the system is already good in handling people (environment) motivation. Related to literature review about supply and demand and the use of ICT (Homburg, 2008; Verplanke, et al., 2010), this means that potential supply and demand about motivation and about potential use of ICT are fulfilled with HSW system.

5.2. The GAP in participation in f-VGI

5.2.1. Culture

Related to complaint about water problem, local people has existing system to make complaint by reporting to local leader so local leader can complaint it straight to water authority (4.3.5). As it was known that water problem in Zanzibar is happening long time before even before signboard was plugged at location (section 4.3.3).

Another culture that has been shaped also about water problem itself, water problem is Zanzibar is way too long happening in Zanzibar so local people is not always depend too much to public water tap anymore but instead they change it by building common well that can be used together or by using private well and distribute to other neighbour (4.3.3). For the area which has no common well, usually they use other source of near the neighbourhood such as local mosque, factory or buy it from local vendor (section 4.3.5). this is also in line with the theory of motivation that people try to reduce uncertainty which is in this case is water deprivation by doing something else to get the same result (water). It is hard to replace usual activity of the system unless there is other factor in HSW project that in the end by sending the SMS the water will flow again.

Other factor is about water authority itself. Many local leader and local try to complaint by using letter, phone and other means to get water but there are no respond or no change after the complaint (section 4.3.3). They think it is wasting of time if they have to complaint again. This culture makes local people do not want or less motivate not only reporting through HSW project but also to use other means. They prefer to solve it by them self and they can do it. The respond of people who use public water tap where he/she has his/her own private tap home felt that the signboard is useless service because they know that the one who stop water is the authority itself. From the unstructured interview they said that why water authority create this service while water authority itself who stops water. It should be water authority that tells local people about the schedule instead of local people report to water authority (section .

5.2.2. Procedure

From the literature it was mentioned that the system is working, and indeed it is working but not all of the system is working. There are parts of the system which play a key role to make them motivated to contribute to HSW project but sadly until now it is not functioning very well.

For instance, in some location the code is wrong and the reply mentioned that they are dialling the wrong code. This problem hinders local people to send more SMS at the second time. Also there in some moment there is delay in reply message that at certain hour suddenly there is reply from HSW project.

Another problem is fast decrease and slow increase of trust that is not working, it should whenever there is SMS coming from local people there is someone who check it whether it is truth information or not. If this procedure is working well people will know that his/her SMS not only mere digital reply but also there is actual respond from HSW project. The evidence can be found from the interview with reporter that said they stop sending as SMS at the second time because they want actual or physical respond where people will come and fixed the problem but there is no people come or their expectation is unsatisfied.

5.2.3. Accessibility

Many potential motivations can be achieved from visualization HSW at internet, but sadly until now, most of user of water tap does not use it. Although water authority can see it and can take benefit from it but for citizen who uses the tap only get plain reply. The evidence can be found by no people protest in some location that their SMS geographically being address to another place or another country at the internet.

Many user of water tap also do not have cell phone. As first requirement of HSW project to work is to have cell phone. Because of the tools, people become unmotivated to participate in human sensor web because they have no access to participate.

5.2.4. Socialization

As a matter a fact socialization of HSW project is not reaching very well to the ear of user of the tap. Although broadcast from media such as radio broadcast and some focus group discussion with local people was being held but still from the questionnaire there is evidence that many people does not understand about the purpose of HSW project. Technical evidence was also found where many SMS from the database of human sensor web which is wrong even from some agent who is already been trained before still cannot send SMS correctly. According to section 4.2.1, the purpose is translated into complaining system but in reality there is not physical respond.

5.2.5. Discussion

Although in potential they are matched in term of motivation but the reality shows that not much people participate. From literature review it was mentioned that in order to established f-VGI to get many participant things such as cultural, policies and process need to be seen in reality(David J. Coleman, et al., 2009) and also about the reality of the use of ICT(Homburg, 2008; Verplanke, et al., 2010). Anselme (2010) also mentioned about individual gathering much information in novel area and in this case are reversed where HSW project has to be socialize often to potential user. From those base line cultural, procedure, accessibility (technology) and socialization are observed in the field to get results. And the results:

a. from the culture it was known that there are already complaint system in research area which is relatively effective according to local leader
b. There are systems in handling in water problem in some area whether it is difficult or not. This also in line with Anselme (2010) where people try to reduce uncertainty (worrying problem) since the problem always happen, it is natural that people already make a way to solve problem

c. the public opinion that has already been built at water authority that the water authority cannot solve the problem.

From procedure, accessibility and socialization it is also known that there are un-perfect system in HSW project that suppose to be running but in reality is not. For accessibility is about cell phone ownership and internet access. Although potentially the system can fulfil almost all of the motivation from the people, but the fact was from result only 50% people has cell phone and all of respondent do not know about the visualization in the internet. From the result also known that many people do not understand about the function HSW project or there is no awareness before. These fact means the socialization is not fully success. It can be inferred from this that all of these reality barrier can make them un/less motivated in participation f-VGI

5.3. How to fill the gap

In logic, only around 50% of 168 respondents have cell phone but number of reporters is 54 people, it means HSW indeed have positive effect to the society. To improve the user participations in HSW project (f-VGI). There are things that should be improved there are should be remain yet.

Basically, HSW project has a system which is now potentially can motivate people to participate in HSW projects. But there are prove in the field that most respondents do not aware about the signboard. And there is ambiguity of conception that HSW project is belong to water authority or it is test innovation. The effect of this ambiguity is very big since negative service from water authority on water service that in the end local people feel useless to participate in HSW project.

So, by these reasons, socialization is the first priority that has to be improved. Because from socialization, some barrier in cultural can be breached. Procedure also has to be improved. But internet accessibility and cell phone accessibility yet cannot be improved.

5.4. Consequence for the framework of motivation

In the literature review it was mentioned that the conceptual framework was built based adaptive existing conceptual framework. This conceptual framework was adapted from motivation conceptual framework about motivation that mention about motivation in participation to VGI (Budhathoki, et al., 2010). The reason to make adapted conceptual framework because by analyzing the existing conceptual framework, it was found that the existing conceptual framework only deals with people who have participated in VGI. To answer the research objective, the existing conceptual framework need to be adapted that can answer the research questions.

In order to adapt the framework, logical assumption what will happen in the field was made based on uncertainty theory of motivation (Anselme, 2010). To fill the need of water, people can do certain behaviour to achieve the goal, people can go to other place, can complaint, or do anything for the sake of water. To look for water availability problem and un-satisfaction about water service, potentially many people will contribute to HSW project as a fast medium to complaint and even for blaming because HSW project can facilitate individual needs. From this assumption conceptual framework of this research were made and try to differentiate motivation in the side of environment (individual) to get know what motivation potentially can make individual contribute to HSW project and motivation that can emerge from individual because of the system.

From the conceptual framework, details to answer research question were made. Related to subject of research, questions were delivered to know the actual behaviour and to search what kind of behaviour that potentially motivated to participate in f-VGI. To know what potentially make individual want to participate in HSW project, data from the field about individual behaviour were gathered either by

interview, interview questionnaire or observation. And to know what capability of system that can give make people motivated also were analyzed with all root to the conceptual framework. But in analyzing the actual people motivation in participation in HSW project was not explicitly mentioned in conceptual framework since the framework only mention participation and not participation. And analyzing barrier also not mentioned explicitly in conceptual framework and the fact in initial conceptual framework mentioned about participation and not participation in context of f-VGI. For this case method to analyze actual motivation in HSW project and the barrier was made. Concept of Budhathoki, et al (2010), Coleman, et al. (2009), Homburg (2008), Verplanke, et al (2010), Anselme (2010) were analyzed and used to develop method to answer research problems.

From the result, it was known that the behaviour of local people if water problem happens. And it was found out that if water problem happens, most people did not complaint, either by reporting to local authority or local leader. The result also showed cultural, accessibility, social and procedural condition. And the results also showed capability system of HSW project. These results were analyzed on the base of methodology that was made. And It was found that many barrier that can prevent them in participating HSW project although potentially, most of behaviour at the field can be satisfied by participating in HSW project.

As consequence of motivation and barrier which mention in section 5.2.1 which also come from literature review, new framework is made to for the purpose in designing and improving conceptual framework of f-VGI (Figure 5.1).

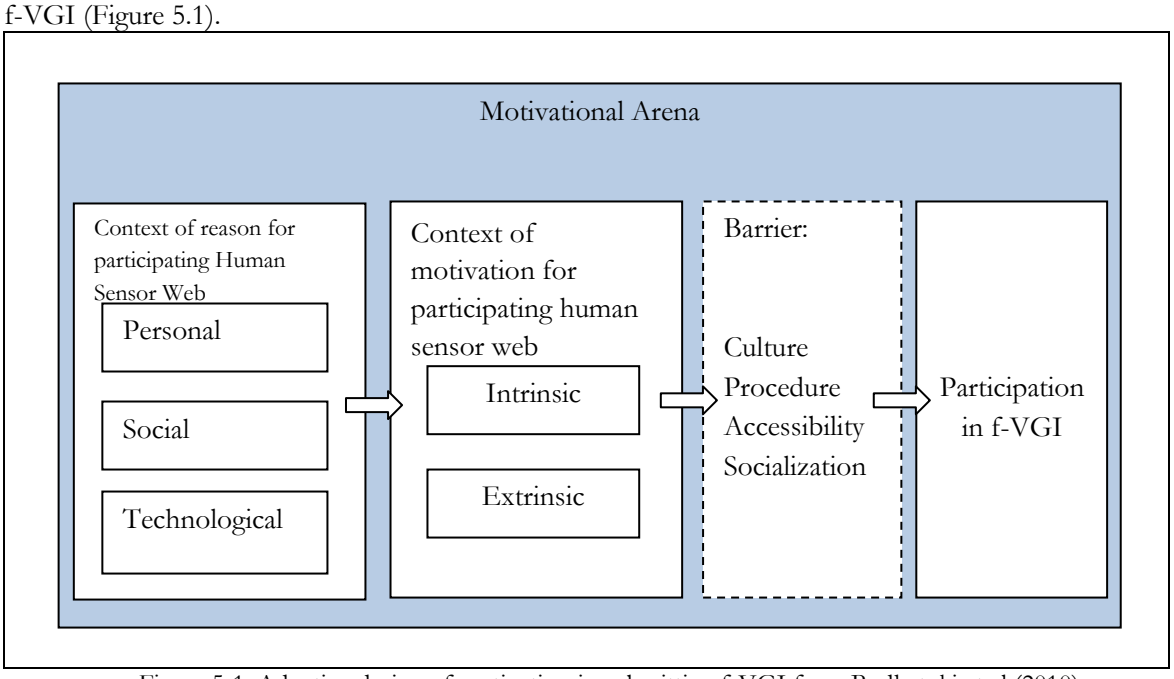

Figure 5-1: Adaptive design of motivation in submitting f-VGI from Budhatoki et al (2010)

6. CONCLUSION & RECOMENDATION

6.1. Conclusions

The main objective of the research is to assess the motivational factors that govern participation in facilitated-VGI. The conclusion is drawn based on research questions:

What kind of motivational factors are working in facilitated VGI?

Motivational factors that working in f-VGI is related to individual stimulation that can be satisfied by participating in f-VGI. At the case of HSW, the stimulation is as follows:

1. Because of unexpected situation about water that makes individual want to complaint, angry to meet individual need
2. Because of unexpected situation about water that makes individual want to help each other
3. Because of the signboard or the SMS reply that makes individual curious or fun
4. Because the individual knows that there is no change by sending SMS then the individual want to get monetary return for sending SMS.

These stimulations some of them can be satisfied by HSW while other such as helping each other, and monetary reason cannot be fulfilled yet. Motivation such as curious and fun can be satisfied by the system capability. Other motivations such as to meet own need, want to help each other cannot be satisfied yet by the system although potentially can be satisfied by the system capability. But there is monetary return motivation that until now is not on the system capability.

What barriers exist for participating in an f-VGI reporting system?

Potentially almost all motivation from question number one can be satisfied with HSW, but there are barrier that make individual hinder to participate. The reasons are as follows:

- Existing complaint system in research area which is relatively effective
  There is existing complaint system in local area which according to local leader which is more effective to than HSW. It is more effective because it was found out that SMS which is send by the individual does not have any physical respond. The respond is only mere textual reply that says thank you for reporting while by going straight to water authority the individual feel more face to face to water authority.
- Existing system in solving water problem.
  To solve water problem, there are some problem solving in the society and individual itself to solve the problem or in other word not depending so much to water authority source of water. the problem solving are: some of the society making small society to build common well that can be used together or Individual has known alternative source of water.
- Imperfect procedure of HSW
  Potentially HSW can satisfy individual needs such as fun, curiosity. But other motivation such as meeting own need and to help each other (altruism) not working, although there are capabilities in the system that can handle that kind of motivation. For complaint, until now it is not working because what individual need is physical respond that in the end can fix the problem not only mere textual reply without any solution. Because of this problem, the chain reaction is people not yet using it as a medium to share information to help each other (no subscriber).
- Socialization of HSW
  Socialization is the major problem, because water problem is happening in research area too long that individual and society have created their own system to solve the problem. If the socialization is not made correctly of individual will continue to solve water problem with a way which is already known.

There is also ambiguity about the purpose of HSW whether also as complaint system or only as notification system. This is related to the fact that purpose of HSW which define as a tools which service providers can use to better manage services and it true the signboard says into more specific to complaint where there is obligation for water authority to answer the question but the fact when there is complain to HSW there is not physical respond from water authority.

- Accessibility problem
  To participate in f-VGI in this case HSW the individual should have cell phone, if individual does not have cell phone it will make them hinder to participate. Another accessibility problem is the internet accessibility because user do not use internet or do not know that the complaint can be seen in the internet.

How can barriers to participation in f-VGI successfully be removed?

Not all the barrier can be removed. Barrier such as accessibility and existing system to solve the problem cannot be removed but by making good socialization it can make understandable of the use of HSW while still using the existing technique to solve water problem. Socialization has to be cleared since there is until now ambiguity of purpose in the system whether the system can take part of complaint system where physical respond is needed or it is just testimony or notification where does not need any respond. Because in the signboard said as complaint system but the fact is there is no real respond from water authority.

6.2. Recommendation

For further research:

1. It is recommended to test the adaptive conceptual framework in designing new system and improving a system especially in f-VGI context. Because this research basically from study case approach it is not yet known the impact if it is used in designing in different context
2. This research is qualitative research where some finding and results in the field actually come from observation. For further research more quantitative approach is recommended in motivation of f-VGI

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APPENDICES

Appendix 1: interview questionnaire for user of public water tap who is not reporter

1. Questionnaire number: … **2. Water Point Number: ...** **3. Shehia Name: …** **4. Name of Interviewer: …** **5. Date: …** **6. Time: …**	**Sex of respondent: Male/Female** **Age: …** **Name of Respondent: …** **Shehia Respondent: …**

The purpose of this research is to understand **the reason of people reporting or not reporting water problem** using SMS in public water tap. AND THIS RESEARCH IS NOT RELATED TO ANY ORGANIZATION

Please make a circle to the multiple choice or explain "others: .." in your own words.

1. Do you understand this signboard? Yes No

2. Do you think the signboard is confusing? Yes No
   If yes, can you explain in what part that the signboard is confusing?

3. Do you have a cell phone? Yes No
   If **no**, who owns a cell phone in your family?
   a. Parents
   b. brothers or sisters
   c. Others: …

4. Do you have your own water source in your home? Yes No

5. If you answered no above, where do you get water from?

6. what makes you to come to this public water tap to fetch water
   a). its closer to my home
   b) The water is cleaner there
   c.) I can be able to report when there is no water
   e) Others, please specify

7. How do you carry the water from public water tap to your house?
   A. By walking B. By biking C. By using motor cycle D. By using car E. I do not carry it, I use it at this place F. others: …

8. How many minutes does it take you to take the water from public water tap to your house?
   ……

9. Do you know the schedule when this public water tap will have water? Yes No
   If **yes**, from whom do you know the schedule?
   a. Friends who works at Zawa
   b. Sheha / local leader
   c. Local friends
   d. Others: …

10. Do you ever find this public water tap without water? Yes No

11. Do you ever find water at this public tap having bad quality? Yes No

12. Until when do **you usually** tolerate that this public water tap has water problem (no water or the bad quality water)?
    A. Right away B. After one day C. one to three days D. More than 3 days E. other: …

13. What **do you usually** do when there is water problem in this public water tap
    A. Search for another resource without report it because I know it is free and I cannot complaint about something which is free
    B. Report it to Sheha and search for another source of water
    C. Go to Zawa office to report it
    D. Call or Send a letter to Zawa
    E. Do nothing/wait until the problem is gone by itself
    F. Send SMS just like the signboard says
    G. Others: …

14. From your response of question number 13, why do you usually do that?
    A. It is Faster B. it is more face to face to authority C. I know people from Zawa D. Other: …

15. **How do you** usually use this free of charge water for? (the answer can be more than one)
    A. For domestic use (drinking, cooking, shower, laundry, etc)
    B. I use it so I can sell it again
    C. I use it to support business (car washing service, motor washing service, etc)
    D. Others: …

16. Since you know it very well that the water in this public water tap is already free for you, What makes you want to report about water problem at this public water tap through SMS, what kind of incentive or rewards do you want **the most**?
    A. No need for rewards, but to make sure the SMS is free of charge
    B. Make sure if I (pay)send an SMS about water problem I will get 3 more free SMS from phone provider (Zantel)
    C. No need for rewards, because I have the water for free
    D. I want to be paid monthly (monthly rewards)
    E. Others: …

17. Do you think if that reward (in question number 16) is stopped you still want to send the SMS?
    Yes No
    If No, can you explain why? Because …

18. Do you think that reward (in question number 16) will make you continue reporting water problem when water problem occur in this public water tap? Yes No
    If No, what kind of other reward can make you continue reporting whenever there is water problem in this public water tap?(it can be more than one)
    A. ……..
    B. ……..
    C. ……..

19. Do you know that all of your SMS can be seen transparently in the internet at http://geonetwork.itc.nl/zanzibar/ and you can know all of water problem report through all Zanzibar? Yes No

20. To improve the understanding of people around this public water tap to get more awareness about water problem by preferably sending SMS through Zawa, what kind of improvement from Zawa do you want?

A. Zawa to educate the people in each Shehia about sending SMS if water problem Occur
B. Zawa should respond quickly by going to the location after they have received the message
C. Keep the SMS free
D. Others: …

21. Do you think if this public water tap is not free anymore you can still report about water problem more often than when the water is free? Yes No

22. If someday this public water tap is not free anymore, what kind of responds from Zawa do you want **the most** to make you send your SMS about water problem?
    A. There should be an SMS reply from Zawa about the schedule to check the water problem at this public water tap and Zawa will check it.
    B. I want Information of each location where water is available in my phone
    C. I just want my free SMS when I send it
    D. I want Zawa to meet me straightforward
    E. Others: …

23. What kind of payment will you want in order to pay for this public water tap?
    A. Pay it directly from this public water tap based on water meter that I use
    B. Make a collective payment for one region for each month, and pay it straight to Zawa
    C. Make a collective payment for one region for each month, and pay it by using cell phone
    D. Other: …

24. For example, if you have sent your SMS about water problem in this public water pipe, and you have paid for the water, what is the cause(s) that makes you not want to send the SMS anymore or prefer to report it in a different way? (it can be more than one)
A. I cannot meet the people from Zawa
B. There is no reply SMS from Zawa
C. There is a reply but I cannot meet Zawa Technical division
D. Others: …

25. How often this public water tap has a water?
a. Two hours/ per day b. one day of water and two days no water c. others: ….

26. Look for water problem that happen right now in this public water tap, do you prefer this public water tap free or not free (paid)?

27. ANY SUGGESTION?

Thank you for the cooperation

Appendix 2: Structured Interview by phone with reporter

1. Besides from this public water tap do you have other way to fetch water?
   a. Yes
   b. No

2. Do you know the schedule when this public water tap will have water?
   a. Yes
   b. no

3. Until when do **you usually** tolerate that this public water tap has water problem (no water or the bad quality water)?

4. What you usually do when there is water problem in this tap?

5. What is the reason you send the sms at first time?

6. Why you send SMS instead of doing what you usually do?

7. What did you expect after sending the SMS?

8. After you send the SMS did you get what you expect?
   a. Yes
   b. No

9. Why you stop sending the SMS?

10. If Zawa cannot response as you expect, what kind of other reward you want the most that makes you want to continue sending the sms even though you know there will be no response from Zawa?

Appendix3: Structured Interview with local leader

1. Usually when there is water problem how do they report it?
2. Until when these people have willingness to report water problem?
3. How many days they can accept water problem?

4. Did people water already now about the rationing from water authority?
5. People in general have cell phone or not?

6. Why people choosing go to Zawa instead of SMS?
7. Is there any person as far as he knows who send SMS about water problem?

8. If these tap is lack of water, does people go to other sources or do anything else?
9. Do you know that by reporting by SMS can bee seen through the internet?

10. To make this people want to report water what kind of incentive do you think?
11. Besides water what else?

12. Is there any other incentive?
13. Compare going to Zawa how long?

14. What should be Improve in this human sensor web?
15. If everything is improved do you think people want to pay for water?

Appendix 4: Survey results from location reconnaissance

no	longitude	latitude	hsw_code	digital coding	physical condition	water flow at reconnaissance	surveyed condition
1	39.193707	-6.166048	053	not tested yet	half broken	no	no water
2	39.197722	-6.167694	057	test	good	no	no water
3	39.196194	-6.166250	059	test	good	no	no water
4	39.201361	-6.175806	101	test	good	yes	water is flowing
5	39.197083	-6.156417	114	not tested yet	good	yes	water is flowing
6	39.211333	-6.161528	135	test	good	no	water is flowing
7	39.202306	-6.168500	190	test	good	no	water is flowing
8	39.222472	-6.160639	227	test	good	no	no water
9	39.202028	-6.171250	802	test	good	yes	water is flowing
10	39.201637	-6.158198	802	test	only pipe	no	water is flowing
11	39.211111	-6.172833	810	test	only pipe	yes	water is flowing
12	39.222639	-6.082583	812	not tested yet	good	yes	water is flowing
13	39.222111	-6.080583	813	not tested yet	good	yes	water is flowing
14	39.224889	-6.074278	814	test	good	no	no water
15	39.229139	-6.073333	815	test	half broken	no	no water
16	39.250694	-6.068111	816	test	no tap	no	No water
17	39.252333	-6.078111	817	not tested yet	half broken	no	no water
18	39.252750	-6.110583	819	not tested yet	good	no	water is flowing
20	39.213417	-6.150444	825	test	only pipe	yes	water is flowing
21	39.215083	-6.157806	828	test	only pipe	no	no water
22	39.218639	-6.159250	829	test	good	no	water is flowing

Appendix 5: Unstructured interview with local people

First person

1. Why are you angry?
2. Did you ever send SMS before?
3. Can I have your number?
4. Do you know the purpose of this sign board?
5. Do you understand now that your SMS can be seen by the whole world?
6. So, after this do you want to report
7. Do you aware about this water tap before

Second person

1. Do you use this public water tap?
2. Why you do not use it?
3. How much it cost you to use this public water tap?
4. Where is the other resource?
5. Is that the place you usually fetch water?
6. Do you aware about this water tap before?

Third person

1. Why the pressure is so low?
2. How long you have to wait?
3. What do you do if it is stop?
4. Is that tap over there is belong to water authority?
5. So if this tap is stop you use that tap also?
6. Do you have to pay if you want to fetch in Soda Company?
7. Do you aware about this water tap before?

Appendix 6: compilation of unstructured interview with water authority

1. In this Kilimani area besides agent, do you have other reporter?
2. Do you have rationing schedule about each water tap?
3. How the system works in this water authority?
4. Where is the most vulnerable area about water availability?
5. What do you think about the users, do you think they are opportunistic person?
6. Do you think all these ladies have cell phone
7. Why the coordinate is wrong?
8. Why the water meter is not working?
9. Is it free to text SMS to HSW?
10. Do you have any complaint data?
11. When Zanzibar got total black out, do you get many complaints?
12. What about this Mablue water tap, why until now the water is still flowing while the other don't?
13. What idea do you think the best way to make these people want to contribute?
14. Why many people wash the car here?
15. Why many people wash the motorcycle here?
16. Why the tap is gone?
17. Why there is no signboard?
18. Have water authority always responded about complaint report from HSW?

Appendix 7: System report

Code	Other code	Explanation
802	53-0-200802	wrong place in zanzibar
114	53-0-104202	Not clear
834	53-0-108205	Wrong country
824	unknown	Unknown code to server
833	unknown	Unknown code to server
829	53-0-103421	Wrong country
135	53-0-103221	Slide a little bit
227	53-0-102021	Still in the area
059	53-0-102021	Still in the area
190	53-0-101021	Still in the area
057	53-0-102520	Still in the area
814	53-0-212102	Wrong country
816	unknown	Unknown code to server
101	53-0-102123	Still in the area
813	53-0-232104	Wrong country
812	53-0-232103	Still in the area
825	unknown	Unknown code to server