The Finnish Sustainable Development Of Water And Sanitation; A Case Study Insights For The Lusaka Water And Sanitation System Of Zambia

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Abstract: Water and sanitation situation is worse for the cities within the developing countries like Lusaka city of Zambia. Currently, more than 2 billion people have been estimated to be living at a reduced access to freshwater resources and by 2050, at least one in four people is likely to live in a country affected by lack of proper supply of water and sanitation services. Fortunately, progress has been scored in some countries of the developing world like Finland, whereby developed communities over 90% of the world’s population now has access to improved sources of drinking water. This is therefore good platform for insight for the cities of the developing world. According to the sustainable development goal number 6 of water and sanitation, the accessibility of clean water and good sanitation services for every community is an important human endeavor. However, this is not so and it is because of an array of many reasons coupled with bad economics or poor infrastructure, a lot of communities do not have access to adequate water supply and sanitation services. This study set out to understand the Finish sustainable development of water and sanitation system and what insights Lusaka can learn from such undertaking. This review assessed management approaches employed in water supply and sanitation service provision in selected parts of Lusaka, Zambia, following the 1994 Water Sector Reforms in Zambia. One of the successful sustainable development ideas of Lusaka is that of the faecal sludge system which has been presented in this paper to show some strides that Lusaka has scored in this area. In the Lusaka sanitation case study, the purpose of the review is to try to contribute towards measures meant to address the sanitation service delivery model for urban and peri-urban areas of Lusaka. In conclusion to improve sanitation and access to drinking water, there is need to increase investment in management of freshwater ecosystems and sanitation facilities on a local level in Zambia and other several developing countries within Sub-Saharan Africa.

Keywords: faecal sludge system, sanitation, sustainable development, water system.

1. Introduction

In order to have a sustainable city, it cannot go without mentioning that water and sanitation are crucial components requiring sustainable approaches. The global primary needs for water have always determined the location, size and form of our cities, just as water shapes the character and outlook of their citizens, hence the sustainable development goal number six of water and sanitation. The health outcomes due to unclean water and sanitation, sustainability experts have appreciated the potential linkages of water with health and the need for sustainable approaches. Undeniably, the contemporary field of public health should be indebted to the sanitary engineers who endeavor to provide clean water and safe disposal of human wastes in escalating cities of industrialization. Most of the developing countries water and sanitation systems face infrastructural and resource deficits, this often leads to cities having limited access to safe drinking water and the access to good sanitation services are also often fragmented in most urban communities. In sub-Saharan Africa, for example, 38% of people do not have access to safe drinking water and 26% practice open defecation. A lack of access to water is even more prevalent among the 800 million slum dwellers worldwide. It has been established that Improving sanitation is ideologically installing technological systems, but also about changing the general sanitation practices of communities within any given society. Many communities fail to aspire for appropriate global sanitation because to achieve that it requires application of appropriate sustainable development ideas that support organizational structures, and carrying out awareness programs to provoke a sustained behavior change of communities. It should be noted however that it is very difficult once the bad behavior practices of sanitation are inherent among communities to foster change of motivating individual and organizational change on a more general level. This study set out to understand the Finish sustainable development of water and sanitation system and what insights Lusaka can learn from such undertaking. This review assessed management approaches employed in water supply and sanitation service provision in selected parts of Lusaka, Zambia, following the 1994 Water Sector Reforms in Zambia.

2. Methodology

The Takala [8] paper was chosen as the main paper that highlights the current practice in Finish on water and sanitation in order to categorically settle Takala study the process was consisted of three stages.

1. Search by keywords (including both the keywords provided by the author and the keywords used by the databases when indexing the document).

This search was carried out in the SciVerse Scopus bibliographic database, the largest abstract and citation database of recent peer-reviewed literature (Elsevier, n.d.). The keywords chosen aimed to capture literature related to water and sanitation in Finland. For this purpose, keywords were searched in pairs: water, sanitation, or Finland were matched, no date restriction was added but the purpose was to at least arrive at the most comprehensive paper for the last 5 years. This exercise yielded 312 articles.

2. Abstract review to select relevant papers.

The abstracts of the 312 papers were reviewed in order to identify the works dealing specifically with water and
sanitation of Finland. The other articles that were excluded were removed because of recurring themes. Through this process, 8 articles were identified as falling within the scope of the review.

3. Thematic grouping of selected papers and content review.
The 18 selected articles were then divided into groupings by topic for content review by the author. Articles spanning several topics were grouped according to what was judged to be the primary perspective presented in their content. This lady to the inclusion of the tankala paper as the best representation of water and sanitation systems of Finland.

3. Results and Discussion
A study by Galli et al., [9]. This paper establishes that sustainable development means staying within global boundaries while simultaneously ensuring adequate resources for all [10]. The most applicable paper to discuss the Zambia water and sanitation systems is a realistic paper by Takala [8] “Understanding sustainable development in Finish water supply and sanitation services”, this paper has echoed that in order to provide clean and safe water as well as sanitation services there is need to employ sustainable development ideas. Because the services of water and sanitation are at the heart of sustainable development and this is because in order to provide these services there is need to ensure stable environment [11]. Takala defines sustainable development as the advancement of human well-being within the planetary boundaries, now considering this definition it covers and captures well all the definitions of sustainable development that have been reviewed in this paper, this is so because social, environment, economic and work conditions of workers, are all well captured in this definition. Human beings survives on the balance of all these tenets. Further, the author discusses her topic of water enshrining it on the sustainable development goals and focusing on goal number 6 which addressed water and sanitation. From the article it is well argued that there are many challenges for many developing countries as there is a challenge is attaining clean and safe water and sanitation for the populations and that about 663 million people lack access to clean water and 2.4 billion to improved sanitation [12]. The argument to be raised in this paper is whether it remains relevant to discuss sustainable development for counties that have already attained these services like Finland, it will be detrimental to bring sustainable development to this level of understanding as strategies in sustainable development are ongoing requiring monitoring and evaluation to ensure a continuous provision of these services without undue interruption. This argument can be supported because countries with improved services of water and sanitation also continue to experience many challenges that endanger the continuous provision of these services [13]. The bigger part of water is that it is not only important for humans but also for the environment and the way we use water may consequently lead to disturbances of how we need to take care of our environments. The rationale in this paper is that sustainable development ultimate goal is to target environmental challenges and social systems, because these are complex and ever changing, this can be advance by the idea that sustainable development is socially constructed phenomenon. Also it must be understood that sustainable development cannot be defined in absolute terms and this is why in this paper there is not obvious reliance on one single definition of sustainable development. This is because sustainable development changes with dynamics of time and approaches used depends on the prevailing situation [14]. This paper finds that those that manage waters systems seem not to understand what need to be done in water resources area. There is need to embrace sustainability if water issues are to be addressed. Foremost mangers of water need to understand population growth and dynamics of climate change and as well as the ever increasing demand for water as a results of the industrial revolution activities such as agriculture and mining. There is also need to embrace the role of other stakeholders to foster inclusion and participation in establishing approaches or management of water and sanitation services that are more sustainable and progressive [15]. There is no need to use a top down approach if the problem of water is to be addressed and that’s why community participation is very crucial in this undertaking.

Funding for sustainable development ideas
Because of the gaps in the preceding article and failure to establish the ideologies that prompted realization of science as the major driver of sustainable development, the following article, “Bridging funding gaps for climate and sustainable development: Pitfalls, progress and potential of private finance” by Clarke, Reeda and Sunderland [16]. This article seeks to address the importance of funding regarding sustainable development ideas such water and sanitation. What is evident from this study is that it is increasing becoming financially burdensome to invest money in environmental issues as these issues increasingly becoming enormous and needing much more financial investment to handle. there is some strides that has been scored especially after the Paris agreement, and it appears that some funds have been secured and what remain is on how to unlock these funds. From the article it has been inherently established that in order to bridge the gap between the financial investment required and the current obtaining investment that has been reserved, there is need for a private finance to show course by fulfilling some of the sustainable development agendas that has been advanced. However, throughout the literature review it has been established categorically what sort of sustainable development commitments the private finance sector need to fulfil, this paper falls short on that score. Reviewing how private finance should go about fulfilling its commitment could be very helpful for such institutions if such commitments are to be met with the required time. The failure to present such commitments could be attributed to the methodological limitations in what papers were reviewed for the focus and the focus was simply to discuss gaps and not present the needs of public finance sector. The other issue would be the issue of using snowballing to get the data, documents may miss out on certain information if those that are choosing the next set of documents seem to be aligned with a certain type of information as is the case in snowball sampling. According to this paper to leverage Sustainable development certain approaches need to be enforced such as an approach of “finance mechanisms for sustainable development efforts”. The paper also fails to define what sustainable development is and the aspect the author seems to be addressing in light with sustainable development.
Conceptualizing sustainable ideas for community

“Incorporating Sustainability/Sustainable Development Concepts in Teaching Industrial Systems Design courses”, the paper highlights how sustainable development will be a key issue among people being trained engineers and hence the inclusion of sustainability in school curricula. This paper defines sustainable development as “development of industrial systems design project focusing on economic, social and environmental dimensions/pillars”, it makes good observation that the concept of sustainable development should be embedded in curricula of those who aspire to design engineering systems so that from the onset the importance of sustainability is appreciated and well advocated for in engineering designs [17]. From the foregoing articles the water and sanitation cases study is discussed in line with this review. The case study is centred on issues of water and sanitation because the two can only be discussed in tandem in order understand the complexity of the other. The case study does not however depict the all of Lusaka but just picked on Peri-urban areas of Lusaka and using Mtendere as a proxy to underpin the water part of the case study, while Kanyama compound to depict the sanitation side of the case study. In the Lusaka sanitation case study, the consideration is to try to address the sanitation service delivery model for urban and peri-urban areas of Lusaka. This case study has been advanced because it tries to show how service adapted to the local conditions, can deliver sanitation services. The other part the case study highlights the fact that there are other many details other than the technical systems if one has to discuss sanitation service delivery. Therefore this case study is cognisant of the financial revenue model as well as sanitation technologies and the focus of the case study is on the faecal sludge management. All these problems presented are as a results of how formerly illegal way of doing things was allowed, however the case study also discusses the formalisation of such illegalities to curtail on the presented problem. It is imperative in this case study to establish a few facts about Lusaka in terms of just population dynamics. Lusaka is a capital city of Zambia and it has an estimated population of about 2.3 million people. Important to note that out of this 60% to 70% live in Peri-urban areas of Lusaka and that 90% use on site sanitation [18]. The high income part of Lusaka seems to has been well planned and most of the high income areas use on site sanitation but by using septic tanks. The issue is that the residents of the low income areas of Lusaka cannot afford to use septic tanks and even those that could afford cannot access the service and this is due to that it is practically impossible because of a lack of access roads to these areas. All these have been compounded by a lack of a well-planned settlement. Based on the premise alluded it should be known that there are no adapted sanitation services that exists for the most of the peri-urban areas of Lusaka. The problem of sanitation is even made worse because most of the peri-urban areas are very densely populated with most of the residents using shallow and elevated pit latrines.

Alternatives of the case

Because of these an initiative called the Faecal Sludge Management Model was developed and funded by the Bill and Melinda Gates foundation in collaboration with Lusaka Water and Sewerage Company. Other partners were also consulted to foster the progress of the initiative. It must be emphasised that there was a lot community engagement right from the start of the project for community acceptability to be built and for the purpose of sustainability. The community was also involved in the planning process of the project. In order for the faecal sludge model initiative to be sustainable it required a business model and therefore the initiative also developed a business model to sustain the operations of the faecal sludge initiative. The funds generated form the model went to help in funding the initiative. Since the target population are from low income areas tariffs are adapted to suit the local financial conditions. A preference was made in terms of what communities could afford, so different services were categorised and each with its own tariff to make a viable project for the underprivileged. The key issue as it can be note was the financial sustainability of the service is a key priority of the initiative. Therefore, the business model was much more than revenue collected from the service provisions. The sludge that was collected from the latrines are treated and fertiliser is made from that which is later on sold for income generations. And the gas extracted from the sludge was used as energy for different purposes. The initiative has scored some success since its inception in 2013. From the time it was realised the sludge management initiative emptied 900 pit latrines in 2 years and most community people expressed pleasure in this initiative. It is therefore concluded based on that the faecal sludge model initiative is responding to the needs of the community. At the same time there are some challenges that have been reported and most of the challenges centred on financial challenges faced. Fromm the financial point of view it is therefore recommended that the faecal sludge initiative be extended to other low income communities. Community people have also advised on the need to scale up the initiative to other communities if more funds have to be realised. This case study is very much in line with the Finish study on water and sanitation services and in line with the UN- General assembly on sustainable development with reference to the sixth goal on clean water and sanitation, it appears meeting this goal is quiet difficult especially in the developing world, were there a lot illegal settlement and most of the people that live in such communities seem to have a high levels of illiteracy and compounding on the problem further. Therefore, there is need for consented efforts from multiple stake holders to come to the table in addressing this growing concern. There has been efforts or attempts that have been made to address this issue though, but it appears there has been little progress scored in this regard. According to Takala [8] this could because of applying mechanic and reductionist principles when addressing these issues of sanitation and from the study the indicated that the better approach to employ is to be able to appreciate the ideas of systemic, holistic and a more plural and contextual approach. On the part of water in the case study a study done will be of help to establish water as a case of some selected parts of the peri-urban of Lusaka. In Zambia a study conducted in Mtendere on the quality of drinking water in basic schools showed that 3 out of the 4 schools had access to contaminated water containing 10 to 100 faecal coliform per 100 milliliters [19]. Another study of effects on siting of boreholes and septic tank on ground water quality in Saint Bonaventure Township in Lusaka also showed that 33% of the boreholes were contaminated with microbe’s indicative of pathogens [20]. Equally, a study in Luapula on community water supply and self-supply models for sustainable water supply indicated that 50% water samples...
from hand dug wells were unsatisfactory containing from 30FC to more than 100FC per 100 milliliters [21]. In the same study, found that the risk of borehole contamination was less than that of hand dug wells and scoop holes. Another study in Mutendere 70% of the water stored for drinking was contaminated by WHO standards. Equally 30% of the water sources for participants in this study were not meeting the WHO standards. It shows that water quality deteriorated to 70% from the initial 30% water contamination at sources of water. This implies that 40% of the sampled water was re-contaminated at home as a result of poor handling during transportation, storage and use. This translates to an increase of water contamination from the water source to stored water at household by 133% [21]. The findings agree with a study that showed that safe storage of water was an important practice for prevention of recontamination from poor handling [22]. In the crude analysis more child diarrhoea cases was reported by households that had poor water results as shown in table 5.2. Only 70% of the water sources passed the WHO standard for microbiological quality. The water quality results of water sources in Mutendere are similar to findings by Banda and others who recorded that 32.5% of water sources in Bonaventure, Lusaka were contaminated [20]. to support the dimensions of these case, a study in South Africa showed that storage of water at household level was susceptible to contamination when the source of water was far from the household [23] It can be seen how common such problems are similar for most developing worlds. Problems to do with water presents with multiple problems ranging from dangerous disease outbreaks in most cases ending in death and this has been the recent picture of Lusaka in the near past, where a cholera outbreak afflicted many communities of Lusaka and posing a very bigger threat to the livelihood of the community. Recurrent clustering of water related diseases in peri-urban settlement of Lusaka has prompted curiosity and investigation into their determinants. Cholera cases have been reported in areas with peaks observed during rainy seasons. To support this cause, WHO indicates that access to safe water is a foundation for prevention and control of diarrhoea [24]. Even though, Zambia has recorded some improvements in the coverage of water, it appears when it comes to water quality there is a compromise due to erratic water supply, poor handling of water during transportation, storage and use. Integrated management of water resources for domestic supply assures household level water safety through continuous flow of water, which is accessible, affordable, and utilised. Due to short supply of safe water, it has been observed that there are varied alternative water sources for domestic use. Handling and storage of otherwise safe water may predispose it to contamination. In the past during the ear of the Millennium of the development goals various strides were made regarding water and sanitation. This was before the formulation of the sustainable development goals. The WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation used monitor progress towards the Millennium Development Goal target to halve, by 2015. At the end of the millennium development goals significant strides were made and most importantly is that number of people without sustainable access to safe drinking water and basic sanitation was significantly reduced.

3.1 Proposed Solutions

Integrated water resources management process brings about pooled approach to scarce resources for constant flow of adequate safe water for families to meet basic water requirements at an affordable cost. The core functions of water as a resource for the well an individual should include, water being treated as an economic, social, health and environmental good:

- Management of water should be harnessed as a comprehensive process and not just on the provision of water, but ensure that water is safe and available at all times.
- The government should support and enable the sustainable water supply through the provision of integrated water policy and regulatory frameworks.
- Communities should be recognised as central to the provision, management and safeguarding of safe water supply.

Research has shown evidence that people who spend more than half an hour per round trip progressively collect less water, this leads to them failing to meet their families’ minimum daily drinking water needs [25]. In such cases the quantity of water collected is often less than 5 litres per person per day which is not sufficient for good hygiene practices such as hand washing (Howard & Bartram, 2003). UNICEF and WHO outlines aspects of drinking water, equity, safety and sustainability. This project proposal will underscore the necessity of basic drinking water systems as the provision of drinking water as it relates to technologies of water supply [12]. Fewtrell et al., examined journal articles with results that generally agree with those from previous reviews, that water quality interventions (point-of-use water treatment) were found to be more effective than previously thought, and multiple interventions (consisting of combined water, sanitation, and hygiene measures) were not more effective than interventions with a single focus. However, there is some evidence of publication bias in the findings from the hygiene and water treatment interventions [12]. The quality of water for drinking is an important factor that determines health of the environment. Therefore the safety of water is crucial for the prevention of many diseases including water borne [24]. People exposed to unsafe water worldwide is estimated at 1.1 billion globally. Poor water quality compromises the benefits of high water quantity coverage. “It is estimated that 10% of improved sources may be high risk, containing more than 100 E. coli or total coliform per 100ml and that drinking water is found to be more often contaminated in rural areas (41%) than in urban areas (12%) “ [27]. Communities without access to safe water may opt to draw water from unsafe sources such as shallow well, rivers and scoop holes [28]. These sources may fail to meet the standard for water quality of zero faecal coliform in 100 milliliters [24].

3.2 Recommendation

Many strategies should be considered to address critical issues of water and sanitation for per urban communities if we have to prevent disease occurrence for such communities. However, these strategies maybe it is imperative a wider spectrum of stake holders are part and parcel of such strategies. In any case at the center of this is actually community engagement right from the beginning so that the levels of acceptability for such strategies are high in
it is also important in in water locally: Implementing the nda, “Bridging -5 , pp. -5 nder and sanitation, and hygiene practices

References


[9]. A. Gallia, G. Durović, L. Hanscome, L. Kněžević, “Think globally, act locally: Implementing the sustainable development goals in Montenegro Alessandro”; Env. Sci & Poli 84, pp.159 – 169, 2018


3.3 Conclusion
the importance of water and sanitation as a service to communities cannot be over emphasized. While some countries have made huge strides in meeting the needs of their people with regard to water and sanitation, especially the developed world. It appears that there is much to be done for the developing world. The author emphasizes that any sustainability approach has water at the heart, because water is not only important for people it is also important for the environment and more or so for the many operations within the human activities. Finish government perform well in this undertaking as presented by the reviewed paper and Zambia has much to learn from the Finish ideas on water and sanitation. The emphasis is on those who manage water systems and what they need to be focusing on. whichever approach to manage water systems, managers need to understand that populations keep on growing, also the activities requiring water are increasing in number in different sectors of the economy.

3.4 Statement of Competing interest
This paper has not been published elsewhere, and the author take responsibility and severally over the information provided therein. The author has no competing interests.

References


Author Profile

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