Bridging the knowledge gap: Information Science role in Climate Change and Health Equity in Sub-Saharan Africa.

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1: Introduction

The main sustainability issues in Sub-Saharan Africa include poverty, food security, inadequate healthcare, education disparities, environmental degradation, and challenges related to governance and infrastructure. These issues are interconnected and pose significant obstacles to the region's social, economic, and environmental sustainability.

In this thesis I have been focusing on the Climate Changes and the role of Information Science in addressing ignorance about health issues, poverty and equity problems in Sub-Saharan Africa. I have especially been focusing on ethical and critical perspectives, data and visualisation for beeing essential issues.In a region like Sub- Saharan Africa, where the vulnerability to disturbaces in climate changes, and subsequent health problems that follows, needs a fair and truthful transmission of information.

1:1 Abstract

I will discuss the importence of data collection as a foundation of knowledge and understanding of the health issues in Africa hence the climate changes.

I will in this paper try to answer why information science play a importent role in adressing climate change-related ignorance and how information need to develop to promote sustainable information practice to meet the needs in a sustainable way in Sub-Saharan Africa.

I will focus on keywords like “Open Data”, “Data Collection and Management”, Data Visualization”, Ethical Consideration”, Critical perspectives”, Information Access”, Information Dissemination” and the roll of SDGs in relation to a sustainable living society in Sub-Saharan Africa.

2. Theoretical framework and methods:

Climate Change poses a significant threat to our planet, impacting it in multifaceted ways. Vulnerability to these effects is particularly acute in developing regions, such as countries in Sub-Saharan Africa. The resultant health crises are contingent upon the effectiveness of information dissemination channels.

The field of information science assumes a pivotal role in addressing these challenges. It achieves this by facilitating the acquisition, dissemination, and utilization of crucial data, fostering ethical and critical perspectives, and enabling innovative data visualization techniques.

In the forthcoming text, we delve into the intricate interplay between information science and the urgent imperative to confront climate change-induced health challenges in Sub-Saharan Africa. Joia S. Mukherjee (2021) give us an updated information about the poverty-situation in Sub-Saharan Africa. But we also needs totake in consideration the information poverty they are dealing with, and its impact on the sustainability challenges they needs to deal with (Bawden & Robinson, 2022).

Solving these challenges requires coordinated actions at different levels, including governments, educational institutions, non-governmental organizations (NGOs), and international entities. Vital measures include launching programs to enhance people's ability to use and understand information and digital tools, expanding the technological resources for information and communication, and encouraging research and innovation in information science. These efforts are critical for boosting sustainable development in Sub-Saharan Africa.

In according to Jan Nolin (2010) we need to focus on sustainability in relation to information science based on three pillars:

- Development of sustainable information technology.
- Development of sustainable information conservation.
- Development of sustainable information sharing.

These three pillars that Jan Nolin (2010) is talking about very much include the fundament we need to reconsider when we thing about information in relation to the problems we can

see in Sub- Saharan Africa about equity, poverty, health issues related to the climate changes. As Jan Nolin (2010) argues, all elements of the sustainable foundation must be in balance and integrate with each other to form a stable basis for sustainability to be maintained. The three areas Jan Nolin (2010) describes are the economic, social and environmental areas that should (and must) work together. This is also the basis of the United Nations Agenda 2030 where all sustainability goals are based on this foundation.

In order for information science to be able to contribute to a sustainable society, and aspecially in a rural area such as the Sub- Saharan Africa, one must therefore take the sustainability goals discussed at a global level as a starting point and then look at each individual part to discern what is needed and missing in each goal and in individual areas to achieve this.

I will now put down bullet points to illustrate the main problems with information supply and the potential solutions (I say potantial because there is really no easy solution on wicked problems) that will requires to develope a more sustainable information supply for the population in the rural areas of Sub-Saharan Africa. What in information science needs to be considered to achive a more sustainable environment relative to climate changes effect on the population in the rural areas of Sub- Saharan Africa:

Sustainability in Sub-Saharan Africa faces a range of complex challenges, including those related to information supply. Here are some key issues and potential solutions , along with their alignment with Sustainable Development Goals (United Nations “Transforming our world, The 2030 Agenda for sustaiable development”):

2:1. Digital Divide:

Issue: Limited access to digital resources, including the internet and information technology, creates disparities in information access and hinders development.

Possible Solution: Expand ICT- (Information and Communication Technology) infrastructure, promote affordable internet access, and develop community technology hubs. This aligns with SDG 9 (Industry, Innovation, and Infrastructure) and SDG 4 (Quality Education). Bawden and Robinson states in ther book “Introduction to information science” (2022) that when we talk about develope countries and poverty, we do not just talk about poverty in generall, but also “information poverty”. What they mean about that is the lack of

financial resources and limited economic opportunities can make it difficult for individuals and communities to afford ICT- devices and access information services (Bawden & Robinson, 2022). And that leads us to the next point.

2:2. Information Inequity:

Issue: Unequal distribution of information resources, both within and between countries, can exacerbate social and economic inequalities. Information Equity in Sub-Saharan Africa refers to the fair and equal distribution of information resources and access to knowledge across diverse populations in the region. It emphasizes bridging the digital divide, providing equal opportunities for education and economic growth, and ensuring that information benefits everyone, regardless of location or socioeconomic status. Information equity is crucial for reducing disparities in healthcare, education, and economic development, ultimately promoting social inclusion and sustainable progress in Sub-Saharan Africa.

Possible Solution: We can see that information sypply will be an question about inequity, where some people are excluded from information and some are included and where there is a differens between rural areas and urban areas (Bawden & Robinson, 2022).

To address information inequity in Sub-Saharan Africa, it will be necessary to invest in digital infrastructure, promote digital literacy, create culturally relevant content, establish community hubs, enforce supportive policies, collaborate with the private sector, and preserve indigenous knowledge.

What can be done is to develop inclusive information policies, prioritize information literacy, and promote local content creation to bridge information gaps. This also aligns with SDG 10 (Reduced Inequalities) and SDG 16 (Peace, Justice, and Strong Institutions), (United Nations "Transforming our world, The 2030 Agenda for sustaiable development").

2:3. Data Quality and Availability:

Issue: Poor data quality and limited data availability impede evidence-based decision-making and development planning. When we talk about problems adressing to Data Quality and Availability in relation to Sub-Saharan Africa we need to consider the specific challenges with the rural area where there is limited access to accurate and up-to-date hampers informed decision-making and development. We also needs to think about this in relation to open data

in a sustainability perspective. Sustainable open data refers to the practice of making data openly available to the public in a manner that is environmentally, socially, and economically viable over the long term. This involves ensuring that open data initiatives are environmentally responsible, economically feasible, and contribute to social well-being, while also maintaining data accessibility, relevance, and quality over time. Sustainable open data initiatives aim to balance the benefits of data transparency with responsible stewardship of resources and the preservation of data's value for current and future generations (Open Data for Sustainable Development, World Bank Group 2015).

Possible Solutions: We need to strengthen Open Data Initiatives and promote open data policies for governments and organizations to publish quality data openly. Bawden and Robinson talkes about “Freedom of information in open data” as a basic human right (2022) Invest in data collection and management systems, strengthen statistical agencies, and promote open data initiatives. Aligns with SDG 17 (Partnerships for the Goals) and SDG 1 (No Poverty).

There are a few different ways to do this. For example in an rural areaas the Sub-Saharan Africa there is a need for developing data infrastructure wich means investing in data collection, storage and disseminations systems. But we must take in consideration the difficulties in relation of developing data infrastructure because it requires a concerted effort involving governments, international organizations, NGOs, and the private sector. It involves investments in physical infrastructure, data literacy programs, data quality assurance mechanisms, and the establishment of clear data governance frameworks. Additionally, fostering collaboration and partnerships at the local, regional, and international levels is crucial for overcoming these challenges and harnessing the potential of data for development in Sub-Saharan Africa. Millet & Estrin (2012) states that data infrastructure can be very difficult to plan in areas that in specific needs of sustainable thinking because of the limited knowledge of the peaople in this area and a limited understanding of where infrastructure is needed.

2:4. Healthcare Access:

Issue: We can see a limited access to healthcare information and services affects public health outcomes and healthcare delivery. (Joia S. Mukherjee, 2021).

Possible Solution: "Quality data are necessary to make good decisions in health delivery, for both individuals and populations." (Joia S. Mukherjee, 2021). Quality data are essential for informed decision-making in healthcare, benefiting both individuals and populations. Data plays a vital role in enhancing care and ensuring fairness. Nevertheless, in many impoverished countries, health data collection has been inadequate, leading to disorganized paper records. Measures to enhance and simplify health information encompass patient-held booklets, demographic health surveys, and the adoption of standardized indicators. Additionally, the evolution of medical record-keeping, including electronic systems, is explored. The application of data for purposes such as monitoring, evaluation, and quality enhancement is elucidated (Joia S Mukherjee, 2021). Other possible solutions would be to implement telemedicine, mobile health (mHealth) solutions, and health information systems to improve healthcare access and outcomes. Aligns with SDG 3 (Good Health and Well-being). However, we have to take into account the fact that developing countries like Sub-Saharan Africa do not have the economy to develop the same information technology as in the Western world, so even if these above-mentioned factors might solve the problems from a sustainability perspective (itś a wicked problem), the same opportunity for information development does not exist in the same extent in these areas (Jan Nolin, 2010). One Health and EcoHealth, as discussed by Taylor & François (2016), emphasize the interconnectedness of human, animal, and environmental health. In Sub-Saharan Africa, where zoonotic diseases are prevalent, these approaches stress the importance of addressing health challenges holistically. A solution is to implement cross-sectoral collaborations that integrate human and animal health services, environmental management, and community engagement to prevent and manage diseases effectively.

2:5. Agricultural Development:

Issue: Inadequate access to agricultural information hinders productivity and food security in rural areas.

Possible Solution: Promote climate-resilient farming practices, provide access to weather data and market information, and support agricultural extension services. Aligns with SDG 2 (Zero Hunger). Leveraging information science in Sub-Saharan Africa can help tackle agricultural challenges by improving data collection, analysis, and dissemination. It enables farmers to access real-time weather data, crop information, and market trends through mobile

apps, empowering them to make informed decisions for better crop yields and food security. Additionally, data-driven insights aid policymakers in crafting effective agricultural strategies, promoting sustainable practices, and addressing regional challenges.

Access to clean water is one of the most challenging problems for a sustainable invironment world-wide, and especially in areas lik Sub-Saharan Africa. There is a need for developing information technology to find clean water at deper level, but it requires expensive technology (Millet & Estrin, 2012).

Issue 2:6: Environmental Sustainability

Problem: As Jan Nolin (2010) states, we need to consider all three main areas at the same time really to be able to see some kind of overall picture. That is, social sustainability, economic sustainability and environmental sustainability because it is a "wicked" problem that actually coexists in a chain of events. Problems that we see in Sub-Saharan Africa in relation to the lack of functioning information science is the impact rapid technology adoption can have on environmental implications, including electronic waste and energy consumption.

Possible Solution: To address environmental issues linked to information science in Sub-Saharan Africa, we can draw insights from Joia Mukherjee's work on healthcare and human rights. By promoting sustainable data management practices, encouraging the use of eco-friendly technologies, and prioritizing data accuracy in environmental research, we can foster responsible information science that contributes to sustainable development in the region. Mukherjee's emphasis on data quality and ethics aligns with the need to mitigate environmental challenges while harnessing the power of information science for positive change (2021).

Addressing environmental concerns related to information science in Sub-Saharan Africa, as suggested by Bawden and Robinson (2022), involves adopting sustainable practices in data centers and ICT infrastructure, reducing electronic waste, and promoting energy-efficient technologies. This approach minimizes the environmental footprint of information systems, aligning with global sustainability goals and ensuring responsible information management in the region.

2:7. Data Governance and Privacy:

Issue: Weak data governance frameworks and inadequate data protection measures pose risks to data security and privacy. To address data governance and privacy challenges in Sub-Saharan Africa, we need comprehensive policies and frameworks. These should encompass ethical data collection, secure storage, and controlled access. Promote transparency, informed consent, and community involvement. Joia Mukherjee's work (2021) underscores the importance of respecting privacy and ensuring that data practices align with ethical principles while advancing healthcare and development initiatives in the region.

Possible Solution: Develop and enforce data protection laws, promote ethical data handling practices, and raise awareness about data privacy. Aligns with SDG 16 (Peace, Justice, and Strong Institutions).

In addressing data governance and privacy challenges in Sub-Saharan Africa, it's essential to establish clear data policies and frameworks, emphasizing responsible data handling and protection. Bawden and Robinson (2022) highlight the importance of ethical data practices, transparency, and accountability. Collaborative efforts among governments, organizations, and communities can help ensure data privacy while promoting information sharing and responsible data management, ultimately fostering trust and driving sustainable development.

Managing data governance and privacy challenges in Sub-Saharan Africa, as discussed by Jan Nolin (2010), involves establishing robust policies and regulations. It's crucial to ensure responsible data handling, protection, and ethical use. Collaboration with governments, organizations, and communities is key to developing comprehensive data governance frameworks that safeguard privacy while facilitating valuable data sharing and utilization for sustainable development.

2:8. Education and Information Literacy:

Issue: Limited access to quality education and information literacy programs hampers skill development and capacity building.

Solution: Invest in educational infrastructure, expand digital learning opportunities, and integrate information literacy into curricula. Aligns with SDG 4 (Quality Education).

To address education and information literacy challenges in Sub-Saharan Africa, it's vital to implement strategies that promote digital literacy, improve access to educational resources, and enhance information skills. Joia Mukherjee's work (2021) highlights the importance of empowering individuals with the knowledge and skills needed to navigate the digital

landscape effectively. Addressing education and information literacy challenges in Sub-Saharan Africa, as discussed in Bawden and Robinson (2022), involves promoting digital literacy programs, fostering a culture of information sharing, and integrating information science into curricula. These measures empower individuals to navigate the information landscape effectively, enhancing educational outcomes and socioeconomic development in the region.

2:9. Community Engagement:

Issue: Lack of community involvement in information initiatives can lead to solutions that do not meet local needs. And we have to take into account the fact that we cannot only talk about information in relation to technological development but also cultural knowledge and differences in different societies and how we use information (Michael Buckland, 2012).

Possible Solution: Engage with local communities, involve them in decision-making, and support community-driven information projects. Aligns with SDG 11 (Sustainable Cities and Communities). In Sub-Saharan Africa, addressing community engagement challenges in information science involves building trust, involving local communities in data collection, and ensuring culturally relevant content. Mukherjee's insights emphasize that engaging communities in shaping information systems can lead to more effective healthcare, education, and development initiatives aligned with local needs and contexts (2021). Engaging communities in information science in Sub-Saharan Africa involves participatory approaches, local language content, and partnerships with local organizations. Jan Nolin's work on sustainable information underscores the importance of involving communities in shaping information systems that meet their needs, fostering trust, and ensuring equitable access to information resources.

Michel Buckland (2012) emphasizes that information science should focus on understanding the various forms and contexts of information. In the context of community engagement, this means recognizing that information comes in diverse formats, from traditional to digital, and understanding how different communities access, use, and share information is essential for effective engagement and empowerment.

2:10. Public-Private Partnerships:

Issue: Limited resources and expertise hinder sustainable information development efforts. The main issue in public-private partnerships for information science in Sub-Saharan Africa

is often achieving a balance between commercial interests and public good. Balancing profit motives with the broader goals of information accessibility and equitable development can be challenging.

Possible Solution: Foster partnerships between governments, NGOs, and private sector entities to pool resources and expertise. Aligns with SDG 17 (Partnerships for the Goals).

Addressing these sustainability issues in Sub-Saharan Africa requires a comprehensive and collaborative approach, involving governments, civil society, international organizations, and the private sector. Sustainable development efforts should align with the SDGs to ensure a holistic and integrated approach to addressing the region's challenges.

A key issue in public-private partnerships for information science in Sub-Saharan Africa is balancing profit motives with societal benefit. To address this, solutions include clear agreements on data sharing, ethical guidelines, and regulations that align with the region's development goals, as highlighted by Bawden and Robinson (2022). For instance, partnerships could involve private companies sharing anonymized data for public health research while adhering to privacy standards.

Jan Nolin's work highlights the need for sustainable partnerships that benefit all stakeholders and ensure long-term impact on information systems (2010).

Conclusion and discussion:

By implementing these tactics that is metioned above and promoting cooperation and inclusivity, nations and communities in Sub-Saharan Africa can create enduring information systems. These systems can play a role in boosting economic progress, advancing social development, and enhancing the ability to withstand challenges like climate change and healthcare disparities.

In conclusion, this paper has underscored the critical importance of data collection as the cornerstone of knowledge and understanding when addressing health issues in Africa, especially in the context of climate change. By investigating the role of information science in combatting climate change-related ignorance, we have illuminated the significance of information development to support sustainable information practices in Sub-Saharan Africa.

Throughout this exploration, we've delved into various key areas, including "Open Data," "Data Collection and Management," "Data Visualization," "Ethical Considerations," "Critical Perspectives," "Information Access," "Information Dissemination," and the pivotal role played by the Sustainable Development Goals (SDGs) in fostering a sustainable and informed society in Sub-Saharan Africa.

In essence, this paper has highlighted the interconnectedness of data, information science, sustainability, and climate change resilience in Sub-Saharan Africa. It has underlined the imperative need for robust data practices, ethical considerations, and equitable access to information resources to empower communities, bridge knowledge gaps, and drive sustainable development in the region.

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