Gender and Participation: Critical Reflection on Zenzeleni Networks in Mankosi, South Africa

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ABSTRACT
This paper unveils the complexity of gender dynamics by reflecting on lessons learned in Zenzeleni Networks and provides a different perspective to notions of "participation" by asking "who participates and how?" The paper employs a feminist conceptual framework, particularly social constructionist theory and intersectionality, to understand women's participation and experience, analyzing multi-layered and intersecting structural injustices that marginalize women's choices, empowerment, scope for agency, and sense of ownership. In-depth interviews and focus group discussions gathered information from women living in Mankosi and women who are working for Zenzeleni Networks, respectively. Results show that gendered power dynamics of the community were reproduced within Zenzeleni Networks. Although women play a key role in the everyday operationalization of Zenzeleni Networks, their role has been considered part of their domestic duties, which results in misrecognition and underrepresentation of their work.

Author Keywords
Women; culture; ICT4D; inclusion; exclusion.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI), H.5.3 Group and Organization Interfaces, Collaborative Computing, K.4.3 Organizational Impacts

INTRODUCTION
Technologies and technology projects are not gender neutral even when they are designed and implemented using participatory processes [10, 12, 21]. In this paper we consider some of the many complexities of power relations and gendered participation in ICT for Development (ICT4D). We propose that gendered division of labour and the invisibility of women's contribution to technology projects can work to exclude them. We base our claim on an analysis of the gendered nature of participation in a Wi-Fi network project operating in a traditional community in South Africa.

Our analysis develops a conceptual framework to understand women's participation and experience and critically reflect on the approach used in the Wi-Fi network project. To do so we apply several theoretical lenses including feminist qualitative research methodology, social constructivism and intersectionality. To demonstrate the appropriateness of these lenses we structure the paper in feminist scholarship and writing somewhat atypically for HCI, particularly in terms of relating the framework to existing research. Thus, we first introduce the Wi-Fi network project and motivate a gender analysis, and then detail and justify, with reference to the literature, the methodology we used to gather, interpret and analyse data. The insights we generated, and describe in subsequent sections, inevitably reflect our theoretical approach yet our theoretical approach was partially a consequence of responding to the existing Wi-Fi network project.

Zenzeleni Networks
The aim of Mankosi Community Networks, recently renamed Zenzeleni Networks, is to produce a model for the sustainable implementation of bottom-up village telcos in rural communities. The project is a partnership between University of the Western Cape and Mankosi community, one of the most disadvantaged areas of South Africa. Currently, Zenzeleni Networks is a telecommunications co-operative that enables community members to charge phone batteries for a fee and make voice calls either for free (on-net) or at a fraction of the cost offered by the incumbents (off-net). Charging stations and phones are installed inside the private homes of 10 families selected by the Tribal Authority first and endorsed by the community later, according to social and technical criteria [41]. Phones are connected to a Wi-Fi router, which creates a network with the other routers in Mankosi. Representatives from these households registered and sit on the board of Zenzeleni Networks. They manage the income generated

by the co-operative in a monthly meeting where other operational and strategic decisions are made.

Gendered Participation in Zenzeleni Networks

Mankosi community is located in a remote rural area of the Eastern Cape in South Africa, is a community composed of around 3,500 people living in 12 villages. Mankosi is governed by a Tribal Authority (TA), which comprises a Headman and approximately one Sub-headmen from each village, each of whose homestead is also a site for administration. Seventy per cent of the population older than 15 (around 2,000) is female, so women *de facto* head most households [40]. This is due to the fact that men migrate to urban, mining and farming areas for work. Although women head most households, by *de facto,* their position as breadwinner or 'the head' is not static and only applicable if the man is not around. Thus power dynamics within household relationships are patriarchal in nature. Interestingly, this contrasts with representation in the board of the co-operative - composed of 3 women and 7 men.

Zenzeleni Networks has benefited the community by reducing costs of communication and charging phones. This positively impacts on local living conditions because money otherwise spent on communication can be used to support other daily expenses. By encouraging the community to create a way to pay for services more cheaply, Zenzeleni Networks has also facilitated incremental income-generating mechanisms that enable a strategy for economic sustainability. Additionally, most of the research project's plans with regards to the institutionalization of the initiative have been accomplished and realized [42]. However, our observations suggest that there are still ongoing challenges related to broader community ownership, for example enabling a more active, rather than passive, process of entitlement and ownership from community members outside the board of the co-operative [41].

To further understand the implications of the process we ask to what extent this participatory approach empowers women, given pre-existing practices and the context of patriarchal cultures? Using a feminist lens we evaluate and critically reflect on challenges of women's empowerment, agency and participation within the Zenzeleni Networks. In order to understand the impact of Zenzeleni Networks on the community, particularly on women's livelihood, the following two questions are crucial to understand women's participation in the project and their sense of ownership: (1) Does Zenzeleni Networks work in favour of women's empowerment or un/intentionally reinforce and perpetuate existing gender and social inequalities? (2) To what extent are women's voices included and/or excluded in the process of building local ownership of the community project? These questions provide a means to unpack the deep-seated power relations that exist within the community's cultural setting.

Mankosi is a traditional society and like technology research, as we propose later, is a patriarchal culture. Before delving into analysis of gendered participations in Zenzeleni Networks, we would like to explain what we mean by 'traditional' and 'culture' and the consequences of these categories when exploring and analysing the role of patriarchal cultural practices and gendered participations in Zenzeleni Networks. We do not consider 'culture' purely taxonomically, as it is "not a fixed attribute of a certain group of people but instead something more fluid, multifaceted and continually being reformulated" [49]. Likewise our understanding of 'traditional society' is non-reductive and does not infer something that is static and backward in contrast to westernization and modernization. We consider that "Culture is performed and enacted, rather than inhabited and received, and cultural categories are implicated in various forms" [15]. Our aim in this paper is not to prescribe approaches for women's equal 'participation' and inclusivity or reinforce ideas about choosing one system over another. Rather we focus on assessing the accessibility and flexibility of systems, especially considering women's empowerment, freedom and autonomy.

METHODOLOGY

There is increased attention to theorising gender, particularly the politics of feminist theories and research frameworks, in the field of HCI. Gender evaluation techniques are also becoming popular in ICT4D's research community. Often evaluating project performance, in relation to broader aspects of a gendered digital divide for ICT4D projects that were not designed specifically for women, is done reflectively and not as a continuous research inquiry. To a large extent this reflects researchers' relationships with their funders, progressive interest and engagement in multidisciplinary study. The research described herein initially emanated from diverse enquiries from the research team and its funders.

In this effort we apply feminist qualitative research methodology. Unlike many qualitative research approaches, this methodology actively seeks to remove the power imbalance between the researcher and the researched [9]. Feminist qualitative research acknowledges the researcher as part of the research subject, and increasingly focuses on differences in the experiences of oppression of the marginalized [16]. Furthermore, it aims to provide a unique space for women to share their lives from their own standpoints and reflection [21].

After several discussions with the 3rd and 4th authors at the university, and conversation with the local champion, the research team decided that 1st author would visit Mankosi for a week to do preliminary research. This focused on three station houses very close to where the researcher would stay. The idea was to introduce her to the local research assistant (LR) and local champion and for her to get a sense of the community. She and the LR spent a day

discussing about Zenzeleni Networks, and her research focus. The LR's prior research experience with the 2nd author made communication very smooth. The following few working days, the 1st author and LR interviewed several women living in and near to the three station houses. Walking door-to-door was very exhausting, but also enriched 1st author's knowledge about rural communities and rural women's everyday life. She presented a preliminary fieldwork report of her first research visit. This focused on rural women's everyday life in Mankosi, mis/appropriation of Zenzeleni Networks to 'Solar project', the overwhelming response *Andiyazi* (in local language IsiXhosa) - "I do not know", and misconceptions of benefit. All themes are relevant to the project in general, and we are trying to address some of their issues, but here we focus on women's empowerment and inclusion and/or exclusion in Zenzeleni Networks. Hence, we decided that 1st author make a second research visit for 2 weeks to do mixed data collection. This fieldwork extended in-depth interviews to other station houses and set-up focus group discussions (FGDs) with the 10 women living and working in the station houses. In total, 1st author and LR interviewed 40 women and conducted a focus group discussion with the women in the 10 station houses.

In the rest of this section we describe and explain data collection and analysis and bring out considerations, related to the literature that shaped our choices. This includes issues of positionality, the compromises we made, and the steps we took from one method of data collection to the other.

Researcher Positionality & Reflexivity
To access information and interact with the community during research fieldwork, "the degree of a scholar's insiderness, or the degree to which scholars manage to overcome their outsiderness, is believed to determine easy access to informants, reliability of collected data, and the success of the fieldwork" [17]. In this context, the researcher's positionality is not static. Positionality refers to the conditions under which a person's position in a social structure arises and stabilizes. In qualitative research it affects relations between the researcher and participants, the information the researcher can observe or experience, and the effects of the researcher's subjectivity on his/her interpretations. Positionality is constantly negotiated in each and every interaction between the researcher and participants [25]. Thus, it is extremely important to constantly reflect on a researcher's positionality and to consider reconcilable and irreconcilable differences that might in/directly impact on research outcomes.

The lead author is a PhD student in a Women's and Gender studies department, who was invited to explore and analyse gender dynamics within Zenzeleni Networks. She is an emerging black African feminist researcher. She is a complete outsider in terms of her identity as an Ethiopian living in South Africa and to Mankosi. She joined the team during the past operational year of the project, and was not involved with the research team or the community from the beginning, which contributes to her outsiderness. Her participation in the research team intends to investigate why women are not involved as much as men are; and how can the project and its replications strategize to create spaces for women to more actively participate. Disclosing the intersectionality of these layered and complex identities are deeply political. It influences the interpretation of data collected to identify gender inequalities in this rural community that are major hindrances to Zenzeleni Networks' progress.

2nd author contributed to this paper because she was involved in projects preceding and in parallel to the early part of Zenzeleni Networks. She is a white, middle-aged, British/Australian woman who has lived and worked in southern Africa for 8-years and grew up in Sudan and the Middle East. Between 2008 and 2014, she spent about 28 months living in, or close to, the area in which Zenzeleni Networks emerged. As an HCI expert, she undertook ethnographic action research that informed designing, deploying and understanding the use of solar charging stations and systems to support local content creation and sharing amongst community members [5,6,8,37]. During research she worked with the male-dominated, TA and community-members of both genders and, in the final year, with women specifically. She applies a decolonizing perspective and her intention in this paper is to enrich and juxtapose the 1st author's insights with her own experiences in the community and reflect on the engagement of male researchers in the team.

The 3rd author leads the research in Zenzeleni Networks, for which he was recently awarded a PhD. He is a white (ethnicity) national in his early 30s. His experience designing and deploying telemedicine networks in remote areas left him wondering what was preventing people in rural areas from using existing technology for their benefit? Building on the experience and contacts in the area from the 2nd and 4th authors, he engaged with Mankosi, where he lived for a total of two years spread over the last four years, in order to create a community-owned telecommunications operator [42]. During this time he was present in more than 40 meetings, either involving the TA, the community as a whole, one of its villages, or the board of the co-operative (which meets monthly). He also conducted research about ICT ownership, expenditure and usage patterns in this and another nearby community [40]; explored the sense of ownership developed by the main stakeholders[1]; [41]; and co-designed sub-systems required for Zenzeleni Networks' operation [39].

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[1] Due to the delegation of power and responsibility from the community to representatives of the households chosen to host the wireless stations, his research focused solely on them and not the entire community.

2nd author, and in fact, the other two authors, were introduced to the area by the 4th author, a middle-aged, white (ethnicity) male who has lived and worked in South Africa for almost 20 years. He initiated wireless networks research in the area in 2004 [44,45], in the context of telemedicine. This demonstrated, to government and industry stakeholders who have since provided annual research funding, that communication over Internet Protocol offers innovative solutions to challenges in remote rural areas. Coming to the research project from such a tech-centric viewpoint, he has sought to overcome that predisposition and explore more community-driven and socially aware approaches, and has therefore invited the other three authors to apply their background and insights to enable Zenzeleni Networks to grow beyond its initial technical aims.

For this research, the 1st author's outsiderness has advantages and disadvantages. She cannot speak or understand (IsiXhosa), thus, utterly relies on a local researcher to translate the questions to the participants. She constantly checks with the LR, which makes the process very exhausting, especially for the LR as she has to translate back and forth. In addition to her professional background because of her positionality within the research project team as an outsider, at least at the start of this research, has an advantage. Her 'outside-in' look uniquely positions her to observe and point out politics of gender and power relations that other researchers involved in the project might be unable to do.

Another concern we had was how to create conversation with the Tribal Authority and co-operative members about the research presented in this paper. After having worked every month during three years to build the trust and autonomy necessary for the co-operative members to know that they were the ones deciding the way forward (and we were mere consultants), the 3rd author did not want the research presented here being seen as a threat to their autonomy. Having seen how easy is for that confidence to be broken and how misunderstandings can appear out of nowhere, we opted to ask for permission for the 1st author to do work with women without drawing too much attention to complex political issues of gendered participation. Thus, there was a tension with the identity of the research; as feminism in general is seen as merely women versus men [31]. This tension reminded us of Agarwal's [1] and Cooke and Kothari [13] argument that there is a limit to what participatory research can achieve. In order to deal with such issues, we had to compromise and communicated with fewer people about the research, and in doing so, diluted the research agenda to simply "women's participation" and avoided terms like feminism and other political jargon. Here, the LR was extremely helpful; indeed her prior experience working with women in a preceding project made our fieldwork work possible. For instance, with 2nd author , the local researcher facilitated and translated six workshops where, altogether,

seven men and 44 women had participated in learning to use a media-sharing application; and analysed video of these workshops for communication practices 8.

In-Depth Interview Fieldwork Experience

On the first visit, the 1st author decided to do one-on-one interviews with the women in the community. We assumed that as station houses provide phone charging services that are cheaper than local market 3Rand (the local market charges per phone for 5 Rand), then the community in general, and women in particular, would have more information and experiences to share about Zenzeleni Networks. Furthermore, we thought open-ended questions would allow women to expound far more on Zenzeleni Networks from simple 'yes' and 'no' answers. 1st author and LR interviewed around 40 women in the village. However, most of the interviews ranged between 5 and 20 minutes. This is because some of the participants generally have minimal realization and/or information about what Zenzeleni Networks does. Some women simply were uninterested. We also observed that some women do not feel confident to talk about Zenzeleni Networks. For instance, when responding to the question, "What do you know about Mankosi Community Networks?" which we assumed straightforward question, the response of the participants rather challenged our bias about the popularity of the project; the majority of women participants' responses were "Andiyazi"/"I do not know". According to the local champion and the LR, " Andiyazi"/"I do not know" can mean different things: (1) I do not have any knowledge about this (which is sometimes very true), (2) I do know but I don't know how to explain, (3) I do know but I am afraid of saying something wrong about the project, or (4) I do know but I am not interested. Another challenge was when the women were asked questions related to issues of "women's involvement in the project" or "what would they recommend to better women's life from this project", the majority of participants were very uncomfortable, and responded - Andiyazi/ "I do not know". This suggests that either they know but they are afraid to speak up or they are having difficulty to conceptualize and visualize the materiality of the Zenzeleni Networks in their everyday life. The longest conversations we had were with the women in the station houses. Even then because of the translation and lack of deeper knowledge they have about the project, the conversation was not insightful.

Focus Group Discussion: Shifting the Margins to the Centre

We felt our experience with the in-depth interviews was very unsatisfactory. The limited knowledge participants have, and/or their reluctance to talk about the project stifled the data we hoped to collect. This interacted with other research dynamics, including the relationship between researcher and participants [14] that made women uncomfortable such as the language used in communicating with them and constant back and forth translation; the scepticism about the researcher's agenda; the

incompatibility of the research objectives with women's everyday experience; and disinterest in the project.

In the 1ˢᵗ author's second visit, the research team decided to do a focus group discussion with the women who live in the station houses and operate the day-to-day transactions of the project. We believed that FGD provides an opportunity for discussion both between researcher and participants and also amongst women who live in the community and work for the project at the same time [46]. Equally, we thought that it would minimize the 'politics of power' between the researcher and participants in the process of fieldwork and knowledge production [7]. However, conversations need to be translated by the LR continuously. We invited all women in the 10 station houses, but only seven managed to attend the meeting. Three participants are part of the co-operative members filling-in for their husbands' positions - two because their husbands are busy with other community responsibilities and one because she is widow of a sub-headman who she will represent until her son assumes her husband's position. With the help of the local (male) champion, we invited the women to come to the headman's house, where co-operative meetings usually occur. Additionally, since we decided to strategically work 'under the radar', we did not want to create a separate request; we planned to have the FGD under or 'usual' project activities. We facilitated the FGD after the cooperative meeting. Here it is very important to mention that the other four women in our FGD joined the cooperative meeting, and told us it was the first time they were part of it. Thus, although our observations do not reveal how women were affected specifically, hosting the FGD at the TA house and inviting the women to a FGD to discuss women's issues in relation to the project will certainly have affects. On the positive side, the absence of male TA members in the FGD reduced such awkwardness.

The discussion among these women completely shifted the spectacles of our research approach. We realized that we were asking the wrong questions. We got into the community with framed expectations and assumptions to find visible exclusion and gender digital divide experiences. Our questions were highly influenced by our academic experience and assumptions about the needs and benefits [30] of these women. We did not comprehend that their experience is far from being boxed within the politics of 'exclusion and inclusion' evaluation frameworks that are preconceived within a Northern epistemological context. Whether or not women in Mankosi are excluded from the researchers' point of view, what is important for this paper are the ways in which the women in the station houses negotiate often intersecting power relations – as domestic housewives and as those responsible for charging phones.

In the following sections we attempt to shed some light on the complexity of undertaking participatory research in a rural community.

SOCIAL CONSTRUCTIVISM & INTER-SECTIONALITY

Many feminist scholars, e.g. Lorber and Farrell [28], Radtke and Stam [35], Fox and Murry [18], Clarke [12], Kramer [27], and Hess [23] argue that despite being a social construct, gender roles and relationships are often reckoned as natural, innate, or predetermined. A social constructionist theoretical framework can be a crucial instrument in making sense of women's everyday life and gendered division of familial and social responsibilities in a rural community such as Mankosi.

Social constructionist theory conceives gender as a societal invention embodying a wide range of issues related to the way men and women interact. Kramer explains gender as "a major building block in the social structures" 27. Ideological prescription of a gender role is reflected in the social and cultural definitions of masculinity and femininity, which determine the status of male and female members of the society. Consequently, this biased conception of gender obscures the social position of women at large. Women are constantly defined in relation to men, subordinate to men and dependent on men, because of unequal access to resources. Similarly, it is well-established that technological interventions are not gender neutral, but "shaped by local histories, geographical conditions, and everyday cultural practices", says Gajjala cited in [20].

Social constructionist theory provides a basic understanding of societal and cultural formations of gender as an identity. However, many feminist scholars argue that 'disentanglement' or seeing different social oppressions separately and exclusively perpetuates the same inclusion-exclusion discourse that one is trying to avoid and argue against. Since the ultimate focus of the research is to show the complexity of power relations and gendered participation in ICT4D, we believe that the conceptual framework of theory of intersectionality provides a unique perspective to intersecting everyday realities. This theoretical strand is offered by postcolonial feminists (Hill-Collins [24], Mohanty [32], Harding [22], and Wylie [48]), who clearly explain that inequality cannot be successfully seen from a 'gender-only' perspective but rather via the intersectionality and mutual construction of different factors that exist within different sectors. In general, intersectionality stresses how the existence of multiple factors such as race, class, gender, ethnicity/culture, and educational level mutually construct one another and highlight a deeper understanding of how women in the African continent are positioned in unequal access and usage of ICT.

GENDERED PARTICIPATION & INCLUSIVITY

Following the participatory approach introduced by the 2ⁿᵈ author in her previous technology projects in Mankosi, this research project continues to reinforce local participation; particularly in relation to decision making around the collective and use of the income generated by the project.

Most importantly, we maintained complete respect of the community's tradition, and their autonomy to decide on every aspect of building up the community project [41]. This included working with delegates chosen by the Tribal Authority according to a set of criteria defined mutually with researchers. Following the local election process, they were later confirmed in a community meeting, where more than 150 people attended, to take the project forward and represent the community [39]. From the beginning, we identified that similar to many other rural communities, the power hierarchy is androcentric; as such, women are not authority figures in the society. However, we had to negotiate with and moderate women's involvement gradually. For instance, while documenting the challenging experiences encountered to create gender balance in the project:

We sought to train both men and women for the project, and the TA also nominated the home of a woman who performs subhead-man's duties. However, in this traditional social ecosystem, a woman's responsibilities make it difficult for her to sustain long-term attendance at training; in our case, almost two months. Three women appeared in the very first sessions of the training. However, while they appeared enthusiastic and engaged, only one could make it to the later stages of the training, and with much less frequency than men [38].

It is true that there are gender inequalities in Mankosi society, which still comprise ongoing challenges for women in various social and economical aspects of their life. Thus, in our project, the women at the station houses cannot attend workshops facilitated by the project team due to their domestic responsibilities. Most women interviewed indicated that their day starts around 4:00 am, to prepare the children for school, fetch water, gather wood, work in the garden, clean the house, cook food for the family, and attend to social meetings and gatherings 4. In addition, because of established patriarchal communication protocols, they do not attend meetings as men do, or if they do attend the meeting, they rarely participate, voice their concerns and exercise their agency. While explaining women's involvement in the project meetings the local champion said:

Our culture does not really welcome the women to talk 24/7[all the time]. So then you are naughty, we are going to find some words to try and blame your participation in this. And, now the project started at the headman, at the headman you don't really have the women talking. We can have the meeting there, and you will find a lot of women don't speak, one or two of them talking.

Based on our observation, the local champion's comment is true. In community meetings, women tend to be reserved, which is considered as respectable gender behaviour for women in general. However, here the thread we want to build up is, how representative is the voice of the 'one or two' women in the meetings, and how seriously has it been taken. Most importantly, how can we measure their 'participation' if meetings are arranged in a space that represents the unequal power structure, which inevitably excludes them from participating and exercising their agency? This continues to be a challenge within the project.

Who Participates and How?

When it comes to critiques on participation in development projects, the general assumption and concern is that there is a gender gap, which is inevitable within the context of a conservative patriarchal cultural system. Moreover, 'gender gap' is constructed around the idea of 'gender-mainstreaming' projects. Thus the analysis and evaluation of project performance in realizing gender equality ends up playing into the binary equation of 'exclusion and inclusion'. We acknowledge that it is an instrumental tool, particularly to explore the impact of gendered relations in technological solutions and interventions. However, Buskens and Webb argue, "gender-mainstreaming has failed as a strategy towards effective and sustainable change towards gender equality and women's empowerment in development interventions" [11]. In other words, focusing on the gender gap without a critical look into cultural codes and structures can immensely compromise and underrepresent women's agency and their ability to negotiate their participation in the project. It also overlooks experiences of women's participation, however gendered they may be, and their contribution to the sustainability of the project.

Therefore, the question and concern, particularly for our project, should be redirected and contextualized to equal participation and inclusivity - "who participates and how?" This approach not only gives us a space to analyse women's involvement and participation in the project; but it also allows us to unravel the complex African cultural construction of gender and its impact on such technological innovative development projects [7].

While explaining the complexity of participation in Zenzeleni Networks, Fowler argues, "the connection between this rigid gender separation and the project itself was harder to pinpoint" [19]. On one level, women are working in the project, which checks the 'participation' box; but their role, however important, is invisible as it naturally falls into the list of their 'domestic' chores and responsibilities that is often unrecognized and unappreciated in a patriarchal world. At another level, despite their unbalanced representation in the decision making, women get drawn into specific activities for the project, especially administering the station house, charging phones, providing customer service, communicating with the local champion when maintenance is required, and collecting money that needs to be paid each month. Agarwal calls this type of participation "activity–specific participation" 1; which permits individuals to do only certain type of tasks.

As such, for the women in our project, their labour is embedded within the family structure, and their 'achievement' is strongly associated with gendered

performance as opposed to contribution in economic participation within the information economy [20]. We realize that the women in each station house are already actively participating and giving a service that is significant to the sustainability of the project. They are actually the backbone of the project. They are the ones who are monitoring the station house on a daily basis, who charge phones, handle the public phone service, collect the 3 Rand from customers, and communicate with the local champion in case maintenance is required. In the focus group discussion with women, when asked to describe their role and responsibility for our project, some said the following:

Participant 3: My responsibility is to look after the customers' phones, to safeguard them from the children playing with or breaking the phones. To ensure that if the cell-phone has a memory card it is not lost. That is my responsibility.

Participant 4: I am solely responsible for charging the actual phones-I also look after the phones. I also charge at night if we have a backlog that means that I do not sleep night. I swap the phones by unplugging fully charged phone and plugging in the next one.

Participant 1: I have the responsibility of working for the people by making sure that by the end of the month ... all of the 3(currency)'s that have been collected by all means have to be indicative of a monetary income by the time we get to the meetings- one can't just say that there is a project but there is no monetary value to show for it. This is my responsibility.

However, their service to the project is mainly considered as the role of the "clerical primary users" [19] that is intertwined with their other 'domestic' duties and responsibilities. Thus, their 'participation' is often unrecognized and behind the scene. It is also due to this patriarchal and androcentric culture that their daily, extra labour, work for the project is unnoticed rarely mentioned and unequally valued. According to Agarwal such complicated gendered participations are categorized under what she calls "participatory exclusion". She argues, "they stem from systematic factors and can, in turn, unfavourably affect both equity and institutional efficiency" [1].

Challenges Women Face

The women in the focus group discussion explained the challenges they have with the project, on a personal capacity or while pursuing expected responsibilities that are simply invisible.

Participant 1: Honestly, this project does hinder us; people want their phones to be charged, as they want to use them. This means that we cannot go places or really do all of my chores. I can't go to church and even if I do go I am not entirely free /comfortable. You can't go anywhere for long. This is a big hindrance.

Other women explain the difficulty they encounter in relation to the infrastructure of the houses and the constant need for them to be available in the station house:

Participant 6: Since we live in the rural areas the structure of our houses are different from 5-room-RDP houses[2]; my kitchen is on one side the other parts are on the other side. Sometimes the customer comes to fetch their phones but then they take the wrong phone-this has happened to me before. Here, I had to investigate who took the phone and where it has gone to; fortunately I hunted it down and found it. But, if a phone goes missing then it is my responsibility to pay for it.

Participant 3: My problem is that there always has to be someone to charge and look after the phones. The charging happens in the portion of the house that you are currently not in. Once someone's battery was misplaced, what had happened was that whoever came to pick up their cell-phone took the battery out of one phone and placed it into theirs. This can be very stressful.

Interestingly, challenges around customer behaviours in relation to the service provided were mentioned. The following comment from a woman participant captures the sentiment:

Participant 5: Sometimes ... I can spend the whole night charging someone's phone, the next thing they tell me that they do not have any money to pay for the charging. I don't understand why they did not tell me this the time they came to drop off their phones. Sometimes the people think that we are lying when we say that the solar panels are not ours, they think that we can charge their phones for free. I can always help them as a customer but if they are dishonest from the beginning then this makes me angry as I have worked hard to charge these phones.

Since women are not authority figures in the house, and their job in the project not appropriately recognized, together with the local cultural practice that leads people to think that they are authorized to use and share the resources that are available in their community and neighbourhood [6]. As the above comment indicates, this challenge frustrates the women.

Routinely in the project, once a month, the cooperative members have a meeting. Although the three women are involved in these meetings, the conversations are lead by men and decision-making of the project within the community. Hence, this social structure shapes and systematically limits and marginalizes other group members, women and the youth, from actively and equally participating in the project [19,38]. Another 4 women also

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2 Reconstruction and Development Program (RDP) was launched after a regime change in South Africa. It focuses on tackling structural injustices, e.g. housing built by the government and delivered to historically marginalized people. The houses have a unique stigma in South Africa.

explained that since they are not attending and participating in these meetings, they depend on the feedback they get from their husbands. Interestingly one woman, who attend the cooperatives meeting, in the focus group discussion mentioned a possible solution for this:

Participant 1: Our thought processes, ideas and needs are not the same as men. Thus, it would be nice for us women to have our own subsection within the project. As women we are of the same accord are intellectually in tune so it's easier for us to understand each other's needs. When it comes to the men we may be afraid of voicing these ideas, maybe he may also hinder you from fully expressing your idea.

Ideally, women's roles should not be limited to the responsibilities that are organized closer to their domestic spaces, they should be given equal opportunity as men to participate in all aspects of the project. But in reality, distinguishing factors that re/produce the gendered hierarchical division within societies remain a challenge. The station is installed in the house, and in a conservative patriarchal world, the 'home' and 'domestic sphere' in general is ascribed to women to be responsible for and take charge. Men, both socially and culturally, are not expected to take up the domestic roles. Thus, the solar system in the house acts as enabler for the domestication of the service, which then means that the women had to naturally work with it [11]. Since this rigid gendered division of labour is indoctrinated through cultural and societal values, the women naturally take the responsibility of everyday management of the station house [26]. The local champion also explains the community culture as follows:

Bear in mind, in our culture the man has authority and the stations are in the houses of a man not in a woman-because the authority is the man. That's one of the reasons I think.

While explaining the local culture and the direct relation it has to the perception of women's role in Zenzeleni Networks, he said that:

The women are there in a way to assist the man- the way it is. If you are my wife for instance, I will be the man to go to the meetings, but you are in the house you collect the money and once I want to go to the meeting, I will ask you for the money to go to the meeting.

The above response resonates with what many feminist scholars, e.g. Okoye [34], Wilson-Tagoe [47], and Ratele [36], have pointed out; that for the customary practices to qualify as binding, they must be accepted or recognised as an obligation by the community which, in most cases, is strongly supported by the elders, who are deemed spokespersons of the respective culture. The dominant ideology of these cultural practices includes narratives that legitimate the patriarchy of the system along with other characteristics of the society's organization [12]. As far as ICT4D projects are concerned, Buskens and Webb argue that "societal beliefs and structures that emphasize male dominance and superiority and foreground women's main

(albeit unrewarded) role of supporting husbands and families are brought by both women and men" [11].

In this particular case, because the men in the cooperative are considered powerful social actors in the community and as patriarchy dictates the 'headman' of their houses, they are the 'authority' figures in the private and public sphere. Thus, the men in charge define and set up the project's organizational objectives and goals; and local protocols exclude women from meetings and decision-making. But when it comes to working on a daily basis to materialize the goals, the task is easily delegated to the women as part of their domestic role. For instance, the future plans of the project denote that the co-operative members distribute incentives (a percentage of all the revenue obtained through the year), rightfully so, for their hard work to sustain the project and continue providing service to the community. Yet, who gets recognition and reward for what kind of responsibility is tangled with local protocols and social relations. Thus most women, except the three women in the cooperative, are assumed to be getting or sharing the benefit from their husbands. Needless to say this does not guarantee women's power to negotiate equal sharing, or even any sharing in the family. In relation to this Agarwal argues, "intrafamily bargaining for more equitable sharing of benefits or tasks … is the most complex" [1]. The features of the following two comments enlighten and challenge our understanding of gender inequality in relation to incentives and recognitions, and the way women negotiate these boundaries in such a way that does not create social chaos and conflicts:

Participant 1: Women are the homemakers, the home is dependent on the women, and without women there is no home. The project should provide opportune projects so that woman can support their homes and children-so that the children have the opportunity to further their education.

Participant 4: This project needs to find more ways ... to create opportunities, as women want to have something that they can have at the end of the day-something that they can give to their children. There have to be things that we can give each other, to give to our children and sustain our homes. There is no way that women will join this project when there is no incentive - there has to be something that one reaps at the end of the day.

In most societies gender is constructed by creating distinctions that maintain female powerlessness and giving authority to male, hence maintaining existing gender relations under the patriarchal system [29]. Fowler emphasizes that, "the common challenges leading to the failure of outwardly participatory ICT4D interventions is inequitable participation in which individuals who possess power in the local community drive the intervention process in ways that serve their interests" [19]. Inevitably, the challenge will continue to be how to shift and negotiate such power structures and empower women to exercise their agency.

Gendered Design of ICT & Research

So far our analysis focuses on reproducing local gender constructions in our project by supporting the current power structure in the project. However, local histories and practices are not only those that exist around the geographic site of the intervention. Complex power relations also exist the decision-making in research labs, far away; in the technologies themselves (see [3]); and, in the dialogue between local and interventionists' culture, and mutual perceptions of those cultures. In reflecting over the project, we begin to realise gendering processes in the research project's approach that might have happened regardless of local patriarchy. In an extensive prior project we meticulously and comprehensively analysed the everyday lives of men and women and the relations between these and the operation and use of solar charging [5]. Despite this careful document of women's work we did not try to think of ways that both engage with the Tribal Authority's patriarchal practices and ensure the technical infrastructure in the network project supported women. We simply accepted, without question, certain constraints in scheduling teaching and involving participants [4] and in the technologies used. Even 2nd author, who documented relationships between gender and charging and communicating in the prior project, and has an intellectual commitment to situating projects in local practices, did not raise this issue. This was partly because 2nd author intended to avoid 'getting in the way of' 3rd author's work, particularly since she was leaving the community and she admired and was confident in his overall approach. However, there was also an element of deference due to his extensive engineering expertise, given that technology is central to their mutual and independent projects. In fact, while the 2nd author has written repeatedly about how power relations are embedded and materialised in the technologies we design and deploy, when it came to practice she was unable to respond in her own projects to critical gender issues that contribute to embedding these. She felt she was not technological expert enough to design alternatives that could serve both the necessary technical infrastructure and social workarounds for women. All she felt able to do, within time constraints in her own projects, was to work with a group of women separately [7]. It is very important to point out here that we do not feel amongst the team that male researchers are anything other than supportive. Rather our point is that technology research itself is patriarchal and technologies as artefacts gender our imaginings.

At another level, in retrospect, this is also where our desensitized professional selfhood manifests. Living in a patriarchal world, in some cases benefiting from it, desensitized our critical view to look deep into our environment with a political view of gender dynamics. We had, what Buskens calls, compromised "capacities for gender (self-) awareness and for intentional agency" [10]. Here, it is also important to point out the attitude of many ICT4D researchers' belief and bias in technological fixation over personal and social issues [43], where gender clearly fits into the latter. Instead of changing the strategies of institutions to reflect and accommodate the service that women are giving as equal and an essential part of the project, we were trapped with the concern of fitting "women into a men's world" and "prove that women can function like men and meet male norms" [35]. This is not to say women are not experiencing these issues, but there are layered complexities to their everyday experience that are unique and need to be negotiated in a systematic way without creating disturbances in the women's lives and the community in general.

DISCUSSION

In a conservative or patriarchal society, research about power and hierarchical social structure and how it affects the impact of development projects such as ours, is often mistaken as an attempt to over-problematize indigenous cultures. Narayan argues that although questioning culture is important in confronting essentialist notions of gender differences, the effect can be violently unpleasant [33]. The very action can be regarded as lack of respect for African culture and an indication of 'westernization'. Similarly, Wilson-Tagoe argues, "exploring the relationship between culture and identity from the perspective of women's narratives does not only mean undermining totalizing definitions of culture; it can also mean disrupting the very foundations of national cultures." [47]. However, Ratele argues that culture is not static, perceiving culture, as a fixed social practice is reductive [36]. In this regard, Bakare-Yusuf emphasizes that focusing on remarkable cultural fluidity and hybridity helps to explain possibilities for transforming African gendered power structures that restrict women's capacity for action and agency 2.

The concerns that we have described will not be solved through a technological fix/solution [20,43]. Similarly, Agarwal argues that there are limits to what the participatory approach alone can achieve [1]. Given these pre-existing cultural establishments of gender inequalities, the project did not prioritise reducing the gender inequalities. The evidence we got from the collected data in this qualitative study shows clearly the gendered reality of women has an impact on the quality of communal participation. Hence, it is our responsibility and ethical commitment to bring to light some of these challenges. Perhaps the acknowledgment of such socio-cultural challenges and sharing it with other ICT4D practitioners might open up a space to have critical discussions and alternative ways of balancing and (if possible) transforming such cultural hindrances.

Only three women from ten station houses, are part of the cooperative and the majority of women do not have a clear idea of what the project is, does and can do, except charging phones and the electricity access generated from solar systems. This is due to limited knowledge or lack of

participation in a dialogue about the project's development agenda. This implies that, despite the board of members having given the mandate from the community to run the project, the process is not representative of the voices of all stakeholders, their choices and interest. As a result, in alignment with Toyama's notion of amplification 43, the cultural gender hierarchies of the community are replicated in the project. The challenge continues to be how to represent the whole community, not only women but also the youth, which is diverse and heterogeneous in its character. This realization is important as it encounters perhaps the technological deterministic attitude and considers social and cultural situations as equally influential and deterministic for sustainable ICT development projects. In critical reflection of the project, one of our authors writes:

> Success must be understood in terms of long-term sustainability of the goals of the network and their impact … Technology developers and evaluators alike appear to agree that social, political and cultural factors must be considered alongside purely technical and environmental considerations. [38]

We hope that this research, and the issues our critical reflection revealed, will advance conversation about participation and inspire projects that look into nuances of 'participation'. We seek to surpass a reductionist critique that frames participation as a binary (exclusion and inclusion) and enable similar ICT development to find ways that work in "favour of women's empowerment rather than, perhaps unwittingly, increasing the gender gap" [33].

CONCLUSION & RECOMMENDATIONS

In terms of the impact of ICT and gender, the lesson we learned from Zenzeleni Networks, only looking at the co-operative and the operation of the project on a daily basis, is not exclusion of women as it has been extensively researched within the ICT4D community; it is rather that of gendered participation, agency and ownership. The question of women's equal participation is extremely complex as it involves "larger issues of social, cultural and economic relations, and therefore becomes a paradigm for exploring … agency as a whole" [47].

Throughout the paper, the authors tried to unpack complex power relations and show how difficult it is to work in a community project. Going back to the two important questions that the paper tried to address, we come to a conclusion that Zenzeleni Networks unintentionally reinforces and perpetuates existing gender and social inequalities. However, based on the finding of this research and conversations amongst the research team on the lessons we learned, the project is now working towards giving more voice to women, and fining a way to negotiate equal partnership and representation of women in the cooperative. Hence, moving forward, learning from this experience, we would like to offer a few recommendations and strategies that can be used to reconcile this gap:

(1) Recently, an ICT business incubator facilitated a workshop that focused on defining the business model for the co-operative members. It was decided, during the process, that each household would receive an incentive for their service – a percentage of the profit obtained by the co-operative throughout the year. The incentive includes all labour to get the project going: technical chores, meeting and decisions of how to manage the project, and the day-to-day operations (charging phones). The problem with this, we have realized, is that it does not recognize gendered division of labour and complex negotiating power of women in domestic spaces, as wives, to get paid equally for the service. While creating an income generating mechanism is an important step in the project, its implementation again plays into a patriarchal system. The women are not directly paid an incentive for their job because the incentive is given for the 'family', except for the three women in the co-operative, the rest of the women working at the station houses are represented by their husbands. Thus, we would like to recommend, as a future plan and strategy, that women who are working in the stations are equally recognised as actors and active economic contributors to the project and should earn a reasonable part of the incentive for their labour.

(2) "Women's empowerment in the information society requires a constant examination of how gender relations as a dynamic cultural process are being negotiated and contested, in relation to the technology environment" [20]. As the women in the focus group discussion indicated, they feel intimidated in voicing their concern at the meetings, even the powerful women indicated that it is preferable to have a separate meetings with women about the specific task they are responsible for and to support each other as 'working' team for the project in household level. We recommend that the project find a way to create such spaces where women feel empowered to voice their concern and continue working with the other women within the cooperative. This in a way can be seen as decentralization of responsibilities and accountabilities without creating conflict within the social structures.

(3) We recommend that, since the principle of the project is participatory while engaging with the community and the cooperative members, the lead researcher and the research team in general must provide feedback on the research findings to the cooperative members. Particular focus will be to propose the above two recommendations to the board of the co-operative. We believe that the already established trust and respectful relationship between the research team and the board can enable the conversations to happen; perhaps even toward acceptance of the proposed ideas.

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