The Role of Social Capital in Mediating ICT-Enabled Peace Building Efforts: A Case Study from Kenya

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Abstract. Inter-ethnic violence has flared in recent years across Kenya's periphery due to struggles around processes of political devolution, corrupt systems of governance, elite sponsorship, cattle rustling, climate change, famine, land, politicization of ethnic relations and illicit arms. Violence has resulted in loss of life, loss of livelihood, increased hatred between communities and large-scale displacement. New ways of violence prevention are needed to achieve sustainable peace, and contribute to broader efforts of social development. This article analyses the implications of integrating ICT in mitigation of ethnic violence in Northwestern Kenya. The theoretical lens of social capital is used, with a focus on different forms of bonding, bridging and linking to analyse how ICTs can reduce those forms of capital that enhance violence and simultaneously promotes those that can promote peace. Our study finds that relatively simple ICT applications that can help inform anonymously on potential violent conditions and initiate speedy and effective response to them, can help promote binding social capital at the expense of bonding forms. This changing dynamics around the constitution of social capital has contributed to effectively promoting peace building efforts. The paper thus contributes to the important domain of 'ICTs for Peace' research and more broadly to ICT4D.

Key Words: ICT, Ethnic Violence, Social Capital, Kenya

1. Introduction

Inter-ethnic conflicts are a widespread problem on the African continent, with devastating effects on human security through loss of life and livelihood, and large-scale displacement [1]. Ethnic violence involves choosing victims based upon ethnic membership [2]. In Africa, the six worst-hit countries from such violence include Nigeria, Ethiopia, Somalia, Sudan, Kenya and Uganda [3], a trend increasing in recent years [3]. Kenya is reported to experience one of the highest levels of such violence [5], particularly following political devolution [6], often encouraged through elite sponsorship [5, 6]. Other sources of conflict include cattle rustling, environmental degradation; drought, land related conflicts and the proliferation of small arms and light weapons (SALWs).

As ethnic violence continues to flare across the Low and Middle Income Countries (LMICs), peace activists are exploring ways of integrating ICTs in peacebuilding efforts [7], such as using mobile phones to help identify and map hate speech and rumours by citizens' perceptions of risk and conflict and providing early warning of potential risk situation [8, 9]. ICTs have been used to track violence in Latin America, for example, Infocrim in Sao Paolo has been credited with a fall in homicides from 12,800 to 7,200 in the period 1999-2005 [7]. Without communication networks, it is difficult and dangerous for civilians to inform on rebel groups, as they run the risk of being identified [10]. The Ushahidi platform has been used in Kenya to map election violence. There are also examples of other ICT applications being used for peace building in Kenya such as the Uwiano Platform for Peace, Umati for monitoring hate speech, Elections I witness and Sisi Ni Amani for monitoring election malpractices. However, the study of these applications have not focused on the role of citizens in implementing these efforts [4]. ICTs can also be used to facilitate organized violence, such as supporting the coordination amongst groups promoting violence [11], by enabling rapid sharing of information [12]. ICTs thus come with both opportunities and risks in peace building initiatives.

There is urgent need to develop more nuanced understanding of the role ICTs play in peace building efforts, and how these play out in particular social contexts. We explore these social dynamics around ICTs through the lens of social capital [13]. We explore this through the research question: *What is the interplay between ICTs and social capital in mitigation or not of ethnic violence?*

This paper is organised in seven sections. In the next section, we outline the theoretical approach based on a social capital perspective. In section three, we describe the methods, followed by the case study narrative. Section five presents the findings, and the analysis in section 6. The conclusions are presented in section seven.

2. Theoretical framework: A social capital perspective

The use of ICTs in mitigating ethnic violence, are shaped by the social networks in which they are embedded including the shared norms and values, and how trust shapes processes of cooperative relationships within and among conflicting communities. The role of social capital has been highlighted by different academic disciplines, such as public policy and sociology, leading to its multiple conceptualizations and definitions (Hossam, 2009), focusing on the structure and/or on the content of the social [14, 15, 16]. We focus on the different mechanisms identified in shaping social capital, namely, bonding, bridging and linking and how these processes are mediated by ICTs. Social capital serves as the glue which can bind community based social networks and are important in shaping processes of technology development and use [17]. Social capital represents resources or assets rooted in an individual's or in a group's network of social relations.

We adopt the definition of social capital as networks, shared norms, and social trust that facilitate coordination and cooperation within or among groups for mutual benefit [16]. Putman emphasizes different means that shape social capital including processes of bonding, bridging and linking, which can both build and undermine social relationships. These means provide an interesting lens to understand the role of ICT in shaping social capital in peace building efforts, particularly in shaping social trust reflecting the level of confidence that people have that others will act in expected ways [18]. Trust indicates a willingness of a person to be vulnerable to another party either as a consequence of their belief of good intent [19]. Trust is embodied in structures of social relations and grows with increasing sense of personal or group security, and processes of accountability.

We study the means of building social capital within the context of a *social network* and seek to understand the level and type of engagement an individual has within the collective and the level of support he or she can obtain [20]. This is reflected in the *norms of reciprocity* between the individual and the collective [16]. In an interconnected group of people, social networks provide the foundation of personal and group interactions and how they unfold.

Bonding represents a means of building social capital in a collective characterised by high levels of similarity in demographics and social attitudes [21]. Bonding thus exists between 'people like us' such as in a family or close friends [22]. Bonding often escalates the polarization between communities increasing their vulnerability to violence, and simultaneously promotes violence against the perceived "other." *Bridging* social capital describes connections across a cleavage that typically divides society, such as ethnic or religious groups [19, 18]. Bridging helps to understand how can ICTs help peace actors to break constraining factors by enabling information flows between conflicting communities, and the building of consensus. *Linking* social capital describes norms of respect and networks of trusting relationships between people interacting across formal institutionalized power structures [23]. We use linking to understand the ICT-mediated relational dynamics among community members, non-state actors and state actors in the context of violence mitigation.

These three means of building social capital help to analyse the complex relationship between social capital and ICT-mediated violent mitigation efforts. We expect for conflict to increase tensions and decrease trust between engaged actors and also force them to rely and depend on each other. Social capital might be formed on the basis of solidarity in the face of an external threat, while relying on bonding processes. We analyse how ICTs reshapes elements of bonding, bridging and linking can enable or not peaceful coexistence of communities. [22] has argued that social capital can provide the basis for social belonging and constructive social interaction, enabling joint problem solving. However, Putman has not analysed the role of ICTs in shaping the different social capital processes, a gap which this paper seeks to address. However, imbalances in the bonding, bridging and linking forms of social capital can also lead to increased inequalities and subsequent conflicts [24]. Social capital can thus both lead to mitigating and promoting conflict [25], based on whether social capital is 'unresponsive' or 'exploitative' [26]. Social capital can both include or exclude groups [21]. Social capital therefore cannot be assumed to always act as a glue, since it can also function as a source of tension, and contributing to violence. How do ICTs like mobile phones redefine these dynamics, reflects our empirical quest.

3. Research methods

This paper results from the work that is ongoing from 2018 in a Faith Based Organization (FBO) in Kenya, where one of the authors is involved as a leader for conflict mitigation efforts. The work involves formation and strengthening of community level peace structures, social contracting processes, strengthening community-authority relations and promoting early warning and early response using ICTs. The experiences and engagement is thus rich, intensive and ongoing and involving a diversity of learnings.

The study is based on the longitudinal research design (2018.2020), involving multi-stakeholder analysis based on qualitative data. The study employed a case study design to understand the role of ICT-based early warning

and response system (EWERS) being implemented by the FBO in Kenya. The analytical focus of the case is on the role of ICTs in shaping peace building efforts of community groups in sites historically plagued by violence in Northwestern Kenya. We sought to understand how the social dynamics, viewed through the lens of social capital, shaped the use of ICTs in peace building efforts.

One of the authors, a member of the FBO, has been visiting the case study sites at least quarterly during the study period, while the other authors has made one visit each of the last two years. Data has been collected through various means of meetings, focus group discussions, and interviews. In 2020, given the travel restrictions, regular contact has been maintained between the authors and with the actors in the field over phone and Skype. Additionally, system reports were examined at periodic intervals, for example to see the changes reported in key indicators of conflict, such as related to cattle theft, domestic violence, prevalence of small arms, drug and substance abuse among others.

The study also applied a multi-stakeholder analysis approach in identifying stakeholders and classifying them, such as indicator monitors, community peace representatives and security agencies. We tried to investigate the relationships between stakeholders, and how these were being mediated by the EWERS application. The stakeholders were analysed at three levels: i) the first was the indicator monitors, also known as field agents that collect intelligence reports from the field; ii) the second was the system developers and analysts who received the data from the indicator monitors; and, iii) the third was the responders who mainly comprised of end-users, the government authorities and the other non-state actors who were expected to take peace building actions. For each group, we examined how members applied the ICT for peacebuilding efforts given their different roles. Peace building efforts were focused towards different ethnic communities engaged in conflict in two clusters: i) the Kipsigis, the Nandi and the Luo in Muhoroni conflict cluster; and, ii) the Bukusu, the Sabaot, the Iteso and the Kikuyu in Mt. Elgon conflict cluster. The analysis focused on interactions between community groups and exchange of ideas and goods. These clusters were organized through different groups, such as peace committees, community advocates and peace representatives, women peace associations and thematic committees.

Data analysis was broadly interpretive, helping to identify three key themes around the relationship between ICTs and social capital, shaped within the context of economic and power relations. We tried to reformulate stories narrated to us by different respondents, and related to concepts of bonding, linking and bridging social capital.

4. Study context

The area under study covered Trans Nzoia, Bungoma, Kisumu, Nandi and Kericho Counties in Western Kenya, where there exists intractable ethnic violence. The FBO has been historically engaged in peace development efforts in these regions, including the use of ICTs. The communities under study were the Kipsigis in Kericho; the Nandi in Nandi and the Luo in Kisumu counties. While the Bukusu, the Sabaot and the Iteso in Trans Nzoia and Bungoma counties formed another conflict axis referred to as Mt. Elgon cluster (see Figure 1)
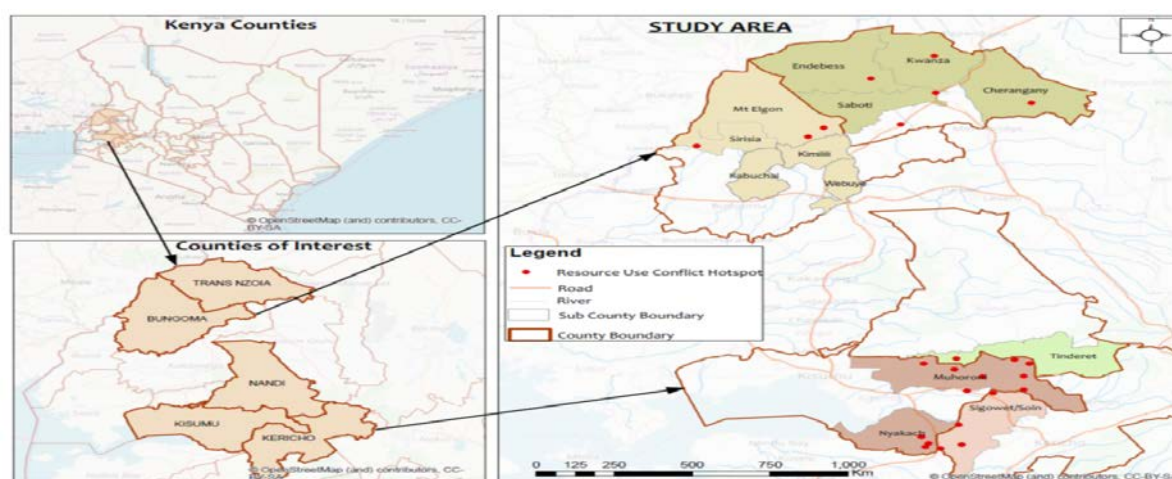

Figure 1. Muhoroni and Mt. Elgon study areas

Communities in Mt. Elgon and Muhoroni clusters have been embroiled in violence since 1963. The causes include political dominance, land and boundary disputes, the proliferation of SALWs, and large-scale cattle theft. Existence of militia groups and IDPs is a threat to security, and there also exist high rates of corruption among

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some police and chiefs who also encourage drug and substance abuse. Ethnic discrimination in resource sharing was another cause of conflict.

The FBO registered in Kenya has been working on various development projects with a primary focus on peace and reconciliation projects. The FBO has designed and implemented an EWERS as a key tool in peace building efforts, based on the the sending, receiving and processing of SMS. The EWERS receives information from field monitors and sends verified information to the mandated responders in time to take action.

The EWERS has three main components comprised of the monitoring, control and response units. The monitoring Unit comprises of a team of field agents knowledgeable about the violent hotspot areas. They are equipped with a simple feature phone and a reliable network provider for easy communication through both SMS and voice calls. Their primary role is to collect data in the hotspot areas according to pre-defined indicators of violence and relay the same to the control unit. The control unit is computer monitoring system with a web-based software. The personnel manning the system analyses, interprets and double checks the reports from the monitoring unit by calling the sender (field agents) and generating relevant reports for action by the response team. The response unit has a team of responders, including state security agencies, NGO's, local administrators, responsible for particular geographical areas and for types of incidents. They respond with appropriate action based on information of incidents received through their mobile phones. The system is schematically depicted in the figure below.
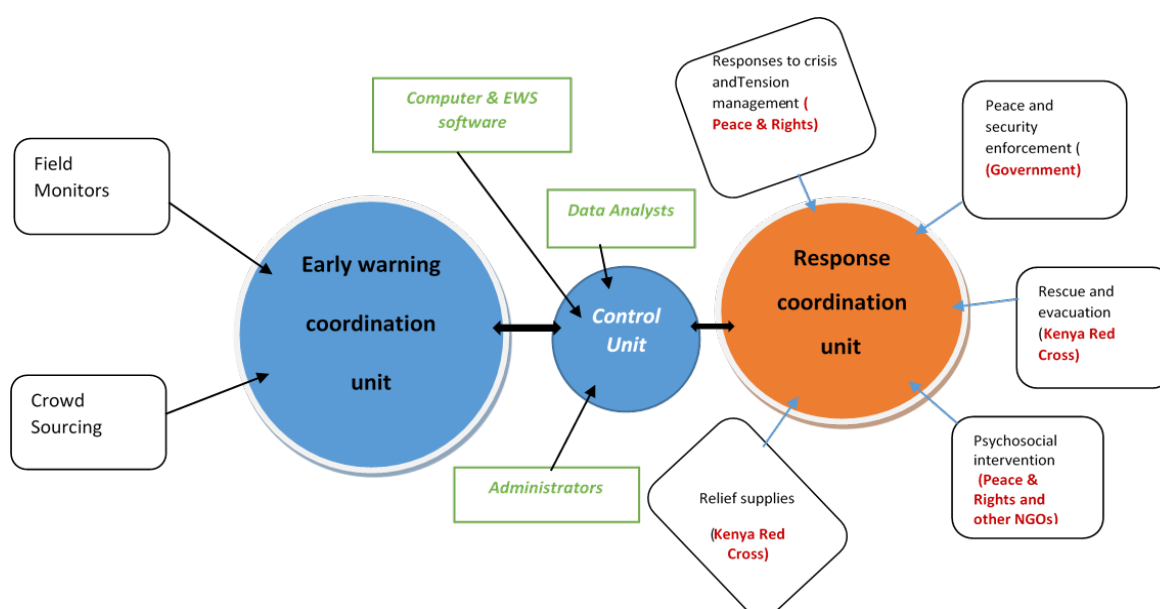

Figure 2. The EWERS in use by the FBO

5. Case description
This section describes the case study around key themes identified through the empirical work.

5.1 ICTs as a platform of sharing sensisitve information for peace and security
The study established that the introduction and use of ICTs helped community members, particularly peace actors in Mt. Elgon, to overcome conditions constraining information flows between communities leading to better social relationships and improved mobilization of community resources. The EWERS, with its inbuilt features to anonymize the sender, motivated the field agents to share sensitive information to each other thereby contributing to saving lives and properties. For example,

> "in Endebess a Turkana woman saw a group of some Pokot youths crossing the border from Uganda to attack the Bukusu and take away their animals and also smuggle in weapons. She sent the message to the system warning that the Bukusu farms will be attacked shortly. The police in collaboration with community leaders responded quickly before the culprits could carry out the attack." (community member in KII).

> In another case, "a Teso family had sold many bags of maize and had got lot of money. A group of Sabaot youths had noted this and were planning to attack this family at night. It was also an opportunity to evict

them from their land which the Sabaot had believed that it was theirs. A Sabaot who got hint of the possible attack sent a message to the EWERS. The Teso family got the alert and moved away that night. The security agencies kept vigil at the home and arrested the youths who had come to attack" (community member part of FGD)

Such sharing helped the strengthening of bonding relationships by enabling access to sensitive information which helped to protect other members by preempting potential attacks. We found that ICTs helped members from across communities to alert each other whenever they sensed that there was going to be an attack. Prior to the introduction of the EWERS, such information went unreported due to fear the community members had of being victimized by the security agencies and the police, and to be embroiled in long-drawn out and resource consuming legal cases. The ICTs helped increase confidence of reporting sensitive matters among members of the community.

5.2 ICT as a medium of minority empowerment

The EWERS provided a medium through which the minority groups could raise their voices and be included in peace building efforts. The EWERS facilitated flows of information, empowering the minorities to challenge the deeply entrenched power structures exercised by the majority groups. The prior lack of inclusion of minorities in these communities was a factor that had sustained the violence, and their inclusion contributed to increasing the levels of justice, as demonstrated in the example below:

> *"When appointing Assistant Chief in Kaplamai, the Nandi community noted that somebody from a different community was going to be appointed instead of their own. They started sending threats and complains which were captured in the EWERS. A Nandi woman received the alert message and opted to use her influence to support a woman candidate who was not a Nandi against the wishes of her community. The Kisii woman who was being supported by the Nandi woman got the position."* (community member in KII).

The EWERS contributed to increasing leadership opportunities for women by enabling them to engage in different peace building efforts and help them to ascend to various leadership positions in their communities. Their engagement in response to the message alerts on issues of gender-based violence, corruption, SALW proliferation placed them at a vantage position to be appointed or elected into leadership. For example:

> *"The community in Chepchoina agreed to unanimously elect one of the most active member of the Peace network to a women leadership position. Everlyne Wasike has caused massive influence through response to the EWERS messages. She became so popular that the men in the community campaigned for her until the fellow women elected her to the chair of Maendeleo ya Wanawake. She was again later elected to the chair of the settlement farm (this position is normally a reserve for men). Even recently three other women from Courageous women group were appointed as village elders."* (community member in KII).

There were also increased opportunities for the empowerment of youth in the communities. The message alerts from the EWERS motivated regular interactions between the Chiefs and the youths from the affected communities, which also drew the attention of leaders to the economic plight of youths. Some chiefs started sensitizing the youth on the importance of peace and respect for the rule of law, and for them to focus on the development of entrepreneurial skills. This served as a means for youth empowerment.

> *"I have gone an extra mile to lobby the support of loaners such as Uwezo and women funds who lend the youth money to start business so that they can upgrade their livelihoods and as result of this, community members have gained trust in the administration and relates with me well."* (Community Chief *in KII*)

5.3 ICTs as a facilitative for access to economic markets

The EWERS helped open up market spaces that had been before closed to community members, by linking then across ethnic divides and encouraging joint venture efforts. These connections led to new economic opportunities and business partnerships, for example, communities in Mt Elgon formed *chamas* and business groups in Saboti.

> *"We were brought together by EWERS to regularly respond to alert messages from the system. But with time we decided to also engage in joint business that has now become a SACCO whose membership is drawn from all communities living in Saboti."* (community member in *FGD*).

Through the focus group discussions, we learnt that that business in the area had improved with the advent of the EWERS as it had facilitated a platform for interaction of diverse groups of people, enabling the opening up of new markets that had before been closed. The Sabaot harvest milk, honey and firewood and supply to the Bukusu

who in return supply maize, cooking oil, sugar, soap. This had previously not happened due to high polarization between these two groups. According to a key informant, the Luo and Kalenjin had started to freely interact in the Sondu market leading to joint business ventures since both groups were included in the network engaged with responding to alert messages related to cattle theft.

> "We exchange goods and services, for instance we the Kipsigis bring tomatoes that the Luo buy on credit and take it to Kisumu, and the payments done later." (community chief in KII).

5.4 ICTs as a driver of community conversations for peace

The early warning messages sent to the EWERS revealed polarized relationships between the Abagusii and Marakwet in the Trans Nzoia County. The persistence of messages drew the attention of national level government leaders who responded swiftly by forming community-based dialogue groups, helping the two communities to engage in reconciliation efforts. After peace was achieved, the communities made a social contract to be solving their issues amicably without being aggressive against the other through dialogue. A tree by the name *simatwet* became their symbol of peace where they would always meet whenever system alert messages pointed to possible dangers to security. Following such regular conversations, many people who had been earlier displaced, were recalled by host communities.

> "The Abagusii IDPs have returned to their farms and were busy farming. The roads connecting between the areas occupied by the two communities had been closed but now they have been opened. Chepkaitit primary school located in the area between the Marakwet and the Abagusii had been vandalized and closed due to violence. None of the communities wanted their children to attend the school. The government repaired and reop-ened the school. Children from the two communities (Marakwet and Abagusii) started schooling together in Chepkaitit primary school. The school board now has members from both communities" (community member in KII)

5.5 ICT system as a tool for recovery of lost assets in conflict situation

The ICTs facilitated the timely reporting of incidents encouraging timely response enhancing recovery of stolen goods and animals especially in the Muhoroni conflict cluster. Communities along the borderlines of Kisumu and Kericho collaborated with each other to ensure recovery of stolen animals and returning them to their rightful owners. One such example:

> "Following the incident where animals were stolen and one person killed, as a community we all resolved that whenever stolen cattle is reported to have crossed to our area, we must search, find and return so that we breed good relationship with our neighbors and this has improved the relationship between us Kalenjins and our neighboring communities. As a chief, am ensuring that this is being enforced across the borders by members of the community and peace committees." (community chief in KII).

5.6 ICTs enabling networking and collaboration to support governance

ICTs facilitated the creation of a strong collaborative relations between the community members and the security agencies especially police. This trust emerged as a result of the sharing of information useful for each other. As there was increased flow of information between the community and the police, some of the barriers to trust were mitigated. According to one focus group discussion, earlier there used to be high level of mistrust between the police and the community members who feared intimidation. For example, a retired officer commanding a police division narrated,

> "most junior officers are weak and can leak the information in regard to secret reports – thus they can easily pass over classified information that is so confidential to the criminals. They also tend to ask irrelevant questions such as how many criminals did you see? Which clothes were they wearing? For example, upon recovery of a cow, a civilian may not be interested to follow up the case in court due to such useless questions. Some policemen still threaten residents with penalties of being locked up. Such questions and threats are intimidating and scared members of the public from reporting." (community member in FGD).

The above statement describes the constraining conditions that had previously affected the relationship between the police and community members, and the laxity of the police in responding to community distress calls. This constraining condition was reduced with the introduction of the EWERS with its inbuilt features of anonymization. Police officers from across the conflict divide now networked and jointly responded to the alerts. The EWERS helped in fast reporting which enhanced quick response from the police and other security teams leading to increased recovery of stolen livestock. Such response actions helped enhance trust between the police and community. The EWERS contributed to transformative changes in security management approaches, and the

police started attending community forums such as church functions, organized seminars, and public security forums to interact directly with the public. They also started inviting some members of the public to give motivational talks to the members of the police force. In the same vein, through public and other community meetings, police officers educated the community on case reporting investigation processes and their respective roles and responsibilities. This resulted in greater bonding between the police and community leaders leading to improved reporting from the community which supported relevant and effective response. This attracted many community members to report accurately and boldly, as narrated by some key informants;

> *"The system helped to improve the image of the police as we sat together and shared challenges with the community leaders. The interaction of security teams at public meetings and community dialogues enhanced understanding among the parties. Through these meetings, more light was shed on best way of reporting, as a result, the senior officers agreed to share their numbers for reporting and further interaction with members of the community."* (OCPD Mogere, KII). *"I was a policeman in Mount Elgon before retirement and it used to be rough due to absence of technology. Any information that was not IT-based was being leaked. Indeed, the area chief was killed due to absence of confidentiality. The EWERS enables pro-activeness from the security agencies which results in quick action and apprehension of criminals. The recent killings in Matungu Sub-County, Kakamega County almost extended to Bumula Sub-County in Bungoma County had it not been reports in the EWERS revealing actors behind threatening leaflets. While working as a policeman in Mount Elgon, I was threatened by criminals several times but the relay of information through the EWERS system always saved me." (*community member in FGD*)*

5.7 ICT as an enabler of accountability in conflict situations

The study established that the integration of EWERS in violence prevention process contributed to increased accountability of the government leaders especially the chiefs and the security personnel who were now expected to respond effectively raised security alerts. When the system relayed information to the police and local administration, the same was also sent to their concerned superiors who could hold them to account. Initially, most of the reported cases to local authorities were ignored or being silenced. Increased accountability helped to enhance trust building between community members and government administration. The trust between the government officials like Assistant Chiefs, Chiefs, Assistant County Commissioners and general members of the public improved due to the frequent interactions during response efforts to message alerts from the system. The trust was demonstrated in the ongoing levels of consultation and the inclusion of community members in key meetings. The Chiefs and their assistants regularly held consultative meetings with community leaders to deal with emerging issues, which has helped enhance transparency in how they were addressed cases of violence. For example:

> *"There is increased interaction between chiefs from Kalenjin side and chiefs from Luo side unlike before when we never used to work together. We collaborate especially on matters related to cattle theft and land and boundary disputes to ensure the two communities coexist peacefully. Whenever cattle theft has occurred on the Luo side and thieves are believed to be crossing to the Kalenjin side, the chiefs from the Luo side will inform the chiefs from the Kalenjin side and with their concerted efforts, the cattle are recovered. The same happens when there is boundary dispute, chiefs from both side would organize public barazas to address the issue.*" (Chief Opiyo- KII). *"I received alert messages from the system complaining about the laxity of chiefs to respond to distress calls from the community members. To deal with these, I directed all chiefs in the region to establish security committees that will respond to distress calls within 5 mins. I have made sure this is enforced leading to improved relationship between the community and the administration."* (community member in KII).

6. Case analysis

Our case highlights the different ways in which ICT contributed to increase trust and reciprocity within the social networks both in Muhoroni and Mt. Elgon clusters.

6.1 ICT –enabled Social networks – peace network as new forms of social capital

We found various new peace networks emerged with the increase in social capital resources for violence prevention. The EWERS created a platform where community members could connect with the administration and the security agencies to engage in a cycle of responses to conditions of insecurity. This represents a form of linking social capital guided by notions of social trust [26]. Similarly, [27] describe linking social capital as networks of trusting relationships between people interacting across explicit, formal or institutionalized power or authority gradients in society. These emerging networks were characterized by trust and reciprocity, key features of social capital. The networks enabled the setting up of a bottom-up approach to peacebuilding and security

governance by linking local initiatives with national plans. These networks enabled mechanisms that allowed local initiatives to inform and influence national peacebuilding efforts, and help ground them to the needs and conditions of the local context. These means that the ICTs created encouraged positive synergies towards transformations in peacebuilding efforts. For example, these networks contributed to the cultivation of a culture of peace and advancing of reconciliation efforts between the community members and authorities. These linking mechanisms enabled the creation of values such as of accountability, transparency, responsiveness, and tolerance, all of which are fundamental in mitigating ethnic violence. The linking peace network was sustained by the reciprocity between the community members and the administration. The police started to respond promptly to the alert messages leading to the recoveries of animals while the community members became increasingly motivated to willingly share sensitive data with the security personnel. Communication among the entities helped to improve coordination and even understanding of the nature of crimes experienced in the areas, helping to establish both a structural and intellectual dimension social capital as it created knowledge, skills and capabilities to operate in new ways [15]. These dimensions helped motivate the performance of the police to enhance peace building efforts.

The integration of ICTs helped better connect the different warring communities. Intractable violence had previously polarized the social relationships among different ethnic groups. Firstly, it helped to create an inter-connected peace network involving the village elders, chiefs, security teams, youths, women leaders, elders and business people across different ethnic divides. This ICT-enabled network of actors collectively engaged to report and respond to conflict escalating concerns like cattle theft, land grabbing, gender-based violence, smuggling and trading in illicit arms, drug and alcohol abuse, prejudicial tendencies and robbery with violence. The relationship was previously characterised by mistrust, non-cooperation, ethnic alignments to religion, political parties and biased economic activities. This polarization was characterized by higher levels of bonding social capital as compared with bridging and linking capital. The communities were more inward looking and self-centred in their activities, and the transcending of these inter-ethnic divided contributed to the expansion of bridging social capital by reducing levels of individual commitment and building greater inter-community orientation for their mutual benefits. This trend, as [21] has argued, that increasing bridging social capital reduces bonding relations. However, in ethical and moral terms, the action that leads to the benefit of the larger populace should be privileged over actions benefitting a minority. Therefore, reduction in ethnic bonding social capital worked for the general peace and welfare of the majority including those previously excluded. .

6.2 ICTs contributed to the growth of trust and reciprocity within and among ethnic communities

Our study points to the growth or expansion of trust and reciprocity in many different forms including inclusion of the minority, strengthening of economic cooperation, enhanced tolerance of diversity and commitment towards reconciliation efforts. All these represent foundational principles of violence mitigation.

Inclusion of minority: The dominant community had used the bonding relationship to unite against the minority from being appointed to leadership positions. However, the EWERS provided a platform where some members who were against this mission to report and support the minority, gained a larger voice. This required an imbalance to be created between bonding and bridging social capital, for justice to be promoted. While the dominant community lost to a minority group, it was unethical when people belonging to a different ethnic group were treated like "others", and as victims of stereotypes and prejudice. This led to discrimination and social exclusion. The stigma associated with discrimination and exclusion burdens people both as individuals and members of particular communities. Those discriminated and excluded suffer from feelings of guilt, helplessness, incompetence and reduced communal worth.

Bridging economic relationship was created when markets opened up to accommodate the members from across ethnic divides who had otherwise been denied such access. Within the bonding framework, individuals and communities had restricted freedoms in terms of interactions with other community members because of norms, values and cultural practices. [28] has argued that freedom or independence from being constrained by another's choice, the freedom of choice, is an innate human right. This freedom is to be respected and promoted, even when this choice is not exercised in rational or virtuous activities [28]. The use of the ICT application helped unlock the bonds to freedom of community members, and trusting relationships were developed with the growth of inter-ethnic economic partnerships, and the simultaneous weakening of bonding relationships.

Increase in values of tolerance of diversity: A fundamental value for human beings to peacefully coexist is tolerance of diversity. The integration of EWERS in violence prevention contributed to increase in tolerance and

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acceptance of different people, values, and beliefs through contacts with diverse others leading to the growth in bridging relationships. This enhanced level of tolerance and acceptance amongst protagonist communities followed the increased flow of information between them and to external stakeholders

Reciprocity as a key factor of reconciliation: In this case, the act of returning the stolen animals to their rightful owners negated the value of cooperation for mutual benefit as those who survived on stolen animals may feel betrayed. However, analysing these consequences through Bentham's principle of utility, that the morally right action is the one that produces the best overall consequences with regard to the utility or welfare of all the affected parties (Crimmins, J. E., 2020). Within this framework, the results from the use of the EWERS can be justified.

7. Conclusions and contributions

This paper concludes that ICT-integrated micro-based violence prevention systems that build on existing social capital mechanisms are effective in addressing ethnic based conflicts as they help offer local solutions to local problems. The study further concludes that the effectiveness or not of such ICT enabled efforts are well understood within a social capital framework and their means of bonding, linking and bridging. The study reinforces [25] argument that the networks that constitute social capital also serve as conduits for the flow of helpful information that can facilitate achieving goals for peaceful coexistence. The empirical evidence has demonstrated that ICTs facilitated the formation of peace networks in the conflicting communities that enabled the effective flow of information thereby contributing to reduce animosity.

The study concurs with [25] have argued that for social capital to contribute to the peacebuilding process or conflict management, there must be a balance of bonding, bridging and linking social capital. Many examples from the empirical study showed that in areas with stronger bonding social capital and weak bridging and linking social capital, injustices like discrimination of minorities in leadership, denial of access to markets and opportunities and exclusion thrive. The study shows that whenever bonding social capital reduces, there is a corresponding increase in bridging and linking social capital, leading to peace, new markets, new resources and opportunities. The study also demonstrates how ICTs can contribute in bringing better balance between these different forms of social capital.

The study concludes that for peacebuilding strategies to be effective in contributing to sustainable peace, the functional elements of social capital need to be factored in the design phase and monitored in the implementation process. The social networks form critical foundations through which violence can be pacified or assuaged. Social capital therefore cannot be assumed to always act as a glue, since it can also function as a source of tension

The paper contributes to ICT for Peace (ICT4P) research and more broadly to the domain of ICT4D. In addition, the paper contributes to ICT-enabled peacebuilding efforts that seek to strengthen linkages between state and non-state actors. The key vehicle for building these contributions comes from the adoption of the theoretical lens of social capital to study peace building efforts and the manner in which ICTs can mediate this relationship. The study demonstrates the inter-relation between the three forms of social capital, and how ICTs can mediate these relationships. For ICT4D researchers, there are implications for the design and development of bridging social capital be enabling the flow of information across ethnic divides. Building in robust features of anonymization of the field monitor's identity was an important device that promoted bridging. Enhanced bridging can lead to reduced bonding, with positive consequences on peace building efforts.

While this study has focused on particular conditions of violence in Northwestern Kenya, we believe our study also provides more generalizable finding for peace building efforts in other contexts. The social capital lens can be useful in diagnosing the underlying reasons for violence and in understanding how ICTs can be designed and implemented in a manner which reduces the reasons promoting violence and enhancing those that can potentially build more trust and mutual reciprocity across the warring groups.

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