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Social Capital and Agriculture Intervention Programmes: The Transformative Potential of Pfumvudza in Ward 24, Masvingo South, Zimbabwe

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ABSTRACT

Agricultural interventions are increasingly sought for in a world devastated by climate change. Such interventions help to cushion farmers from the adverse impacts of climate change and thus, improving and transforming their livelihoods. Successful adaptation to, and implementation of new approaches to farming such as Pfumvudza/Intwasa, however, requires interaction and engagement with the social capital endowments of the local farmers in order to avoid duplicating failed, top-down rural development paradigms. Deploying social capital theory and based on a qualitative methodology, this study examines the role of social capital in agricultural innovation with particular reference to the Pfumvudza/Intwasa farming model implemented in Zimbabwe. Through unstructured interviews, focus group discussions and quasi-participant observation, the study found that social capital and agricultural innovation are inextricably linked. The article demonstrates that Pfumvudza benefited a lot from grassroots networks, organisations and interactions with far-reaching positive effects on rural development. Bonding capital at village level played a key role in reducing the costs and labour associated with the agricultural intervention. At the same time, linking social capital in the form of government agencies and non-governmental organisations provided the much-needed technical know-how. The study also shows the 'dark side' of social capital which relates to norms that are conservative and resistant to change. It recommends interfacing as a solution to negative social capital where the views and interests of various stakeholders are counterpoised.

Key Words: Agricultural Innovation, Climate Change, Social Capital, Pfumvudza/Intwasa, Zimbabwe

RÉSUMÉ

Les interventions agricoles sont de plus en plus recherchées dans un monde dévasté par le changement climatique. De telles interventions aident à protéger les agriculteurs contre les impacts négatifs du changement climatique et, par conséquent, améliorent et transforment leurs moyens de subsistance. Une adaptation réussie et la mise en œuvre de nouvelles approches agricoles telles que Pfumvudza/Intwasa nécessitent cependant une interaction et un engagement avec les dotations en capital social des agriculteurs locaux pour éviter de reproduire les paradigmes de développement rural de haut en bas qui ont échoué. En utilisant la théorie du capital social et basée sur une méthodologie qualitative, cette étude examine le rôle du capital social dans l'innovation agricole avec une référence particulière au modèle agricole Pfumvudza/Intwasa mis en œuvre au Zimbabwe. Grâce à des entretiens non structurés, des discussions de groupe et une quasi-observation participante, l'étude a révélé que le capital social et l'innovation agricole sont inextricablement liés. L'article démontre que Pfumvudza

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a grandement bénéficié des réseaux de base, des organisations et des interactions avec des effets positifs considérables sur le développement rural. Le capital de liaison au niveau du village a joué un rôle clé dans la réduction des coûts et de la main-d'œuvre associés à l'intervention agricole. En même temps, le capital de liaison sous forme d'agences gouvernementales et d'organisations non gouvernementales a fourni le savoir-faire technique nécessaire. L'étude montre également le « côté sombre » du capital social qui se rapporte à des normes conservatrices et résistantes au changement. Il recommande l'interface comme solution au capital social négatif où les points de vue et les intérêts des diverses parties prenantes sont contrebalancés.

Mots-clés : Innovation agricole, changement climatique, capital social, Pfumvudza/Intwasa, Zimbabwe

Introduction

Agricultural interventions are efforts designed to meet an ever-increasing global demand for food, especially through countering the adverse impacts of climate change on food production. Several agricultural interventions have been instituted, albeit with varying degrees of success at both regional and international levels. Agricultural interventions entail the multifarious efforts to increase food productivity at the same time ensuring environmental sustainability (Leeuwis, 2004). It is not only about new technology but also encompasses the broad spectrum of institutional changes, alternative ways of organizing markets, labour, land tenure and distribution of benefits (Leeuwis, 2004; Spielman *et al*., 2009). From the above definition, it is clear that any agricultural intervention programme requires a transformation of knowledge, systems, livelihoods and practices. In this article, Pfumvudza/Intwasa programme represents a gradual shift from conventional farming (Chiputwa *et al*., 2011). Although conventional farming creates a favourable soil structure for germination of seeds and prevents the proliferation of weeds, it indeed accelerates soil erosion and depletes the soil nutrient content (FAO, 2001a). The Pfumvudza/Intwasa intervention is, therefore, both a response to climate change and the flaws associated with conventional farming. Ongoing research on agricultural intervention focus on measures intended to reduce the effects of climate change on agricultural production and at the same time reducing the vulnerability of communities to climate change induced shocks (Klerkx *et al*., 2010).

Since its adoption in the 2020-2021 farming season, Pfumvudza has received some scholarly attention that focused on its potential to ensure food security in Zimbabwe (Mucheri, 2020; Mujere, 2021; Phiri, 2021; Scoones, 2021; Jakachira *et al*., 2022; Mavesere and Dzawanda, 2022). Whilst these studies have provided valuable insights to the understanding of the farming model, there is still a dearth of literature in terms of understanding how social networks interact with and influence the success or failure of rural agriculture innovations like Pfumvudza. In fact, the link between social capital and the agriculture sector in Zimbabwe is still under-researched. Though innovation is critical for economic development and food security, it is important to understand the context and networks within which the innovation takes place. *Pfumvudza* farming model involves the interaction of multiple stakeholders such as farmers, extension officers, Non-Governmental Organisations (NGOs), researchers and scientists who possess different skills, knowledge and experience (Woodhill and Wennick, 2014). The combination of these experiences and knowledge banks needs to be understood within the framework of social capital in order to determine the extent to which they influence success or failure of the programme. This study therefore adds to the

existing literature on Pfumvudza by examining the role of bonding, bridging and linking social capital in the implementation and subsequent success or failure of the new farming model. Notwithstanding the much heralded virtues of social capital to the success of developmental interventions, this study also acknowledges the 'dark side' of social capital (Dakhli and De Clercq, 2004). This relates to how norms that foster collaborative behavior can be simultaneously mobilised against an intervention strategy such as Pfumvudza and thus compromising its success.

This study augments research on agricultural intervention programmes by examining the interplay between social capital in its various forms and the implementation of the Pfumvudza/Intwasa farming intervention in Zimbabwe with particular focus on Ward 24, Masvingo South. This is quite critical for rural development practitioners, governments and donor communities as it offers insights into how social networks shape rural communities' response to innovations in the agricultural sector. This study begins by giving a background of conservation agriculture in order to set the context within which the Pfumvudza programme was introduced. It goes on to provide available literature on Pfumvudza and the conceptual framework that informs the study. After that the methodology employed is discussed followed by presentation and discussion of findings.

Conservation Agriculture: A Precursor to the *Pfumvudza* Model

In an attempt to deal with the vagaries of climate change and food insecurity, the Government of Zimbabwe (GoZ) through the Ministry of Lands, Agriculture, Fisheries, Water, Climate and Rural Development introduced the *Pfumvudza/Intwasa* farming model. The farming model is a type of conservation agriculture (CA) put in place to augment food shortages and ensure efficiency in the agricultural sector (Phiri, 2021). This move was informed by climate change resilient research which identified climate smart agriculture (CSA) as one of the sustainable agricultural practices that can enable small scale farmers to withstand the devastating impacts of climate change (Makate *et al*., 2018). In the same vein, Mucheri (2020) notes that *Pfumvudza* is part of the CSA initiative to promote food security at household level and beyond in line with the National Development Strategy 1 (NDS 1), Vision 2030 and Sustainable Development Goals. The success of the programme is also expected to contribute significantly to economic growth and development that will see Zimbabwe achieving its vision 2030 of an upper middle income society.

As already indicated, *Pfumvudza/Intwasa* farming model is a type of conservation agriculture. Taking that into cognisance, it is therefore imperative to highlight the background of the conservation farming practice in order to contextualise the origins of the *Pfumvudza/Intwasa* model. Conservation agriculture was originally developed in the Americas and Australia and it combines three basic principles notably, minimum soil disturbance, crop residue retention of available plant material on the soil surface and diversifications through crop rotations (Kassam *et al.*, 2009). These principles of conservation agriculture have great potential to contribute towards sustainable production intensification (Petty, 2008). This is particularly because conservation principles and practices have high adaptation capacity to climate changes because of the higher affective rainfall due to higher infiltration as well as greater soil moisture (Gukurume *et al*., 2010).

In Sub-Saharan Africa, conservation agriculture was introduced as a key measure to improve food security (Hobes, 2007; Gukurume *et al.*, 2010). In Zimbabwe, conservation agriculture was introduced against the backdrop of dwindling agricultural production evidenced by varying

food imports, especially during the 2011-2012 season when the government imported about 50% of its maize needs (Manyeruke *et al*., 2013). As of 2012, Masvingo province only had 378 300 food insecure households, and this is because most of the farmers harvest what is commonly known as 'winter pushers' or *Masundachando* in Shona terms (a term commonly used to refer to meagre harvests that cannot sustain a household until the next farming season) (Hove and Gweme, 2018). In light of these statistics, adoption of conservation farming technique was irresistible.

However, it is quite important to note that conservation farming has received a low uptake across Africa. In Uganda, for example, the adoption of conservation agriculture is still low despite the much heralded virtues preached by the government and non-governmental organisations (Osiru, 2013). This view is also supported by Friedrich *et al*. (2012) who reiterated that the uptake of conservation agriculture in Africa has been disappointing owing to the substantial problems associated with targeting, adapting, and adopting the new technology, especially for small scale farmers. In Zimbabwe, the adoption of conservation agriculture has been very disappointing despite the efforts of donors to support it (Marongwe *et al*., 2011). As a result of the contestations and conflicting worldviews associated with the programme, farmers chose to adopt some of the principles of conservation agriculture such as digging holes and left others such as mulching and crop rotation. This represents a partial adoption of conservation farming (Giller *et al*., 2009; Pedzisa *et al*., 2010).

A study by Gukurume *et al*. (2010) in Chivi South revealed that farmers had a negative perception of the program as they have euphemistically termed it '*dhiga ufe'* (dig and die) as opposed to the conventional phrase '*dhiga udye'* (*dig and eat*). This is because the programme involves a lot of labour, especially with regards to the digging of holes and weeding. The farmers in Chivi South, however, pretended to have a positive attitude towards conservation farming as they were given free inputs by the Government (Gukurume *et al.*, 2010).

The above observations confirms the projection made by Gowing and Palmer (2008) who believed that the adoption of conservation farming was likely to be partial as opposed to comprehensive. Risk aversion is mostly associated with innovations in the agriculture sector of Zimbabwe. Small scale farmers do not want to experiment with new innovations in the sector as they are afraid of incurring losses. Farmers are likely to take the less risky components of a new technology than the riskier ones (Pedzisa *et al*., 2015). This explains why some farmers in Zimbabwe are more likely to adopt the digging of holes but avoid new crop varieties which they are not used to. It is against this background of contestations and conflicting lifeworlds between the farmers and donors that Pfumvudza was introduced with the core founder of the programme, Odrieve having strong hope that it can help to rectify some of the flaws of conservation farming (Mujere, 2021). The Pfumvudza concept was developed by Brian Odrieve, founder of Foundations Farming in 2020. The name was given by Berin Stockhill, Orieve's friend around 2007 (*The Sunday Mail* 2021, 16 January). Pfumvudza is a Shona term that refers to the blossoming of fresh leaves during the spring season connoting the beginning of a new farming season (Mujere, 2021). The blossoming of the leaves is part of nature's communication to the farmers that they need to prepare for the new season approaching. The concept was developed to meet cereal needs for an average household of six members over one year from a small piece of land measuring 16 metres by 39 metres assuming one bucket of grain is consumed a week (ibid).

Existing Literature on Pfumvudza/Intwasa Farming Model. *Pfumvudza/Intwasa* model was introduced as an antidote to the food insecurity challenges bedeviling Zimbabwe since the turn of the millennium. Mucheri (2020) believes that if its principles are well implemented, *Pfumvudza* is a potential game changer to attain food sufficiency, and this will enable Zimbabwe to regain its status as an exporter of maize in the region and beyond. In concurrence with this, Mujere (2021) purports that *Pfumvudza* has great potential to contribute towards household food security and simultaneously reducing carbon emissions if implemented according to the recommended standards. He, however, argued that the success of the new farming model lies in the level of adoption by the farmers. His findings reveal that farmers who adopted all the principles of *Pfumvudza* got higher yields compared to those that partially adopted the principles. A study by Mavesere and Dzawanda (2022) in Ward 21, Munyarari area in Manicaland corroborates the above findings. They found that the implementation of *Pfumvudza* during the 2020-2021 cropping season increased yields and reduced the dependency of farmers on donor aid. Defe and Matsa (2021) also found that conservation agriculture increased food production in Chiredzi, wards 3 and 4. All these findings point to a positive correlation between adoption of Pfumvudza principles and increased food security.

Another central theme in the literature revolves around the challenges associated with the Pfumvudza Programme. Chief among these, were the untimely distribution of inputs by the Government. This challenge was compounded by logistical challenges and corrupt tendencies in the distribution of seeds and fertilisers (Mavesere and Dzawanda, 2022). This was also confirmed by the *Herald* (2021) in which farmers in Mutoko lamented the late distribution of inputs. Simango (2021) added that the stealing of inputs for personal gain was rampant across Zimbabwe, and this has impinged on the successful implementation of the noble scheme. These challenges seem to be a cancer that has rocked the African continent. In Uganda and Zambia inputs were distributed late under the conservation farming programmes (Osiru, 2013). Overreliance on government provision of inputs resulted in delays in planting and related effects on the yields. Mujere (2021) also observed that the lack of requisite skills among rural farmers is hindering meaningful progress in the agricultural sector.

Given the above challenges, this study sought to highlight how social capital can be used as a working tool to supplement government and donor support of the *Pfumvudza/Intwasa* model. It identifies social capital as a missing link in agricultural intervention programmes. The study is motivated by the realization that there is a dearth of literature on social capital and the agricultural sector in Zimbabwe. It presents the perceptions of farmers towards the new farming method. This is critical in determining the extent to which they employ social capital towards or against the programme in question. It goes on to look at how bonding, bridging and linking social capitals have been mobilized for and or against the *Pfumvudza* model.

The *Pfumvudza* model in Zimbabwe is a recent innovation in the agricultural sector with a potential to ensure food security both at household and national levels. Its potential however, lies in the ability of stakeholders to strategically engage with the 'knowledges' and institutions of the smallholder farmers in the rural areas. In terms of orthodox rural development practices, agricultural innovations have been wrongly conceptualized as 'mere technical devices' in which social capital has very little if any space (Leeuwus and Ban, 2004).

Resultantly, such approaches have been marred by resistance and thus failing to deliver results. This has been the case with Conservation Agriculture (CA) which was either abandoned or sabotaged (Gukurume *et al.,* 2010) due to its top-down nature. Since the turn of the millennium, approaches to agricultural innovations have emphasised that agricultural research and interventions to deal with the effects of climate change must be embedded in the larger innovation systems integrating knowledge from various stakeholders and effectively putting it to use (Dakhli and De Clercq, 2004; Jun and Weiguo, 2008; Chou and Chang, 2008; Kaasa, 2009). This demonstrates the importance of focusing on interdependence, networks, joint learning and social interaction (Leeuwis and Ban, 2004). This approach takes into cognizance that social capital and innovation in the agricultural sector are inextricably interwoven. It is against this background that this study examined the role of social capital in the adoption of the *Pfumvudza* farming model and the concomitant impact on rural development and transformation.

The purpose of this study wass to analyse the role of social capital in the implementation of the *Pfumvudza* programme. The study sought to answer the following two key questions:

RQ1: What are the perceptions of farmers towards the *Pfumvudza* programme?

RQ2: What is the role social capital in the success and or failure of *Pfumvudza*?

Conceptual Framework

In order to have a deep understanding of the complex influence of social capital on the success of *Pfumvudza*, the research employed Putnam's (1993) social capital theory. According to Putnam *et al*. (1993:17), social capital refers to "features of social organization, such as trust, norms and networks that can improve the efficiency of society by facilitating coordinated actions". This definition provides an analytical framework upon which trust, norms and networks are analysed in terms of how they shape farmers' attitudes towards or against *Pfumvudza*.

This also relates to how extension officers, as 'knowledge bearers' engage with the existing structures in the rural communities to develop a framework for the success of the said farming model.

While the social capital theory is very broad, covering an array of issues, this study dwells much on the three subsets of social capital enunciated by Putnam namely bonding, bridging and linking social capitals. Bonding social capital, on one hand, refers to ties which are shared between members, typified by ethnic groups, religious networks of close friends, peers and relatives within a specified locality (Njuki *et al*., 2008). Woolcock and Sweetseh (2002) added that bonding social capital refers to connections to people like you (family, relatives, kinship). It also refers to relationship within a homogeneous group. This form of social capital has been useful for analyzing how village level relationships have contributed to the success and or failure of the *Pfumvudza* concept. Given the fact that digging the holes is laborious, farmers had to form groups at village level to help each other to lessen the burden of '*dhiga ufe*'(dig and die) as some have labeled it (Gukurume *et al*., 2010). Bonding social capital has also been essential in understanding the local farmers' engagement in mutual sharing of inputs such as seeds and fertilizers. Information sharing among the farmers was also reflected in the form of bonding social capital.

Another subset of social capital is bridging capital. According to Woolcock and Sweetseh (2002), this type of social capital refers to connections to people who are not like you in some demographic sense. They add that bridging social capital is characterized by extensive loose networks, weakened reciprocity, blurred type of trust and is highly

instrumental. It is what the community requires to get ahead. In relation to this study, this type of social capital has been used to understand how the farmers collaborated with their neighboring villages in sharing information and experience. Other villages acted as reference points for the Agricultural Extension officers when teaching. Field days that were conducted in nearby villages constituted bridging social capital. Although this type of social capital is seen as weak or loose, it performed a vital task in ensuring the success of the *Pfumvudza* by bridging the gap between villages in terms of standardizing their operations.

Lastly, there is linking social capital. According to Putnam (1993), this form of social capital relates to the role played by local institutions in conjunction with the local communities to build resilience and adaptation to poverty and marginalization. Woolcock (2001) goes on to reiterate that linking social capital pertains to connections with people in power whether they are in politically or financially influential positions. It is vertical in nature as it implies institutions coming in a top down approach with a developmental programme. These institutions come in and rely on existing bonding and bridging social capital. Agarwal (2008) asserts that local institutions determine how communities under vulnerability respond to their situation. This form of social capital has been useful in analyzing how local institutions in their civic, public and private forms have contributed to the implementation of the Pfumvudza concept. This subset of social capital has been used to assess the role of NGOs, Government institutions and grassroots organisations in driving ahead the programme. It should, however, be noted that that social capital can produce undesirable outcomes that are inimical to development at the community level (Dakhli and De Clercq, 2004).

Despite this, not much emphasis has been directed towards the dark side of social capital. To substantiate on the dark side of social capital, this study used Scott's (1985) concept of weapons of the weak to show how farmers (grassroots people) can sabotage developmental interventions that are not in line with their life worlds. This concept is useful in understanding how farmers in the said area have resisted machinations imposed on them by developmental agencies.

Research Approach

This study is interpretive in nature and therefore naturally lends itself towards a qualitative methodology. The choice of this methodology lies in the desire to understand social reality from those involved in the activities under study. In this context, the researcher sought to understand how small scale farmers were directly engaged in the *Pfumvudza* farming and thus have a deep and nuanced picture of the said farming venture. Using the qualitative methodology, the researcher managed to unpack the experiences, attitudes and perceptions with regards to the *Pfumvudza* programme. The methodology allowed the researcher to understand the community dynamics in the formation of groups and how social capital was employed through a web of interactions among the farmers, government departments and the extension officers, something that was going to be difficult if a quantitative methodology was employed (Denzin and Lincoln, 2000).

Based on the qualitative methodology, the researcher triangulated unstructured interviews, focus group discussions and quasi-participant observation in order to solicit data from the participants. The fieldwork for this study was conducted from October 2020 to July 2021. The researcher was also involved in the digging of holes and thus had an insider perspective of the programme.

Focus group discussions were used to corroborate findings from unstructured interviews and participant observation as they helped to produce evidence and insights which was less accessible without interaction in a group

setting as listening to the verbalized thoughts and experiences of others tends to stimulate memories, ideas and experiences in group participants (Lindlof and Taylor, 2002).

A purposive sampling technique was used to select participants for this study. This is whereby the researcher used personal discretion to select information rich cases. This was made easy due to the fact that the researcher is a resident of the ward in question. As a result, the politics of belonging played a crucial role in getting access to the research participants. The '*Wematongo* philosophy' (Politics of belonging) made it easier for the researcher to be accepted by the community and thus avoiding suspicion from the farmers and extension officers who are the primary sources of information (Nhodo, 2019). Through this method, the researcher selected 25 farmers (15 men and 10 women). Two key informants, namely the extension officers working in the area, both of them females were also interviewed. Key informants were useful in providing relevant and insightful information about the *Pfumvudza* because of their knowledge, skills-set or position within society although they can do it in a subjective manner (Marshall, 1998).

The researcher obtained verbal consent from the village heads and the Ward councilor. Verbal consent was also sought from the farmers in the ward. All the participants were guaranteed the right to withdraw from the research at any time. Gaining entry was not a challenge since the researcher is a resident of the area under study. In order to maintain anonymity, pseudonyms were used. As a result, all the names mentioned in this study are not real ones but were simply ascribed to the participants for the purposes of study.The villages from which respondents were selected were just numbered from 1-5 and their real names are not captured.

Findings and Discussion

Perceptions of Farmers on Pfumvudza. The results of this study reveal mixed perceptions of farmers on the *Pfumvudza* farming model. Some farmers viewed the model positively as a way of enhancing food for their families. There were, however, different reasons for seeing *Pfumvudza* positively. Firstly, age was found to be an important variable in influencing adoption or non-adoption of *Pfumvudza*. Most elderly farmers (especially above 60 years), believed that the *Pfumvudza* model is designed in their best interest as they could no longer till large pieces of land. Three farmers indicated that they were grown up to the extent that they can no longer travel to their distant fields and as such they could only utilize nearby small plots to do farming the *Pfumvudza* way. Most of the female farmers have their children working in towns and the majority in South Africa. As a result, they lacked enough manpower to utilise large pieces of land.

Another group of farmers also saw *Pfumvudza* as good as they did not have cattle to use as draught power. During one of the workshops organized by an extension officer the researcher could note farmers who did not have cattle welcoming the farming model. This was after the extension officer explained that the model was also designed to help the vulnerable groups in the communities. Mr Nengu said:

> *Pfumvudza is good for us who do not have cattle. It helps us since we do not have money to hire those who have cattle to plough for us.*

The outbreak of the cattle disease commonly known as January disease which destroyed cattle in the study area and all over Zimbabwe also had an impact on how farmers viewed *Pfumvudza*. Most farmers in Ward 24 lost huge numbers of their cattle to January disease.As a result, the *Pfumvudza* model was the only option available for them in order to get food. During the researcher's visits to the said villages,

it was hard to come across even two cattle. The extension officers also testified that the villages mentioned were the worst hit by January disease in the area. Mr Chari remarked:

> *My son even if we say the Pfumvudza model is very laborious how are we going to till the fields? We no longer have cattle due to January disease. In this village there are only two households that still have cattle two for each household. Those who came up with Pfumvudza have done a great thing for us.*

The new farming model coincided with the outbreak of January disease and it offered an immediate solution to the problem.

Some farmers, however, indicated that they preferred *Pfumvudza* because it has proved to be fruitful to them since the adoption of the '*Dhiga udye*' (dig and eat) programme. These farmers started by implementing *Pfumvudza* in their small gardens and later extended it to their fields.

> *I never stopped doing dhiga udye since its adoption long back and since then I have never bought food for my family. Surely, this is a profitable farming model", said Ms Muneni in an interview.*

These sentiments show that some farmers are encouraged by the yields they get from *Pfumvudza* and nothing else. Such farmers indicated that their success lies in following what the extension officers say and also selecting the best crop varieties for their area. Some farmers, however, displayed a very negative attitude towards *Pfumvudza*. They saw it as very demanding in terms of labour requirements as they had experienced from the Conservation Agriculture which ended up being euphemistically dubbed '*dhiga ufe*' (dig and die) (Gukurume *et al*., 2010). Such farmers were, however, digging the holes and the reason for this was that they simply wanted inputs from the government. Lack of seriousness was seen even from the way they dug their holes. The measurements were not very accurate and in some cases, mulching was not done. In an interview with one farmer, the researcher got the following response:

> *We are now being killed my son, I doubt if we are going to survive for a long time. It is hard to dig on hard ground. We no longer enjoy summer as we have to work throughout the year. From harvesting we go to shelling maize and from there holing and from there we have to look for the mulch till the rains come.*

Most farmers complained about the hard labour involved in *Pfumvudza* farming. Complaints about too much labour associated with this farming technology are rampant across Zimbabwe and Africa in general. As reported by NORAD (2011), most women in Zambia complained that conservation farming is very laborious. The digging of the holes itself is quite tedious compared to conventional farming using ox-drawn implements. In ward 24 as is the case in Zambia conservation farming techniques doubles the weeding effort. This is because farmers are not allowed to use cultivators or herbicides to fight against the weeds leading to weed pressure (FAO, 2007). This situation compelled some farmers in the study area to revive collective work activities such as '*hoka/humwe'* embedded in bonding social capital to be discussed later.

The role of local institutions in the Pfumvudza project. Another major finding of this study is that local institutions are very integral to the adaptive potential of the farmers to the *Pfumvudza* concept. Private institutions played a key role in ward 24. As indicated earlier on, the concept was introduced by Foundation for Farming (FfF), a local NGO, which has provided a framework upon which the model was based. NGO workers played an important role in disseminating information to the local farmers on how they can maximize on the *Pfumvudza* farming model to achieve food security, hence, transforming their livelihoods. The capacity building workshops held with the local farmers were part of the empowerment drive that is crucial to the success of any programme or project.

In terms of public institutions, government departments played yet another important role in conjunction with the NGOs. Agricultural extension officers were the foot soldiers

of the programme. These officers provided the farmers with the information that they wanted. The information range from measurements of the *Pfumvudza* plot, application of fertilizer and lime as well as instructions on mulching. One of the extension officers had this to say:

> *Our role is to teach the farmers on how to implement the programme. Most of our farmers are illiterate and therefore they needed information on how to measure the plot. We instructed them on how to apply fertilizer and lime in their plots.*

The advantage of having extension officers at hand was that they had a deep knowledge of the area including the information on climatic conditions, soil type and even the nature of the farmers themselves. This was important in contextualizing the *Pfumvudza* programme in Ward 24. Two of the officers in the ward indicated that they had more than four years working in the area. This resulted in them being well furnished to work with the local farmers.

Another critical role of the extension officers was to convince the farmers about the viability of the *Pfumvudza* model. This was an important task to carry since the local farmers in the area were used to their own farming practices which include tilling huge tracts of land but getting poor yields. In an interview, one of the extension officers said:

> *We had a huge task to convince the farmers that the Pfumvudza model was good for them. This was not an easy task since most of our farmers are old people who have always had their own ways of farming. Most farmers were afraid of venturing into Pfumvudza. We, however, managed to convince most of our farmers, and they are now used to it.*

From the observations made by the researcher, the extension officers had a mammoth task as the farmers had experienced the '*dhiga udye'* (dig and eat) programme that ended up being dubbed "*dhiga ufe*" (dig and die).

The experience they had implanted a negative attitude against the *Pfumvudza* programme and hence they wanted adequate information (Gukurume *et al*., 2010).

The extension officers also played a supervisory role. They supervised the digging of the holes to see if the farmers were doing it in accordance with the prescriptions given to them. The researcher witnessed the extension offices moving around the villages supervising and monitoring farmers' progress. One of the officers said:

> *We are busy moving around supervising our farmers. Some do the work recklessly just to have it done but some lack the knowledge on how to do it and we help them. We even encourage others to start afresh although it is irritating for them.*

This role was of paramount importance in Ward 24 as in many other wards in the country because farmers were not very serious in the initial stages of the implementation of *Pfumvudza*. Most of them simply wanted to get inputs from the government and that is the reason why they did not want to dig the holes in the desired way. They simply wanted to have something to show to the extension officers so that they could be given inputs. These findings resonate with those of Gukurume *et al*. (2010) in Chivi South where farmers pretended to love the programme simply to get inputs. Thus, they simply embraced conservation agriculture because they were financially weak to buy the expensive inputs from the shops. In terms of Goffman's (1959) dramaturgical theory, farmers simply showed the front stage, which implies pretention instead of their back stage, characterised by a strong negative attitude against conservation farming.

The extension officers also supervised the distribution of inputs. They ensured that adopters of *Pfumvudza* get the inputs first. In addition to that extension officers have also organized field days, and these have been very fruitful in terms of bringing together farmers' knowledge and experiences. These field days helped to cement the local farmers' relationships and simultaneously providing a platform for both farmers and extension officers to evaluate their progress. Field days also helped to create uniformity in the Ward in terms of the implementation of the *Pfumvudza* concept.

In terms of the benefits of these field days, one farmer had this to say:

> *Field days were very useful, they were a platform to learn from the extension officers and from other farmers too. We had a good time on the recently organized field day. We were motivated by other farmers' experiences with the new farming method.*

The above excerpt shows how farmers benefited from the field days. However, some farmers indicated that field days are associated with the misuse of funds by the organizer farmers. This had the effect of weakening ties amongst farmers and a threat to bonding and bridging social capital. It is crucial then for the extension officers to monitor closely how the funds are disbursed to avoid future squabbles.

The role of bonding and bridging social capital in the implementation of Agricultural Innovations. As highlighted earlier on, bonding and bridging social capitals are offered by civic local institutions which are the local people's organisations. In this study bonding social and bridging social capital proved to be the most important drivers of the *Pfumvudza* programme. This is because they defined the local farmers' perceptions and aspirations. At the community level, local farmers organized groups based on kinship, family and village level relationships. In the 2020-2021 season farmers relied on these groups for holing. Because the job was done as a group, it was done quickly and efficiently since there was the idea of sharing. As indicated elsewhere in this paper, most of the farmers are old people and were not used to the measurements of the plot. These benefited from the said groups as they learnt and still continue to learn from each other. One of the village heads in the ward had this to say:

> *When the Pfumvudza programme started we formed our group. Through group effort, we managed to help each other to dig the holes. We organized humwe (collective working) so that we could help one another. This greatly helped us as elderly farmers since we were not used to measurements so we benefited from the young, educated farmers who taught us how to measure the plot.*

From the response above, it was also noted that the *Pfumvudza* programme helped to revive one of the oldest Shona practice of *humwe* or *hoka* (collective working). This practice helped so much to build social cohesion which is a sine quanon to the success of any programme or developmental intervention. Majority of the participants argued that bonding social capital enabled them to cement their relationships with their village mates and to share experiences in terms of farming. The results also indicated that grassroots groups helped so much in gathering the manure for mulching. In village 2 farmers gathered their humus together and used buckets and scorch carts to carry the mulch into different plots in the village. This helped to reduce labour for the farmers. One farmer had this to say:

> *My son we are only two people here, myself and your grandfather, and our little grandchildren. Without these 'hoka/humwe' we cannot continue with this Pfumvudza thing. The programme is quite laborious.*

These sentiments pointed to the value of bonding social capital as farmers could easily organize ways that are best suited to their pace to deal with the challenges they face. Similar findings were found in the Chishawasha area where farmers capitalize on working together for the collective good of their communities (Tanyanyiwa, 2021).

Another observation made was that there were delays in the distribution of *Pfumvudza* inputs by the government. This observation is not peculiar to Masvingo South only. Similar findings were made by Jakachira *et al*. (2022) in Mwenezi district where the top dressing fertilizer was released by government just before the crops were ready for harvest. In Zambia, inputs were given to farmers late and this compromised productivity during the implementation of conservation farming. Hove and Gweme (2018) also lament the erratic and late distribution of agricultural inputs by non-governmental organisations to farmers in Ward 31 of Zaka which caused some women to abandon conservation farming.

In the 2020 to 2021 cropping season, inputs were availed late in ward 24, Masvingo South. This was also the case in Mutoko where farmers lamented untimely distribution of inputs (The Herald, 2021; Mavesere and Dzawanda, 2023). This was also worsened by rampant corruption and stealing of inputs associated with the programme (Simango, 2021). Thus, in a bid to adapt to the effects of climate change, farmers had to also battle the untimely and erratic supply of inputs using social networks at their disposal. Bonding social capital played a pivotal role in augmenting input supplies by government. About 65% of the farmers fell back on their village groups to proceed with their farming venture. Some groups organized money-go-round (*mukando*) and they managed to purchase the seeds and fertilizer. In three of the villages studied farmers bought their 50kg bag of seeds and a bag of compound D fertilizer and shared amongst them as they waited for the government supplied inputs. These were able to grow their maize earlier compared to those who waited for the inputs from government. One of the *Pfumvudza* farmers had this to say:

We managed to raise our money as a group having realized the delay by the government to distribute inputs. We used the funds to purchase a 50kg bag of seeds and a 50kg bag of compound D fertilizer. We shared it among ourselves, and this helped us to grow during the first rains. We also managed to buy the variety we wanted that is 513 SEDCO.

This benefit derived from group work testifies to the view that bonding social capital is crucial in driving the *Pfumvudza* programme ahead. Thus, social capital at community level is increasingly becoming a social safety net for most rural farmers in Zimbabwe. In the Chishawasha area, small scale farmers share seeds from past seasons and help each other in times of shocks. *Mikando* (money go round) are also common among the Chishawasha farmers (Tanyanyiwa, 2021). These findings are corroborated by Baiphethi and Jacobs (2009) who who observed that the erratic and untimely supply of agricultural inputs has become a cancer across the sub-Sharan region as most farmers now rely on informal channels such as on-farm seed saving, farmer-to-farmer exchange and unregulated sales. The resilience by the farmers is strongly linked to Granovetter's (1973) theory of strong and weak ties which hinges on the idea that if local people perceive that formal institutions are failing to deliver what they have to offer in a sustainable way, (hence weak ties), they resort to informal networks that they perceive to be strong. In this case, the farmers were not passive victims of the delay by the government to provide inputs for the farming season. Instead, they fell back on their local networks to achieve their goals.

The 'Dark Side' of Social Capital: Everyday Forms of Pfumvudza Resistance. Like its predecessor Conservation Agriculture (CA), the *Pfumvudza* model was a kind of top down approach to development (Gukurume *et al*., 2010). Small scale rural farmers who were the primary beneficiaries of the new farming model were seldom consulted; the model was imposed on them. Most farmers interviewed believed that too much power was vested in the extension officers who were the ambassadors of the government programme. They determined the maize variety (Sygenta MR1514) that was used. This resulted in an impasse between the farmers and the extension officers. On one hand, the officers reasoned that the new variety was in line with the changing patterns of rainfall in the area and was resistant to diseases and pests. On the other hand, the farmers did not want to experiment with the new variety. One of the farmers reiterated:

We cannot experiment with hunger. This is our first time to hear about this variety. If it fails then we will starve the whole of next year. It was supposed to be used in the second round, not now.

Most farmers in Ward 24 are used to the SEDCO Variety 513 and they did not have confidence in the Sygenta maize variety. Farmers claimed that the Sygenta variety was good

looking but did not produce a big size of the cob expected by the farmers. Some farmers resisted growing the variety and instead they grew their usual varieties although this was not expected by their extension officers. The extension officers threatened not to assess farmers who grew other varieties. In terms of yields, the farmers who grew SEDCO 513 variety got better yields compared to those that used the Syngenta variety although there were some variations across the ward. Based on the low yields obtained from Syngenta variety, some farmers then resorted to using their usual varieties and thus creating an acrimonious relationship between farmers and the extension officers. This dark manifestation of social capital is succinctly captured by Dakhli and De Clercq (2004) who posit that, norms that promote conservatism can reduce creative thinking and reaching for out-of-the box solutions. This was demonstrated by some farmers in Ward 24 who held unshakably to SEDCO 513 despite the existence of new varieties. Some farmers devoted the fertilizers they got from government to crops that were not under *Pfumvudza*. This gave a wrong impression for some farmers that the new farming model was not a success, yet inputs were used on a different plot.

The above standoff between farmers and extension officers is aptly captured by Scott (1985) in his analysis of the 'Weapons of the Weak'. His argument is that grassroots people do not engage in violent actions against a developmental intervention that is not consistent with their life worlds. Instead, they use their invisible power to resist machinations imposed on them by those at the upper echelons of power. This idea explains the behavior of the farmers in the said area. Some received the maize variety but shelved it and grew their usual variety (SEDCO 513) without the knowledge of the extension officers.

This was because it was difficult for them to come head on with a government programme since challenging it was just as good as coming head on with the state.

As stated earlier on, *Pfumvudza* is based on the principle of minimum soil disturbance and thus farmers have to dig only the holes for planting (Odreive, 2006). This principle was taught clearly by the extension officers and was implemented by most farmers in ward 24. However, in the 2021-2022 season some changes were noticed. Almost 50% of the farmers preferred to exercise Pfumvudza model on tilled land in direct contrast to the principle of zero tillage. This was done after some farmers who dug holes on ploughed land got more harvest than those who practiced zero tillage. Asked on why they were doing that one farmer had this to say:

> *Last year we did not get good harvest because we listened to the extension officers to practice zero tillage. Those who practiced Pfumvudza on tilled land performed far much better than us. Experience has shown us that deep ploughing is the best way of conserving moisture in our arable lands.*

Farmers who dug holes on ploughed land have influenced others to do the same. As a result, most farmers have resorted to ploughing first and then dig holes. Most participants interviewed have shown that they have agency as farmers even if the extension officers are more educated than them. One female farmer had this to say:

> *As farmers we also have our working minds. As a result, we also use our local knowledge to deal with the challenges we face. What is important for us is the harvest that we get at the end of the season. This must not be seen as a protest against extension officers.*

The above excerpt shows that local farmers are not passive recipients of agricultural innovation, rather, they are knowledgeable actors who make sense of the ideas imposed on them from the top. In other words, they have agency which they can use to resist machinations by the State or private players (Giddens, 1984). This explains why there was so much conflict of interests between the farmers and extension officers.

Another bone of contention revolved around manure

application in the holes. Extension officers recommended a cup of manure per hole. This cup is commonly known among the farmers as '*cup yetea*' (300ml) meaning the cup that farmers usually use for drinking tea. Farmers, however, argued that this was too little especially for their sandy, infertile soils. As a result, they applied more quantities. Varying quantities of manure were applied by different farmers yielding different results. Although extension officers encouraged farmers to apply principles that are relevant to the specific needs of their fields, this random approach created a problem of lack of standardisation as farmers adopted different approaches to the practice. The net effect was that evaluation of the programme was compromised.

The above findings relate to the concept of the dark side of social capital. Whilst norms are important in collective action for the good of a social group, they can as well have some deleterious effects on developmental outcomes. Norms that are conservative in nature are dangerous, especially in agricultural innovation. They encourage a group to cling to the old ways of doing business, and leaving no room for the implementation of new ideas. This was quite evident from the way farmers responded to the introduction of the new variety. Their strong association with SEDCO made it difficult to accept the Sygenta produced seed. The farmers still want to maintain SEDCO 513 despite the problems currently associated with it. Bourdieu's concept of habitus is crucial in understanding this form of negative social capital. Habitus is a set of dispositions which compels individuals or groups to act, think, and respond in a certain way. This is based upon constant interaction with the environment, training and learning. The result of this process is 'knowledge' that will be transmitted from one generation to the other (Maringira *et al*., 2015). Thus, the farmers because of their vast experience with their pieces of land and their traditional farming methods, they find it very difficult to adjust to new technologies and approaches. In this context, SEDCO 513 and ZAP 61 maize varieties have become so much part of the ward 24 farmers that they perceive any other variety as a threat to their yields. Such knowledge is built firmly among the farmers because of the strong ties developed through bonding and bridging social capital. This makes a neighbor, friend or relative's idea more acceptable than that of a 'foreigner' (extension officer or government agent). Such negative social capital is clearly inimical to development and subsequent success of innovations in agriculture.

Given the impasse discussed above, it is vital for development agencies and the farmers to find a point of convergence where they can create a common rallying point based on mutual understanding and acknowledgement of each other's concerns and approaches. Without this, agricultural innovation will remain elusive, and the problem of food insecurity will continue to haunt communities. This idea of convergence was also proposed by Long (1992) in his Actor Oriented approach. He proposed that an 'interface' is required where the views of different actors such as farmers, government and extension officers in this case are counterpoised. The situated knowledge of every actor must be taken on board in order to achieve desired outcomes (Gukurume *et al*., 2010). However, the challenge with this approach relates to its feasibility. Given the heterogeneous nature of rural communities, coming up with a clear interface might not be feasible no matter how desirable this might be. As such, new ways of engaging rural communities in development must continue to be searched for their transformation and development.

Conclusion

This article has examined the role of social capital during the implementation of the *Pfumvudza* farming model in Zimbabwe. It emerged from the findings that social capital and agricultural innovation are inseparable. The significance of relations of mutual cooperation and trust in

the success of the said farming model must not be underestimated. Based on this study's findings, it can be noted that any innovation in the agricultural sector requires cooperation by the grassroots people for it to realise desirable outcomes and their concomitant effects on development. The technocrats must build upon the existing social networks as they help in developing resilience and lowering of the costs and labour of the intervention. It is also prudent to argue that the development agents must be able to discover the alternative avenues available for the local farmers in the absence of government or donor support and capitalize on them and if possible, develop them so that they become sustainable options for development. This relates to local money-go-round or micro financial cooperation at community level that constitute a community's social safety nets. These are readily available, and they are easily accepted by the locals as they are designed in line with their life world. Thus, in the broader context of agricultural innovation and climate smart agricultural practices in particular, this study advances the argument that governments and other stakeholders must be conversant with the social capital endowments of the farmers and appreciate their value in the success of innovations designed for rural development. The existence of negative social capital must not be seen as a hindrance but an enabling situation which allows further exploration of new opportunities and approaches. Where social capital manifests its dark side, as in the case of Ward 24, some innovative ideas and support structures must be put in place to curtail the dire ramifications that it can produce. Overall, an understanding of the role of social capital is a panacea to most of the challenges encountered in conservation agriculture in Zimbabwe.

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The author declares no conflict of interest in the paper.

References

Agrawal, A. 2008. Local Institutions and Climate Change Adaptation, In: Social Development Notes, No 113.

Baiphethi, M.N. and Jacobs, P.T. 2009. The contribution of subsistence farming to food security in South Africa. *Agrekon* 48 (4): 459-482.

Chiputwa, B., Langyintuo, A. S. and Wall, P. 2010. Adoption of conservation agriculture technologies by smallholder farmers in the Shamva District of Zimbabwe: A Tobit application (No. 1371-2016-108874).

Chou, S. and Chang, Y. 2008. An Empirical Investigation of Knowledge Creation in Electronic Networks of Practice: Social Capital and Theory of Planned Behavior (TPB). In: Proceedings of the 41st Hawaii International Conference on System Sciences, IEEE.

Dakhli, M. and De Clercq, D. 2004. Human capital, social capital, and innovation: A multi-country study. *Entrepreneurship and Regional Development* 16 (2): 107-128.

Defe, R. and Matsa, M. 2021. The contribution of climate smart interventions to enhance sustainable livelihoods in Chiredzi District. *Climate Risk Management* 33: 100338. https://doi.org/10.1016/j.crm.2021. 100338

Denzin, K. and Lincoln, N. 2000. A Hand Book of Qualitative Research. London: Sage Publications

Food and Agriculture Organisation (FAO). 2001. Conservation agriculture – Case studies in Latin America and Africa". FAO Soil Bulletin 78, FAO, Rome.

Food and Agriculture Organisation (FAO). 2020. Crop and food security assessment mission to Zimbabwe. FAO: Harare.

Friedrich, T., Derpsch, R. and Kassam, A. 2012. Overview of the global spread of conservation agriculture. *The Journal of Field Actions, Field Actions Science Reports*. Special Issue 6, http:// factsreports.revues.org/1941 (accessed 20 April 2014).

Giddens, A. 1984. The Constitution of Society. Chicago: Polity Press

Giller, K. E., Witter, E., Corbeels, M. and Tittonell, P. (2009). Conservation agriculture and smallholder farming in Africa: the heretics' view. *Field Crops Research*, *114* (1), 23-34.

Goffman, I. 1959. Presentation of the Self in Everyday Life: A Dramaturgical Approach. New York: Doubleday Publications.

Gowing, J.W. and Palmer, M. 2008. Sustainable agri cultural development in sub-Saharan Africa: the case for a paradigm shift in land husband ry. *Soil Use and Management* 24 (1): 92-99.

Granovetter, M.S. 1973. The strength of weak ties. *American Journal of Sociology 78* (6): 1360-1380.

Gukurume, S., Nhodo, L. and Dube, C. 2010, Conser vation Farming and the Food Security- In security Matrix in Zimbabwe. A Case of Ward 21, Chivi Rural. *Journal of Sustainable Development in Africa* 12 (7)*: ISSN: 1520-*5507

Hobbs, P. R. 2007. Conservation agriculture: what is it and why is it important for future sustainable food production? *The Journal of Agricultural Science* 145 (2): 127.

Hove, M. and Gweme, T. 2018. Women's food security and conservation farming in Zaka District-Zimbabwe. *Journal of Arid Environ ments* 149: 18-29.

Jakachira, G.,Chingwanangwana, B., Chimbunde, P. and Musaniwa, O.2022. Designing the Sus tainability of Farming Method: Case of the Practice of Pfumvudza/Intwasa by Smallhold er Farmers in the Mwenezi District of Zimba bwe. *MANAGING EDITOR*.

Jun, L. and Weiguo, Z.2008. Supporting Social Net work-Based Knowledge Creation. Internation al Conference on Computer Science and Soft ware Engineering, IEEE Computer Society.

Kaasa, A. 2009. Effects of different dimensions of so cial capital on innovative activity: Evidence from Europe at the region alev el. *Technovation* 29 (3): 218-233.

Kassam, A., Friedrich, T., Shaxson, F. and Pretty, J. 2009. The spread of conservation agriculture: justification, sustainability and up take. *International Journal of Agricultural Sustainability* 7 (4): 292-320.

Klerkx, L., Aarts, N. and Leeuwis, C. 2010. Adaptive management in agricultural innovation sys tems: the interactions between innovation networks and their environment. *Agric. Syst.* 103: 390–400.

Leeuwis, C. and v. d. Ban, A.W. 2004. Communication for Rural Innovation - Rethinking Agricultur al Extension. Oxford, Blackwell Publishing Ltd.

Long, N. 1999. The Multiple Optic of Interface Analy sis. Wageningen: Wageningen University, Nertherlands.

Makate, C., Makate, M. and Mango, N. 2018. Farm household typology and adoption of climate-smart agriculture prac tices in smallholder farming systems of southern Africa. *African Journal of Science, Technology, Innovation and Development* 10 (4): 4,421–439. https://doi.org/10. 1080/20421338.2018.1471027Mupangwa,

Manyeruke, C., Hamauswa, S. and Mhandara, L. 2013. The ef fects of climate change and variability on food security in Zimbabwe: a socio-economic and political analysis. *Int. J. Humanit. Soc. Sci.* 3 (6)*: 270–286.*

Maringira, G., Gibson, D. and Richters, A. 2015. "It's in My Blood". The Military Habitus of Former Zimbabwean Soldiers in Exile in South Africa. *Armed Forces & Soci ety* 41 (1): 23-42.

Marongwe, L. S., Kwazira, K., Jenrich, M., Thierfelder, C., Kas sam, A. and Friedrich, T. 2012. An African success: the case of conservation agriculture in Zimbabwe. pp. 153-161. In: Sustainable Intensification. Routledge.

Mavesere, F. and Dzawanda, B. 2023. Effectiveness of Pfumvu dza as a resilient strategy against drought impacts in ru ral communities of Zimbabwe. *GeoJournal* 88 (3): 3455 -3470.

Mucheri, T. 2022. Climate smart agriculture: Panacea for food insecurity challenge in Zimbabwe? Quick lessons from practical application of Pfumvudza Model. *AfricaGrowth Agenda* 18 (4): 4-6.

Mujere, N. 2021. Assessing the potential contribution of Pfumvu dza towards climate smart agriculture in Zimbabwe: A review Preprint (www. preprints. org) doi:https:// doi. org/ 10. 20944/ preprints2 02101. 0619. v1 18. multi-country study. *Entrepreneurship and Regional Develop ment* 16 (2): 107-128.

Nhodo, L. 2019. Surviving marginalization in development- in duced displacement in Zimbabwe: a case study of Tokwe Mukosi Dam Project. Doctoral dissertation.

Nhodo, L., Gukurume, S. and Mafongoya, O. 2013. Contestations and conflicting lifeworlds in conservation farming prac tices in Zimbabwe: The experiences of peasant small holder farmers in Chivi south district in Masvin go. *Russian Journal of Agricultural and Socio-Economic Sciences* 16 (4): 19-30.

Oldreive, B. 2006. Foundations for Farming trainers' manual. Foundations for Farming, Harare.

Osiru, D.S.O. 2013. Conservation agriculture: Facilitators guide for Farmer Field School (FFS). Document, prepared for FAO.

Pedzisa, T., Rugube, L., Winter-Nelson, A., Baylis, K. and Mazvimavi, K. 2015. The Intensity of adoption of Con servation agriculture by smallholder farmers in Zimba bwe. *Agrekon 54* (3): 1-22. DOI: 10.1080/03031853.2015.1084939

Phiri, K., Nhliziyo, M., Madzivire, S. I., Sithole, M. and Nyathi, D. 2021. Understanding climate smart agriculture and the resilience of smallholder farmers in Umguza district, Zimbabwe. *Cogent Social Sciences* 7 (1): 1970425. . https:// doi. org/ 10. 1080/ 23311 886. 2021. 19704 25

Pretty, J. 2008. Agricultural sustainability: concepts, principles and evidence. *Philosophical Transactions of the Royal Society B: Biological Sciences* 363 (1491): 447-465.

Putnam, R. 1993. Making Democracy Work: Civic traditions in Modern Italy. Princeton: University Press Routledge

Scoones, I. 2021. Can the Pfumvudza conservation agriculture programme deliver food security in Zimbabwe? In: The future agriculture blog. accessed at https://www.future- agricultures.org/blog/can-the-pfumvudza- conservation-agriculture-programme-deliver-food-security-in-zimbabwe/

Scott, J.C. 1985. Weapons of the weak: Everyday forms of peasant resistance. Yale University Press.

Simango, A. 2021. Zimbabwe young farmers lead the charge in agriculture. Retrieved from https://www. un. org/ africarene wal/ magazine/ september- 2021/ zimbabwean- youngfarmers-lead- charge- agriculture

Spielman, D., Ekboir, J. and Davis, K. 2009. The art and science of innovation systems inquiry: applications to Sub-Saharan African agriculture. *Technol. Soc.* 31 (4): 399–405.

Tanyanyiwa, V.I. 2021. Networks for Resilience: Role of Social Capital in Climate Change Adaptation in Chishawasha, Zimbabwe. In: Filho (Eds.), Handbook of Climate Change Management. https://doi.org/10.1007/978-3-030-22759-3_82-1

Woodhill, J. and Wennick, B. 2014. From principles to practice. In: Pyburn, R. and Woodhill, J. (Eds.), Dynamics of Rural Innovation – A Primer for Emerging Professionals. LM Publishers, Arnhem.

Woolcock, M. 2001. The place of social capital in understanding social and economic outcomes. *Canadian Journal of Policy Research* 2 (1): 11-17.

Woolcock, M. and Sweetser, A.T. 2002. Bright ideas: social capital—the bonds that connect. *ADB Review* 34 (2): 26-27.