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**ABSTRACT**

The Government of Zimbabwe has identified irrigation development as a key enabler and accelerator of economic development in what is considered an agro-based economy, with agriculture accounting for at least 20% of GDP. There are two extreme policy and academic positions on the value of irrigation, particularly in the smallholder sector, with one arguing that smallholder irrigation development is viable and sustainable and the other arguing otherwise. Despite evidence of several shortcomings, the government and donors have maintained a renewed interest in smallholder irrigation development. The Zimbabwean government has consistently allocated at least 30% of its annual agricultural budget to irrigation development in recent years. Donors and multilateral institutions, on the other hand, have poured millions, if not billions, of dollars into various programme interventions over the years. The aim of the study was to determine whether smallholder irrigation schemes are a success or a failure, or rather a blessing or a curse. The study reviewed the literature on smallholder irrigation schemes in Zimbabwe. The review shows that smallholder irrigation schemes in Zimbabwe are contributing to food security and the rural economy, although there is no consensus among scholars to confirm that smallholder irrigation schemes are indeed a blessing.

Il governo dello Zimbabwe ha identificato lo sviluppo dell'irrigazione come fattore chiave e acceleratore dello sviluppo economico in quella che è considerata un'economia basata sull'agricoltura, con l'agricoltura che rappresenta almeno il 20% del PIL. Esistono due posizioni politiche e accademiche estreme sul valore dell'irrigazione, in particolare nel settore dei piccoli proprietari terrieri, con una che sostiene che lo sviluppo dell'irrigazione dei piccoli proprietari è praticabile e sostenibile e l'altra che sostiene il contrario. Nonostante le prove di numerose carenze, il governo e i donatori hanno mantenuto un rinnovato interesse per lo sviluppo dell'irrigazione dei piccoli proprietari. Negli ultimi anni il governo dello Zimbabwe ha costantemente stanziato almeno il 30% del suo budget agricolo annuale per lo sviluppo dell'irrigazione. I donatori e le istituzioni multilaterali, d'altra parte, hanno versato milioni, se non miliardi, di dollari in vari interventi programmatici nel corso degli anni. Lo scopo di questo studio è determinare se gli schemi di irrigazione dei piccoli proprietari sono un successo o un fallimento, o piuttosto una

benedizione o una maledizione. Lo studio ha esaminato la letteratura sugli schemi di irrigazione dei piccoli proprietari nello Zimbabwe. La revisione della letteratura mostra che i programmi di irrigazione dei piccoli proprietari in Zimbabwe stanno contribuendo alla sicurezza alimentare e all'economia rurale, sebbene non vi sia consenso tra gli studiosi per confermare che i programmi di irrigazione dei piccoli proprietari siano davvero una benedizione.

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**Keywords:** Smallholder Irrigation Schemes, Economic Development, Zimbabwe

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## 1 – Introduction

According to Von Braun and Diaz-Bonilla (2008), Sub-Saharan Africa (SSA) faces the daunting challenge of feeding more than 2 billion people by 2050. The World Bank estimated in 2008 that 85% of people in SSA live in rural areas and depend for their livelihoods primarily on rain-fed agricultural production with generally low yields. Governments are preoccupied with the need to ensure food self-sufficiency in the present and are preparing for future needs in the face of expected population growth and the effects of climate change.

Since the early 1930s, irrigation development in Zimbabwe has been guided by policies and strategies developed for other sectors of the economy. These policies and strategies refer to irrigation where relevant and convenient. In turn, the lack of a comprehensive policy or strategic framework to guide the sector has left it open to ad hoc interventions that respond to ongoing socio-economic and political developments and often serve individual interests at the expense of the collective.

Farmers, especially smallholder farmers, have been at the centre of the chaos caused by the constant intervention of governments and donor agencies, which, through various programmes, continue to provide funds for the rehabilitation and revitalisation of irrigation systems. In the last two decades alone, the irrigation sector has witnessed multi-million dollar donor facilities focused on rehabilitation. Just before the turn of the 21st century (1999-2003), the International Fund for Agricultural Development (IFAD) in partnership with the Danish International Development Agency (DANIDA) and the GOZ provided \$19.3 million under the Smallholder Irrigation Support Programme (SISP) facility to rehabilitate 2500 ha, followed by the European Union (EU) (2008-2012) under the Smallholder Irrigation Development Support Programme (SMIDSP) with a \$6 million facility to rehabilitate at least 2000 ha. Between 2014 and 2019, the EU, through the Food and Agriculture Organisation of the United Nations (FAO), invested a further €6 million through the Smallholder Irrigation Programme (SIP) to rehabilitate 1000 ha. The SIP programme has also been complemented by the Swiss Agency for Development and Cooperation (SDC) with a USD 6.6 million facility to rehabilitate 700 ha.

One thing these agencies have in common is that they mostly worked in the same three provinces: Manicaland, Masvingo and Matebeleland South. Only the SMIDSP programme covered all eight provinces of Zimbabwe. At the same time, the government has consistently spent an average of 30 per cent of the agricultural budget on irrigation, a trend that has been observed over a period of more than ten years. A closer look at these programme objectives and impact areas suggests that there is evidence of duplication of effort and resources, confirming the notion that the sector is trapped in a vicious cycle of construction, neglect, rehabilitation, neglect, rehabilitation. Rosin *et al.* (2013) argue that "*without doubt, new agricultural technologies and research have increased food production over the past century, with substantial increases in yields*

and reductions in prices. However, the benefits have not been evenly distributed, with at least 1 billion people in sub-Saharan Africa and South Asia undernourished, with sub-Saharan Africa being the worst affected". With the increasing globalisation of the world economy, food production and access has become a global phenomenon, shaped by an intricate network of governments and private institutions that control and manage the value chain of food systems in all its complexity.

In recent years, the Ministry of Lands, Agriculture, Fisheries, Water and Rural Development (MLAFWRD) has spent 30 per cent of its already limited budget on rehabilitation of individual schemes, without investing in the institutions and capacity to manage them, or in the inputs and incentives farmers need to access markets. At the same time, Zimbabwe's irrigation sector has not attracted significant foreign investment from bilateral and multilateral donors to the same extent as other countries in southern Africa, especially after the 2000 land reform and subsequent sanctions.

In 2020, the Government of Zimbabwe launched its National Development Strategy 1, which gives prominence to irrigation development as a key accelerator for improved food production and sets an ambitious target of increasing the area under irrigation from the current 170 000 ha to 350 000 ha by 2025. However, such a national policy goal is not underpinned by a robust sector policy blueprint, which is critical in shaping the institutions, financing and implementation of complementary programmes. Denison and Manona (2007) observed that *"infrastructure development will fail unless comprehensive strategies are adopted that address all the components of an irrigation enterprise"*, referring to access to markets, credit, irrigation inputs, institution building and crop production information.

Despite good political will and donor support for smallholder irrigation programmes in Zimbabwe, the lack of a robust sector policy blueprint, the absence of attractive meaningful foreign investment and the current economic landscape continue to have a negative impact on smallholder irrigation schemes. This necessitated the need to undertake this study to determine whether smallholder irrigation schemes are destined to succeed or not, or better still, to be a blessing or a curse.

*Objective of the Study:* This study sought to determine whether or not smallholder irrigation schemes in Zimbabwe are doomed to fail.

## 2 – Methodology

This paper is based on a literature review and the capture of the researchers' working experience. It is a case study approach where a desk review was carried out with a reflection and analysis of studies published on the revitalisation of smallholder irrigation schemes with a focus on Zimbabwe. This study is motivated by two main theoretical frameworks, namely self-determination theory and critical theory. *"Self-determination theory provides a broad framework for understanding human motivation and personality by defining the psychological nutrients required for optimal motivation, commitment and well-being. It emphasises the idea that people's relationships and social contexts must include and support their basic human needs for autonomy, competence, and relatedness"*(Legault, 2017).

On the other hand, this study critiques what other researchers have found; therefore, the narrative is also in line with the principles of critical theory. Critical theory opens up ways of analysing power, discourse and historical understandings. In doing so, critical theory mandates reflexivity in research and writing, attuning researchers 'to the assumptions underlying their own busy empiricism' (Agger, 1991). In the actual data collection, the principles of grounded

theory were applied. Grounded theory is a systematic methodology that involves the construction of hypotheses and theories through the collection and analysis of data. It then uses inductive reasoning to gain a deeper understanding of a phenomenon. As more data is collected and reviewed, codes can be grouped into higher level concepts and then into categories. The aim is to generate a range of opinions that will stimulate debate on policy and strategy within the irrigation sector in developing countries.

### 3 – Literature review

Baah-Acheamfuor *et al.* (2023) quote Tranfield *et al.* (2003) who state that a literature review is an essential tool used to enhance debate and disseminate academic findings from different studies. Some studies cited by Sinyolo *et al.* (2014) support the observation that there is a broad consensus in many parts of the developing world that the use of small-scale irrigation systems remains an effective and important strategy for increasing agricultural production, strengthening household food security, and reducing rural poverty (see Hussain & Hanjra, 2004; Molden *et al.*, 2007). This position echoes that of Araral (2005), who argued that irrigation in developing countries is a critical contribution to poverty reduction, economic growth, food security and environmental protection. Irrigation is an essential part of the package of technologies, institutions and policies that underpin increased agricultural production. Thus, irrigation water as a production input in agriculture is an important socio-economic good with a positive role in poverty alleviation (Hussain & Hanjra, 2004), although large-scale public irrigation systems in many developing countries suffer from recurrent underinvestment in maintenance, rapid deterioration of infrastructure, inefficient, insecure and inequitable water supply, and reduced coverage (Araral, 2005).

Yudelman (1985) argues that irrigation projects often fail to increase agricultural productivity or meet expected economic and financial returns. Levine (1987) found that the incentives faced by irrigation agencies mean that certain patterns of construction, decay, repair and modernisation are both economically and politically rational. Zimbabwe provides a classic example of irrigation. In some countries, smallholder irrigation schemes have not only had a negligible impact on people's living standards but have also increased their vulnerability to drought and their dependence on external aid, but the situation is different in Asia, where smallholder irrigation schemes have existed for centuries and many have generally been successful despite formidable challenges (Mutambara *et al.*, 2016).

Smallholder farmers in Zimbabwe face a cocktail of challenges. Research by FAO, cited in Nhundu and Mushunje (2010), found that the high cost of irrigation development hinders the development of small-scale irrigation schemes. Credit lines, which would normally allow farmers to make substantial investments in their farms, are difficult to obtain due to the lack of proper title deeds and land rights in Zimbabwe. This has dampened the enthusiasm of farmers to invest in the infrastructure of the land, resulting in record low levels of production and reduced farm incomes. The slowdown in economic growth, caused by a prolonged period of inconsistent monetary policy frameworks and bouts of hyperinflation, has led to a reduction in capital accumulation over the past two decades, making the country's existing financial constraints even more difficult to manage.

Nhundu and Mushunje (2010) found that 'about 13% of irrigation farmers in Zimbabwe had 99-year leases, which guarantee the right to hold the land for a long period of time and allow them to invest heavily in irrigated production. Land tenure remains a critical success factor for

smallholder irrigation. According to Nhundu and Mushunje (2010), about 65% of farmers are leaseholders and a further 22% have neither title deeds nor leases, making land rights a significant barrier to the success of smallholder irrigation.

In his study of the National Irrigation Administration (NIA) of the Philippines, Araral (2005) found that these problems, which include 'the persistent problems of inefficient, unreliable and inequitable water supply, chronic underinvestment in maintenance, rapid deterioration of infrastructure and reduction of service areas with adverse effects on cropping intensity and productivity', appear to be common to most developing countries. This is supported by Masasi and Ng'ombe (2019), who echo the same sentiments. In order to make smallholder systems sustainable, the Zimbabwean government provided large subsidies that were tied to maize production (with the aim of ensuring the country's self-sufficiency in food production, Nhundu and Mushunje (2010). After the Fast Track Land Reform Programme (FTLRP) in 2000, the transfer of land administration was hasty and unstructured; government institutions continued to act as if they were administering the programmes, providing subsidies to farmers to produce wheat and maize in particular. This meant that farmers were not free to adapt their production to market demand and had little incentive to maintain the schemes, so production inevitably declined as much of the infrastructure fell into disrepair.

The challenges of smallholder irrigation management observed by Mutiro and Lautze (2015) are still prevalent today, demonstrating a serious disconnect between policy and practice. Sustainability, especially of public programmes, remains a topical issue and therefore governments need to consciously address institutional arrangements while promoting investment in more infrastructure. According to Nhundu *et al.* (2015), "*poor maintenance and lack of effective control over irrigation practices have led to the collapse of many irrigation schemes*" (Figure 1).

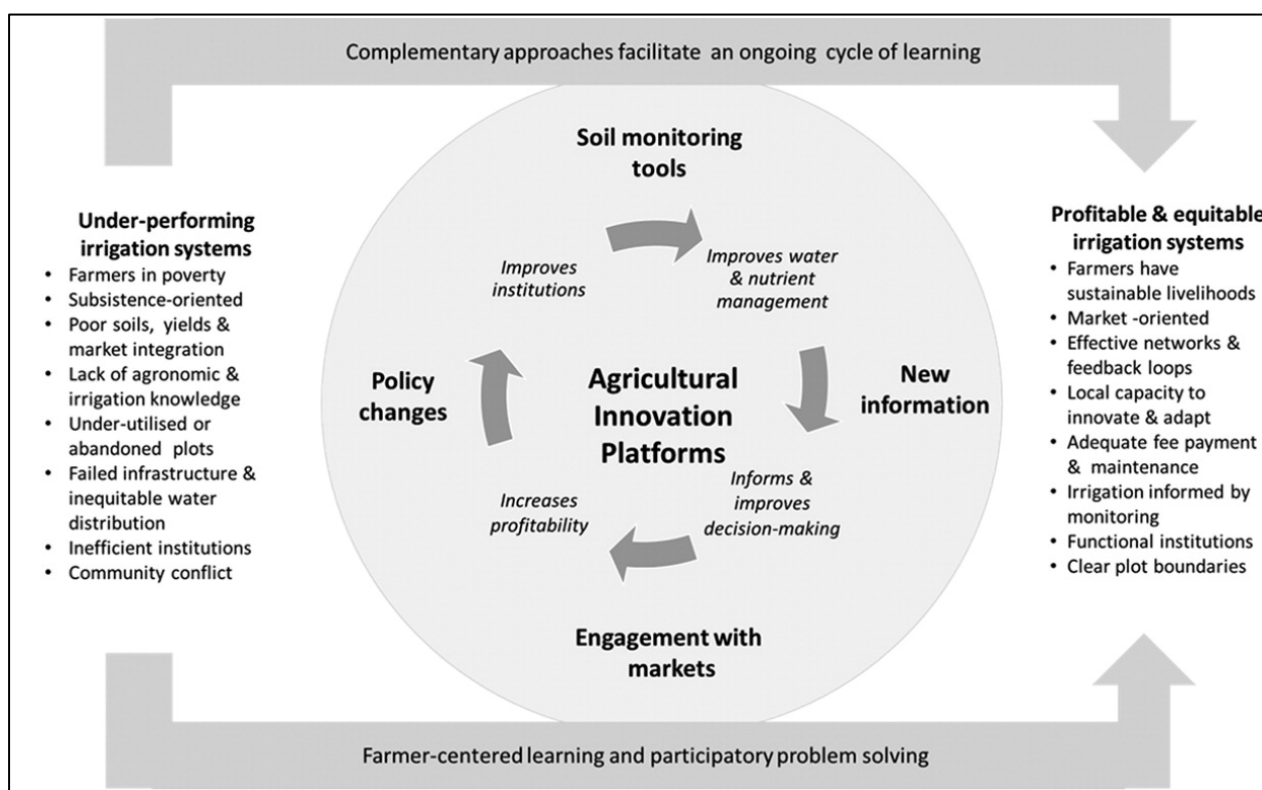
According to the Department of Irrigation Development in Zimbabwe, the total developed irrigation area in Zimbabwe was estimated at 206,590 ha, of which 132,370 ha were functional. However, as of 2021, the current functional areas are estimated at 171,000 ha and the target set for irrigation development in the country is 350,000 ha by the year 2025 according to the National Development Strategy 1,(NDS 1). Given the recent trend of an estimated less than 15 000 ha per year of developed area, the policy target of 350 000 ha of functional area by the year 2025 is very ambitious. Policy strategies need to be evidence-based and based on a rigorous consultative process.

In their study on smallholder irrigation management, Van Rooyen *et al.* (2020) state that "*irrigators, irrigation management committees (IMCs) and government officials must all adapt to the paradigm shift in irrigation management from an inefficient subsistence system to a market-oriented production system*".

"The idea that improving crop production on smallholder farms is simply a matter of providing advanced technology is wrong, no matter how much progress is made. It is not just a water problem that undermines smallholder irrigation systems" (Moyo *et al.*, 2020). According to Moyo *et al.* (2020), "the causes range from government policies (such as inadequate institutions), to environmental problems (such as high salinity and waterlogging), to social issues (such as farmers' lack of agronomic and irrigation knowledge), to financial challenges (farmers' inability to support the system)".

FAO (2000) found conflicting evidence in the available literature on the long-term success and viability of smallholder irrigation schemes in Zimbabwe. The early irrigation schemes established by missionaries in the 1930s have been praised in several studies for their allegedly

successful agricultural production, financial stability and economic viability.



**Fig. 1 – Transitioning underperforming smallholder irrigation systems in Africa to profitable and equitable irrigation systems** (Source: Bjornlund *et al.* 2018; Pittock *et al.*, 2018)

Roder (1965), quoted in FAO (2000), wrote that "irrigation projects have been successful in helping farmers to achieve a certain amount of prosperity, much more than dryland farmers, probably more than white farmers' employees, and similar to that of urban workers". FAO (2000) concluded that since the 1930s, farmers participating in irrigation schemes have tended to have higher incomes than their dryland counterparts. Irrigation development is seen as providing opportunities for employment and economic growth for rural people, and governments see it as a solution to curbing rural-urban migration. FAO (2000) agrees with Roder (1965) who found that most irrigation farmers secure their wealth by building better houses and buying agricultural equipment. In monetary terms, the net worth of irrigation farmers was consistently one and a half to two times higher than that of their dryland counterparts around the Nyanyadzi irrigation scheme in Zimbabwe.

Alvord (1933), cited in FAO (2000), claimed that the Mutema irrigation scheme in Zimbabwe's Manicaland Province had helped to end a famine in the area, causing the government to reduce its drought relief grain allocation by 90-180 tonnes per year.

Meinzen-Dick *et al.* (1993), cited in FAO (2000), found that Natural Region V is home to the most vulnerable farmers in terms of food deficit, and these happen to be dryland farmers, while their irrigated counterparts reported experiencing rare instances of food shortages. The same study found that irrigation schemes were so important that 72 per cent of farmers with plots of 0.25 ha to 0.5 ha depended solely on them for their income.

According to Rukuni (1988) and Meinzen-Dick *et al.* (1993) as cited by FAO (2000), colluding irrigation led to an increase in crop production and incomes because they had the advantage of

having a crop in the winter season when rainless conditions prevent production in dryland areas. Ruigu and Rukuni (1990), Makombe *et al.* (1993) and Dhloldo (1997) agree that the incomes of irrigated farmers are significantly higher than those of dryland farmers, while the quantities of inputs are greater in irrigated than in dryland areas, supporting the notion that irrigated farming is more intensive than dryland farming, making irrigated farmers significantly better off than urban workers who have to cope with a host of additional demands such as paying rent, transport, water and electricity bills.

Mupawose and Blackie (1984) recommended the introduction of cost recovery mechanisms in smallholder irrigation schemes because irrigation development was becoming unaffordable. Nhundu and Mushunje (2010) concluded that the majority of new smallholder irrigation schemes in southern Africa were not able to generate sufficient revenue to substantially cover the initial development costs, including maintenance costs, and further argued that they had an insignificant impact on household and national food security. They agreed with the World Bank (2008), which reported that "*there are few cases of successful and sustainable farmer-managed smallholder irrigation schemes, despite efforts by governments, NGOs and private organisations*".

FAO (2000) concluded that opinions on the economic viability and socio-economic impact of smallholder irrigation development vary and are sometimes conflicting, with some literature arguing that such investments are not sustainable and others arguing that smallholder irrigation schemes are agriculturally, financially and economically viable. However, none of the literature reviewed has taken the initiative to investigate and identify the solutions that enable effective and sustainable smallholder irrigation schemes.

## 4 – Discussion

It is clear that the impact of small-scale irrigation on economic development is supported by many studies, although few argue that small-scale irrigation leads to higher productivity and hence economic development. The lack of an irrigation policy for the country manifests itself in unclear rules on who should manage irrigation infrastructure, bear its costs and reap its benefits. This problem is exacerbated by the disconnect between national policies and actors and those at the district/scheme/village level, where informal institutions such as village headmen still play a key political role outside the control and authority of central government.

Concerns about the management of smallholder irrigation schemes also affect the performance of irrigation projects. In contrast to the size of the irrigation scheme or the entity that owns and controls the scheme, the quality of management usually determines whether an irrigation project is successful or not (Alqaisi, 2018). This is the case in the vast majority of cases. In most cases, government schemes have failed because of poor management by farmers and the use of a top-down approach by officials from the Department of Agricultural Extension and Technical Services (AGRITEX). In many cases, the lack of community participation in the initiation of irrigation projects affects the sustainability of irrigation schemes. Stakeholder involvement is key to the success of any project. Therefore, when stakeholders are involved, they have the opportunity to incorporate their own ideas and concepts into the project by suggesting changes to the overall project strategy and providing feedback on how the project should be implemented. On the other hand, the importance of farmer training cannot be overemphasised as a way of improving the productive use of water (Yokwe, 2009).

Another critical success factor is the challenge of unclear project ownership. Because Government of Zimbabwe owns the land, it is difficult for farmers to use it as a collateral to



secure loans to invest in the schemes. In addition, the land reform created situations where farmers were put together on lands sharing the same irrigation infrastructure where no one owns the infrastructure, and besides no one feels like investing resources into maintaining it. This is the reason why Moyo *et al.* (2017) postulates that there is confusion over who manages irrigation infrastructure.

Other challenges faced by smallholder irrigators include:

1. Unsustainable plot sizes. To get a better idea of the difficulties farmers face, it is important to consider things like the average size of irrigated or cultivated land in an irrigation scheme per farmer or household. Farmers need a plot of land large enough to support a level of production that is profitable for them. The small plot sizes of around 0.2 ha to 0.5 ha in most irrigation schemes in Zimbabwe limit the ability of farmers to produce a sustainable crop. This position is consistent with the findings of Moyo *et al.* (2017) who found that lack of tenure security and small size of irrigated plots are major disincentives for irrigators to invest, thus qualifying them as major causes of poor performance of irrigation schemes.

2. Limited participatory approach to irrigation development.

3. Unclear definition and duplication of roles among government departments and agencies.

4. Production and productivity have been very low, with farmers unable to pay for operation and maintenance costs.

An effective management strategy is required to maximise efficiency, promote cost recovery and sustain the system as a whole (Rukuni *et al.*, 2006). It is suggested that an appropriate management architecture needs to be in place that keeps pace with infrastructure development to promote cost recovery and sustainable operation and maintenance. Smallholder irrigation can serve as a cornerstone for rural development and improved living standards in rural Zimbabwe if a more comprehensive strategy is adopted. The economic viability of smallholder irrigation schemes in Zimbabwe was questioned by Mupawose and Blackie (1984) who identified the lack of management, input and irrigation skills on the part of farmers as a factor in the failure of irrigation schemes. Smallholder irrigation schemes in sub-Saharan Africa have performed poorly, failing to lift farmers out of poverty, increase food security or improve local or national economies (Pittock *et al.*, 2020). This calls for more research to understand why these schemes in Africa are failing whereas in Asia and other countries are succeeding.

## 5 – Conclusion

Despite evidence of the various drawbacks, the government and donors have maintained and renewed their interest in smallholder irrigation development. The Zimbabwean government has allocated at least 30 percent of its annual agriculture budget to irrigation development. On the other hand, donors and multilateral institutions have over the years pumped millions of dollars through various programme interventions into the sector, which is trapped in a vicious cycle of construction, neglect, rehabilitation, neglect. This has given the impression that the smallholder irrigation sector is siphoning off funds from central governments and donor agencies. However, because smallholder irrigation schemes contribute to food security and rural economies, they remain of paramount importance in addressing issues of food and nutrition security, poverty alleviation and job creation.

Irrigation schemes provide a large and ideal platform for political expediency, so politicians will never for a moment argue against financial support for their constituents. In the current environment, it would be fair to conclude that smallholder irrigation schemes are doomed to succeed. However, there is no consensus among academics that smallholder irrigation schemes are a boon.

*Limitations and future research.* This was a case study of Zimbabwe. This limits the generalisability of the findings to other countries. It is strongly recommended that the study be replicated in other countries. Future research studies should also use other research methods such as qualitative, quantitative, or mixed methods.

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