

Determinants of Drought Risk Reduction Adoption Decisions: A Case Study of Gwembe Rural Communities-Zambia

Joan Mwanza*, Evaristo Nsenduluka† and Overson Shumba†

Abstract

Like any other natural hazards, the frequency and intensity of drought events are increasingly being understood within the context of global climate variability. The subsequent growing emphasis on disaster risk management entails adopting risk reduction initiatives for resilience building. The study aimed to establish perceived determinants of household adoption decisions of drought risk reduction strategies in Gwembe rural. An interpretative paradigm underpinned this study, with a qualitative approach confined to a case study. The study engaged 140 participants selected through purposive and convenience sampling and subjected to open-ended, in-depth interviews. The study utilised thematic data analysis with the aid of Nvivo Pro 12. Findings showed that determinants of drought risk reduction adoption decisions were predominantly socio-economic, environmental and institutional based. It was concluded that some interconnectedness existed between perceived determinants of adoption decisions and constraints faced in adopting risk reduction initiatives. Additionally, low adoption and high levels of no adoption tendencies affected the progression of resilience building to future drought events. A project planning approach incorporating strategies for addressing significant constraints and adopting risk reduction was recommended.

Keywords: Adoption Decision, Constraints, Determinants, Drought, Resilience Building, Risk Reduction.

* University of Lusaka, Zambia; joanbeulah@yahoo.com

† Copperbelt University, Kitwe, Zambia

Introduction

The field of Disaster Risk Management (DRM) generally emphasises Disaster Risk Reduction (DRR) approach for enhanced Community Disaster Resilience (CDR). Disaster Risk Reduction (DRR) is the systematic development and application of policies, strategies and practices that minimise vulnerabilities and other unfolding disaster impacts in a community within the broad context of sustainable development (UNDRR, 2021). Additionally, it entails increased efforts to prepare for disasters, prevent them, and mitigate them (Allan & Andrew, 2014; Twigg, 2015).

The increased focus on disaster risk management can be observed from various global agreements and commitments considered drivers of change. This has also led to increased policies and strategies in the light of climate variability with multiple interventions at the grassroots level (Jonathan et al., 2022). Notably, in risk reduction, the UN General Assembly declared 1990 to 1999 as the International Decade for Natural Disaster Reduction (IDNDR), aimed at upping efforts to reduce the loss of lives, livelihoods, and assets and reduce environmental degradation. Other agreements included the Yokohama Strategy for a Safer World, the International strategy for disaster reduction, the Hyogo Framework for Action (2005-2015) and the Sendai Framework for Disaster Risk Reduction (2015-2030) (Alexander, 2018; Tozier et al. 2015; UNISDR, 2015; UNISDR, 2016b; and Wanner, 2021).

Regarding developing countries, according to the UNISDR Global Assessment Report (2015), disaster risks have been increasing due to weak governance, vulnerable livelihoods, especially in rural communities, degradation of environments, poverty and inequalities.

It has been understood that risk reduction engagement is meant to facilitate community disaster resilience, the ability to withstand the shocks and stresses of disaster risks and build the ability to prepare, plan for, absorb, recover from and adapt to adverse events (Paton & Johnston, 2017; Susan et al., 2013). According to Twigg (2015), disaster resilience generally insinuates that when the capacities of a community are built, vulnerability and eventual susceptibility to disaster risks and associated negative impacts are

minimised to a greater extent. This suggests further that without disaster resilience, disaster risks and effects continue to cause havoc to a community's human livelihoods, health and other social and economic gains (UNISDR, 2015; Zambia Vulnerability Assessment Committee Report, 2015).

Regarding drought hazards being this study's primary focus, risk reduction initiatives in any given community can either be introduced by an external agency for adoption or emanate from a community's initiative. Supported by Begho (2021), the adoption decision of drought risk initiatives involves households or communities reviewing the various options of a practice based on the reality of their experiences before embracing it.

Alexander (2018) posited that some adoption determinants may not be universal, but their commonality can be detected in many communities. A practice tends to be adopted quickly depending on how measurable it is, its notable success and its replicability elsewhere.

For rural communities prone to drought events, it has been argued that generally, a high aversion to risks hinders their investment in any risk reduction practice with the potential to change their trajectory. This leads to a myriad of continued underachievement of production or benefits that they would have experienced in the first place and that ongoing vulnerability to natural hazards stems from such (Cenacchi, 2014; Gerber et al., 2014).

While there has been a need for more studies on various determinants of adoption decisions of risk reduction measures regarding different hazards in different developing countries, it remains essential to gain an insight into the context-specific dynamics of the targeted location.

Therefore, The argument is that despite the facilitation of various drought risk reduction strategies by developmental agencies, government ministries, and those locally devised, Gwembe rural communities still record high levels of vulnerability to dry weather conditions needing external intervention (ZVAC report, 2015). This scenario suggests weak levels of resilience at household and community levels, which begs the question of what stimulates

intentions to adopt or dis-adopt some known drought risk reduction initiatives.

Research Questions

The current study brings context-specific perceived determinants to adoption decisions of drought risk reduction initiatives. Therefore, the study was premised on three objectives leading to specific related questions: (1) What socio-economic factors have been perceived as influencing decisions in adopting drought risk reduction initiatives? (2) To what extent are environmental factors determinants of intentions to adopt drought risk reduction measures? (3) What institutional support factors play a role in the adoption decisions of drought risk reduction initiatives?

Data was collected from various sources to answer these questions, and a thematic analysis approach was applied with the aid of Nvivo Pro 12, a highly qualitative software in data analysis.

Theoretical Framework

Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) was proposed by Icek Ajzen in 1985. The theory assumes that three aspects influence human behaviour in the adoption process of practice: attitude, subjective norms and perceived behavioural control (Ajzen, 2020). To give it more context, personal attitude reflects the actual attitude towards a particular behaviour, whether positive or negative, depending on factors under consideration. Subjective norms reflect how one perceives the attitudes of others towards behaviour, and Sam (2013) posits that these are norms followed by having other people in mind to make oneself acceptable. On the other hand, perceived behavioural control suggests one's belief in one's ability to perform a specific behaviour and the extent of one's control, depending on internal and external factors. The latter also assumes that the stronger the perceived control, the stronger the intention to perform a behaviour and the effort to succeed (Zaremohzzabieh et al. 2021).

Socio-Cognitive Theory

On the other hand, the social cognitive theory by Bandura (2014) is a learning theory that assumes that human behaviour is a product of personal factors, environmental influences, and behavioural patterns. It posits that learning takes place where people are agents to influence or are influenced by their environment. The theory assumes further that people tend to learn by observing the behaviour of others and related outcomes. If the result is positive or successful, adopting and reproducing a similar practice is likely as opposed to observing adverse outcomes (Chen et al., 2022).

Study Methodology

Study Design

The study was anchored on a qualitative approach, with the design being a case study whose philosophical disposition was interpretivism, involving the six selected rural communities of Chief Munyumbwe and Chipepo. A case study for the chosen study location was appropriate in enabling the extraction of contextual details of what could be deemed as constraints in using indigenous knowledge in risk reduction approaches and providing theoretical generalisation (Tsang, 2014; Yin, 2013).

Study Setting

The study targeted Gwembe district in Southern Zambia, one of the districts within the ecological zone I, about 260km from the capital, Lusaka, known for recurrent below-average rainfall ranging between 600 and 800mm. Specifically, the critical study sites were the communities from the two main chiefdoms, Chief Munyumbwe (Lukonde, Fuumbo and Lumbo) and Chief Chipepo (Chihepo, Chabboboma and Kkoma) area.

Gwembe district is among the most vulnerable areas in Zambia, prone to recurrent drought and occasional flash floods. Topographically, the mountainous terrain has steep slopes and fast-flowing, fast-drying ravines that undulate, often resulting in highly erosive land-creating gullies. Their predominant livelihood is agriculture, livestock production and fishing for those near Lake Kariba. A historical study by Colson and Scudder (2018) showed that Gwembe people once lived along the banks of Kariba Lake due

to alluvial soils and sufficient pasture for their livestock. For the construction of the Kariba dam, displacement was apparent, triggering food insecurity and leading to increased vulnerability of the district over the years (Khoza, van Niekerk, & NemaKonde, 2022; Makondo, Chola, & Moonga, 2014; Mulenga, 2021).

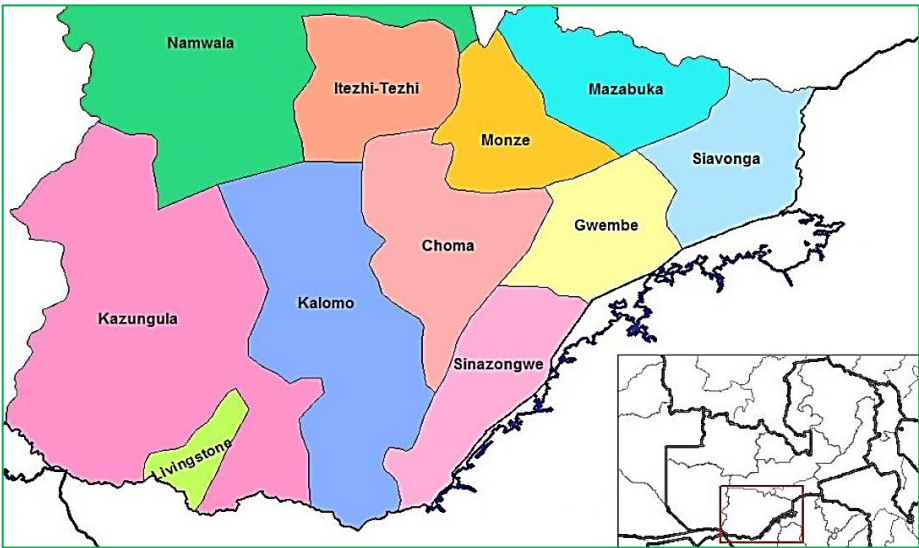


Figure 1. Location of Gwembe District

Source: Maphil.com

Study Population

The district of Gwembe had about 10,288 households, translating to a population size of 52,711 (Central Statistics Office Report, 2010). The targeted rural communities in Gwembe district had a total of 5,520 households. It must be noted that the population details were based on the 2010 Census report as the current 2022 similar report still needed to be published at the time of data collection.

Inclusion and Exclusion Criteria

Selected rural communities of the Gwembe district, which are primarily rain-fed agriculture-dependent, were targeted in the study. Inclusion criteria involved selected communities known to have been exposed to risk reduction-related projects and initiatives before. The said communities, furthermore, were to be familiar with

drought events and associated risks. The study, therefore, excluded communities that needed to meet the stated criteria.

Sample Size

Considering that sampling in qualitative studies has not been so definite as understood from various existing 'rules of thumb' of multiple scholars, the study leaned on a minimum of 50 participants. In line with Boddy's (2016) rule of thumb of between 5-50 participants and Daniel's (2019) suggestion of a minimum of 35 participants, the study determined a sample size of up to 140 participants. Determining the sample size was also guided by being transparent about the categories of specific persons to be subjected to primary data extraction (Saunders et al., 2015).

Major study participant categories included household heads, traditional, community leaders and development agency project staff as key informants. Additionally, focus group discussions with an average of 10 community representatives formed part of the targeted sample apart from field observations.

Sampling Techniques

The study adopted convenience and purposive sampling in selecting readily accessible, willing and available study participants within the targeted geographical proximity (Creswell & Creswell, 2017; Etikan et al., 2016). Purposive sampling involved selecting key informants privy to their community's livelihood-related interventions, including traditional community leaders and development agency project staff. Furthermore, convenience sampling helped identify community representatives in focus groups if they met the set criteria.

Data Collection

Multiple approaches for primary data collection were deployed, involving in-depth, open-ended interviews among household heads, key informants, and focus groups in each of the six targeted rural communities in the Gwembe district. For triangulation, field observations of available infrastructure and amenities that play a role in drought risk reduction efforts were undertaken during

transect walks and mapping exercises. Considering language, local data entrants familiar and fluent in Tonga were engaged and trained for easy translation of the interviews for the participants needing translation.

Considering the complexity of the matter under investigation, using multiple data collection methods involving a few categories of study participants was inevitable. Another justification was the need to provide supplementary information and contextual clarification based on the meanings attached, stemming from their lived drought experiences. Furthermore, in the highly qualitative study, the need for triangulation for an insightful understanding remained inevitable.

Data Analysis

Data analysis was undertaken using a thematic analysis method using Nvivo Pro. 12, a highly qualitative analysis software. The choice of the mentioned software was justified by its ability to deal with large qualitative data sets and visualisations of selected texts and retrieval (Dhakal, 2022; Maher et al., 2018; Zamawe, 2015).

Data presentation involved a combination of Nvivo-based verbatim expressions, pictorial depictions, and other visualisations deemed appropriate for the study.

Ethical Consideration

The qualitative study requiring interactions with various study participants endeavoured to uphold, among others, the principles of Informed Consent, Confidentiality, Privacy, Anonymity, beneficence and justice.

Study Results

Factors perceived as key determinants to adoption decisions in drought risk reduction strategies were various but categorised as Socio-Economic, Environmental and Institutional based.

Socio-Economic Factors

Socio-economic factors cited as common suggested accessibility and enablement and included the following:

Resource availability such as funds, essential equipment, tools for irrigation and farming, certified seed for better yields, arable land, and credit facilities are cited as influencers in a household's adoption decisions and initiatives. The non-availability and accessibility of rippers and shaka hoes in conservation farming were mentioned as part of the related equipment and tools, consequently forcing households to recline to the conventional way of farming. *Family size* insinuating labour source was cited as a determinant of adoption depending on the labour demand involved.

An agricultural extension officer interviewed confirmed the claim as he explained the following:

Over the years, conservation farming has proven that yields are better. However, labour is quite intensive in the early years of practising this farming system. Basin-making takes time before they are permanent seed stations. Minimum tillage also leads to continuous weeding, so weed killers are expensive for some households. The only option is to use whatever tools they have to weed their fields. All such actions demand intensive labour, which can be discouraging for small households.

Levels of Knowledge and skills in a particular initiative were a factor mentioned by study participants, without which it tends to limit adoption possibilities.

A key informant from World Vision mentioned in the affirmation said:

When implementing developmental or livelihood projects in Gwembe, one common feature for our institution is training through workshops and community awareness. Considering the literacy levels of rural Gwembe, especially among women, it remains inevitable that project beneficiaries will be trained to enhance adoption and sustain initiatives.

One's experience, familiarity with a practice and social networks such as farmer cooperatives or village bank groupings were all revealed to be significant in the adoption decisions.

Environmental Factors

Environmental factors like high temperature, recurrent dry weather conditions, and hilly landscapes with minimal water retention of rivers and streams were mentioned as influencers of initiative adoption. *Deforestation* was said to affect beekeeping, an initiative linked to income security as a deterrent to adoption decisions.

The built environment, such as the lack of dams and weir dams for rainwater harvesting and the poor road network leading to the high cost of transporting products for sale, were all alluded to as key to the adoption process.

To affirm this claim, one of the key informants had this to say;

Other constraints include more resources or rainwater harvesting infrastructure such as dams/weir dams. When we have rains, if only we were managing to harvest it, our communities would be more active with gardening initiatives and still survive the hunger caused by drought effects.

(Deputy Chief Munyumbwe)

This was affirmed by a few critical informants from development agencies, and one had this to say;

Poor road infrastructure over the years has contributed to high transportation costs for livestock and other produce. This remains a constraint on the potential for business expansion among small-scale farmers (World Vision Key Informant).

The susceptibility of millet and sorghum to birds, monkeys, and worms, as well as the challenges faced in cash crops such as bulky cotton with transport challenges, were indicated as influential to adoption decisions.

One of the household heads had this to say:

Millet and Sorghum are better replacements for maize in our nshima. However, bird and monkey attacks are so common that, as a family, you need to resort to field camping. So, what happens is that we take turns sleeping by the fields to scare away monkeys at night and birds during the day. Otherwise, the yields drop drastically (**Luumbo Household Head**).

Institutional Support Factors

Institutional-based factors suggested project implementation and management, which included the following:

Poor Community project sustainability was cited predominantly by organizational-based key informants and was affirmed by other study participants. One of them had this to say;

Under our livestock restocking project, one cattle and goat dip tank was constructed in Nakanjele and Lukonde, respectively, within the Chief Munyumbwe area. The community had leadership in place to ensure sustainability and management of the facility after the handover. An evaluation was undertaken after two years; generally, the facilities never functioned. The leaders alluded to the lack of drugs and water as the major challenge they faced until they abandoned the facility (Key Informant-EFZ).



Figure 2: Abandoned Cattle Dip Tank –Chief Munyumbwe
Source: *Field Data*

Other related expressions include the following:

Adoption has been fair during the ongoing development of the project. However, once the project has been phased out, the default rate is high, with most people who were once beneficiaries resorting to other activities and slumping back to their old ways of doing things (EFZ)

It has been easy to have many beneficiaries adopt the various projects although so long resources are made available and the project is ongoing (World Vision)

Other factors that help influence the adoption of some initiatives include regular meetings, Farmer encouragement from extension officers and Conservation farming testimonies (Alliance Ginney).

The limited Number of Beneficiaries and Project Resources by the external agencies as an adoption determinant was alluded to during focus group discussions, and projects tended to target few households. This aspect was said to slow down ripple effects that should have spread to non-direct beneficiaries regarding knowledge and skill development.

Similarly, as cited, the short project duration discouraged some from adopting particular initiatives, knowing that the concerned agency would need to be present longer to ensure material support and fruition.

Limited External Support and the reduced presence of developmental agencies in the area were cited, especially during the COVID-19 pandemic. This is where some agencies were observed either withdrawing from the area or rechanneling resources to prevention efforts.

This was affirmed by one of the organisational key informants who mentioned the following:

Since the COVID-19 pandemic, our organisation has witnessed a drastic reduction in funding levels as most of our donors faced difficulty mobilising resources for continued development projects. Some aspects alluded to include high staff mortality rate and donor supporters apart from a change in focus, where the limited resources are re-channelled towards prevention

and mitigation efforts of the pandemic (Key Informant-ADRA)

Considering the district's nature, delayed agricultural input distribution under the Fertilizer Support Program (FISP) and inadequate government support were significant adoption determinants.

To affirm the stated claim, one of the key informants had this to say;

Everyone knows that Gwembe has had recurrent droughts for years. There has been flooding and more years of below-average rainfall in some years. We have been told over the years that the government will be constructing dams in communities to harvest rainwater for other livelihood activities. However, this promise has yet to be fulfilled over the ten years. Even relief food has become scarce over the years, with few beneficiaries. Our main road from Chipepo through Chief Munyumbwe to other areas, such as Monze, has not been worked on for years adequately. We feel neglected by the government (Senior Headman-Chipepo.)

Extension service availability was revealed as critical to the adoption process, citing the benefits of information sharing, consultations and demonstration plots.

Unreliable interpretations of some indigenous early warning predictions were said to restrict the extent to which households would adopt the practice.

Weather index insurance introduced within the FISP program was said to hold potential for improved adoption of conservation farming due to compensations attached if one experienced a production loss.

A summary of related responses on key adoption determinants to drought risk reduction can be seen in Table 1.

Table 1. Focus Group Discussions Expressions on DRR Adoption Determinants

Number	Study Participant Category	Responses
	Focus Group Discussions (FGD)	
1	<Files\FGD_CHIPEPO> - § 1 _reference coded [1.21% Coverage]	<ul style="list-style-type: none"> ❖ Knowledge level of farmers in the community ❖ Most of them are illiterate
2	<Files\FGD_FUMBO> - § 3 references coded [1.42% Coverage]	<ul style="list-style-type: none"> ❖ Accessibility to agricultural tools and equipment. ❖ Financial availability ❖ Family size
3	<Files\FGD_CHABBOBOMA> - § 1 reference coded [2.29% Coverage]	<ul style="list-style-type: none"> ❖ Constant hunger experiences and poverty emanating from drought or dry spell events
4	<Files\FGD_KKOMA> - § 1 reference coded [1.54% Coverage]	<ul style="list-style-type: none"> ❖ The high levels of vulnerability to drought effects
5	<Files\FGDLUKONDE> - § 3 references coded [3.18% Coverage]	<ul style="list-style-type: none"> ❖ Hunger episodes of the area ❖ Reality of perpetual below average rainfall ❖ People practicing Conservation Farming are observed to be better in food security.
6	<Files\FGD_LUUMBO> - § 1 reference coded [2.09% Coverage]	<ul style="list-style-type: none"> ❖ Recurrent drought or dry spell events in the area is discouraging

Source: Field Data

Some factors observed as determinants were considered constraints to the adoption process, summarised in Table 2.

Table 2: Household Head Opinions on Constraints to DRR Adoption Decisions

Number	Study Responses Household Head and Represented Community	Participant (HH and)	Category
1	<Files\HH_001-CHABBOBOMA> - § 2 references coded [4.80% Coverage]		<ul style="list-style-type: none"> ❖ Lack of finances and equipment to farming and irrigation purposes
2	<Files\HH_001-CHIPEPO> - § 1 reference coded [1.58% Coverage]		<ul style="list-style-type: none"> ❖ Lack of finances and equipment to reinforce some risk reduction strategies.
3	<Files\HH_001-KKOMA> - § 1 reference coded [0.75% Coverage]		<ul style="list-style-type: none"> ❖ Lack of equipment ❖ Limited arable land sizes ❖ Lack of sufficient household labor due to HIV/AIDS and migration of some members to urban areas in search of survival.
4	<Files\HH_001-LUKONDE> - § 1 reference coded [2.76% Coverage]		<ul style="list-style-type: none"> ❖ Lack of equipment, inputs, chemicals and knowledge ❖ CF is quite involving and labor intensive so on amply stomach it is discouraging
5	<Files\HH_005-LUUMBO> - § 1 reference coded [4.98% Coverage]		<ul style="list-style-type: none"> ❖ Lack of equipment ❖ Limited sources of water ❖ External projects target limited number of beneficiaries so we miss out
6	<Files\HH_005-FUMBO> - § 1 reference coded [4.98% Coverage]		<ul style="list-style-type: none"> ❖ Minimal presence of external agencies ❖ Expensive Equipment and tools for farming and irrigation.

Source: Field data

From the illustrations, some factors deemed determinants of adoption decisions were also considered constraints to the adoption potential of drought risk reduction, as illustrated by the generated word tree in Figure 2.

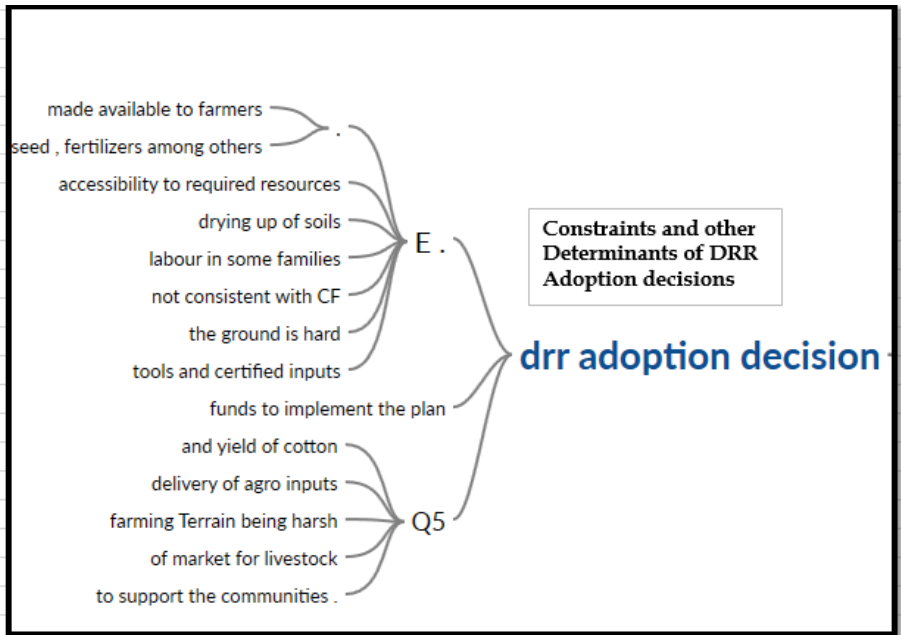


Figure 3: Key Determinants and Constraints to DRR Adoption Decisions

Source: Field Data

Discussion of Findings

From the findings, socio-economic factors insinuated household accessibility to various resources to facilitate enablement and ease of initiative engagement, without which adoption possibilities were expected to be low. Additionally, exposure to information from training, social network interactions, and past experiences remained a reference point in making adoption decisions. In support of this augment, field observations revealed that a practice that had a long existence, tested and proven had a higher influencing potential for adoption.

Findings on environmental factors perceived as adoption determinants included both natural and built environments. These

indicated some of the community livelihood elements influencing initiative engagement. For instance, high temperatures and recurrent dry weather conditions suggested low decisions in adopting initiatives deemed sensitive to the mentioned factors.

Furthermore, built environments such as a lack of weir dams or other facilities for rainwater harvesting suggested restricted engagement in irrigation or other water-based activities such as gardening and fishing. The same can be said about poor road networks leading to high transportation costs of products, constraining households from adequate involvement in some off or non-farm income-generating activities.

Study findings on institutional adoption determinants involved project management and other related dynamics as alluded to. This suggested further the community's dependence on developmental agencies, thereby affecting the extent of adoption. In addition, poor project exit plans and limited beneficiaries meant high levels of disadoption of risk reduction initiatives.

Other aspects of institutional factors related to a sense of community support system. These were observed regarding external agency presence, government support levels, extension services, and weather index insurance, among others. Availability of the stated meant that adoption decisions of related initiatives were more probable.

Study Affirmations

Findings on the various *socioeconomic factors being determinants of risk reduction adoption decisions agree with Cenacchi (2014) and Safari and Amghani (2021) in Pakistan. Their studies suggest that outside the resources above, the uptake of practices and systems dwindles, leading to higher abandonment or disadoption cases. The study results are also in line with Adnan et al. (2021), Hirpha et al. (2020), and Wens et al. (2021), who alluded to family size, availability of labour, accessibility to income and other resources, experience, and size of land as critical determinants of adoption decisions.*

From the local front, the current findings also align with the study by Saldarriaga *et al.* (2014), whose survey of several provinces in Zambia revealed a similar stance. Their findings cited experience,

training in CF techniques, tillage equipment possession and farmer cooperative membership as drivers of adoption decisions.

Findings surrounding environmental-related adoption determinants are consistent with Cenacchi (2014), who revealed that in Sub-Saharan Africa, extreme weather conditions slowed down household investments and the adoption of improved agriculture technologies and practices. Similarly, Mubanga and Umar's (2014) findings in Zambia affirm that environmental changes push farmers to adopt practices they perceive would reduce crop losses and that below-average rainfall tends to spur the development of risk-averse behaviour among farmers. The results on the recurrence of drought were consistent with Mubanga and Umar (2014), who indicated that this was a driver for the diversification of initiatives. Similarly, Gupta et al. (2014) revealed that unsustainable land and water management practices were among the culprits of drought intensification with a bearing on adoption rate.

Locally, the results agreed with Makondo et al. (2014), whose findings in Gwembe indicated that the built environment, such as road infrastructure, is a driver of adoption decisions with a bearing on market accessibility and prices of products.

The study findings on various *institutional factors* are consistent with those of Bunclark et al. (2018), who revealed that community involvement in planning and implementation influences adoption and sustenance rate. Findings on project implementation by external agencies, a limited number of beneficiaries and duration as adoption decision determinants tend to align with Cenacchi (2014). His findings alluded that when communities gain control over their livelihood decisions, progression towards practice adoption is observed.

Regarding external support as part of the institutional factor, similar findings are that of Giller *et al.* (2015) and Arslan *et al.* (2014). They all espoused that the support of the donor community and developmental agencies has been behind the high adoption of conservation farming among small-scale farmers due to material incentives. A further agreement is also seen from Gupta *et al.* (2014). He alluded to a lack of a robust government-facilitated strategic plan

against natural hazards, determining the community's perception of the risk reduction commitment and its eventual adoption.

Findings on extension services as another significant adoption determinant tend to agree with Grabowski *et al.* (2016), whose study was conducted in Zambia. Their findings showed that extension services with demonstration plots for continued skills development were significant in adoption decision-making. In the same vein, findings from Khoza *et al.* (2022) in Malawi and Zambia pointed to inadequate technical support from extension officers as deterring the adoption of climate-smart agriculture techniques. The findings were also consistent with Shiferaw *et al.* (2014), Wens *et al.* (2021) and Thinda *et al.* (2020), who alluded to early warning information emanating from extension services as a determinant of the adoption decision process.

Findings on the indigenous early warning systems and their inadequacy confirm the findings by Dale (2018) and Makondo *et al.* (2014). They revealed that a comprehensive multi-hazard system for early action and reliance on the exact needs to be improved among governments, thereby influencing the rate of risk reduction initiatives.

Study Differences

Most studies noted insignificant contradictions in the determinants of adopting drought risk reduction. This suggests that the areas under study, though different from various regions, presented similar and common factors but contextual.

Theoretical Framework Applicability

The applicability and linkage of the assumptions of the two underpinning theories to the study findings are clear.

According to the findings, a conviction to succeed in a particular practice is often influenced by resource accessibility and being in control of the same, perceived as enablers of effective DRR implementation. This speaks to personal factors and behavioural control among the primary constructs.

On the other hand, external influences on DRR adoption decisions are seen in social networks, experience, environmental factors, institutional support, and observation of behavioural outcomes from others. This insinuates an interaction of subjective norms, environment and behavioural patterns of others within a particular environment as premised by the stated theories. This tends to influence learning and intentions to adopt or not to adopt a drought risk reduction initiative.

Conclusion

Perceived determinants of drought risk reduction adoption decisions in context-specific targeted communities were multifaceted. This was evidenced by three common socio-economic, environmental, and institutional support areas. Associated constraints from the three-factor categories influenced household decisions to adopt or dis-adopt an initiative. This implies that risk reduction project planning requires integrating a framework that addresses determinants of low or high dis-adoption of risk reduction strategies. This would further ensure household transformative resilience building against future hazards.

Acknowledgements

I thank Professor Eustarckio Kazonga for his relentless guidance and inspiration in using Nvivo for my qualitative study analysis and journal writing principles.

The generosity and expertise of many who remain unmentioned have contributed to the improvement of this study in innumerable ways, thereby saving me from many errors. Thus, those which remain inevitably are entirely my responsibility.

Conflict of Interest

The author of this paper declares that there was no financial interest or personal relationship, which may be considered a potential conflict of interest.

Author Contribution

The author confirms sole responsibility for the initial study conception, design, data collection, analysis, interpretation of results and manuscript preparation.

Funding Statement

The author received no financial support for this article's research work, authorship, and publication.

Data Availability

The author confirms that the data supporting the findings of this study are available within the article and its supplementary materials as well as on request.

Disclaimer

The views expressed in this article are the author's own analysed views and not an official position of the institution from which the study was undertaken.

References

- Adnan, K.M., Ying, L., Sarker, S.A., Yu, M., Eliw, M., Sultanuzzaman, M.R. and Huq, M.E., (2021). Simultaneous adoption of risk management strategies to manage the catastrophic risk of maize farmers in Bangladesh. *GeoJournal*, 86, pp.1981-1998. <https://doi.org/10.1007/s10708-020-10154-y>
- Ajzen, I. (2020). The theory of planned behaviour: Frequently asked questions. *Human Behaviour and Emerging Technologies*, 2(4), 314–324. <https://DOI: 10.1002/hbe2.195>
- Alexander, D. (2018). A magnitude scale for cascading disasters. *International Journal of Disaster Risk Reduction*, 30, 180-185. <https://doi.org/10.1016/j.ijdr.2018.03.006>
- Allan, L., and Andrew, M., (2014). The future of disaster risk management, *Environmental Hazards*, 13:4, 267-280, DOI: 10.1080/17477891.2014.935282

- Arslan, A., McCarthy, N., Lipper, L., Asfaw, S. and Cattaneo, A., (2014). Adoption and intensity of adoption of conservation farming practices in Zambia. *Agriculture, ecosystems & environment*, 187, pp.72-86. <https://doi.org/10.1016/j.agee.2013.08.017>
- Bandura, A. (2014). Social cognitive theory of moral thought and action. In *Handbook of moral behaviour and development* (pp. 69-128). Psychology press. Retrieved from: <https://citeseerx.ist.psu.edu/d-ocument?repid>
- Begho, T. (2021). Using farmers' risk tolerance to explain variations in adoption of improved rice varieties in Nepal. *Journal of South Asian Development*, 16(2), 171-193. <https://doi.org/10.1177/097317412111023636>
- Boddy, C.R., (2016). Sample size for qualitative research. *Qualitative Market Research: An International Journal*, 19(4), pp.426-432. <https://www.emerald.com/insight/content/doi/10.1108/qmr-06-2016-0053/full/html>
- Bunclark, L., Gowing, J., Oughton, E., Ouattara, K., Ouoba, S. and Benao, D., (2018). Understanding farmers' decisions on adaptation to climate change: Exploring adoption of water harvesting technologies in Burkina Faso. *Global Environmental Change*, 48, pp.243-254. <https://doi.org/10.1016/j.gloenvcha.2017.12.004>
- Cenacchi, N. (2014). Drought risk reduction in agriculture: A review of adaptive strategies in East Africa and the Indo-Gangetic plain of South Asia. Retrieved from: <https://books.google.com/books?hl>
- Central Statistics Office Report (CSO), (2010). Lusaka, Zambia
- Chen, P. H., Hong, J. C., Ye, J. H., & Ho, Y. J. (2022). The role of teachers' constructivist beliefs in classroom observations: A social cognitive theory perspective. *Frontiers in Psychology*, 13, 904181. <https://doi.org/10.3389/fpsyg.2022.904181>
- Colson, E. and Scudder, T., (2018). New economic relationships between the Gwembe Valley and the Line of Rail. In *Town and Country in Central and Eastern Africa* (pp. 190-210). Routledge

Retrieved from: <https://www.taylorfrancis.com/chapters/edited/10.4324/9780429490453-10/>

- Creswell, J.W. and Creswell, J.D., (2017). Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications. Retrieved from: <http://www.ceil-conicet.gov.ar/wp-content/uploads/2015/10/Creswell-Cap-10.pdf>.
- Dale, L. (2018). Anticipate, Absorb, Reshape (A2R) A Baseline Study of Climate Resilience in Developing Countries. *Consilience*, (19), 36-57. <https://www.jstor.org/stable/26427711#>
- Daniel, B. K. (2019, June). Student experience of the maximum variation framework for determining sample size in qualitative research. In *18th European Conference on Research Methodology for Business and Management Studies* (p. 92). Retrieved from: <https://books.google.com/books?>
- Dhakal, K., (2022). NVivo. *Journal of the Medical Library Association: JMLA*, 110(2), p.270. <https://doi.org/10.5195/jmla.2022.1271>
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, 5(1), 1-4. <https://doi.org/10.11648/j.ajtas.20160501.11>
- Gerber, N., Nkonya, E., & von Braun, J. (2014). Land degradation, poverty and marginality. *Marginality: Addressing the nexus of poverty, exclusion and ecology*, 181-202. https://library.oapen.org/bitstream/handle/20.500.12657/28031/10.1007_978-94-007-7061-4.pdf
- Giller, K. E., Andersson, J. A., Corbeels, M., Kirkegaard, J., Mortensen, D., Erenstein, O., & Vanlauwe, B. (2015). Beyond conservation agriculture. *Frontiers in plant science*, 6, 870. <https://doi.org/10.3389/fpls.2015.00870>
- Grabowski, P.P., Kerr, J.M., Haggblade, S. and Kabwe, S., (2016). Determinants of adoption and disadoption of minimum tillage by cotton farmers in eastern Zambia. *Agriculture, Ecosystems & Environment*, 231, pp.54-67. <https://doi.org/10.1016/j.agee.2016.06.027>

- Gupta, A. K., Nair, S. S., Wajih, S. A., Chopde, S., Gupta, G., & Aggrawal, G. (2014). Mainstreaming climate change adaptation and disaster risk reduction into district level development plans. *NIDM New Delhi (India), GEAG Gorakhpur (UP, India) and ISET, Colorado (US), P, 114*. Retrieved from: <https://www.researchgate.net/profile/Garima-Aggarwal-8/publication/287546336>
- Hirpha, H.H., Mpandeli, S. and Bantider, A., (2020). Determinants of adaptation strategies to climate change among the smallholder farmers in Adama District, Ethiopia. *International Journal of Climate Change Strategies and Management, 12(4)*, pp.463-476. Retrieved from: <https://www.emerald.com/insight/content/doi/10.1108/IJCCSM-01-2019-0002/full/html>
- Khoza, S., van Niekerk, D. and Nemaconde, L.D., (2022). Gendered vulnerability and inequality: understanding drivers of climate-smart agriculture dis- and non-adoption among smallholder farmers in Malawi and Zambia. *Ecology and Society, 27(4)*. <https://doi.org/10.5751/ES-13480-270419>
- Khoza, S., van Niekerk, D., & Nemaconde, L. D. (2022). A Decade of Inaction in the SADC region? -disaster risk data gaps and inconsistencies on the Sendai Framework Monitor. *Progress in Disaster Science, 16*, 100250. <https://doi.org/10.1016/j.pdias.2022.100250>
- Maher, C., Hadfield, M., Hutchings, M., & De Eyto, A. (2018). Ensuring rigor in qualitative data analysis: A design research approach to coding combining NVivo with traditional material methods. *International journal of qualitative methods, 17(1)*, 1609406918786362. <https://doi.org/10.1177/1609406918786362>
- Makondo, C.C., Chola, K. and Moonga, B., (2014). Climate change adaptation and vulnerability: A case of rain dependent smallholder farmers in selected districts in Zambia. *American Journal of Climate Change, 3(04)*, p.388. Retrieved from: https://www.scirp.org/html/4-2360196_52218.htm
- Mohammed, B. S., Fethi, A., & Djaoued, O. B. (2017). The influence of attitude, subjective norms and perceived behavior control on entrepreneurial intentions: Case of Algerian students. *American*

Journal of Economics, 7(6), 274-282. DOI:10.5923/j.economics.20170706.02

- Mubanga, K.H. and Umar, B.B., (2014). Smallholder farmers' responses to rainfall variability and soil fertility problems by the use of indigenous knowledge in Chipepo, Southern Zambia. *Journal of Agricultural Science*, 6(6), p.75. [https://DOI: 10.5539/jas.v6n6p75](https://doi.org/10.5539/jas.v6n6p75)
- Mulenga, M. (2021). Government agricultural policy and rural poverty in Gwembe district of Southern province of Zambia, 1964-2011 (Doctoral dissertation, The University of Zambia). Retrieved from: <http://dspace.unza.zm/handle/123456789/7496>
- Paton, D. and Johnston, D., (2017). Disaster resilience: an integrated approach. Charles C Thomas Publisher. <https://books.google.com/books?hl>
- Raikes, J., Smith, T. F., Baldwin, C., & Henstra, D. (2022). The influence of international agreements on disaster risk reduction. *International Journal of disaster risk reduction*, 76, 102999. <https://doi.org/10.1016/j.ijdr.2022.102999>
- Saldarriaga, M., Nyanga, P.H. and Kopainsky, B., (2014). Dynamic decision making in coupled social-ecological systems. In 32nd international conference of the system dynamics society (pp. 20-24). Retrieved from: <https://www.researchgate.net/profile/Birgit-Kopainsky/publication/281280672>
- Saunders, M.N., Lewis, P., Thornhill, A. and Bristow, A., (2015). Understanding research philosophy and approaches to theory development. Retrieved from: <http://catalogue.pearsoned.co.uk/educator/product/Research-Methods-for-Business-Students/9781292016627>
- Savari, M., Shokati Amghani, M. (2021). Factors influencing farmers' adaptation strategies in confronting the drought in Iran. *Environ Dev Sustain* 23, 4949-4972, <https://doi.org/10.1007/s10668-020-00798-8>
- Shiferaw, B., Tesfaye, K., Kassie, M., Abate, T., Prasanna, B.M. and Menkir, A., (2014). Managing vulnerability to drought and enhancing livelihood resilience in sub-Saharan Africa:

Technological, institutional and policy options. *Weather and climate extremes*, 3, pp.67-79. <https://doi.org/10.1016/j.wace.2014.04.004>

Susan L. Cutter, Joseph A. Ahearn, Bernard Amadei, Patrick Crawford, Elizabeth A. Eide, Gerald E. Galloway, Michael F. Goodchild, Howard C. Kunreuther, Meredith Li-Vollmer, Monica Schoch-Spana, Susan C. Scrimshaw, Ellis M. Stanley, Gene Whitney & Mary Lou Zoback, (2013). *Disaster Resilience: A National Imperative*, *Environment: Science and Policy for Sustainable Development*, 55:2, 25-29, DOI: 10.1080/00139157.2013.768076

Thinda, K.T., Ogundeji, A.A., Belle, J.A. and Ojo, T.O., (2020). Understanding the adoption of climate change adaptation strategies among smallholder farmers: Evidence from land reform beneficiaries in South Africa. *Land Use Policy*, 99, p.104858. <https://doi.org/10.1016/j.landusepol.2020.104858>

Tozier de la Poterie, A. and Baudoin, M.A., (2015). From Yokohama to Sendai: Approaches to participation in international disaster risk reduction frameworks. *International Journal of Disaster Risk Science*, 6, pp.128-139. Retrieved from: <https://link.springer.com/article/10.1007/s13753-015-0053-6>

Tsang, E. W. (2014). Generalizing from research findings: The merits of case studies. *International Journal of Management Reviews*, 16(4), 369-383. <https://doi.org/10.1016/j.jsis.2013.09>.

Twigg, J., (2015). *Disaster risk reduction*. Retrieved from: <http://bvpad.indeci.gob.pe/doc/pdf/esp/doc2601/doc2601-contenido.pdf>

UNDRR, (2021). *Droughts Or Floods*. Retrieved from: <https://www.preventionweb.net/news/droughts-or-floods>

UNISDR. (2015). (United Nations International Strategy for Disaster Reduction). (2015). *Sendai framework for disaster risk reduction 2015–2030*. Geneva: UNISDR. Retrieved from: <https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>

- UNISDR. (2016b). HFA National Progress Reports. Retrieved from <http://www.preventionweb.net/english/hyogo/progress/reports/?pid:222>
- Wanner, M.S., (2021). The effectiveness of soft law in international environmental regimes: participation and compliance in the Hyogo Framework for Action. *International Environmental Agreements: Politics, Law and Economics*, 21(1), pp.113-132. Retrieved from: <https://link.springer.com/article/10.1007/s10784-020-09490-8>
- Wens, M.L., Mwangi, M.N., van Loon, A.F. and Aerts, J.C., (2021). Complexities of drought adaptive behaviour: Linking theory to data on smallholder farmer adaptation decisions. *International Journal of Disaster Risk Reduction*, 63, p.102435. <https://doi.org/10.1016/j.ijdr.2021.102435>
- Yin, R. K., (2013). Validity and generalization in future case study evaluations. *Evaluation*, 19(3), 321-332. <https://doi.org/10.1177/1356389013497>
- Zamawe, F. C. (2015). The implication of using NVivo software in qualitative data analysis: Evidence-based reflections. *Malawi Medical Journal*, 27(1), 13-15. <https://DOI:10.4314/mmj.v27i1.4>
- Zambia National Disaster Management Policy, (2015). DMMU, Lusaka, Zambia.
- Zambia Vulnerability Assessment Committee Report (ZVAC) (2015), DMMU Lusaka Zambia,
- Zaremohzzabieh, Z., & Mohd Rasdi, R. (2023). Revisiting the determinants of knowledge-sharing behaviour in organisations: a meta-analytic structural equation model application. *Global Knowledge, Memory and Communication*. <https://doi.org/10.1108/GKMC-02-2022-0034>