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REVIEW ARTICLE

A REVIEW OF THE NATIONAL AGRICULTURAL POLICY OF ZAMBIA AND ITS ALIGNMENT WITH SUSTAINABLE AGRICULTURAL PRACTICES: A CASE STUDY OF KASISI AGRICULTURAL TRAINING CENTRE

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ABSTRACT

Kasisi Agricultural Training Centre (KATC) in association with small-scale farmers, has a vital role in fostering sustainable organic practices for sustainable agricultural development. A study was conducted to establish the alignment of sustainable agriculture practices at KATC, with that of the National agricultural policy and, how sustainable practices are implemented by the training institution. The qualitative case study involved seventeen (17) participants who were purposively selected from the target population. Data was collected using semi-structured interviews, observations, and a focus group discussion. A document review on SNAP's sustainable agricultural practices (SAPs) was conducted, and data were analysed using thematic content analysis. The study showed that KATC's sustainable organic practices such as soil fertility management, soil and water conservation, and pest and disease management were aligned with policy objectives of, increasing crop production, food security, and nutrition, promoting sustainable management and use of natural resources. An integrated approach is essential in implementing SAPs aligned with policy objectives, to enable the effective adoption of SAPs by small-scale farmers and agricultural development. The study recommended specific policies and legislation on sustainable agriculture to influence the implementation of sustainability practices.

KEYWORDS

Sustainable Agricultural Practice, Small-Scale Farmers, Food Security, Climate Change, Policy.

1. INTRODUCTION

Climate change and its associated negative impacts have been identified as a major threat to global food security, economies, human health, and many other sectors of life (Engelbrecht et al., 2015). The situation has accelerated efforts to respond to climate change challenges, through the development of global treaties such as the United Nations Framework Convention on Climate change (UNFCCC), whose primary aim is to stabilise the greenhouse gas levels in the atmosphere to mitigate dangerous human-induced elements within the climate system (MNDP, 2016). Lupele suggested that, where policies are concerned, climate change education should be provided by governments and should entail empowering all stakeholders and major groups at local and international levels (Lupele, 2020).

The agricultural sector in Africa, which is mainly dependent on rainfall, bears the most impacts from environmental variabilities. Zambia has not been spared from the negative consequences of climate change. The productivity of crops, livestock, fisheries, and overall national food security has been adversely affected (Ministry of Agriculture, 2016). The country identified four main sectors that are most vulnerable to climate change: agriculture, water and energy, natural resources and human health (Shitima, 2015). The Zambian agricultural sector constitutes about 67% of the workforce and contributes 20 % to the national gross domestic product (Moonga and Chileshe, 2019). It is also a source of livelihood for half of the country's population (Wineman and Crawford, 2017).

The country's agricultural sector is guided by national agricultural policies which undergo periodic reviews, depending on prevailing conditions, for instance, climatic conditions and/or the social and economic well-being of the country (MA, 2016). The policies are implemented through established structures for national resources management, agricultural production, food and nutrition security, and institutional strengthening. Despite these efforts, food security remains a priority to Zambia and the Southern African Development Community (SADC). The agricultural sector still requires urgent intervention in terms of raising awareness around greening/sustainable ways of farming and practices by education and training institutions. Crush and Frayne noted that food insecurities in southern Africa are mainly caused by the inability to produce enough food due to a lack of agricultural technical support, unfavourable environmental conditions, land pollution, unsustainable farming practices, and the inability to adapt to climate change (Crush and Frayne, 2010).

Agricultural training institutions play a significant role in executing policies through initiatives based on identified priority sectors (agriculture, water, energy, natural resources, and health). The training centres provide training and support to farmers. However, many farmers, especially small-scale farmers, lack the appropriate skills, awareness, and technical knowledge to adapt to, and mitigate the impacts of climate change. Adenle, Wedig and Azadi suggested that advanced technology adoption by small-scale farmers can be considered as an alternative strategy to addressing food insecurities (Adenle et al., 2019). Sustainable agricultural practices could also assist in mitigating the negative impacts

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from climate change and, at the same time, promote social-economic development in the country. Developing appropriate agricultural policies that align with sustainable agricultural practices is crucial to effectively address challenges identified within the agricultural sector. The current Second National Agricultural Policy (SNAP) objectives address several aspects, including food and nutrition security, natural resource use and management, the mainstreaming of environment and climate, and the production of crops, livestock, and fisheries, which could be regarded as directly speaking to sustainability practices in agriculture.

At an international level, the Intergovernmental Panel on Climate Change (IPCC) plays a vital role in shaping policies and influences the development of appropriate climate change adaptation strategies to address climate challenges faced by member counties (IPCC, 2022). The Economic Community of West African States (ECOWAS), through the Economic Community of West African Agricultural Policy (ECOWAP), addresses priority areas based on sustainable agriculture, with an emphasis on the management of water and soil in agriculture (ECOWAS Commission, 2008). In this policy, irrigation and integrated water resources management, integrated soil management, and the use of improved technologies are promoted.

Where sustainable agricultural policies are concerned, there are differences among Southern African countries. Some do not have approved policies and do not practice any sustainable agricultural initiatives, some have the policies but are not plasticising the policy objectives, and yet some are involved in sustainable agricultural practices even though they do not have policies in place. In countries like Malawi, Botswana, and Namibia, national agricultural policies do not clearly define issues around sustainable agricultural practices. As for South Africa, the country has no approved policy on sustainable agriculture but there are several drafted policy guidelines such as a white paper on sustainable agriculture and a policy on agriculture which indicate the intention towards effecting sustainable agricultural development (Khwidzhili and Worth, 2017).

The two South African policy documents are also closely related to the pillars of sustainable agriculture (Khwidzhili and Worth, 2017). The challenge for South Africa, is aligning these policies to government programmes, and farmers' activities, so that practices in the sector can be implemented without undermining the core values of sustainable agriculture. Like in the SNAP, the use of organic and chemical fertilizers and the use of improved seeds and hybrids are highlighted as means of increasing productivity in agriculture. However, this begs the question of how sustainable agricultural practices and the underlying principles are understood by policymakers. Ghana does not have a specific policy on sustainable agriculture but was found to have, in implementation, several sustainable agricultural practices, even though the rate of adoption of such practices is low (Agula et al., 2018).

Climate change challenges associated with agricultural production and food insecurities remain a primary concern for Africa, especially because many people depend on agriculture. Literature revealed the non-alignment of national agricultural policies with agricultural practices where addressing climate change challenges in agricultural development is concerned (Mdee et al., 2021; Midgley, 2015). This paper is based on a broader study that aimed at understanding sustainable agricultural practices and the role of policy in promoting sustainable agriculture in Zambia. It draws insights from a case study of the Kasisi Agricultural Training Centre. This paper analyses the objectives of the second agricultural policy and then reviews its alignment with sustainable agricultural practices.

2. Research Design and Methods

The research was conducted at Kasisi Agricultural Training Centre (KATC). The training centre is in the Chongwe district, which is situated 30km northeast of Lusaka, Zambia, as shown in figure 1. A qualitative case study approach was adopted based on social constructivism, which emphasises the subjectivity of interrelations between the researcher and the participant and epistemologically assumes that reality could be a result of a co-construction between the researcher, what is being researched and individual experiences (Maguire and Delahunt, 2017; Creswell, 2013). Data collection was conducted from May to August 2021.

Figure 1: Study area map, Kasisi Agricultural Training Centre- Chongwe, Zambia.

Interviews (semi-structured interviews and key informant interviews), observations, and a documentary review were used to collect data on sustainable agriculture and practices that are implemented by KATC and their alignment with the Second National Agricultural Policy. Participants for the study comprised key informants from KATC staff (director/head of departments, extension workers), KATC stakeholders such as trainee farmers, and individuals working in collaboration with the centre (KATC) in initiatives relevant to the study focus. The participants were purposively selected from the target population (KATC). The sample consisted of twelve (12) participants for interviews and five (5) participants for key informant interviews. Table 1 is a summary of methods, the respondents and the information collected each respondent group. Each interview took a duration of between thirty (30) to sixty (60) minutes.

The English language was used as the main media of communication; however, the local languages such as Nyanja/Bemba (conversant with the researcher and participant) were used in instances when certain words could not be well expressed in the primary language (English). A digital audio recorder was used to record the proceedings of the interviews. In addition, field observations were conducted to record information on sustainable agricultural practices implemented or being practised at the training institution. Angrosino describes observation as an act of using one's senses to note an observed phenomenon in the field setting by use of instruments and recording for scientific study (Angrosino, 2007). The method was employed to take note of practices in their physical settings at the institution, as well as to note activities by the KATC partners. Methodological triangulation helped to provide an in-depth understanding of sustainable agricultural practices at KATC.

Table 1: A Summary of The Employed Research Methods.				
Method	**Participants**	**Number of respondents**	**Solicited information**	**Data analysis method**
Semi-structured interviews	KATC staff	12	Establishing sustainable agricultural practices at KATC and the alignment of KATC practices with the National policy on sustainable agriculture.	Thematic content analysis of interview data
Key informant interviews	Key informants – KATC Director, head of departments, extension workers, KATC stakeholders	5	Establishing the role of KATC in sustainable agriculture	
Method	**Documents**	**Number of documents**	**Solicited information**	**Data analysis method**
Document review	Second National Agricultural Policy	1	Establishing policy objectives and major sustainable agricultural themes in the policies	Thematic content analysis of policy documents
Method	**Purpose**		**Solicited information**	**Data analysis method**
Observations	To take note of and photograph visible sustainable agricultural practices		Any noticeable sustainability practices	Thematic content analysis of filed notes and photographs

The Second National Agricultural Policy document was reviewed to establish sustainable agriculture themes. Four main themes emerged from the policy document that is, agricultural production, food and nutrition security, sustainable management and use of natural resources, and climate change adaptation and mitigation. The data recordings obtained from the interviews and group discussions were transcribed by the researcher to create a narrative. Data collection notes were pre-analysed by reviewing what transpired from each discussion at the end of the day, identifying what went well and what did not go well, and identifying new ideas which could have surfaced during the day. Transcribed data were sorted based on thematic content analysis using a deductive approach. The transcript was carefully read and the data was sorted into relevant categories and themes, by copying and pasting into a word file using Microsoft Word (Anderson, 2007; Maguire and Delahunt, 2017). Data aligning with the four main themes established from the policy document were also organised accordingly for the purpose of this paper.

3. Results and Discussion

3.1 SNAP Policy Objectives and Sustainable Agricultural Practices at KATC

Table 2: National Agricultural Policy Objectives and Sustainable Agricultural Practices Implemented by KATC		
Policy Objectives on Sustainability Practices	**Measures in Policy**	**Sustainable practices at KATC**
Agricultural Production	• Promote the efficient use of available water resources • Encourage effective use of agrochemicals and fertilisers • Improve the use of crop varieties and certified seeds • Establish livestock breeding centres and improve pastures • Encourage the production of high-value irrigable crops • Promote the conservation of fodder • Promote production of farmed-fish species	• Implements soil fertility management practices: production of on-farm fertiliser (compost/ bio-fertilizer), intercropping, crop rotation, planting of cover crops • Use of biological control measures in diseases and pest management. • Promotes and implement soil and water conservation practices such as minimum tillage, mulching, use of conservation basins, erosion control • Use of farmer-saved seeds/indigenous species
Food and Nutrition Security	• Promote diversified agricultural production • Promote accessibility to bio-fortified seeds/ vines • Encourage on-farm agro-processing Promote Value addition, preservation, on-farm storage • Encourage cultivation/consumption of indigenous crop varieties • Provide nutrition education	• Promote crop diversification • Use of indigenous crop varieties • Promote the production of food organic crops • Value-adding to organic products • Establish community seed banks • Provide training and community education on sustainable agriculture
Sustainable Management and Use of Natural Resources	• Promote sustainable land management technologies • Promote agroforestry • Foster utilisation of renewable energy resources • Develop water harvesting and storage infrastructure • Promote Integrated agriculture	• Promote sustainable use of farm-based resources • Promotes agroforestry. • Establish tree/agroforestry nurseries • Practice beekeeping • Establish woodlot • Advance soil-water conservation activities
Climate Change Adaption and Mitigation	• Promote resilient agricultural methods • Develop integrated plans/programs on climate change adaptation measures • Conducts climate change risk assessments	• Promote Indigenous plant/crop species • Promote early maturing plant varieties • Conduct soil and water conservation practices: Basin planting, minimum tillage, mulching • Conduct weather observations/monitoring and develop plans for the farming season

The SNAP's primary objectives are to speed up the reduction of food and nutrition insecurity, reduce poverty and increase employment in the agriculture sector as well as increase the growth of the sector. The policy is facilitated, monitored, regulated, and evaluated by the Ministry of Agriculture and Ministry of Fisheries and Livestock. The implementation of the policy is strongly dependent on partnerships with the farming communities and other stakeholders. Four policy areas were identified as the areas that speak to sustainable agricultural practices. These are agricultural production, food and nutrition security, natural resources use and management, and climate change. Table 2 outlines these four areas. It also states the measures identified in the policy under each of the areas. Based on thematic analysis, the last column identifies the sustainability practices at KATC which align with each of the four policy areas.

3.1.1 Agricultural Production

This policy objective describes production and productivity where crops, livestock, and fisheries are concerned. To increase productivity, measures outlined in Table 2 were recommended for implementation by the policy. The measures include efficient use of available water resources, use of high-value irrigable crops, improved pastures, conservation of fodder in animal production, and increased production of farmed-fish species. However, practices such as the use of fertilisers and agrochemicals raise questions about the subsequent impacts of such measures on the crops, soils, and biodiversity in farmlands (Savci, 2012). Further, the SNAP encourages promoting conservation agriculture by incorporating the use of chemicals (fertilisers) in crop and animal production is contradictory to the principles of sustainable agriculture. A practical example on the ground is the implementation of the Farmer Input Support Programme (FISP) by the department of agriculture. Inputs (seeds and chemical fertilisers) are handed out to small farmers every farming season.

The programme may be viewed by others as the government's effort in assisting small-scale farmers that are unable to afford the purchase of inputs for crop production. A review by Mason, Jayne and Mofya-mukuka of Zambia's agricultural input subsidy program, showed that the use of fertiliser increases soil acidity and that 98% of small-scale farmers' maize is growing on acidic soils of a PH of less than 5.5 (Mason et al., 2013). This compromises the growth and performance of crops and organisms which are found in such soil environments. Further, some researchers noted that by promoting agricultural productivity using inorganic fertilisers, the FISP contradicts the core values of sustainable crop production for environmental sustainability (Mason et al., 2013). This research revealed that 12 142 out of the 26 000 farmers under the department of agriculture in the Rufunsa district in the year 2021, were on the FISP program but only 1000 were using sustainable farming practices (in partnership with KATC). This shows that the SNAP has not been very effective in terms of influencing agricultural production where ecosystem protection and environmental sustainability are concerned.

3.1.2 Sustainable Management of Natural Resources

Figure 2: A beehive at a farmer's apiary in Nkondola village in Chongwe district.

Figure 3: A KATC linked farmer's agroforestry nursery in Chongwe.

To ensure the sustainable use and management of natural resources, the SNAP outlines measures such as the use of sustainable land management technologies which include conservation agriculture, agroforestry, the use of renewable energy resources, and the development of an integrated agricultural approach. Other measures for ensuring the sustainable use of water resources mentioned in the policy are water conservation and the establishment of water infrastructure. KATC has significantly implemented initiatives and practices to respond to these policy objectives. These practices include among others; the use of farm-based resources in land production, the establishment of tree nurseries and woodlots for reforestation, fruit, medicinal and energy source, beekeeping, and agroforestry (Kralik et al., 2020; Campanhola and Pandey, 2019). These were also noted during observations. Figure 2 shows a beehive in a farmer's apiary at Nkondola village in Chongwe district while figure 3 shows an agroforestry nursery in Chongwe district. Other authors also noted that sustainable practices such as the management of water resources and conservation of forests, and reafforestation of catchment areas are prioritised in the sustainable management of resources (Fon et al., 2020; Nkiakia and Lovett, 2018). In agreement, Adnele et al. (2019) also argued that the adoption of such technologies was crucial for the advancement of environmental sustainability.

3.1.3 Food and Nutrition Security

The SNAP of 2016 noted that national production for most crops in Zambia increased in the years around the 2000s while average yields changed significantly due to changes in weather conditions. Diversified agricultural production, consumption of indigenous crop varieties, and nutrition education were identified in the SNAP as measures to increase food production, reduce food insecurity, and enhance nutrition among farmers and communities. Other ways of enhancing food and nutrition security were identified in the policy as access to biofortified seeds/vines, promotion of on-farm agro-processing, value-adding, preservation and establishment of the on-farm storage systems, and cultivation of indigenous crop varieties. In practice, KATC and its farmers' accent to crop diversification enhances food sustainability, because a variety of crops respond differently to environmental variabilities. Diversification enables the farmer to produce and contribute to the household food basket despite environmental variabilities (Nkomoki et al., 2018). Figure 4. Shows a variety of harvested crops that are grown organically by a group of farmers Kansonkomona Village in Chongwe.

Figure 4: Crops that were grown organically by a group of farmers, Kansonkomona Village in Chongwe.

Other practices such as intercropping and crop rotation contribute to food security among farmers (Kinkese, 2017; Zulu et al., 2017). Value adding based on sustainable processing methods, packaging, and storage provides a longer storage lifespan for harvested crops and preserves the nutritional value of the crops/products. KATC, through its production and marketing division, processes, packages, and sells its organic crops such as wheat and wheat products. For example, wheat is processed into oats and flour to generate income. The KATC-linked farmers established community seed banks, where harvested seeds are selected, sorted out for quality control, and packaged. They are clearly labeled, stored in an identified secured facility and later shared for re-planting amongst farmers and communities. Figure 5 shows a seed storage system for a group of farmers in Kansonkomona Village in Chongwe.

Figure 5: Seed storage system or seed bank for farmers in Kansonkomona Village in Chongwe

The policy also emphasises accessibility to bio-fortified seeds to produce nutrient-enhanced varieties (NAP, 2016). Despite the policy recognising the existence of indigenous (local) and hybrid seeds, the issue of seed ownership has recently become contentious in the agricultural sector. The Plant Breeders Rights Act of 2007 does not make provisions for farmers' saved seed varieties, therefore small-scale farmers who are custodians of indigenous seeds are prone to market exploitation and are not protected by SNAP and the law in this regard (Mwila, 2016). However, KATC makes a significant effort; beyond what is in the policy to sensitive, educate and practically involve local small-scale farmers in promoting crop diversification and local seed preservation for the enhancement of food and nutrition security for farmers and for future generations (figure 5).

3.1.4 Climate Change

The National Agricultural Policy (2016, pp vi) described climate change as 'significant changes in weather patterns or change in the distribution of weather parameters around the average condition over specified time'. The SNAP aims at promoting sustainable production methods that are resilient to climate change and raising awareness of adaptation and mitigation measures that should be incorporated into government programmes. The SNAP also makes provision for integrating environment and climate change in the agricultural sector by strengthening production methods that are resilient, and adaptative to climate change, and conducting climate risk assessments. On the ground, KATC and its farmers promote sustainable organic agricultural systems which enhance productivity and are not harmful to the environment.

These agricultural methods promote the use of compost, green manure, bio-fertilisers and natural pesticides and forbid the use of chemical fertilisers and pesticides (Becker et al., 1995). Other practices include soil and water conservation management methods such as the use of planting basins, minimum tillage (Pang et al., 2020), mulching, zero burning in agricultural fields, use of indigenous plant/crop species, and growing early maturing plant varieties (Barreiro and Díaz-Ravina, 2021). A group researchers' recent study on the impact of SAPs on production among small-scale farmers in Cameron revealed that long crop rotational schemes are beneficial to agricultural production (Fon et al., 2020).

As highlighted earlier in this discussion, crop diversification, especially the use of indigenous seeds locally known as orphan seeds or *Gankata* and disease-resistant crop varieties, is encouraged by KATC (see figure 4). These methods are used as part of climate adaptation responses in agricultural crop production. KATC and its farming community conduct their own weather pattern observations and monitoring and obtain data on annual weather predictions from a local meteorological centre, which helps them in making informed decisions on what crops to grow in a particular season. This is like the situation with ECOWAP where aspects of natural disaster management and food crisis prevention are emphasised through the development of strategies for early warning and crisis management systems and mitigation (ECOWAS Commission, 2020).

However, this differs from the situation in Kenya where there are inadequate early warning systems and increased agricultural practices that conflict with environmental sustainability practices within the food and agricultural policy framework (Alila and Atieno, 2006). Farming practices that are destructive to the environment are said to be contributors to environmental degradation and food insecurities in the country (Alila and Atieno, 2006). The coverage of sustainable agricultural practices in the NAP is limited. Some of the practices it suggests are not well-aligned with sustainability practices, especially on chemical fertiliser and pesticide use and the promotion of hybrids. KATC has more SAPs than those covered by the policy. This could have been influenced by factors such as the institutional objectives and principles on which the institution was founded, and other local and international policy imperatives. The next section discusses some of the factors that could have influenced the alignment of KATC's work with SAPs.

3.2 Other Factors Influencing KATC Work

Other than the SNAP, several other factors influence the work of KATC. The institution was established by a religious organisation (Society for Jesuits) based on the view that it was God's instruction to humans to be 'caretakers' of the environment, not destroyers. This underlying principle influenced its adoption of sustainable organic and environmentally friendly practices. At the social-economic level, health concerns explain why KATC took responsibility to produce and provide healthy food to society. Through its marketing and sales department, the institution promotes crop diversification to enhance income security within the institution as well as among the households of KATC-linked small-scale farmers. At a policy level, national policies such as the Zambian 7th National Development Plan recognises organic sustainable agriculture as a niche that could increase the country's income through organic crop exports (MNDP, 2017).

KATC is one of the main advocates against the use of GMOs by farmers in the country and works in collaboration with the University of Zambia to find ways of empowering rural people where issues of land ownership are concerned. A group researcher in their study on the adoption of sustainable agricultural practices, food securities and land tenure noted that land tenure insecurities could hinder the adoption of sustainable agricultural practices for small-scale farmers who are mainly on customary land (Nkomaki et al., 2016). Some of the policies that influence KATC's work include the Child protection policy (safeguarding the rights of children against abuse, during the implementation of its programmes); the Gender policy (women's representation in promoting sustainable agriculture); the National policy on climate change of 2016 and the National Adaptation Plan of Action (NAPA).

International policies or regional agreements which KATC's practices align with, and which may have influenced its work include the Sustainable Development Goals (SDGs), the United Nations Framework Convention on Climate Change (UNFCCC), the IPCC guideline on Agriculture, Forestry and Other Land Use which has a focus on the restoration of organic soils, the Comprehensive Africa Agriculture Development Programme (CAADP) for the Framework for African Food Security (FAFS), and the Alliance for a Green Revolution in Africa (AGRA) (IPCC, 2014; Lokosang et al., 2016). KATC's sustainable agricultural practices also relate to imperatives in the Agenda 2063 on modern Agriculture for increased productivity and production, environmentally sustainable and climate resilient economies and communities, the AU Agriculture and Food Security on initiatives such as Africa Seed and Biotechnology Programme (AFSB) and the Ecological Organic Agriculture Initiative (EOAI) and the African regional nutritional strategy 2016 – 2025's agenda.

4. CONCLUSION

The study's main objective was to review the National Agricultural Policy for Zambia and establish alignment with sustainable agricultural practices, using case study insights from KATC. The study showed that KATC and its associated farmers implemented sustainable practices, such as the production of organic manures and fertilisers from locally based materials, which are used for soil fertility management. Soil, and water

conservation practices included minimum tillage, mulching, and conservation basins. Farmer-saved seeds are used in crop diversification for crop production. The study also showed that these sustainability practices are aligned with the SNAP policy objectives of crop production, food security, sustainable use and management of natural resources and climate change adaptation and mitigation.

However, the policy recommendations on promoting the use of inorganic chemicals for crop and animal production, and the use of hybrid seed varieties and species do not align with the values of sustainable organic agriculture. This study, therefore, recommends policy reforms to recognise local and indigenous seeds produced and preserved by small farmers to help attain the full potential for food and agricultural diversification; sensitisation of the public and policymakers on the importance of sustainable organic agricultural practices development in the country; further research into sector-specific responses to challenges relating to climate change and linking such studies with sustainable agricultural productivity; the formulation of legislation to address sustainable organic agricultural practices, and the integration of such into the national agricultural policy.

Conflict of Interest

The authors declare that there are no known conflicting interests that could influence the outcome of this study.

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