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About the Journal

Studies in Cooperatives is a specialist open-access journal focused on publishing peer-reviewed articles on cooperatives and the solidarity economy. The journal is dedicated to publishing high-impact review papers and primary studies.

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Editorial

In a rapidly changing world characterised by multiple challenges, harnessing the values of cooperatives to build resilient livelihoods continues to be an attractive option for millions of people around the world. In building a resilient socio-economic system, cooperatives must continuously adapt to new opportunities while responding to this novel challenges. This edition of *Studies in Cooperatives* brings together five manuscripts that address important related issues. In the first contribution to the volume, Popoola used data from 93 poultry cooperatives in Southwestern Nigeria to demonstrate the impacts of members' corporate and cooperative identity on the attainment of cooperative goals. In the second contribution, Ngowi unpacked the implications of the Fourth Industrial Revolution for agricultural marketing cooperative societies. The study, based on a purposively selected sample of 201 respondents from Moshi Cooperative University found that cooperatives that adopt digital technologies "adopt DTP have a beneficial impact on their members' businesses and wellbeing, resulting in higher incomes, better governance (decision-making involvement), better service accessibility, and strengthened agricultural value chains". The study therefore recommended policies that encourage agricultural marketing cooperatives to adopt digital technologies. Malan and van der Walt's study explored the design of digital platforms for sustainability and entrepreneurship through engagement with the local food system. Their study used ethnographic approach and mapped out "face-to-face organising can be blended with digital networking, and digital affordances can be constructed to build indigenous and local knowledge, create transparent profiles and reputations, and enable groups in society to produce sustainability by groups formation and management".

In the fourth contribution to the volume, Thaba examined how blockchain technologies can strengthen the cooperative values. The study makes an important contribution to the roles of blockchain technology in strengthening cooperatives. In the final contribution to the volume, Mbokazi and Maharaj interrogates the potential role of agricultural cooperatives on township's local economic development using the Waterloo township as a case study. Their study found that although cooperatives are positioned to contribute to rural economic development and have received substantial support from the government, they continue to perform below expectations. Understanding how to address the challenges that cooperatives face and to maximise their contributions to rural economic development is therefore a critical consideration.

Cooperatives are resilient institutions focused on community and shared prosperity. Their legacy resonates through history and continues to inspire the values of collective empowerment. Contributions to this volume highlight their valuable roles and the importance of embracing and integrating technology, innovative financing mechanisms, and cross-sector collaborations to enhance the impacts of cooperatives.

Okem Andrew Emmanuel.

How Members' Corporate Responsibility and Co-operative Identity Affect their Achievement of Cooperatives Goals: A Case Study of Poultry Farm Holders in South-West Nigeria

David Popoola¹

¹Affiliation: Department of Agricultural economics and farm management, Federal University of Technology, Minna, Nigeria.

Correspondence: popooladavidp@gmail.com, +2347034355030.

Abstract

Individual's commitments towards societal principles/ identities might, and or, might not reflect as an individualistic benefit/ reward functions of such society among members, especially in socioeconomic settings. This study hence sets, to investigate the magnitudes of causality on cooperators' participation (CP), production characteristics, multidimensional wellbeing alongside their determinants, using data obtained from 93 Cooperator poultry farming households collected via multistage sampling. Probit regression, Multiple regressions, and the Alkire-Foster Multidimensional poverty indices were used in data analyses. Descriptive analyses result showed that poultry farmers with; training access, regular meeting attendance, and longer membership duration operates larger farms with relatively higher output while, monthly meeting significantly increased farm output at $P \leq 0.1$, but cooperative membership duration negatively correlates with poverty. Probit analyses result showed that total per capita expenditure, and gender of household head positively influences frequency of meeting attendance regularity (MAR) significantly at; $P \leq 0.1$, and $P \leq 0.1$ probabilistic levels respectively, while it is negative for years of formal education, and significant at $P \leq 0.01$. For cooperative membership duration (CMD); years of formal education, and meeting regularity status negatively determined CMD significantly at; $P \leq 0.01$, and $P \leq 0.05$ respectively, but multidimensional welfare, years of farming experience, and total per capita expenditure positively influences CMD significantly at; $P \leq 0.01$, $P \leq 0.01$, and $P \leq 0.01$ respectively. Finding based policies were further proffered.

Keywords: Cooperative Participation, Cooperative Membership Duration, Alkire-Foster multidimensional Poverty Indices, Econometric analyses, Production characteristics.

1 Introduction

Association membership usually involves nomenclatural, or statutory identification of individuals with a group, or association, while participation is another concept that has to do with membership status beyond mere statutory, or nomenclatural association with the society. Participation involves deliberate, and conscious commitment of

member's resources to well support and getting involved, hereby promoting the interest of the organization, and or, the interest of the participants. Achieving this usually involves adherence, and commitment to the guiding or established principles of the society.

As opposed to contractual servicing, cooperators usually pool up resources to meet needs that they could not be idiosyncratically addressed. According to Mghenyi *et al.*, 2022, small scale farmers who solely raise their poultry birds for their meat and eggs outputs, but individually rears below 1000 birds are widespread in Nigeria. According to Ijere (1992), people cooperate since they cannot attain their goals alone, hereby inducing the cooperative spirits. This is to achieve their joint aims through a self-enlightened interest rationale to cooperate, which invariably facilitates the consolidation of cooperatives identity among the cooperators, thereby easing up the possibilities of achieving the cooperatives goals and objectives among members.

The International Cooperative Alliance (ICA, 2015) defined cooperative as "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned and democratically-controlled enterprise". Success of cooperatives, which is a measure of her members' performance in areas of specific or general interests, may or may not significantly depend on magnitudes of members' participation. This view is further consolidated in the findings of Österberg, and Nilsson (2009).

However, beyond some level of attendant social-economic activity-based association of persons, Cooperative identity can be consolidated through effective participation among the Cooperators for them to be adequately achieved. On the contrary, the problem of cooperative identity may arise when they experience ownership, or management control crises, thereby providing loopholes for negative externalities. For example, Mwelukilwa (2001) obtained that, "heavy externalities, has systematically eroded, and diminished the poverty reduction potential of cooperatives" hence, promotion of genuine-committed membership participation and membership control in cooperatives becomes necessary. This is nonnegotiable required especially in developing countries like Nigeria where poverty is a major menace in the development transitional cycle phase that the country is.

Recently across 107 developing countries where Nigeria is inclusive, a minimum of 1.3 billion individuals (22%) lives below the poverty line (UNDP; OPHI; 2020). Also, Harkelius *et al.* (1996) states that, "Members participation in cooperatives has always been an important issue, because members' active participation in, and loyalty to a cooperative business is crucial for the success of the cooperatives", which builds on cooperative identity.

Cooperative identity involves the values of democracy, equality, self-responsibility, equity, self-help, solidarity, and the tradition of their founders, cooperatives also believes in the ethical values of honesty, social responsibility, openness, and care for others (ICA, 1995), and their achievement may be influenced through adherence to the cooperatives principles such as members' participation in; economic, education, and training activities, alongside information dissemination, in addition to voluntary and open membership amongst others, wherein participation is demonstrated through regular meeting attendance, sustained membership, resource commitment, etc., while these processes are hypothesized in this study to impact cooperative identity.

It is worth noting that there are limited studies that investigated the cooperative participation impact, while many of the existing studies that investigated the impact, or effectiveness of cooperative membership have not gone beyond comparative approach (Membership versus Non membership) to further exploring some within cooperative variable impact measurements, wherein this study explores the effect of some key cooperatives participation variables such as duration of membership, frequency of meeting attendance, training, etc., on cooperative goals achievement. This will help detect and establish the existing interplays between these important cooperative membership variables; their impact on production; and multidimensional welfare (cooperative goals), alongside their determinant factors.

Regarding a few related existing works, Taiwo, and Okafor, (2011) worked on "Effect of membership participation on cooperative performance: a study of selected multipurpose cooperatives", using a sample size of 112 respondents. Data were analyzed with both inferential and descriptive statistics due to the nature of data that limited usage of econometric analytical functions. They found that the relationship between members' participation and cooperative performance is significant however, the study focuses more on cooperative membership participation while cooperatives performance was hinged on members' perception without a cooperative performance tangible/quantitative measure, also not related to any cooperatives identity measure, or cooperative value such as; wellbeing promotion, output level, etc., were not captured, which this study sets to address including econometric analyses.

Also in China, Qiao Liang *et al.* (2015) worked on "Members Participation, Social Capital, and Cooperative Performance, using a sample of 147 farmers' cooperatives in China". The results showed a positive relationship between some dimensions of members' participation in training, social capital, and general meetings. However, their research focused more on members external affiliations tagged "social capital" without linking such to be induced by cooperative membership participation or otherwise, while cooperative identity and cooperative values are not much emphasized, which this study seeks to improves upon.

In addition, Shi Zheng *et al.* (2011) in their research titled “Farmers’ behaviors and performance in cooperatives in Jilin Province of China”: A case study using a large sample dataset from Jilin Province to examine the mechanism of decision-making among farmers in becoming cooperators and analyzes farmers’ awareness of cooperatives, willingness to participate, their behaviors and cooperatives performance. Their empirical finding showed that farmers’ education, agricultural products variety, low prices of agricultural products, agricultural production costs, risks, etc., are the most influential factors in deciding behaviors. Their research did not do much telling us how much cooperative participation influences these performances, while focusing on crop production decision makings without a linkage to cooperative participation, due to data-imposed limitation, which this study furthers upon.

In Malaysia, Ching Choo Huang *et al.* (2015) researched on “Influence of Cooperative Members’ Participation and Gender on Performance”, using the annual reports data from 2008 - 2012 from 34 cooperative societies in Malaysia. They found male dominance in the board of cooperatives in Malaysia, and that there is insignificant relationship between the gender composition of the cooperative board and their cooperative performance, while mean of members’ participation (regularity of directors at meetings) was high and did not significant associate with cooperative performance. The analytical scope in their study was focused on members’ participation and gender performance, without necessarily reckoning with cooperative identity wherein this study integrates cooperative participation variables and its effect on cooperative identity alongside their determinants.

Furthermore, numerous research on multidimensional welfare historically depended on the single dimension; expenditure approach, i.e. the unidimensional approach, and uncommon to find studies that adopted the multidimensional poverty measure approach in measuring participation. This is a limitation (Alkire and Foster 2011). According to Sen (1985), poverty is, in relation to lack of basic capabilities or basic needs. These thus translates poverty to be multidimensional and should hence be measured by aggregating key wellbeing indicators.

The correlates of some cooperative identity linked variables (e.g. production output level, welfare statuses etc.) i.e., the level of achievement of some dimensions of cooperative identity goals as influenced by cooperatives participation is yet relatively obscurely established via empirical findings. In addition, the determinants of cooperative membership duration as well as the determinants of membership participation as varied from determinants of membership is highly worth investigating.

This study thereby sets to investigate how production characteristics, and multidimensional welfare correlates with cooperators’ participation with specific

objectives of; describing the existing nature of cooperator participation behaviors among cooperators, and how cooperative participation behaviours of cooperators influences their production, and multidimensional poverty level. Also, the determinants of cooperators' participation, and determinants of cooperative society membership duration among the respondents were analyzed.

1.2 The Collective Action Theory (Actionist theory)

Collective action theory was propounded by Marshall in (1998) and revised in 2014 (Marshall 2014). The theory established that individuals who are members of some institutional/organisational arrangements that shared established norms/principles are well capable of sustaining cooperation (participation) that advances the achievement of common interest of their groups. This theory well acknowledged the Touraine's self production of society radical theoretical framework in 1973, where sociology of society (Ss) as adapted for this study is a function of a sociology of actors (Sa), and their relationships can be expressed as follows i.e.,

$$Ss = f (Sa) \dots\dots\dots (1)$$

Hence for an individual or set;

$$E(S_{ai}) = E(S_{Si}) \dots\dots\dots (3)$$

Here, the Sociology of actors (Sa) is a function of their societal participation (Sp) within the society

$$Sa = f (Sp), \dots\dots\dots (4)$$

such that actors are not simply the components of social systems, but the agents of those systems or groups hence, providing the ability of a society to organize and govern themselves based on established principles, and establish its quality of history in its activities.

The collective action is that action taken by a group (either indirectly or directly) in the pursuit of members/organizational established interests. This theory can be further adapted to a situation where the actions of individuals (S_{ai}) in a society in form of identities, commitment, or participation (S_{pi}) in the organizational activities (e.g., via regular meeting attendance, physical presence in organized trainings, etc.) organized as their goal achievement process imposes a direct outcome (S_{si}) on individuals in the

organisation individually or collectively. Such goals could be for instance, increased market access, poverty reduction, or farm output increment as applied to this study.

1.3 Hypothesis

Ho₁ = Cooperators participation behaviours does not significantly influence production level

Ho₂ = Cooperators participation behaviours does not significantly influence multidimensional poverty level

Ho₃ = There are no significant determinants of cooperative participation among cooperators

Ho₄ = There are no significant determinants of cooperative membership duration among cooperators.

2 Materials and Methods

2.1 Study area/ Data Source

This study utilised a multistage sampling technique to collect empirical data from poultry farm holders in Southwest Nigeria (Oyo State). The State comprises 33 Local Government Areas- LGAs with about 7.8 million persons (NBS, 2017). Oyo State was purposively selected from the existing six States in the South West zone for the first stage, due to existence of large poultry farm holders therein (Oyo State Government, 2023), followed by a stratification into a non-heterogeneous and non-overlapping categories of; dense poultry production area and less dense poultry production area strata based on the concentration of poultry production activities, from which two agricultural zones (i.e., Oyo and Ibadan/Ibarapa respectively) are randomly selected per strata from existing the four Agricultural Zones within this State (Ogbomoso, Ibadan/Ibarapa, Saki and Oyo). Third sampling stage was a random selection of three Local Government Areas (LGAs) per Ibadan/Ibarapa Zone (Ibadan North, Ibadan South, and Ido), and Oyo agricultural zones (Oyo Central, Oyo west, and Afijio) which is followed by random selection of 10 farm settlements/communities; one community/farm settlement within the Ibadan North, Ibadan South LGAs and two from Ido LGA (owing to relatively larger poultry production activities taking place in Ido), while one community/Farm settlement was selected per Oyo central, Oyo west, and four communities/farm settlements from Afijio LGA (owing to relatively larger poultry production activities taking place in Afijio), from which 93 response units were validated.

2.2 Analytical technique

2.2.1 Production characteristics

Production scale, and farm output profile are used to describe production characteristics. Farm production scale grouping follows that of Omotosho and Oladele (1988), Subhash *et al.* (1999), and Ojo (2003), where farms having ≤ 1000 birds were

considered as small scales, those with >1000-5000 birds are classified as medium scales, while those having >5000 and above birds are regarded as large-scale poultry farms.

2.2.2 Cooperative participation

As accommodated by the available data, Cooperative participation was a measure of Cooperative membership duration (CMD) in years, frequency of meeting attendance regularity (FMA), and individual's access/participation in trainings (exogenous).

2.2.3 Multidimensional Poverty Index (MPI)

The multidimensional poverty indices (MPI) developed by Alkire and Foster (2007), and Alkire et al. (2011), and Alkire, Roche, and Vaz (2017), was used to quantify the multidimensional poverty indices of the poultry farmers. This methodology included two steps: an identification stage (k) to identify 'who is poor' by considering the set range of deprivations suffered, and an aggregation stage which generates the actual poverty measures (M).

Table 1: Dimensions, indicators, and weights

Dimensions	Indicators	Measurements	Related to	Weights
Education	Schooling (years)	Deprived when no household member has completed at least 9 years of formal education	SDG 4	1/6
	Child enrolment	Deprived if any school-aged child is out of school in years 1 to 6	SDG 4	1/6
Living Standard	Electricity	Deprived when household lacks power supply	SDG 7	1/18
	Drinking water	Deprived when household lacks access to clean drinking water or clean water is more than 30 minutes' walk from home	SDG 6	1/18
	Sanitation	Deprived when lacks an improved toilet or if their toilet is shared	SDG 6	1/18
	Housing	Deprived if hut/house/ has a dirt, sand or dung floor or is built with sub-standard material	SDG11	1/18
	Cooking fuel	Deprived if they cook with wood, dung, or charcoal	SDG 7	1/18
	Assets	Deprived when household lacks more than one of: radio, TV, bike, telephone,	SDG12	1/18

		or motorbike, and do not own a car or tractor		
Health	Health care quality	Deprived when household lacks access to a quality health care	SDG 3	1/6
	Health as a limiting factor	Deprived when health is limiting factor in most regular activities	SDG 3	1/6

Note: SDG1 is eradicate extreme poverty; SDG2 is Zero Hunger; SDG3 is good health and wellbeing; SDG4 is Quality education; SDG6 is clean water and sanitation SDG7 is Affordable and clean energy; SDG11 is sustainable cities and communities; SDG12 is Responsible consumption and production. SDG (2015).

When any household “X” is subjected to a deprivation cut-off “z” and a poverty threshold “k”, a household possessing the indicator of each dimension is assigned the corresponding score/weight. The maximum scoring is 100%; when each dimensions is equally weighted. A cut-off of 33.3%, which is equivalent to one-third of the weighted indicators is utilised to censor the poor from the non-poor and can be obtained as follows;

$$Ho (X; k; Z) \equiv \frac{1}{N} \sum_{n=1}^N I (C_n \geq k) = \frac{q}{N} \dots \dots \dots (5)$$

$$A (X; k; Z) = \frac{\sum_{n=1}^N I (C_n \geq k) C_n}{q} = \frac{\sum_1^q c}{q} \dots \dots \dots (6)$$

$$Mo \equiv \left[\frac{1}{N} \sum_{n=1}^N I (C_n \geq k) \right] \left[\frac{\sum_1^q c}{q} \right] = Ho \times A \dots \dots \dots (7)$$

Where: Ho= Head count ratio, A= Average deprivation intensity, Mo= Adjusted headcount or multidimensional poverty index, q= incident of multidimensionally poor, N= population size, C= deprivation count, “ I ” is an indicator which assumes the value of 1 when the parenthesised expression is true and zero when otherwise.

2.2.4 Determinants of Cooperative participation variables

Out of all the cooperative participatory variables, ranging from access to training, frequency of training, meeting attendance regularity, and duration of cooperatives membership; only frequency of meeting attendance regularity (FMA) variables, and membership duration (CMD), are fitted for a regression specification model. This further owes to the fact that both variables are human controlled, compared to other variables (access to training, and frequency of training) which are largely institutionally controlled, as also provided for by data scope.

Binomial regression analysis

A binomial Probit regression analytical model was used to derive the factors influencing frequency of meeting attendance regularity (FMA) among cooperatives. Given a dualistic response variable Y_i and an explanatory vector variable X_i which is hypothesised to influence Y_i , and presented as follows:

$$\Pr \{ Y_i = 1 | X_i \} = \Phi(\beta_0 + \beta_1 X_{i1} + \dots + \beta_n X_{in}) \dots\dots\dots (8)$$

Where; Y_i = binary choice regularity variable , X_i = explanatory variables.

$$Y_i^* = \beta_0 + \sum_{n=1}^N \beta_n X_{in} + \mu_i \dots\dots\dots (9)$$

Y_i = binary the dependent variable. (1 = regular in meeting attendance or 0 if otherwise).

X_i are set of explanatory variables; X_1 = Total per capita expenditure, X_2 = Gender of household head, X_3 = Primary occupation (dummy; Farming=1; Otherwise=0), X_4 =

Farm size capacity layers, X_5 = Years of formal education, X_6 = Marital status, X_7 = credit access (Dummy; yes=1, no =0).

The dichotomous variable assumption state of Y_i is specified as;

$$Y_i = \begin{cases} 1 & \text{if } Y_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \dots\dots\dots(10)$$

Due to the non-linearity assumption of the probit model, the marginal effect which is the coefficient of interest had to be generated, with the model specified as follows.

$$\frac{dy_i}{dx_i} = \phi(\beta'x_i)\beta_i \dots\dots\dots(11)$$

Where ϕ is the standard normal distributional probability density function.

Multiple regression.

The multiple independent variable regression model was utilised to estimate duration of cooperatives membership (CMD) and the influencing factors. The multiple regression was employed due to the continuous nature of the regress and its capability to estimate the maximum likelihood and depth (marginal effect) in its coefficient, making it superior to the dichotomous Logit and Probit models. The OLS model

specification is as follows;
$$Y_i = \beta_0 + \sum_{i=1}^n \beta_i X_i + \mu_i$$
 (12)

Explicit model specification:

$$= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \mu_i \dots \dots \dots (13)$$

Where, Y_i = dependent variable i.e., Duration of membership (in years), X_i = Set of explanatory variables, μ = Error term and $E \sim N(0, \sigma^2)$, β = Parameter estimates; β_0 =Intercept, β_1 =Slope.

X_1 = Total per capita expenditure (Naira), X_2 = Household size, X_3 = Regularity status (Dummy; regular=1, otherwise=0), X_4 = Average quantity of daily output (In crates), X_5 = Years of farming experience, X_6 = Cooperatives membership status (Dummy);

Member=1, None membership=0).), X_7 = Credit access (Dummy; yes=1, Otherwise=0), X_8 = Level of formal education (years), X_9 = Multidimensional welfare score.

3 Result and discussion.

3.1 Access to training and output production scale.

The result of the analysis on the relationship between training and scale of poultry production is presented in table 2, which shows that farmers with access to training can operate a relatively larger farm size and vice versa. This positive relationship is expected to improve their wellbeing in turn.

Table 2: Access to training and production scale

Production Scale Access to	Small scale	Medium scale	Large scale	Pooled
Yes	13(40.63)	34(60.71)	4(80.00)	51(54.84)
No	19(59.38)	22(39.29)	1(20.00)	42(45.16)
Total	32(100)	56(100)	5(100)	93(100) Diff:2063.71

Source: Field Survey data analysis result. Percentage parentesized.

3.2 Relationship between access to training and daily production output level.

The result of the analysis on the relationship between training and daily output level among layer egg producers is presented in table 3, which shows that poultry farmers with access to training produces a relatively higher output, relative to those without training access.

Table 3: Access to training and daily output level

Daily output Access to training	0-20	21-40	≥41	Pooled
Yes	17(47.22)	16(64.00)	18(56.25)	51(54.84)
No	19(52.78)	9(36.00)	14(43.75)	42(45.16)
Total	36(100)	25(100)	32(100)	93(100) Diff: -43.352

Source: Field Survey data analysis result. Percentage parenthesized.

3.3 Regular meeting attendance and output production scale

The result of the analysis on the relationship between regular meeting attendance and Production Scale among layer egg producers is presented in table 4, which shows a positive relationship between Farm size and regular Cooperative meeting attendance.

Table 4: Regular meeting attendance and output Production Scale

Production Scale Meeting attendance	Small scale	Medium scale	Large scale	Pooled
Irregular	8 (25.00)	14(25.00)	1(20.00)	23(24.73)
Regular	24(75.00)	42(75.00)	4(80.00)	70(75.27)
Total	32(100.00)	56(100.00)	5(100.00)	93(100.00) Diff: -1371.2

Source: Field Survey data analysis result. Percentage parenthesized.

3.4 Relationship between regular meeting attendance and average daily farm output

Result of the analyses on the relationship between regular meeting attendance and Production Scale among layer egg producers is presented in table 5. It shows a positive

relationship between regular Cooperative meeting attendance, and daily poultry farm output level.

Table 5: Regular meeting attendance and daily output level

Daily output (crates) Regularity of	0-20	21-40	≥41	Pooled
Irregular	10(27.78)	5(20.00)	8(25.00)	23(24.73)
Regular	26(72.22)	20(80.00)	24(75.00)	70(75.27)
Total	36(100)	25(100)	32(100)	93(100)

Source: Field Survey data analysis result. Percentage parenthesized.

3.5 Relationship between cooperative membership duration and daily output level

The result of the analysis of the relationship between Cooperatives membership duration and daily output level among layer egg producers is presented in table 6. The result shows a positive relationship between Cooperatives membership duration and average daily output level of egg in the study area.

Table 6: Cooperatives membership duration and daily output level

Daily output Membership duration	0-20	21-40	≥41	Pooled
1-3	12(33.33)	11(44.00)	8(25.00)	31(33.33)
4-6	12(33.33)	6(24.00)	6(18.75)	24(25.81)
≥7	12(33.33)	8(32.00)	18(56.25)	38(40.86)
Total	36(100.00)	25(100.00)	32(100.00)	93(100.00)

Source: Field Survey data analysis result. Percentage parenthesized.

3.6 Cooperatives membership duration and farm size

Analytical estimate result on the relationship between Cooperatives membership duration and farm size among layer egg producers in table 7 below shows a positive relationship between length of Cooperatives membership duration and farm size among the poultry farmers in the study area.

Table 7: Cooperative membership duration and farm size

Farm Size Membership duration (years)	Small scale	Medium scale	Large scale	Pooled
1-3	15(46.88)	15 (26.79)	1(20.00)	31(33.33)
4-6	10(31.25)	13(23.21)	1(20.00)	24 (25.81)
≥7	7(21.88)	28(50.00)	3(60.00)	40(40.86)
Total	32(100.00)	56(100.00)	5(100.00)	93 (40.86)

Source: Field Survey data analysis result. Percentage parenthesized

3.7 Significance of relationship between meeting frequency and daily output level

The result of the analysis on the relationship between meeting frequency and daily output level among layer egg producers is presented in table 8. The result shows that monthly meeting has a positively significant relationship with production output level and significant at 10% probabilistic level hence, we reject the null hypothesis. This is likely because those who meets monthly makes time to well organize, plan, and adequately prepare for their meetings hereby benefiting more, than when otherwise.

Table 8: Frequency of meeting and daily output level

Daily output category (Crates) Frequency of training	0-20	21-40	≥41	Pooled
Weekly	22 (61.11)	2 (8.00)	9 (28.13)	33(35.48)
Monthly	14(38.89)	23(92.00)	23(71.88)	60(64.52)
Total	36 (100)	25(100)	32(100)	93 (100) Diff: 64.77 P=0.1414*

Source: Field Survey data analysis result. Percentage parenthesized.

3.8 Meeting frequency and production scale

The result of the analysis on the relationship between meeting frequency and production scale among layer egg producers is presented in table 9. The result showed that those who hold meetings monthly operates relatively larger farm scales.

Table 9: Frequency of meeting and production scale

Production Scale Frequency of training	Small Scale	Medium scale	Large scale	Pooled
Weekly	15 (46.88)	17 (30.36)	1 (20.00)	33 (35.48)
Monthly	17 (53.13)	39 (69.64)	4 (80.00)	60 (64.52)
Total	32(100)	56(100)	5(100)	93(100) Diff:-2043.6

Source: Field Survey data analysis result. Percentage parenthesized.

3.9 Cooperative Membership duration and multidimensional poverty

The outcome of the analyses on the relationship between cooperative membership duration and multidimensional poverty among layer egg producers is presented in table 10. The result shows that there exists a negative relationship between duration of membership (in years) and poverty among the layer egg producers in the study area. This shows the effectiveness of cooperatives in multidimensional welfare promotion among its members with time.

Table 10: Duration of cooperative membership profile

Poverty indices Duration (Years)	AIOD (A₀)	(H₀)	MPI (M₀)	Poor	Nonpoor	Pooled
1-6	0.376984	0.342	0.1289	14 (87.50)	41 (53.25)	55 (59.14)
7-12	0.444444	0.111	0.0493	2 (12.50)	18 (23.38)	20 (21.51)
≥13	0.00	0.00	0.000	0 (0.00)	18 (23.38)	18 (19.35)
Pooled	0.416667	0.172	0.0717	16	77	93(100.00)

Source: Field survey data analysis result.

3.10 Determinants of meeting attendance regularity (MAR) and cooperative membership duration (CMD)

Tables 2-10 provides a descriptive analysis on the relationships between MAR variables and CMD variables with production output and multidimensional poverty level while tables 11-12 provides a more concise econometric analyses.

3.10.1 Determinant factors of meeting attendance regularity (MAR)

The result of the Probit regression analysis conducted to determine the factors influencing meeting attendance regularity provides a statistically valid result. It showed that; per capita expenditure positively influences meeting attendance regularity, and this may be because members' commitment to society's activities is one

of the factors considered when allocating benefits hence, members frequently present in meetings are predisposed to more opportunities which in turn positively improves their income, in addition to their return on investment/capital contributions hence, increased per capita expenditure. This also attunes with the Keynesian theory of income and expenditure, with a coefficient of 2.83e-06 and significant at 10% probabilistic level hence, we reject the null hypothesis.

Besides, gender of household head positively influences participation regularity. This may be because houses with male household heads are likely to be more predisposed to meeting attendance due to their lesser engagement with domestic related activities, and decision makings. This was found to be significant at 10% probabilistic levels. Furthermore, years of formal education was found to negatively influence regularity of meeting attendance. This is likely because members with high formal education are likely to be saddled with some other engagements, duties, or responsibilities that deprives them from regular meeting attendance. This was found to be significant at 1% probabilistic level.

Table 11: Determinants of meeting attendance regularity (MAR)

Variables	dy.dx ¹	Standard Error	P-Value
Per capita expenditure	2.83e-06 *	6.46e-06	0.102
Access to credit	0.1171803	0.4121315	0.288
Gender	0.2316342*	0.4847762	0.074
Primary occupation	-0.3424957	0.3717516	0.357
Years of formal education	-0.0495865***	0.0688987	0.007
Farm size	0.0000176	0.0000983	0.503
Marital status	0.1420461	0.395081	0.179
_cons	2.41832**	1.189321	0.042
	LR chi ² (7) = 15.49		
	Prob > chi ² = 0.0302		
	Pseudo R ² = 0.1489		

Source: Field Survey data analysis result. *** P≤0.01, **P≤0.05, *P≤0.10.

3.11 Log-likelihood analysis on determinants of cooperative membership duration (CMD)

The analysis provided a good fit as the Variance Inflation factor, Coefficient of determination, and adjusted R² diagnostic estimates are highly validated.

The result showed that years of formal education negatively influenced cooperative membership duration significantly at 1% probabilistic level hence, we reject the null hypothesis. This likely owes to the fact that educated farmers benefits relatively lesser than their uneducated, or less educated counterparts. This suggests the need to provide for improved cooperatives education/training capacity to well meet the needs of all members, irrespective of their exposures, or latent knowledge scope. Besides, multidimensional welfare significantly at 1% significant probabilistic level. This is likely due to the satisfactory cooperative identity benefits obtained from cooperatives by cooperators relative to when it is otherwise.

Also, meeting attendance regularity status negatively affects cooperatives membership duration at significantly 5% probabilistic level. This is likely due to the law of diminishing marginal utility of cooperators' response function hence, raising the need to make cooperative activities more dynamic, and less monotonous.

Furthermore, years of farming production experience positively influences cooperatives membership significantly at 1% probabilistic level. This possibly is due to the existence that farmers with increased length of farming experience may tend to maintain their cooperative membership to sustain or expand their farm business. Besides, total per capita expenditure was found to positively influence duration of cooperative membership significantly at 1% probabilistic level. This may be due to the possibility that cooperatives help provide financial supports required to finance investment expenditures which they can enjoy *pari passu* with time.

Table 12: Determinants of cooperative membership duration (CMD)

Variables	VIF	Coefficients	Standard Error	P-Value
Formal education (Years)	1.53	-0.6736438***	0.1585833	0.000
Multidimensional welfare	1.52	18.22243***	4.168241	0.000
Household size	1.85	0.1613505	0.3084344	0.602
Farming experience	1.31	0.3952022 ***	0.0575442	0.000
Meeting regularity status	1.07	-2.42219**	1.189176	0.045
Access to credit	1.24	0.7967378	1.300217	0.542
Output	1.14	0.0014174	0.0026261	0.591
Per capita expenditure	1.69	0.0000307***	0.0000116	0.010

Constant		9.829828**	4.156232	0.018
		Mean VIF = 1.42 Prob > F = 0.0000 R² = 0.5561 Adj R² = 0.5138 Root MSE = 4.7818		

Source: Field Survey data analysis result. *** P≤0.01, **P≤0.05,*P≤0.10.

4 Conclusion and recommendations

Cooperatives are jointly owned enterprises established to serve its members and jointly meet, or improve their social, cultural, and economic needs. The joint effort portrays Corporate Responsibility (CR) which also promotes the achievement of Co-operative identity through members' effective and regular participation. The study result showed that poultry farmers with access to training can operate a relatively larger farm size and with larger farm output relative to their counterparts deprived of training access. Also, regarding regularity of meeting attendance among members, those regular in meetings are found to operate relatively larger farms and have larger outputs. Considering the effect of Cooperatives membership duration on output level, there exists a positive relationship between length of Cooperatives membership duration, farm size, and output level.

On the effect of meeting frequency on output level, monthly meeting as opposed to weekly meeting have a positively significant effect in promoting increased farm holding, and production output level. Those who meet monthly apparently operates relatively larger farm size. Analytical results on membership duration, and multidimensional poverty showed that, there is negative relationship between duration of membership (in years) and multidimensional poverty indices. Considering MAR; members' commitment to regular meeting attendance reflects one of the cooperative identities, which is "self-responsibility".

This "self-help" or "self-responsibility" which cooperatives upholds is expected to facilitate significant achievement of social, economic, and other goals and aspirations among members proportionately and vice versa. However, variant factors influence this wherein some members are more regular than others in scheduled meetings with its outcome consequences. We discovered in this study that Cooperative participation promotes or help to consolidate cooperative identity. Total per capita expenditure, alongside gender of household head significantly influences MAR positively but was however negatively influenced by years of formal education.

Finally, on CMD is a dimension of the cooperative identity of "solidarity" which determines how long cooperators decides to uphold their membership participation,

based on reconciliation between their short term and long-term expectations. From this research it was found that years of formal education and regularity status negatively affects cooperative membership duration, while years of farming, alongside total per capita expenditure were found to positively influence duration of cooperative membership, and also significantly influenced by multidimensional welfare hereby indicating the positive relationship of MAR and CMD with the achievement of the UN's Sustainable Development Goals (SDGs) of Zero Poverty, and quality Education (see UNDP; OPHDI, 2020).

Sequel to the empirical findings, the following recommendations are hereby proffered; firstly, education, and training of cooperator as an important cooperative principle was found to positively impact farm output promotion. This is evidence of positive cooperative identity among the cooperators which is particularly cooperatives' self-help value hence, periodic trainings should be embraced, and made accessible to farmers at appreciable time intervals by Governments and, or Cooperatives while providing input supports to training beneficiaries to boost production. Also, training capacities of existing cooperatives should be improved dynamically to sustainably accommodate and well address the divergent needs of potentially increasing membership. This can be improved upon when governments provide training facilities for cooperatives to boost their capacities and allow or establish good Public Private Partnerships (PPPs) with cooperatives while avoiding cooperative ownership/control challenges that may develop in this course. Consistent cooperative membership and regularity in meeting attendance was also found to be significantly essential hence, should be encouraged especially among the middle-upper class, and experienced farmers who have tendencies of low cooperative turnout as found in this study because cooperative membership promotes multidimensional welfare statuses which no one can seem to have too much of.

Also, beneficiaries of government Agricultural/entrepreneurial credits schemes of the Central bank of Nigeria (CBN) e.g., Agri-Business Small and Medium Enterprise Investment Scheme (AGSMEIS); the Bank of Agriculture (BOA); Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL); Bank of Industries (BOI) and other credit/grant issuing establishments, should be attached to registered and highly performing cooperatives during and after their trainings with their respective trainers in order to further provide necessary supports and also help in sustaining a better post-training performance and to also help increase and maximise their delivery potentials. Finally, reinforcing incentives should be provided for highly participating cooperators, to encourage improved members' participation, and consolidate increased cooperatives' collaborative goal achievements and foster a sustainable post Covid-19 Era.

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Digital Technology Potentials in the Fourth Industrial Revolution and their Implications in Agricultural Marketing Co-operative Societies

Alex Julius Ngowi

Department of Co-operative Development and Management, Moshi Co-operative University, Tanzania

Correspondence: alexngowi28@gmail.com

Abstract

For enhanced Co-operative development and effect in the Fourth Industrial Revolution (4IR), Agricultural Marketing Co-operative Societies (AMCOS) must adopt Digital Technology Potentials (DTP) as an alternative to traditional practices. Although the benefits of DTP are becoming more widely acknowledged, little was known about its implication on cooperative development and co-operative effect. This study filled that knowledge gap by investigating the cooperative researchers and academics perspectives regarding the adoption of DTP and their implications. The study included 201 respondents from Moshi Co-operative University who were chosen purposively based on their background in ICT and co-operatives, as well as their research experiences. It was perceived that co-operatives that adopt DTP have a beneficial impact on their members' businesses and wellbeing, resulting in higher incomes, better governance (decision-making involvement), better service accessibility, and strengthened agricultural value chains. The technologies that have been highlighted as having substantial potential implications are digital apps, websites, mobile phone services, data storage and analytics, broadcasting, satellite and remote sensing, and social media platforms. It was concluded that adoption to DTP is perceived to significantly contribute to the growth and impact of cooperatives regardless of the size or nature of the AMCOS. It was recommended for the policy statement to encourage AMCOS to embrace DTP to maximise cooperative impact.

Keywords: Fourth Industrial Revolution, digital technologies, cooperative impact

1 Introduction

The advent of digital transformation, which combines digital, biological, and physical systems in a complex way, is the main factor driving the Fourth Industrial Revolution (4IR). The Internet of Things (IoT), artificial intelligence (AI), big data analytics, blockchain, nanotechnologies, sophisticated robotics, sensors, cloud infrastructure, and 3D printing are some of the foundational technologies included in the 4IR framework (Sife, 2021). The foundational technologies are an essential force behind organisational development, especially in the field of Co-operatives, as it has a profound effect on consumer expectations, productivity, collaborative creativity, and organisational structures. This is evidenced by (TCA, 2019) that, based on improved

production techniques, increased profitability, and strengthened resistance against climate change, the digital transformation linked with the 4IR in agriculture could lead to a better quality of life for farmers including those in co-operatives.

Agricultural Marketing Co-operatives (AMCOS) are being forced by the demands of the 4IR to go beyond traditional approaches, like the "business as usual" strategy, and adopt Digital Technology Potentials (DTP) to increase the impact of their cooperatives (Misaki, 2021; Okediran and Ganiyu, 2019; Narmilan, 2017; Shyam, 2015). However, a knowledge-based strategy with an emphasis on use, availability, accessibility, and affordability is required considering the proliferation of DTP, replacing the information-centric paradigm (FAO, 2019). According to McKinsey, (2019) production and profitability are increased when DTP is used, especially by AMCOS, because of helping smallholder farmers and other stakeholders to get agricultural information and knowledge services. On the other hand, Stephenson et al., (2021) indicate that implementation of DTP, such as the integration of digital advising and financial services, can raise smallholder farmers' income by 57% and enhance productivity in the agriculture sector by 168%.

Encouragingly, more and more studies (World Bank, 2017; FAO and ITU, 2017; 2019) are highlighting how knowledge is becoming more and more concentrated in the field of agriculture. Therefore, for stakeholders in the agricultural value chain including AMCOS, it is critical for them to prioritise the adoption of DTP to maximise the effect and development. According to Ngowi and Mlangalanga (2022), AMCOS are motivated to implement DTP with the highest priority because it will increase output, lower costs, improve water efficiency, spread best farming practices, and create agricultural markets. However, little is known about DTP adoption's effects and implications for Co-operative development and effects. The lack of knowledge particularly in Sub-Saharan Africa about farmers' use of DTPs and their effect has been brought to light by Stephenson et al., (2021). It is noted that there is a striking difference in digital service delivery between small-scale (24–37%) and large-scale (74–80%) farms. This study, therefore, examined scholars' perspectives on how DTP adoption can support the growth of AMCOS and their overall impact to close the current knowledge gap.

2 Methodology

This study used a mixed-methods approach, integrating both quantitative and qualitative methodologies, to investigate the role of Digital Technology Potentials (DTP) on cooperative development and impact. The study participants were 201 Moshi Co-operative University (MoCU) third-year students pursuing bachelor's degrees in ICT and cooperatives. Furthermore, the study involved two key informants who were MoCU ICT professionals and Co-operative lecturers. The process of gathering data involved starting WhatsApp group chats with the following topic: "how the adoption

of digital potentials may contribute to Co-operative development and impact." Participants were divided into 26 groups composed of seven or eight members, following the researcher's criterion for productive group discussion.

Closed-ended question was sent to the WhatsApp groups, asking participants to list and discuss the Digital Technology Potentials (DTPs) relevant to Agricultural Marketing Co-ops (AMCOS) and explain how implementing them could advance cooperative growth and have a positive influence. Key Informant Interviews (KIIs) were held with cooperative lecturers and an ICT specialist to obtain more insights into the specific DTPs that AMCOS could implement and their potential implications. The qualitative data were grouped into a theme to enable thorough discussion and support the quantitative findings. Quantitative data were analysed using percentages and frequencies.

3 Results and Discussions

3.1 Perceived Transformative impact of Digital Potential in Co-operative effect and Development

The study findings revealed that, a significant majority of the study participants (83.6%) perceived that the adoption of Digital Technology Potentials (DTP) would be crucial to the advancement of Agricultural Marketing Cooperative Societies (AMCOS) and the promotion of cooperative impact. Their perceptions were based on the expected advantages of improved member livelihoods, more revenue, and strengthened agricultural value chains. Moreover, key informant insights emphasised how crucial it is to embrace digital potentials to support cooperative growth and amplify their benefits. One of the key informants emphasises that, the ability to communicate obtained data to members (farmers), customers, and other stakeholders in the agriculture value chain is a key advantage in co-operatives. More importantly, an important point made by the all-key informants was that the incorporation of DTPs not only helps cooperatives grow, but it also gives members confidence in their ability to use information and communication tools effectively for developing, implementing, and assessing current farming and marketing conditions.

Furthermore, the results of the fourth and sixth focus group discussions highlighted the importance of adopting DTP arguing that it enhances access to important information regarding market prices and production techniques. It was explained that the knowledge shared via digital potentials are crucial to the cooperative movement's growth and the expected cooperative outcomes to members and other stakeholders in the agricultural value chain. The study found adoption of DTPs' highlights their diverse function in improving communication between cooperative members as well as external information support that can have a favourable effect on market participation, members wellbeing and production methods.

The study findings concerning the influence of digital potentials on cooperative development and the co-operative effect are consistent with the claims made by Shyam (2015), whose investigations verify that the integration of Digital Technology Potentials (DTPs) greatly advances agricultural organisations and enhances the welfare of their members and other stakeholders in the value chain. According to Shyam's findings, there are several important ways that DTPs have a positive impact. These include raising profitability and productivity, managing resources effectively, providing access to critical weather information, and easing the formulation of policies and decision-making procedures that maximise agricultural output.

The study findings on implication of DTP adoptions in AMCOS implies that adopting DTPs is specifically important as it provides decision-makers including members as co-operative owners with more timely and pertinent information, facilitating informed decision-making, and enhancing the general development of their enterprises through enhanced cooperation and communication. Also study findings implies that DTPs can help to boost extension services by supporting AMCOS through knowledge management, consulting services, and decision support tools. Furthermore, the study findings implies that by promoting efficient knowledge transfer, effective information distribution, and successful farm management techniques, offers the potential to improve agricultural technologies and farm management practises.

3.2 Anticipated Digital Potentials for Adoptions and their Unique Benefits

The study respondents were requested to rank technological potentials to be adopted by Agricultural Marketing Cooperative Societies for enhanced cooperative effect and development. The study participants also were required to explain the distinct advantages that come with each technological potential to be adopted. The study findings on the anticipated digital potentials for adoptions are indicated in Table 1 as were obtained from the 26 groups, each with seven to eight individuals. The study results revealed that mobile services were ranked number one followed by social media platforms and digital applications. Websites and satellite and remote sensing technologies were ranked as fourth and fifth technologies to be adopted respectively. The least ranked technology was data storage and analytics technology.

Table 1: Anticipated Digital Potentials for Adoptions (N= 26)

Digital Technology Potentials	Number of Responses	Percentage of responses	Rank
Mobile phone services	24	22.0	1
Digital Applications	21	19.3	3
Social Media Platforms	23	21.1	2
Websites	20	18.3	4
Data Storage and analytics technologies	9	8.3	6
Satellite and remote sensing technologies	12	11.0	5
Total Number of responses	109	100	

Source: Field data, (2022)

3.2.1 Mobile Phone Services

The study found that mobile phone digital technology services perceived to have a positive paradigm change in cooperative effects and development. The study results revealed that mobile phone service such as interactive voice answers play main roles in cooperative development and effect. It was also argued that mobile phone services facilitate consultations, knowledge sharing, communication and information sharing among cooperative members, customers, and purchasers. On the other hand, key informant interviews demonstrated how revolutionary mobile phone technology has become, especially when it comes to funding. One of the key informants argued that, proliferation of mobile banking services has changed connections within financial landscapes, in addition to increasing places of engagement. The study results on the unique benefits of mobile phone services are consistent with Sanga, (2018) highlighting the role played by big mobile providers such as Vodacom, Tigo, and Zantel in facilitating smallholder farmers' access to financial information and services from their cooperatives.

3.2.2 Social Media Platform

The study findings revealed that adoption of social media platforms was ranked as the second important digital channel for the development and enhancement of cooperative effect. The study participants demonstrated that stakeholders and cooperative members in the agricultural value chain can effectively obtain relevant information through the AMCOS' social media channels, circumventing obstacles related to time and cost. Notable apps that have been recognised to improve collaborative development are Facebook, Instagram, YouTube, WhatsApp, and (X), the previous Twitter name. It was also revealed that social media platforms allow for smooth communication between members of cooperatives and those involved in the

agricultural value chain. This communicates information about market dynamics, agricultural best practices, online training modules (audio and video), weather forecasts, farming seasons, agricultural input sources, and online procurement. The study findings also demonstrated the advantages of social media as a platform for promoting agricultural goods, asking for guidance on problems like sick plants or animals, and encouraging interaction between specialists and farmers.

In addition, the study findings revealed the need of extension specialists and information and communication technology (ICT) in maintaining and updating collaborative social media accounts. Key informant number two emphasizes that enhancing cooperative development is fostered by this proactive approach, which makes sure that farmers, stakeholders, and members are always informed and up to date on progress. Furthermore, it was stated that social media platforms work well as news sources for disease outbreaks, emergencies, and preventative actions for farmers.

The study findings further revealed that, majority of study participants in the FGD made the claim that small-scale cooperative producers can increase their revenue by using social media to position their products and be visible in the market. Key informant one asserted that cooperative businesses may communicate clear and consistent acts to its members, clients, and the public directly through social media. Additionally, he added that social media plays a multifarious function in cooperatives' member and consumer engagement initiatives as a communication channel, brand-building tool, and essential component.

3.3.3 Digital Applications

The third ranked digital potential to be adopted for enhanced cooperative development and effect was the integration of ICT apps. This represents a shift from standard mobile phones to smartphones that can run a variety of software applications. It was revealed that this progression includes technologies like picture sharing, smartphone apps, group chats, video calls, Short Message Services (SMS), Interactive Voice Responses (IVR), and social media platform connectivity. Based on insights gleaned from the WhatsApp group discussion, smartphone applications can provide users with useful and current information. For example, study participants mentioned that farmers and other cooperative members can take advantage of smartphone capabilities to take pictures of potential pest infestations or crop illnesses. For a comprehensive diagnosis and recommendations, these photos can subsequently be sent to specialists within the relevant cooperatives. The study findings also revealed the usefulness of software in precision farming by showing examples of situations in which farmers can send photos of their plants, crops, and leaves to specialists for examination and recommendations.

3.3.4 Website

The study results revealed that, developing websites has become the cooperative sector's fourth major digital potential that is essential to its growth and to increasing the effectiveness of the cooperative. The study findings emphasised the versatile utility of website pages for cooperatives, including support for marketing initiatives, online sales and auctions, and access to a variety of information for members and other stakeholders. The general view that emerged from the FGD was that the inclusion of online sales and auctions on cooperative websites allows for global participation and acquisition, eliminating the need for traditional in-person point-of-sale events. According to key informant number one, there is inherent value in carrying out these transactions in an open manner. Key informant two emphasises that these practices also fit with the cooperative ideals of member involvement, transparency, and openness. The study results also revealed that online transactions may be easily completed with digital payment methods like Visa cards and other internet-based choices like quick interbank transfers.

In addition, it was found that websites are excellent sources of data that provide stakeholders and cooperative members with access to information necessary for making decisions. Key informant two emphasises that Co-operative websites function as efficient means of sharing vital agricultural knowledge and information, much like other digital platforms. This covers an array of subjects such as farming methods, meteorological forecasts, notifications, and preventive actions. It was generally agreed from the FGD that, by taking proactive efforts to reduce losses or hazards resulting from diseases, pests, or weather fluctuations, members and other stakeholders are empowered to take preventive action through websites.

3.3.5 Data Storage and analytics technologies

The study findings revealed how crucial data analytics and storage technologies are to promoting co-operative growth and impact. It was agreed by study participants that integration of analytics and data storage might have a significant positive impact on cooperative growth, even though it was originally ranked as the least important potential. It was generally agreed by all participants from the FGD that AMCOS might use advanced analytics to create algorithms by using technology to compile data from various farming practices, particularly in the agriculture sector. It was clarified that these algorithms, when are customised to the requirements of smallholder farmers, can enable cooperatives to increase agricultural yields in a sustainable way.

In addition, it was elaborated by key informant two that AMCOS can derive important insights by skilfully utilising analytical and data storage technologies. These comprise accurate estimates of harvest yields, the best fertiliser needs, possible cost reductions, and improved crop optimisation methods for upcoming cultivation cycles. Key informant two added that the gathered information serves as the cooperative's basis,

empowering them to initiate calculated risks and make well-informed choices. On the other hand, the first key informant elaborated that Co-operative smallholder farmers can be better equipped to predict farming operations using the understanding gained from data analytics and storage. Key informant one added that Co-operative members can use technology-driven information to guide their farming endeavours with an increased level of sustainability and efficiency.

3.3.6 Satellite and Remote Sensing Technologies

Technology related to satellites and remote sensing was ranked as the sixth DTP that cooperatives must embrace. The study results from the FGD revealed that remote sensing technology includes a wide range of sensors, instruments, devices, and systems made for various uses. The second key informant stressed the critical role that sensor networks play in providing real-time information, as well as the superior quality and amount of data that are necessary for making well-informed decisions. One important technological instrument mentioned by the second key informant in the sensor technology was yield monitoring sensors, such as GPS sensors that can be easily included into harvesting machines. The second key informant clarified that this approach could provide vital crop data, such as crop weight output in real time.

Additionally, in the scope of sensor networks, the variable rate fertiliser application tool was another interesting gadget mentioned to be useful in enhancing cooperative development and effect in the 4IR. It was made clear by the second key informant that AMCOS could evaluate plant health using this automated fertilisation technology by looking at colours, giving them exact control over how much granular, liquid, and gaseous fertiliser is applied. Additionally, two more sensor digital devices, weed mapping and variable spraying controllers were discovered during the focus group discussions. It was clarified that cooperatives would implement these advances, which will help to increase the overall use of remote sensing technologies in agricultural practices.

3.3.7 Broadcasting

Broadcasting emerged as the fifth most effective potential for supporting cooperative growth and effect. According to the first key informant, radio and television are both effective means of distributing important public information to members and the public. This includes pertinent agricultural statistics, market trends, farm input availability, quality evaluations, usage policies, weather projections, packaging analysis, and pricing dynamics, among other important factors. The second key informant, however, emphasises on the modern environment of online radios and televisions and linked this development to technological breakthroughs. Key informant emphasised that, to provide members and stakeholders throughout the agriculture value chain with relevant agricultural knowledge and information, AMCOS or their unions might set up their own online channels. Given these

explanations, the first key informant advised AMCOS to take the initiative and grab the chance to get airtime on radio and television channels. This would be a calculated step that would increase awareness and promote a shared success culture within the cooperative framework by facilitating the sharing of valuable skills and cooperative success stories.

4 Conclusions and Recommendations

The study's overall conclusion is that DTPs are perceived to significantly contribute to the growth and impact of cooperatives regardless of their size. Mobile phone services are thought to have a revolutionary influence on the growth and impact of cooperation, with interactive voice answers being a key component. One noteworthy contribution is the facilitation of communication, knowledge exchange, and consultations between buyers, customers, and cooperative members. Social media platforms most notably Facebook, Instagram, YouTube, WhatsApp, and Twitter are thought to have become crucial conduits for the growth and impact of cooperative efforts. They make it easier for people to collaborate, communicate, and exchange information throughout the agricultural value chain. Integration of ICT apps has been seen as having the digital potential for cooperative development and effect, particularly on smartphones. Precision farming and the identification of pest infestations are made possible by smartphone applications that facilitate the transmission of information efficiently. Additionally, Websites are useful for a variety of purposes, such as online sales and marketing campaigns. Collaborative websites are important information resources that can help stakeholders make well-informed decisions. Storage technologies and data analytics are crucial for the cooperative growth impact. Sustainable increases in agricultural yields can be made possible by advanced analytics by developing algorithms specifically for smallholder farmers. Effective use of data analytics leads to better crop optimisation, risk assessment, and informed decision-making. The study also concludes that sensor networks, which include yield monitoring devices, can provide real-time data for well-informed decision-making. Improved plant health evaluation and general agricultural practices are facilitated by automation technologies, such as variable rate fertilisation instruments. Lastly, radio and television broadcasting are seen as having the capacity to promote Co-operative growth and effect. Technological advances might make it possible for cooperatives to distribute agricultural knowledge through new channels, such as online radios and televisions.

The study recommends for the policy statement to encourage AMCOS to embrace DTP to maximise Co-operative impact. Specifically; a) To improve communication, knowledge exchange, and consultations, cooperatives should make the most use of mobile phone services; b) Social media platforms are important tools for cooperatives to use and share information, thus they must be regularly updated and used; c) Promote the use of smartphone applications among members of Co-operatives to improve communication and teamwork. Instruction in the use of digital tools for pest

control and precision farming should be given; d) Co-operatives should make investments in easily navigable websites with capabilities for online bidding and sales to encourage participation from across the world e) Assist Co-operatives in integrating modern analytics to enable customised insights and decision-making f) Investigate forming alliances with IT companies to combine remote sensing and satellite technologies for data collection in real time g) To transmit to a larger audience, cooperatives should proactively set up internet channels. Seek chances to obtain airtime on conventional radio and television networks to present success stories and encourage teamwork.

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The design of digital platforms for sustainability and entrepreneurship: Engaging with the local food system

Naudé Malan¹, Juanita van der Walt²

¹Associate Professor in Business Management, University of Johannesburg

²Lecturer in Logistics and Supply chain Management, University of Johannesburg

Correspondence: nmalan@uj.ac.za

Abstract

Digital platforms hold promise to transform food systems to sustainability, as they can effectively mobilise and organise communities and entrepreneurs. To achieve sustainability, cooperative relations amongst actors in the food system need to be created. However, digital systems on the internet, specifically communication applications, may also enrol marginalised actors into unsustainable patterns in the economy. This paper aims to develop a set of design principles for the development of digital applications and face-to-face opportunities for the creation of a solidarity-based local food system with short supply chains. The article draws on ethnographic experience from practitioners in the food system who have prototyped various digital and face-to-face systems to organise emergent food producers and traders. A local food system with short supply chains would realise many of the aims of a solidarity economy, and the paper develops these principles by reference to social justice and considerations of autonomy and personhood of actors in society. Face-to-face organising can be blended with digital networking, and digital affordances can be constructed to build indigenous and local knowledge, create transparent profiles and reputations, and enable groups in society to produce sustainability by groups formation and management. We delineate what these affordances can do, and how they should be designed.

Keywords: multi-stakeholder engagement; public innovation labs; social media; food systems; entrepreneurship.

1 Introduction: Digital food systems

iZindaba Zokudla has been organising the Farmers' Lab since 2015 and the Virtual Farmers' Lab since 2020. This research project in multi-stakeholder engagement hosts these public innovation labs (McGann, Blomkamp & Lewis 2018; McGann, Wells & Blomkamp 2019; Hassan 2014) to build clusters or bundles of actors with and alongside emergent entrepreneurs. The idea of clusters or bundles of innovators (Barret et al. 2020) lies central to the idea of innovation and is here used to identify opportunities for

cooperative relations amongst urban farmers. Bundles or clusters of innovators would benefit from and are constructed by digital social media, and within these systems, we see multiple opportunities for cooperative activities. This article aims to analyse and identify opportunities for digital organising of food systems that draws on such cooperative opportunities.

Malan, van der Walt, Sirenya, Mkhabela, du Toit and Robertson (2022) examined the use of social media by urban farmers and food traders. We found that the costs of data prohibit the widespread adoption of social media systems by these entrepreneurs. This indicates a missed opportunity for enterprise development, as these digital systems can construct a “digital commons” and hold promise for cooperative behaviour amongst entrepreneurs, their partners in business and customers. These systems, inclusive of artificial intelligence (AI), have heralded significant business development opportunities that can exploit and enhance the commons. Elinor Ostrom (1990) points out that it is the supply of new institutional arrangements, often by participants in common property regimes themselves, that lead to the development of sustainable cooperative regimes. Social media, specifically communication applications that transmit and receive messages, hold promise to contribute to such cooperative relations.

Cooperatives in South Africa occupy a privileged place in the political and sociological imagination (Satgar 2019:1; Ndumo 2019). They represent an alternative to the corporation and invoke imaginaries of the commons and self-determination. The state has also actively promoted the formation of cooperatives, which also occurred during the previous apartheid era where agricultural cooperatives led the way to the establishment of South Africa as a major food producer and agricultural exporter. The difference is that cooperatives are now pursued in a township and urban development context, and in an agricultural space that has liberalised (Ledger 2016; Aliber & Cousins 2013). Hence, we have witnessed a proliferation of cooperatives, “four times the number that had registered in the previous 82 years” (Bennie 2019: 216). Unfortunately, we see up to 88% of these cooperatives “failing” (Satgar 2019:6) and one key concern is the self-management of these cooperatives. Many fail due to the inability to understand the contracts they enter, and unable to manage the conflict amongst members that ensues (Bennie 2019:233). Communications systems on social media have great potential to improve these relations, and we elaborate on how these communication “affordances” can be structured to instil greater cooperation amongst food producers and traders and their customers in urban contexts.

This article focuses on social media and communication applications, often distributed, and hosted on mobile phones, and the potential these hold to build cooperative relations amongst urban farmers and food traders. These actors in the food system act amongst bundles or clusters of innovators, and amongst competitors in an open

market. A cooperative, together with its business partners may be seen as such a bundle or cluster of innovators, but we may also see cooperative relationships emerge amongst competitors in specific markets. Currently many have emphasised the opportunity to collectively “infrastructure” (Nogueira 2020; Manzini 2014) relations with others in “public innovation lab” type settings, and social media and communication technologies can further these aims. These attempts at “infrastructuring” society can re-structure infrastructure as this represents the idea of “commons” as it also structures competition amongst actors. Nogueira characterises “infrastructuring” as “a means to democratize the processes of determining how resources should be allocated and mobilized” (2020: 4) and describes an iterative model to “infrastructure” the new processes around circular enterprises (2020: 6). This idea of “infrastructuring” could be completed both on social media and in a public innovation lab setting, and this article explores the benefits this could give to cooperatives engaged in the food system.

To what extent can actors use this emergent and nascent “digital commons” to promote new sustainable food enterprises in urban food systems? Malan et al. (2022) point to the opportunities that can be exploited by using the analytics a social media platform would make possible. Furthermore, the abilities to communicate in a true peer-to-peer way (Engeström 2007) allows any actor in a network to influence the whole network. This decentralised ability itself creates new cooperative opportunities for those enrolled into a network. In this way, new patterns and institutions that govern the trade of food can emerge. These opportunities would be glaring in an urban context where people live in close physical proximity, although these systems can certainly be extended to rural areas. This article uses our experience gained as activist/practitioners to reflect on the opportunities these new digital systems make possible. We have been working with urban farmers and food traders, and this has enabled us to focus our recommendations to emergent entrepreneurs in urban food systems. We are thus able to develop a set of recommendation on how these digital systems and platforms can be used to build sustainable food systems in urban areas, and these can be extended to other sectors of the economy. This article offers limited empirical evidence, which is also anonymised and abstracted to protect the identities of participants in the project. This ethnographic approach obtained institutional approval from the UJ Research Ethics Committee under no REC-01-131-2020.

The iZindaba Zokudla Farmers’ Lab integrates many stakeholders and actors like the university, society and business with emerging food producers and entrepreneurs, and the iZindaba Zokudla website (izindabazokudla.com) and its real-life events (archived on Facebook) and the Virtual Lab ([https://www.facebook.com/IzindabaZokudla/events; https://www.izindabazokudla.com/general-5](https://www.facebook.com/IzindabaZokudla/events;https://www.izindabazokudla.com/general-5)) has generated valuable experience. We intend to develop these systems further, and this article is an attempt to justify this expansion.

iZindaba Zokudla structures its events to create opportunities for self-organised groups to embark on complex projects (Habiyaemye 2023). Public Innovation Labs are used by independent actors for their own ends and interests, and this is encouraged in the open-access event. The event affords an opportunity to nudge or steer these groups in preferable directions. This allows emergent networks and activities to form alongside and inside these labs, in effect scaling up effects from individuals to groups.

iZindaba Zokudla also uses a Mass SMS system, on Uniserver live, that allows short messages to be sent and it can only receive a short reply from recipients. The cost is significant and stands in some contrast to how mass group messages can be freely sent on WhatsApp and Telegram except for data charges. However, the USSD system is much more accessible as recipients receive messages at no cost, underscoring the need for blended and intermediate technology in reaching out to farmers of different socio-economic backgrounds. iZindaba Zokudla also maintains a website (<https://www.izindabazokudla.com>) with built-in analytics as well as a Facebook page (<https://www.facebook.com/IzindabaZokudla>). These benefit the owner of the site, but the question is how can an actor use the multiple (and third-party) platforms that the internet makes available for the development of their own enterprises? This will be decisively influenced by how we conceptualise the food system and its workings. As we have an opportunity to re-make key aspects of the food system with these digital affordances, we go further and propose what would be needed to develop a food system that is both sustainable and focussed on the interests on new emergent urban food entrepreneurs.

In the WhatsApp groups shared by this “community” we see some control exerted over the group by members to keep the discussion “business like” through the creation of an “ethics” officer. This suggests farmers or actors may structure the relations amongst themselves as a Community of Practice (Wenger 1998). These third-party platforms offer opportunities for unorganised entrepreneurs to practice exaptation of the “affordances” on a platform and steer it to their own user-centred ends (Von Hippel 2005) as the systems are open ended and follow human communications features. Users “discover” how to use these systems through a process of exaptation, where they constantly push the functionalities of the systems into new terrain. To stimulate the development of local and sustainable food systems, we conclude by offering a set of design principles for the creation of a digital and sustainable local food system communication platforms.

This paper constructs an argument on why and how we could develop such conducive digital systems for local food system development. Digital systems can enable peer-to-peer networks amongst emergent producers, traders and their consumers, and this hold both promises of autonomy and innovation and for addressing challenges of

enrolment into larger systems of production. We develop a prototype of digital functionalities that would enable emergent producers, traders, and their consumers to build a locally focussed and cooperative food system.

2 Virtual food systems and Sustainable Development

A “just transition” to a future sustainable food system implies that “actors and stakeholders in communities come together to address linked issues related to food” (Pereira & Drimie 2016: 20). This is complex and multidimensional and includes regulation and market competition and interactive relationships amongst stakeholders in the food system (Malan 2021). The proliferation of digital applications for agricultural development (Steinke, van Etten, Müller, Ortiz-Crespo, van de Gevel, Silvestri & Priebe 2020) are undoubtedly informed by the interests of commercialisation, and they may intensify the further exploitation of natural resources, indigenous peoples and benefit established actors in the food system who hold an inordinate influence over this system itself (Yi, Meemken, Mazariegos-Anastassiou, Liu, Kim Gómez, Canning & Barrett 2021; Clapp 2021). The South African food system is excessively dominated by large firms, and there are real concerns about competitiveness in this sector (Competition Commission South Africa 2022). Cooperatives in the agricultural sphere are thus pushed to perform as commercial and export-oriented firms (Bennie 2019: 218; Aliber & Cousins 2013). This may benefit the country, but it is unclear if this will benefit the local communities from where emergent farmers come from. Emergent (new) farmers may not have this interest in mind in embarking on food production, and there are lucrative markets in under-served urban areas (Malan et al 2022). Agricultural cooperatives and new urban food producers would do well to focus their energies on exploiting emerging urban food markets. They may have a competitive advantage in this regard, as our discussion of urban agriculture shows.

The sustainability of the food system depends on a fundamental shift in “Conventional” agriculture, often identified with the adoption of chemically intensive fertilisers and pesticides, large-scale mechanised production systems and use of hybrid and recently, genetically modified genetic resources. This accounts for between 30% and 22% of climate-linked emissions (McIntyre 2009: 11). Commercial or “conventional” agriculture is a key contributor to climate change. Losses to biodiversity, soil, and livelihoods for indigenous populations where colonial and other large scale plantation agriculture takes place, implies a radical re-think of agricultural development. The inordinate concentration we witness in the food system may compound this (Yi et al 2021; Clapp 2021). In South Africa this is a particularly acute problem due to the concentration of limited numbers of commercial firms in food production activities, but it highlights the need to build food systems that are locally focussed so food insecurity at local level can be addressed by increasing economic development in local under-developed areas. In urban areas we are witnessing the

emergence of widespread urban agriculture, and this locally-embeddedness of this form of agricultural production is ripe for intervention with digital and communication systems. Food regime theory (Friedman & McMichael 1998) predicts the neglect of urban producers in the food system, and the neglect of smallholders in the global (McMichael 2005) and South African food systems (Greenberg 2010; Cochet, Anseu & Fréguin-Gresh 2015). Can communication technologies on social media address this problem? We set out how this can be done below.

2.1 Stakeholder engagement, the Internet and sustainability: Do not farm the farmer!

The internet affords us opportunities for the “spontaneous ordering of conduct, or self-regulation among user communities” which is “one of the great democratic possibilities of the social media age” (Flew 2020: 2). This points to the opportunity for authentic and human-interest organising, uncontaminated by the interests of the market and insulated from state intrusion. Steinke et al (2020) emphasise the local and user-centredness of innovation that can occur on these digital platforms, and this article aims to enrich these opportunities.

Nevertheless, platforms on the internet, like Facebook, “produces a viral, profit-driven distortion of identity politics [or] ‘identity economics,’ a new version of traditional market research” that rewards “individual demagoguery and vigilance” as part of a neo colonialist and capitalist project (Lim 2020: 1). The emergence and proliferation of AI has triggered a governance response (NIST 2023). The governance of AI focuses on managing and governing the risk of using such tools and aims to increase trust in the use of AI. Corporations must govern their own conduct and use of AI, and this is a subset of ICT governance. This approach does address risks to marginalised users only to some extent and is welcome. However, the opportunity to build systems that would enable smaller producers a competitive advantage is possible, as current AI is novel and there is scope for a reconfiguring of systems through it. It is still unclear what the long-term impacts would be. Urban and small farmers can exploit these new functionalities and gain access to commercially important internet penetrated markets, but the problematique of using such systems for transformative aims is complex and a suggestion is made below on how these systems can be reconfigured. We need to innovate to redesign these systems for equity and economic transformation.

The use of social media for economic organising has “the potential to alter important patterns of human society, such as the speed of information flows, the scope of media production and the actors responsible for defining public opinion” (Lazer et al. 2021:190). We need to be vigilant on the effects this may have on economic and social organising. Due to the proliferation of AI mediated digital platforms, we will see third-party platforms being used for local organising. Mobilisation thus occurs within the confines of a third-party platform, and this is ambiguous, as it could enrol emergent producers into larger systems. However, these also offer hope and opportunities for

the co-design of new user-driven patterns to emerge in the economy (Steinke et al 2020: 2), as we elaborate on below.

The dangers of economic organising on the internet lie in disregarding diversity (Steinke et al. 2020: 3) and thus being enrolled into the interests of dominant and mainstream third-party platforms that mediate access to the net itself, and to others. These digital “Trojan Horses” enrol us into ancillary projects, merely through our participation on these platforms. Facebook, for instance, offers a free networking service but its product is advertising information. The engagement with stakeholders on the internet is in some respects an intensification and extension of “Stakeholder management” (Freeman, Harrison, Wicks, Parmar & De Colle 2010). The employ of these methods in the digital realm, where much more extensive powers of enrolment are evident, creates intimate relationships between the firm and society that flows from enrolling stakeholders deeply and digitally into product and enterprise design.

Digital enrolment is part of “new product adoption patterns, alternative innovation regimes that include intelligent machines as innovation partners with humans, disruption of the producer, the 4IR consumer, and a fundamental change in business models” (Botha 2019: 188). This is because technology acts as the medium of stakeholder engagement and is “physically continuous with human beings” (Botha 2019: 190). This heralds user-driven innovation, a “co-creation” of products - a “self-organising of consumers” – so they can “innovate their own products” (Botha 2019: 190, 191).

The relationship between the firm and society is brought into relief by this pattern of digital engagement. Consumer Culture Theory confirms that such engagement with “capitalist cultural production systems invite consumers to covet certain identity and lifestyle ideals” (Arnould & Thompson 2005: 875). The firm benefits tremendously by selling a highly optimised product, as it has incorporated “life-world” data of consumers in its own organisational and product design. The firm can thus exploit and shape consumer preferences significantly, and the influence on the “life-world” of the consumer determines future products and engagements. Society, through the co-determination of needs and products, can thus be made to approximate a perfect market for the firm, as it increases its profits and its own command over the life-world all consumers share. The juxtaposition of stakeholders and actors, particularly in digital social media, enrolls us into semi-private networks and processes that subjugates human interests to hidden interests inherent in the network and technology itself (Lenartowicks et al. 2018; Hughes et al. 2007; Latour 2005: 84; 136).

The benefits of using social media and technology in enterprise and product design may be overshadowed by the dangers of the firm exploiting the self-organisation of actors. This vision of enterprise and product design may be most appropriate to digital

products and services, but the co-determination of both society and firm in this way, may preclude governing the firm, economy, and society towards sustainability. In the field of agriculture, this intimate engagement would shape farmers as a consumer of systems of food production, and it could both be used to reinforce current market patterns, or to disrupt them. At this point, the design of engagement systems, both on the internet and in society, becomes a matter of interest. Engaging with “interpretive agents rather than ... passive dupes” (Arnould & Thompson 2005: 875) may be necessary, not only to bring innovation in technology, but can also build the relationships, both digitally and real, needed so society can govern and steer the food system to sustainability.

Boroon and Erfani (2021: 14) caution that institutions that govern the internet may not be able to provide adequate protection in developing countries. They recommend increasing awareness amongst users, policymakers, and programmers, and this has undoubtedly stimulated the latest wave of AI governance (NIST 2023). However, engagement processes can enable society to shape the firm, and this would create a more equitable process of interaction between society and economy in this new digital realm. This could move the governance of human systems like the internet and the food system, to a higher order of functionality and benefit to society.

This is appropriate for the governance of the food system, which, like the internet, is a highly decentralised market. Food systems do “not work adequately for the poor” (Battersby 2012: 154) and exhibit structural injustices, and thus we need to transform the food system based-on “how people actively navigate their foodscapes” as this highlight “connections between food system and other inequities” (2012: 155). Empowered actors would be able to shape these systems differently, realising a “just transition”. Hence, a “dynamic sociological conceptualisation of transitions” (Geels 2004: 915) emphasises interaction with other systems, particularly political instability, directed innovations, windows of opportunity, and “Kuhnian anomalies” to stimulate change.

Barrett et al., (2020) recommend “bundling innovations” together so that change can happen at multiple places in the larger socio-technical system. At this point the organisation of producers and retailers into Communities of Practice (Wenger 1998) could structure such “bundles” of innovators and innovations together and form the basics of a locally focussed food system with cooperative features. Furthermore, we need to construct “imaginaries” (Froese & Mevissen 2019) about ecology, society and economy which could combine these in productive ways. Engagement needs to be broad and deep with a diverse constituency in society, so that the enterprise and product development process does not result into a myopic process to create society and consumers for the commercial advantage of the firm.

Digital systems offer opportunities for the re-organisation of communities and the development of cooperative and locally based economic organising. For instance, these could positively benefit collective actions like network formation and management and the sharing of information and skills. On these platforms many recipients can be reached, and these can help in organising events and the dissemination of media and materials. These allow actors to control the networks they inhabit and select their partners. These systems are also a case in point in technology adoption and adaptation, and the exaptation of the features of these communication systems could enable an entrepreneur to re-create the economic relations surrounding an enterprise.

We need alternative patterns and relationships amongst farmers if they are to develop sustainable production systems amongst themselves and vis-à-vis local communities who are often food insecure. Some have developed systems to facilitate the flow of communication and networking amongst practitioners, scholars, and public managers, and these are ready to be further developed to digital versions (Maher, Mann & McAlpine 2022). To what extent do these offer viable opportunities to innovate and develop sustainable ways of producing, distributing, and marketing food?

2.2 Conventional agriculture and the transformative potential of digital organising

Winarto, Walker & Ariefiansyah (2019: 239) observe that contemporary farmers “have been trapped in the ‘cage’ of the green revolution paradigm”. This system of “conventional agriculture” enrolls actors “to operate according to scripts that meticulously prescribe what is to be done, how, when, where, [and] in what sequence” (van der Ploeg 2016: 3), which negates the unique value proposition of individual farms, and favours post-farmgate actors. Such homogenous value chains favour established actors, whilst nascent and emergent urban producers still need to forge new relationships around their enterprises. This suggests alternative production regimes, like agroecology, are needed to benefit emergent, marginalised, and small farmers, as current and often predetermined value-chains reinforce the subservient position of farmers, and smallholder farmers, in the food system. However, the current paradigm or mode of production itself is unsustainable (McIntyre 2009) and we need a “combination of community-based innovation and local knowledge with science-based approaches in AKST (Agricultural knowledge, science and technology) [which] holds the promise of best addressing the problems, needs and opportunities of the rural poor” (McIntyre 2009: 2). The combination of community-based innovation and local knowledge with science and technology implies a new form of organising amongst food producers that is innovative and may distribute value in new ways in society.

The creation of local food systems, where producers connect with local communities, is open to digital mediation. The Food Sovereignty movement (Holt-Giménez 2011) point to the political aim of controlling the food system. Recent assessments of urban, regional, and national scale “local” agriculture (Walsh et al 2022: 2; Grafius 2019;

Rüschhoff 2021) indicate that local production could make available “four times the production of commercial horticulture, with significant potential to shorten supply chains and improve food access”. However, the opportunity to develop a food system in an urban area seem to imply that more than commercial relationships are at stake. Jensen & Orfile (see also Lenton & Latour 2019) theorise the ways such relationships should be structured to create a locally based and focussed food system:

Creating a symbiosis between communities officially classified as multiply deprived, underutilised local assets and infrastructure, and the activities of those operating within the local food sector that are potential sources of critical resources, presents opportunities for myriad beneficial food production, processing, distribution, and education hubs (Jensen & Orfile 2021:565).

The reconfiguration of food production to incorporate urban “local self-sufficiency” implies a renewed focus on smaller producers, on smaller fragmented lands. These imply reduced transportation costs and equity and social effects when local producers attain livelihoods by delivering good food to consumers. Here there is space for cooperative relationships.

The digital revolution in agriculture is an opportunity to embed new scientific, appropriate, and ecologically sound production techniques in new social patterns and institutions. This could offer livelihoods to smallholder farmers, urban and peri-urban farmers, integrate large farmers in more streamlined supply chains, and offer those following regenerative practices a new marketing channel. Local food systems would also experience direct democratic pressure from consumers, and it is in their interests to advocate for an ecologically sound (amongst others) food system (FAO 2021), particularly if food is produced close to where people live.

Digital organising is not inclusive. To understand what it should be able to do, we need to see face-to-face alternatives as a necessary corrective to the dominance of digital organising. “Public innovation laboratories” represent a key part of the solution to building sustainable food systems. They “represent a distinctive approach to the use of emerging techniques, instruments, and methods of ... governance. They are redefining the nature of the problems that policy should address, and simultaneously specifying the kinds of solutions appropriate to remedying them” (Williamson 2015: 252). These “public innovation labs” use both digital and real-life means to “produce the knowledge about citizens that is required by those who seek to design the services and interventions to govern them” and these labs use “social media to share ideas, build alliances, and circulate resources” (2015: 269) as part of a new approach to public policy making. Considering the interpersonal difficulties in cooperative management in South Africa, it seems necessary to innovate in how actors engage and participate in current state-led cooperative development. Facilitative methods, the mobilisation of

large groups, and the development of engagement processes to achieve these ends as an extension of action research and systemic action research methods (Burns 2012; 2014), could recreate cooperative members as active and cooperating subjects. We can structure these relationships in a public innovation lab, and reinforce these new patterns of behaviour in public, making it possible for cooperatives and their communities to develop a new institutional pattern of behaviour around urban agriculture.

2.3 Personhood and autonomy as design principles for digital systems

Much of current and future organising will take place through the internet as a pervasive medium. Lenartowics et al. (2019: 13) emphasises the protection of our “personhood” to allow us to act and affirm difference vis-a-vis these systems, something face-to-face organising could do for digital engagement. They suggest a universal basic income, for instance, to secure this personhood which would allow authentic participation, also of those marginalised, in the systems society offers, with the prospects that this would make the institutional arrangements created more just. Once we act autonomously, “peer to peer functions that do not require any more centralized structures” can safeguard it (Lenartowics et al. 2019: 16). Hence, the creation of a peer-to-peer functionality can then realise human interests, and not ancillary interests in the market or state. This qualifies participation and suggests participation through the internet can be de-linked from processes of dependency and enrolment, and the cost of data, by affording a face-to-face alternative. This will create an opportunity to organise and mobilise with untainted interests, and here the interest in sustainability becomes key.

As people will network unmediated by intermediary systems and interests, they can take responsibility for the outcomes of their actions. A peer-to-peer system of social interaction will create opportunities to “balance multiple loyalties” (Engeström 2007: 53) when lesser-powerful actors create “mycorrhizae” or networks of alternative opportunities that can bypass and subvert dominant interests. Artificial intelligence could become a “buffer” that allows humans control over such systems which will protect our “organic and psychological continuity” (Lenartowicks et al. 2019: 13).

It is possible to consolidate the above into a set of requirements for “the innovation which is needed” (Lenartowics et al. 2019: 16) to enable human control over the expanding systems and platforms on the internet. We need a non-invasive system to protect the autonomy and agency or “personhood” of the subject in the engagement process. This allows authentic and innovative action uncoerced by reigning social systems. This could assist in the reconfiguration of the economic, social, and ecological systems of society. Designers and programmers can develop alternative systems, and through this they can avoid themselves becoming means to enrol others into the systems they create. Below we consider how this can be realised in practice.

2.4 Infrastructuring a sustainable food system: Facilitation and co-design of enterprises

Sustainable food markets and systems imply entrepreneurial activity which in South Africa as in many other places is “not sufficient” to compensate for the “poor education system ... [which] does not prepare young people adequately for the realities of the labour market” (GEM 2018: 27). Propensities for entrepreneurial activity is a key challenge for the development of a sustainable food system globally, and this is undoubtedly influenced by corporate concentration in food value chains (Yi, et al. 2021; Clapp 2021). It is thus no surprise that the 2020/2021 Global Report by the GEM (GEM 2021: 52) indicates (as part of the COVID pandemic) a “majority of economies had lower levels of adults running either a new or established business in 2020”. We may see lower entrepreneurial activity in a condition of crisis, and this does not bode well for achieving sustainability through innovation and an increased dynamism amongst actors in society.

New start-ups in developing countries would bring the inequities of “developing” the informal sector into view. Alcock (2018: 55), distinguishes between “revolutionaries” and “counter-revolutionaries” in this sector, emphasising that the revolutionaries have been “investing in and partnering with a multitude of small business ... realised the power of networking, conglomeration and business community” whilst the counter-revolutionaries have “tried to build their businesses on the backs of small businesses, exploiting rather than sharing value”. A focus on entrepreneurship may thus reinforce the concentration of corporate power in the food system, and we need to identify ways entrepreneurs can collectively improve their prospects of success in the market.

Developing enterprises in South African “townships” (previous racially classified settlements bereft of income generating opportunities; Mahajan 2014) gives us clues on how to extend the idea of “bounded communities” or clusters of innovators that can reorganise local food systems (Jensen & Orfile 2021; Siegner, Acey and Sowerwine 2020). These, in much of the post-colonial world, would demand an affirmative racial and geographical or “local” bias – versus a pure economic or ecological view – to realise a sustainable food system (Malan, 2020a). It also alerts us to the limits of digital organising, suggesting strongly that these activities need to be blended with additional means to secure enough space for innovation.

The act of enterprise development is a key instance in how we re-create society. Entrepreneurs aiming to create sustainable food enterprises are “challenging conventional practices across the entire food and agriculture value chain and building value aligned with both planetary capacity as well as consumer demand” (Lynde 2020: 3). These will indicate structural shifts in the economy, and we need to see entrepreneuring – “the processes through which entrepreneurial individuals and

groups remove economic and social constraints, and thus create new possibilities for themselves and others within society” (Tobias et al. 2018: 728), to realise sustainability by re-organising society. Entrepreneurs and business act as “brokers between producers and consumers to create new socio-ecological relations” (Pereira et al. 2020: 1327). Many have emphasised that this ability to shift structures (“architecting” Lynde 2020:3 or “infrastructuring” Nogueira et al. 2019) can reconfigure social systems and thus long-term action.

A social lab, to entrepreneurship development, can enhance the infrastructuring activities of entrepreneurs by affirming the “commons”. Infrastructuring/entrepreneurship/ architecting is thus a way and opportunity for entrepreneurs to collaborate in a public innovation lab to together create effects in larger sectors and across value chains. Digital methods blended with such a lab thus hold critical potential for innovation. Marginalised communities, and those acting in the public interest can use such opportunities to build local self-sufficient food systems amongst themselves and create the conditions for sustainable systems and enterprises to emerge.

It seems public innovation labs, and the movement towards “design for social innovation” (Manzini 2014) represents a new means and opportunity to develop new kinds of knowledge and means to govern food systems. Lenton and Latour have proposed the idea of “autocatalytic networks” (Latour & Lenton 2019) of people and “things”, as key to the realisation of sustainable development. Groups can “produce” sustainability by linking biophysical processes with human organising and entrepreneurial activity. “Sustainability” entails the reproduction of a group that “produces” it in new practices, narratives, and activities, in effect creating new structures and action in society.

This way of realising sustainability is highly appropriate to the food system. A “local food” value chain can be built to address sustainability by cooperative or “symbiotic communities” that “fundamentally transform the use of urban space and the regional food system by engaging the public in efforts to stabilize, improve, and sustainably scale urban food production and distribution” (Siegnier, Acey and Sowerwine 2020: 568; Jensen & Orfile 2021). This explicit engagement around “bundles of innovation” in socio-technical systems (Geels 2004: 901; Barrett et al 2020) is the opportunity for cooperative action. Sustainability emerges when there is integrity amongst ecosystem and these new functions, and this must be net positive for society.

The structural susceptibility of agro-ecology to autocatalytic networks should be noted. Agro-ecology links “the social, ecological, and political elements of growing food in a manner that directly confronts the dominant industrial food system paradigm” (Siegnier et al. 2020: 570) by “producing” qualitative new relationships and production processes, as it integrates diverse communities and ecosystem functions. This creates a

new entity – a community of practice/ autocatalytic network/ symbiotic community – in social, economic, and ecological policymaking that can operationalise the key themes of sustainability into a practical action-oriented programme.

A public innovation lab can create these communities but can also create narratives of sustainability and circularity for enterprises (Jensen & Orfila 2021; Nogueira 2020) or of agro-ecology and communities (Siegener et al. 2020) through facilitative methods. Organising action with many others in a public “Lab” creates conditions for multiplicities of intervention (Burns 2012; 2014) that can satisfy systemic change requirements and realise interests of a “symbiotic community” in new and different ways than hitherto. The critical opportunity here is to allow such groups to connect the innovation of the firm with structural change in society.

3 Discussion: Design principles for sustainability

3.1 Public effects and Multiple platforms

The diverse media that iZindaba Zokudla uses would suggest that plural systems could off-set any hegemonic behaviour. Diverse engagement opportunities, from public innovation labs to digital intermediary systems between farmers and stakeholders forms the foundation for a pluralist and voluntary form of organising. Actors independent of organisers (or hierarchies) should be able to use open and plural systems for their own ends. This would allow networks to emerge amongst many, and it is the consistency amongst these plural networks that would contribute to sustainability. A public event acts as a critical forum, which may show “power as shameful or powerless” (Young 1992: 86), but this forum can also divide transformation into separate tasks (Young 2011: 118), pluralising and organising activities. By using a website linked to these real-life events and activities a research and action programme can be created and maintained by this new digital “organizational logic” (Castells 2010: 164) that has potential to build a new economy. The network, learning, practice, and identity impacts of such organising could “infrastructure” incentives amongst entrepreneurs, moving them to become a Community of Practice. This could lead to synergistic activities as the conditions wherein action takes place can be changed, mainly through learning and information, and this could push activities towards sustainability. This needs an independent public innovation lab that avoids the “perverse performance measures of the public sector” (McGann, Wells & Blomkamp 2019: 13; Brock 2020), which would be important considering the preeminent position cooperatives occupy in political imaginaries.

The serendipity of chance is an important cue in human endeavour, and this is enhanced by blending digital and actual open access events. This plural organising strategy to organise a group of actors will off-set the inherent bias of access to digital technologies and allow unstructured and novel issues and actors to come to the fore from unmediated contexts, i.e. entrepreneurs outside the digital sphere. This is

especially important in a context of poverty, as the digital divide looms large in social media, and results in a significant bias if we look at the world through social media (Lazer et al. 2021). An open access event ameliorates many of these negativities. To achieve such systemic “effects” the open access character of a public innovation lab that can accommodate everyone, is important, as “Whoever comes are the right people” (Regeer, Mager & Oorsouw 2011: 216). This translates to hosting a permanent, open access assembly with an underdetermined agenda that can accommodate the diverse and idiosyncratic needs and interests of a diversity of participants. This open “town hall” setting creates conditions for multiple kinds of networks to emerge and affords an opportunity to influence them.

3.2 Building communities and networks of symbiotic practice

To manage a local food system, it is likely that plural platforms are necessary, from Facebook to allow anyone to join or form a group, a website to “own” and manage memberships, video-call software to build cohesion amongst the group, specialist software like Miro Board (<https://miro.com/>) and perhaps even more bespoke platforms where groups can coordinate their activities. However, this plurality needs to be designed to achieve synergies, and no single platform can capture all activities, highlighting the aims of such organising: to increase the autonomy of the actor in the food system.

Social media nevertheless affords opportunities for organising networks that may in themselves negate hegemonic behaviour. “Inscription devices” (Williamson, 2015: 259) or the “#” hashtag enable the digital creation of networks by anyone and allows a democratisation of the indexing of the internet. Williamson (2015: 259). points out that “Through the hashtag, the histories and methods of various different organisations and actors ... are hooked up, interwoven with one another, and stabilised as a coherent body of knowledge and practices”. An “inscription device” can embark on the creation of an autocatalytic network through “platforming intersectionality” (Christian et al. 2020:1) and the manufacture of “entrepreneurial solidarities” (Soriano & Cabañes 2020) amongst actors. Digital media could effectively deliver learning, practice, identity, and network resources to create communities of practice (Wenger 1998) and allow members to interact across space and time with others. We now turn to how this may be designed.

3.3 Future affordances

3.3.1 Digital indigenous knowledge

We must speculate and innovate on the affordances digital platforms make possible. WhatsApp groups discuss a diversity of topics, and this material is ripe for indexing, packaged as learning materials, and needs to be presented back to users as knowledge that can be used, questioned, and changed. Steinke et al (2020: 13) emphasise the “Strategic partnerships between public extension providers and private technology

companies may lead to the development of scalable, locally suitable information services." WhatsApp does not allow for such "processing", but other platforms may develop an AI driven knowledge harvesting system that can catalogue, index, and present this information back to users. This expanded Wiki would feed off the WhatsApp chats and could be configured to reflect not timeless and permanent truths, but rather a live form of local and indigenous knowledge. These knowledges are very dynamic, and indexing would construct a true alternative knowledge that may rival scientific knowledge. It would significantly off-set knowledges propped up and "infrastructured" by industry interests. This system would value workable and practical knowledge and truths, and would build learning amongst actors, without the users expending labour in constructing it.

3.3.2 Digital profiles and reputations: managing networks

The development of a profile and reputation system on the internet can support peer-to-peer organising through the development of identities and networks. A profile system that is rated by peers will immediately expose all profiles to the public gaze and transparency will emerge. In this sense, a less powerful actor will know whom she is dealing with and hence actors can self-select the groups they want to inhabit in furthering their own entrepreneurial journey. This allows actors to preserve their autonomy whilst interacting with multiple others in managing their networks. As actors inhabit local areas, it may be that local synergies could be best exploited by them, and here cooperative relations may emerge. Local resources could be harnessed and managed, and this could promote an urban agriculture that harvests local resources and create exchange relationships around food production.

The development of a profile is a key aspect of developing an identity on the internet. However, the identity of an entrepreneur derives also from the products and enterprise they hold. The use of the "#", groups on messenger services, and the alignment of reputations and profiles would allow the crowding in of similar enterprises and entrepreneurs, and create dangers like groupthink or collusive behaviour. These can be combatted only by bringing in diversity and alternatives. The ability to present an enterprise on social media, and design its products with reference to others, affords a safe space for enterprise development. Social media allows any player to compete with larger players in the aesthetics and symbolism of enterprise and product design. This grand levelling of the playing field does enable smaller players to compete.

3.3.3 Digital local and circular enterprises

The blending of such profile and material development with ancillary considerations, like geographic proximity and territoriality, may tip the scales in the favour of local entrepreneurs, as circular enterprise development at this scale in the economy could construct very competitive food enterprises that can beat supermarkets and linear value chains, as they draw on local resources(see www.izindabazokudla.com). The

development of a circular enterprise, ancillary to a social media system, could make available the resources (people, wastes, social capital, and reciprocities) for a small local enterprise to beat the competition. There are significant externalities evident in the centralised systems of most supermarket chains. These need to be replaced dynamically in the economy by better performing enterprises. Social media is amorphous and could assist in the development of reciprocities that can realise inputs (from household wastes) and the ability to manage the local food value chain (by exchanging waste for food and marketing “local” produce) can result in competitive local production. This would be significantly transformative and may represent the beginnings of a sustainable food system.

4 Conclusion

We have delineated a prototype for the reorientation of organising and mobilising on the internet. The internet reflects current interests and the way it is being constructed by leading platforms are conservative and are aimed at reifying established economic interests. Only by radically innovating on how we are enrolled and how we enrol others on the net, would we be able to use it for truly emancipatory human interests. The ideas above are unproven but derive from an ethnographic intimacy with the struggles of emerging entrepreneurs. We would have to realise these to ascertain whether they have real utility. We have to afford activists and practitioner the chance to experiment with these, and it may be that they will eclipse the recommendations made in this article.

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Blockchain Technologies to Strengthen the Cooperative Values

Sebonkile Cynthia Thaba¹

Department of Transport and Supply Chain Management, University of
Johannesburg

Correspondence: scthaba@uj.ac.za

Abstract

Blockchain technologies have similar elements that, if implemented by a cooperative enterprise, will strengthen the principles and values of co-ops. Cooperation among cooperators is one of the cooperative values. Cooperative platforms and Blockchain technologies are two types of interventions that can help strengthen the cooperative businesses that are the basis of these organizations' success. There is little discussion of how blockchain technology may affect non-financial services businesses, business strategy, and the generation and distribution of value. The objective of this study is to identify the blockchain technologies that will improve the internal and external operations of cooperative firms that provide both financial and non-financial services. To ensure that the internal operation of the cooperative is reinforced by a transparent voting mechanism and that the financial position of the cooperative is transparent. The 18 articles that were fully reviewed had the elements of integration clearly showing the relationships between blockchain technology and cooperative principles. Therefore, each paper is researching the blockchain with specific technologies that can be linked to cooperative principles.

Keywords: Cooperatives 1; Blockchain technologies 2; South Africa 3; Financial and Non-Financial Services 4; and Cooperative principles

1 Introduction

South Africa is one of the emerging countries that need to foster the resilience of cooperative enterprises. With a high unemployment rate, inequality, and poverty, the country can leverage cooperative enterprises to alleviate poverty, bridge the inequality gap, and create jobs. Profitable cooperatives benefit several other people; if the principles are followed, this means that every member, employee, or community of such cooperative benefits. For a long time, post-apartheid, South African cooperatives were known to be unsuccessful; thus, after 30 years of new democracy, South Africa still does not have a single cooperative that is able to compete with privately owned businesses, and this is in all sectors such as finance, education, agriculture, retail, and so on. The study is counting out the white-owned cooperatives that had been in existence before the birth of the new democratic South Africa, and this is for obvious reasons, as such cooperatives, when formed, excluded the black South African people.

It is not hidden that South Africans are deeply affected by poverty, unemployment, and inequality. In 1994, when the new democratic government took power in South Africa, cooperatives were introduced to all citizens. Due to their lack of growth and sustainable development, cooperatives continue to encounter several obstacles due to their fragility and susceptibility to both internal and external causes (Godfrey et al., 2017; Ortmann and King, 2007). In the developed world, cooperatives are thriving in a variety of industries, including agriculture (Ortmann and King, 2007), manufacturing, and finance. Cooperatives in both developing and developed countries demonstrate how, under the appropriate circumstances, they may significantly reduce poverty among some of the poorest people in the world (Birchall, 2004). Developing countries like Uruguay, Slovenia, and Kenya are competing for comparative strategic advantage in the development and application of blockchain technology, as are major powers like China, Russia, Japan, and the United States (Manski, 2017).

In South Africa, cooperatives confront various obstacles, including a lack of trust and integrity among members (Thaba and Mbohwa, 2015), the inability to embrace maturity or independence (Kanyane and Ilorah, 2015), lack of knowledge on cooperative governance and management (Okbandrias and Okem, 2016), no access to finance from financial institutions (Rena, 2017), and a lack of financial discipline (Ortmann and King, 2007). This is one of the factors contributing to South Africa's higher cooperative failure rate (Ortmann and King, 2007; Rena, 2017). Internet-based technologies can help change how people relate to one another and how businesses operate with respect to moral concerns and societal challenges (Sczesni et al., 1991). Technologies based on blockchain are disrupting important economic and financial sectors, enabling the democratization of banking, services, agriculture, and governance (Manski, 2017). Blockchain technologies have similar elements that, if implemented, will strengthen the principles and values of cooperative enterprises (Nabben et al., 2021). One of the cooperative values is cooperation among cooperators. The cooperatives must discover methods to collaborate and support one another to strengthen the value chains. Cooperative platforms and blockchain technologies are among the interventions that can play a part in bolstering the cooperative enterprises that serve as the foundation for the success of these organizations.

There is little discussion of how blockchain technology may impact non-financial services businesses, business strategy, and the generation and distribution of value. Morkunas Paschen, together with Boon (2019). The objective of this study is to identify the blockchain technologies that will improve the internal and external operations of cooperative firms that provide both financial and non-financial services. to ensure that the internal operation of the cooperative is reinforced by a transparent voting mechanism and that the financial position of the cooperative is transparent.

Due to the democratic nature of blockchain technology's decentralized architecture, one blockchain future scenario envisions a massive global development of cooperative forms of wealth ownership and management (Manski, 2017). Blockchain technology could facilitate a digital revolution in cooperative business model structures (Kollmann et al., 2020). The literature chapter covers cooperative principles, cooperative platforms versus traditional cooperatives, current blockchain technologies relating to cooperatives, and cooperative principles.

1.1 Cooperative platforms versus traditional cooperatives

Rapidly growing as a new trend in the sharing economy, platform cooperatives are essentially cooperatives facilitated by digital platforms and, as such, have shared ownership and democratic control over the platform (Zhu and Marjanovic, 2021). A traditional cooperative is any form of business that is democratically owned by its members, with the aim of uplifting every member who is part of the cooperative. The cooperative platform is mainly for social businesses operating on a digital platform. Platform-based cooperativism emerged because of the efforts of cooperative developers and academics who evaluated an alternative platform paradigm (Konnova et al., 2021). Such businesses and organizations are either built on participatory governance, in which users eventually have (partial) control over the platform or technology, or they are bound by a statutory purpose that places social and environmental aims ahead of financial gains (Zhu and Marjanovic, 2021). Digital platforms connecting service providers and consumers create the so-called "joint economy," which is based on breakthrough technologies transforming traditional sectors of the economy, such as transportation and lodging, even though the platforms place little emphasis on the social and environmental impacts of their operations (Konnova et al., 2021). The democratic control of the digital platform by its own members, who are also co-owners, is a defining characteristic of platform co-ops (Zhu and Marjanovic, 2021). Platform co-ops, with their cooperative principles and innovative digital platform technology, are far better positioned to create positive social effects than their platform capitalism counterparts (Zhu and Marjanovic, 2021). Platform user valuation models and blockchain decentralized structures have been claimed to be well aligned with social economy principles, particularly cooperatives (Brülisauer, Costantini, and Pastorelli, 2020).

1.2 The cooperative principles

1.2.1 Open and Voluntary Membership

Most cooperative principles bear some resemblance to the social contracts of the platform economy, and platforms by default adhere to the voluntary and open membership concept, which normally allows anybody to register an account (Schneider, 2018). Blockchain provides the adaptability and operational preparedness needed to accommodate a requirement for open and optional membership (Chaturvedi, 2018). Cooperatives that operate blockchain projects or are built on a

blockchain spread cooperative values and principles over the globe while also adhering to blockchain principles (Adjovu, 2018). To join a cooperative, you must do so of your own free will, and no one is denied membership based on any inherent characteristic, which is the same for blockchain projects. Voluntary and open membership is a principle and value shared by both the cooperative movement and blockchain projects (Adjovu, 2018). Most cooperative principles bear some resemblance to the social contracts of the platform economy, and platforms by default adhere to the voluntary and open membership concept, which normally allows anybody to register an account (Schneider, 2018). Blockchain provides the adaptability and operational preparedness needed to accommodate a requirement for open and optional membership (Chaturvedi, 2018). Cooperatives that operate blockchain projects or are built on a blockchain spread cooperative values and principles over the globe while also adhering to blockchain principles (Adjovu, 2018). To join a cooperative, you must do so of your own free will, and no one is denied membership based on any inherent characteristic, which is the same for blockchain projects. Voluntary and open membership is a principle and value shared by both the cooperative movement and blockchain projects (Adjovu, 2018). Most cooperative principles bear some resemblance to the social contracts of the platform economy, and platforms by default adhere to the voluntary and open membership concept, which normally allows anybody to register an account (Schneider, 2018). Blockchain provides the adaptability and operational preparedness needed to accommodate a requirement for open and optional membership (Chaturvedi, 2018). Cooperatives that operate blockchain projects or are built on a blockchain spread cooperative values and principles over the globe while also adhering to blockchain principles (Adjovu, 2018). To join a cooperative, you must do so of your own free will, and no one is denied membership based on any inherent characteristic, which is the same for blockchain projects. Voluntary and open membership is a principle and value shared by both the cooperative movement and blockchain projects (Adjovu, 2018). Most cooperative principles bear some resemblance to the social contracts of the platform economy, and platforms by default adhere to the voluntary and open membership concept, which normally allows anybody to register an account (Schneider, 2018). Blockchain provides the adaptability and operational preparedness needed to accommodate a requirement for open and optional membership (Chaturvedi, 2018). Cooperatives that operate blockchain projects or are built on a blockchain spread cooperative values and principles over the globe while also adhering to blockchain principles (Adjovu, 2018). To join a cooperative, you must do so of your own free will, and no one is denied membership based on any inherent characteristic, which is the same for blockchain projects. Voluntary and open membership is a principle and value shared by both the cooperative movement and blockchain projects (Adjovu, 2018). Most cooperative principles bear some resemblance to the social contracts of the platform economy, and platforms by default adhere to the voluntary and open membership concept, which normally allows anybody to register an account (Schneider, 2018). Blockchain provides the adaptability and operational preparedness needed to accommodate a requirement for open and optional membership (Chaturvedi, 2018). Cooperatives that operate blockchain projects or are built on a blockchain spread cooperative values and principles over the globe while also adhering to blockchain principles (Adjovu, 2018). To join a cooperative, you must do so of your own free will, and no one is denied membership based on any inherent characteristic, which is the same for blockchain projects. Voluntary and open membership is a principle and value shared by both the cooperative movement and blockchain projects (Adjovu, 2018). Most cooperative principles bear some resemblance to the social contracts of the platform economy, and platforms by default adhere to the voluntary and open membership concept, which normally allows anybody to register an account (Schneider, 2018). Blockchain provides the adaptability and operational preparedness needed to accommodate a requirement for open and optional membership (Chaturvedi, 2018). Cooperatives that operate blockchain projects or are built on a blockchain spread cooperative values and principles over the globe while also adhering to blockchain principles (Adjovu, 2018). To join a cooperative, you must do so of your own free will, and no one is denied membership based on any inherent characteristic, which is the same for blockchain projects. Voluntary and open membership is a principle and value shared by both the cooperative movement and blockchain projects (Adjovu, 2018).

1.2.2 Democratic Member Control

Membership in colonies is currently elective and open by default (Mannan, 2018). Because a cooperative is owned collectively by its members, each member has the same rights, and cooperatives are democratically governed by their members, who all have equal voting rights (one member, one vote). Cooperatives are organizations reliant on the transparency and honesty of their members. Cooperative members have the voting power to democratically operate their organization. According to Teja, Shravani, Simha, and Kounte (2019), when many people wanted authority, the necessity to find a mechanism to select the person to be in power increased. Among those numerous options, voting is the one most chosen by most people around the world (Teja et al., 2019). Governance covers the methods of governing conducted by a state or social system through laws, norms, power, or language (Razzaq et al., 2019). It contains the technique needed to balance member power (connected to accountability) and even the main responsibility for boosting organization practicality (Razzaq et al., 2019).

1.2.3 Members' Economic Participation

Members' economic participation is the second principle of cooperation, where a collection of people in the business world, in their capacity as associates or members, look out for one another's interests while operating a company or serving as a sponsor for one (Kollmann et al., 2020). It means that a cooperative brings together individuals who engage in similar economic activities, and the group creates a business that is jointly owned by its members. Cooperative platforms are firms that represent cooperative qualities that have begun to emerge in the collaborative economy with the goal of providing less vulnerable workplaces and more broadly accountable organizations, and these platforms put the user-members' interests first by involving them in the platforms' financing and management (Mannan, 2018). Blockchain, for example, has an inherent decentralization approach that could have many impacts for services and generate a high socioeconomic value addition through traceability, fair pricing, commonly recognized and verified standards, and the democratization of access to services and products across all societies and regions (Brülisauer, Costantini, and Pastorelli, 2020). Greater cooperative engagement is facilitated by the blockchain's potential for distributed consensus, token-based equity shares, and automated governance, while some of the administrative constraints are reduced. Members of a cooperative raise their own funds as members and share profits among themselves. The blockchain participation is the second principle of cooperation, where a collection of people in the business world, in their capacity as associates or members, look out for one another's interests while operating a company or serving as a sponsor for one (Kollmann et al., 2020). It means that a cooperative brings together individuals who engage in similar economic activities, and the group creates a business that is jointly owned by its members. Cooperative platforms are firms that represent cooperative qualities that have begun to emerge in the collaborative economy with the goal of providing less vulnerable workplaces and more broadly accountable organizations,

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2.2.4 Autonomy and Independence

"Autonomy and independence" are also values that platform owners frequently emphasize while challenging existing sectors, sometimes while proclaiming "concern for the community" (Schneider, 2018). Create an account utilizing blockchain technology; "autonomy and independence" are values that platform owners frequently uphold while upending established markets, even as they profess to have a sincere "concern for community" (Schneider, 2018). Cooperatives are independent, self-governing groups that are run by their members. They do so on terms that guarantee democratic governance by their members and uphold their cooperative autonomy if they sign agreements with other organizations, including governments, or generate money from other sources. Education, Training, and Information A cooperative's membership community must be educated and continually re-educated; each member's life experiences help each co-operator grow intellectually and morally and strengthen his or her ability to cooperate with others (Kollmann et al., 2020). Platform co-ops are anticipated to gain from upskilling and the subsequent career development opportunities because of adhering to cooperative principles, particularly those related to offering education and training opportunities, which is anticipated to result in their improved living standard (Zhu and Marjanovic, 2021).

2.2.5 Cooperation Among Cooperatives

The cooperative platform demonstrates the importance of "Cooperation Among Cooperatives. there is a great deal of "cooperation" across platform firms, such as through API protocols and standards-setting organizations such as the World Wide Web Consortium, (Schneider, 2018). Distributed crypto-ledger as a novel solution that facilitates trusted cooperative applications and services among cooperatives and other chain organizations (Kamilaris, Fonts and Prenafeta-Boldó, 2019).

2 Blockchain technologies in relation to cooperatives

Cooperatives and blockchain projects both advocate democratic member control and the freedom of individuals to come together for their mutual benefit (Mannan, 2018). Blockchain's primary use case is in the development of decentralized systems where trusted third parties (such as intermediaries) have no authority over the underlying ledger, or the data contained within (Kollmann et al., 2020). Cooperative, participatory data governance and coordination frameworks are one of the blockchain technologies DAOs can learn from (Nabben et al., 2021). This is because DAOs face many of the same problems that platform coops do, and they could use cooperative principles to improve governance design and relationships between institutions (Nabben et al., 2021). Blockchain has grown in popularity since the introduction of bitcoin and Ethereum. The blockchain (Ethereum) is currently the most popular technology that can be used by cooperatives for both financial and non-financial purposes to strengthen cooperative values and principles. Blockchain technology, such as Ethereum, has the potential to improve internal and external cooperation. The digitalized voting system and shares in real-time will encourage the members to invest and dedicate more to the cooperative enterprises. Blockchain technology will further ensure that the cooperative forms part of the value chain with other cooperatives. Familiarizing the members with these fascinating blockchains will increase the cooperatives' competitiveness, and cooperators will be learning from one another. One of the strengths of blockchain is security, traceability, and transparency, which is also one of its weaknesses. The cooperatives are not attractive in the markets of both the private and public sectors, and this is due to security. The equity, which is distributed by the cooperative as a business and by the members in the form of membership and affiliation fees, can be secured using an equity-based blockchain token. Compliance with the traditional cooperative identity enables entities to access public equity financing using crypto assets without publishing a prospectus in accordance with the Prospectus Regulation, as the first step in analyzing the cooperative identity changes when membership is offered in transferable blockchain tokens (Gurkov, 2021). Governance actions are typically undertaken by a state that faces numerous governance issues, such as data privacy, food safety, and voting, which can be resolved with the aid of blockchain characteristics such as decentralization, smart contracts, and immutability (Razzaq et al., 2019). Many business transactions and legal agreements can be converted into "smart contracts" when recorded digitally and carried out entirely by computers or other programmable machinery (Nair and Sutter, 2018). By decreasing the need for trusted intermediaries, smart contracts can reduce fraud as well as arbitration and enforcement costs (Lee et al., 2022).

2.1 Critique of cooperative platform on traditional cooperative principles

Platform cooperativism is starting to provide ownership models that might be more advantageous to the platform economy of the future than the investor-owned structures that are currently the norm (Schneider, 2018). Cooperativism on platforms

is conceivable and essential, but it is by no means inevitable. The existing owners of web platforms are apparently eager to offer us everything but ownership. The members of traditional cooperatives are the owners of the enterprises. Democratic governance and ownership, crucially, are almost wholly absent from the platform economy. (Schneider, 2018). Due to blockchain's inherent decentralization, it has the potential to revolutionize many industries and provide significant social value in the form of improved transparency, more equitable pricing, universally accepted and verifiable standards, and expanded access to goods and services across the globe (Brülisauer, Costantini, and Pastorelli, 2020). After years of idealistic hopes and optimistic guesses, it's time to admit that blockchain is still an immature and expensive technology (Rocas-Royo, 2021).

3 Research methods

The purpose of the study is to identify the blockchain technologies that are compatible with cooperative principles among the different types of blockchain networks. From the previous research, which identified blockchain technology and proposed a comprehensive blockchain technology that complements the principles of cooperatives, The study used the systematic literature method to identify the key elements that showcase that indeed blockchain technologies can be in a position to strengthen cooperative principles, looking at the current state of South African cooperatives, which are struggling to gain momentum when compared to international cooperatives, particularly those operating in the developed world. The study is reviewing the cooperative principle and integrating it with the key factors and characteristics of blockchain technologies. To meet the purpose of the systematic literature review method, academic articles relating to cooperatives, social enterprises, and blockchain were reviewed. The articles selected for this study were searched in Scopus, Google Scholar, and Web of Science. Recognizing that Google Scholar, Web of Science, and Scopus are the three major scholarly databases, Scopus was selected based on its ability to arrange the data results for content analysis. Its results were sufficient to use Scopus alone and exclude other databases. Scopus can be used to find relevant literature due to this search engine's full integration with major publishers, advanced search tools, and analytical instruments, as well as its intuitive user interface and seamless integration with the Elsevier reference manager (Vignieri, 2020). Furthermore, Scopus incorporates interdisciplinary literature from all research fields, thereby reducing the likelihood of missing vital research information (Vignieri, 2020). The search on article title, abstract, and keywords turned up 93 articles, but after thorough reading of the articles, only 7 articles were relevant to the theme of the study. Most of the articles were not suitable, as the word "cooperative" was mainly used in different fields with different meanings. With the Web science databases, the first results in all the fields of Web science's 235 documents were found. Based on the abstract, we learned that the term "cooperative" is mostly used in information systems and other fields for different techniques, tools, frameworks, and models, and that the

papers were reduced to 31 from three databases that contained 234 articles. Google Scholar, the world's largest research database, displays peer-reviewed articles that are less than 5 years old. Because of the nature of Google Scholar's search engine, most papers were scanned through the title and keywords of 332 articles to yield 55 articles, and only 8 articles were reviewed after reading the abstract. As mentioned before, "cooperative" as a word can mean many things and is used in different disciplines such as mining, engineering, education, and business.

Table 1: Databases Articles on Cooperatives and Blockchain technologies

Databases	Title and Keywords	Title, Keywords and Abstract	Full review and cited
Google scholar	332	20	10
Web Science	235	5	4
Scopus	471	7	4
Total		32	18

The 18 articles, which were fully reviewed, had the elements of integration clearly showing the relationships between the blockchain technology and the cooperative principles, which are illustrated in Table 1.2. Each paper is researching the blockchain with a specific technology and can relate the technology to one or more of the cooperative principles. In most cases, the papers that are in Google Scholar are also available in Scopus and Web Science, so such repeated articles were eliminated (Lykidis, Drosatos, and Rantos, 2021).

Table 2: Cooperative Principles and Block Chain Technologies

	<i>Cooperative principles</i>	<i>Blockchain Technologies</i>	<i>Author</i>
	Open and Voluntary Membership	Colony Connected And Autonomous Vehicles	(Mannan, 2018), (El Faqir, Arroyo and Hassan, 2020) (Raja <i>et al.</i> , 2022),
	Democratic Member Control	Automated governance/e-government	(Petersen, 2022), (Razzaq <i>et al.</i> , 2019), (Rocas-Royo, 2021), (Kassen, 2022),
	Members' Economic Participation	Equity-based blockchain token	(Kamilaris, Fonts and Prenafeta-Boldú, 2019),

			(Alaassar, Mention and Aas, 2022), (Battisti, Creta and Miglietta, 2020)
	Autonomy and Independence	Decentralised Autonomous Organisations Distributed crypto-ledger Distributed Ledger technologies	(Nabben <i>et al.</i> , 2021), (Mannan, 2018), (Manski, 2017), (Singh and Kim, 2019), (El Faqir, Arroyo, and Hassan, 2020) (Kamilaris, Fonts and Prenafeta-Boldú, 2019) (Manski and Bauwens, 2020)
	Education, Training, and Information	Reinforcing Learning	(Raja <i>et al.</i> , 2022)
	Cooperation Among Cooperatives	Blockchain decentralised structures Smart Contracts	(Brülisauer, Costantini and Pastorelli, 2020) (Lee <i>et al.</i> , 2022)
	Concern for Community	Cooperative efficiency Smart Grid technology in blockchain	(Nair and Sutter, 2018) (Manski, 2016)

Table 3: Research Process

<i>Step</i>	<i>Description</i>
<p><i>Stage 1</i> <i>Formulating research objectives</i></p>	<p>Research objectives</p> <ol style="list-style-type: none"> 1. To review the cooperative principles 2. To identify blockchain technologies relating to cooperative enterprises 3. To match the blockchain technology with cooperative enterprises
<p><i>Stage 2</i> <i>Locating. Selecting and reviewing articles</i></p>	<p>Literature database Web Science, Scopus and google scholar</p> <p>Search period 2017 to date: Blockchain as a recent emerging field most article are recent.</p> <p>Inclusion criteria Cooperatives principles and blockchain technology</p> <p>Exclusion criteria Any cooperative meaning which is not relating to social economy or enterprises</p> <p>Search strings 'Cooperatives and blockchain' 'Blockchain and cooperatives' 'Cooperative enterprises and Blockchain' 'Blockchain and cooperative social enterprises' 'Social economy and cooperative 'Bitcoin and cooperative/ social enterprises/economy'</p>
<p><i>Stage 3</i> <i>Analysis</i></p>	<p>Methodology and analysis Descriptive and content analysis</p>

Source: Mageto, Joash, and Rose Luke (2020)

Table 4: Contribution Journals

<i>Journal Name</i>	<i>Publisher</i>
<i>(IJACSA) International Journal of Advanced Computer Science and Applications</i>	SAI
<i>Review of Management of Science</i>	Springer
<i>Journal of Financial Regulation and Compliance</i>	Emerald
<i>Trends in Food Science and Technology</i>	Science Direct
<i>Electronic Markets</i>	Springer
<i>Studies in Systems, Decision, and Control</i>	Springer
<i>Information Systems</i>	Science Direct
<i>Independent Institute</i>	Jstor
<i>Industrial Marketing Management</i>	Science Direct

4 Data analysis, findings, and discussion

The two blockchain technologies discussed under the key finding are the colony and automated governance of e-government. These are the two key tools in the paper that are intensively discussed linked to the cooperative principles.

4.1 Colony

Colony aims to establish decentralized, self-organizing businesses in which decision-making authority derives from high-quality work (Mannan, 2018). The cooperative's first principles, open membership, and democracy, are compatible with the blockchain colony, as it advocates self-organized enterprises that are decentralized. As autonomous businesses, cooperatives should rely solely on their members to produce quality work to sustain the business or organization without reporting to or receiving orders from any other organizations or businesses. Colony's proposed capital and governance structure, based on technological and game-theoretic insights, may provide valuable lessons for cooperatives seeking to connect globally dispersed workplaces via the Internet (Mannan, 2018). The colony is also supporting the principle of cooperation among cooperatives and the principles of education, training, and information. The colony can be able to integrate cooperatives in different areas to work together on an online platform. It can also provide support by providing training and information online. This is mainly the principle of cooperatives: that different cooperatives work together, and that there is continuous training, education, and information sharing. Today, many e-hailing companies are privately owned, with

drivers working for them as independent contractors. In other words, the drivers, or vehicle owners, are working on behalf of themselves and the e-hailing companies. They are e-hailing business models that operate more as cooperative enterprises, as the vehicle owners and the drivers do have a stake in the e-hailing business, so they are not independent contractors but own shares in the e-hailing business. There should be an open and voluntary membership for all the members. Even though, unlike the traditional cooperatives, the e-hailing business has its challenges when it comes to full membership and autonomy, more work or research will need to be done to come up with a model that is fully autonomous, open to all the members, and operates fully as a cooperative with all the cooperative principles.

4.2 Automated governance or e-governance

Governance in developing countries remains the biggest challenge in different sectors that are governed by the state. E-governance, or automated governance, automates e-health care, e-army, and e-migration (Kassen, 2022). From a paper-based bureaucratic process to digital services, e-government services have evolved significantly in the past decades (Lykidis, Drosatos, and Rantos, 2021). Blockchain technologies are integrated and achieve all the cooperative principles' goals and objectives. In contrast to traditional contractual and relational governance as well as other IT solutions, blockchain offers an automated framework for enforcing agreements and achieving cooperation and coordination (Petersen, 2022).

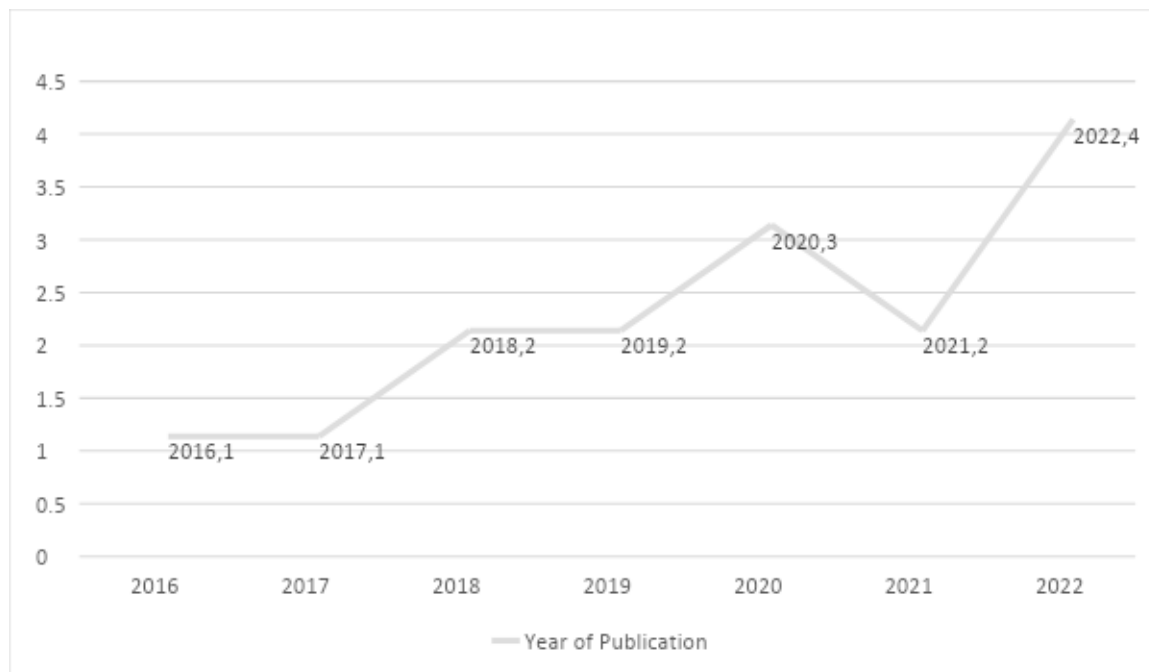


Figure 1: Years of publication

The first paper reviewed in the study was published in 2016, in 2022 which is the current year, only 4 papers were published. This shows that the research is still in the early stages or gradually emerging. This is because blockchain, is one of the 4th industrial revolution tools which are still emerging and starting to gain momentum within the research.

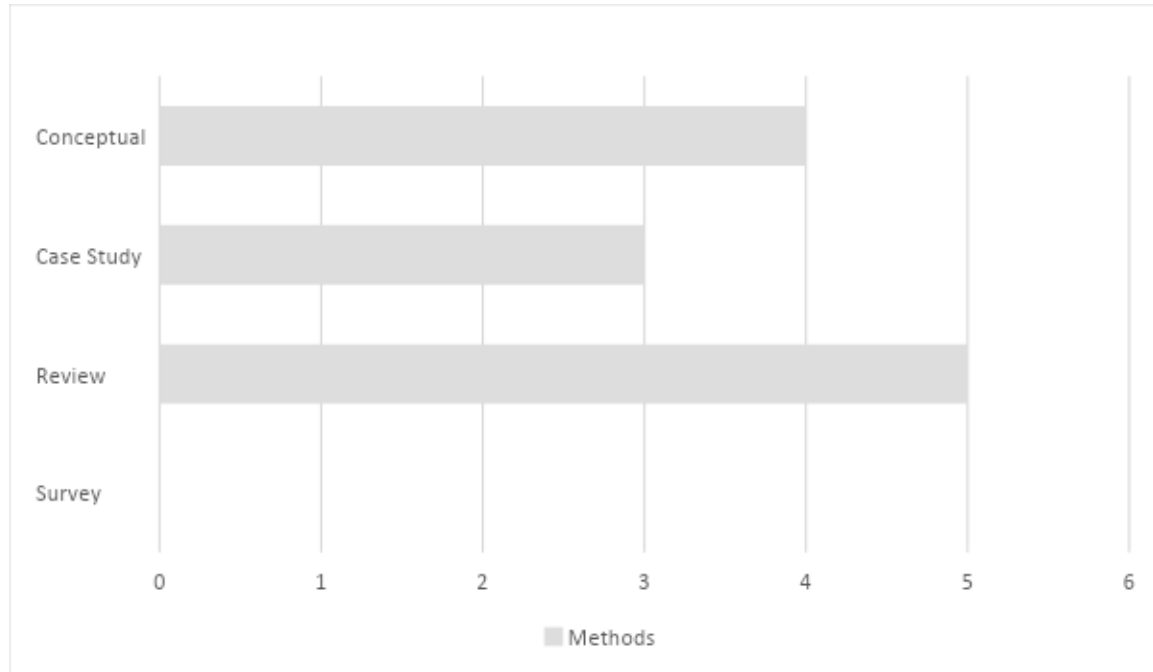


Fig 2: Research Methodology and Percentage of Articles

The papers examined describe the research methods employed, which included conceptual, case study, and literature review. of the articles were based on survey research methods. This shows that blockchain technologies and collaborative research are still emerging and require more attention as the is a positive impact if the two can gain more interest from the researcher and practitioners. Cooperatives are impacting positively to communities and blockhain technologies can strengthen the impact.

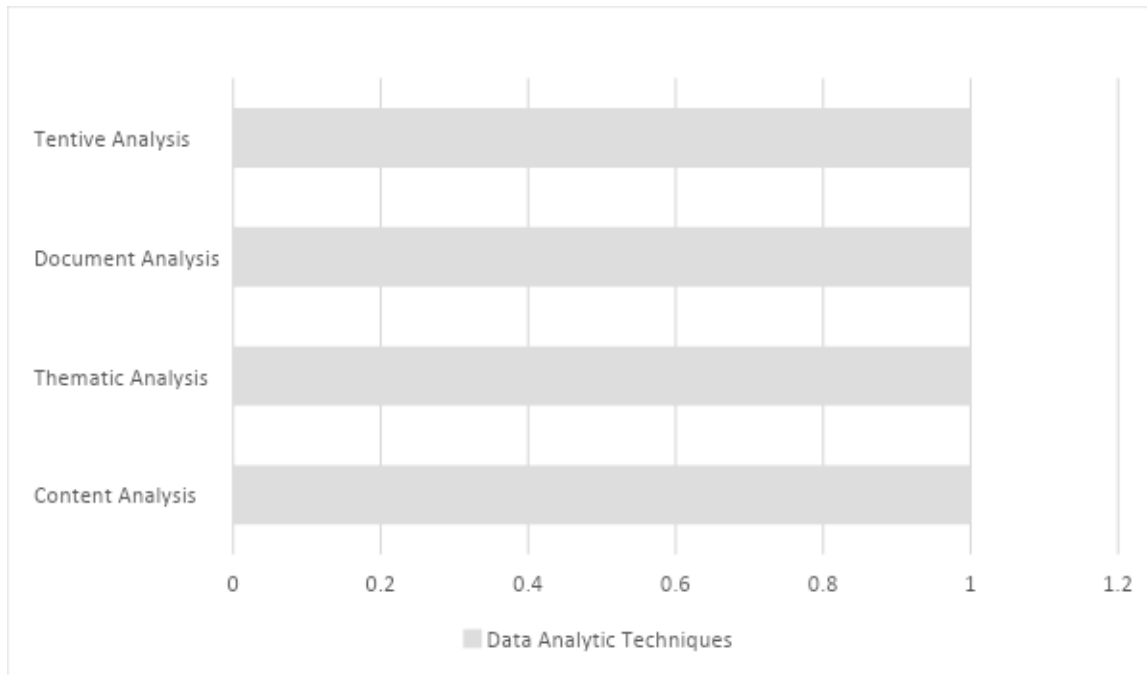


Fig 3: Research analysis for papers reviewed

The total number of papers which the full text was reviewed are 18 articles from 2016 to 2022. As shown in Figure 1, 90% of the reviewed paper are from the previous five years. The analysis used to review the papers are tentative, document, thematic and content analysis. Most of the research papers are qualitative, which shows that the area still lacks the quantitative study and more importantly empirical research.

4.3 Discussions

Shared Ownership and Control: Both blockchain and cooperatives are characterized by member ownership and democratic control. This commonality makes blockchain a fitting technology to support cooperative structures.

Blockchain technologies inherently align with several cooperative principles, enhancing their application in cooperative contexts. Colony aligns with several key cooperative principles, particularly those related to membership, control, participation, and autonomy. While the DAOs and DLTs are aligned with membership, control, economic participation, Autonomy and Independence, community concern and cooperation among cooperatives.

Blockchain's decentralized and secure nature can make cooperatives more resilient during emergencies or difficult periods. Which is already one of the strength of cooperatives worldwide. Cooperatives, with their decentralized and secure nature, have proven to be resilient during crises, including the COVID-19 pandemic (Billiet, et. al, 2021; Birchall, 2013; Dongre and Paranjothi, 2020). This resilience is attributed to

their member-centric governance, embeddedness in local communities, and mission centrality (Billiet, et al, 2021).

The governance challenges in emerging economies, which also affect cooperatives, can be addressed by blockchain technology. It offers potential improvements in cooperative governance and national level policy and regulatory frameworks, including aspects like elections.

Blockchain enables cooperatives to operate globally, breaking geographical barriers and fostering a more inclusive membership. The willingness of the end product producers, such as coffee and the cocoa products, can leverage from the blockchain technology through embedding in within their supply chain network to eliminate the poverty experience by the cocoa and coffee farmers in emerging economies. In agricultural contexts, blockchain can make the pricing of commodities and final products transparent and traceable. This can combat issues like counterfeit goods and unfair practices in supply chains. The blockchain technology's potential to improve supply chain transparency is evident, but further research is needed to understand its full implications.

By eliminating intermediaries, especially in savings or credit cooperatives in emerging economies, through usage of blockchain technologies can reduce costs and increase efficiency. The technologies such as smart contracts, DLTs and DAOs are among the blockchain technologies which can be used in saving or credit cooperatives. While the field is still emerging, current research shows growing interest, indicating that blockchain technology could significantly strengthen cooperatives, especially in governance and supply chain management.

5 Conclusion and recommendation

South African cooperatives are faced with numerous challenges which mainly are the failure rate due to poor governance. The blockchain technologies can be a new route of success for such cooperative, there is still a lot on groundwork which needs to be done, by the government, private sectors, non-governmental organisations and educational institutions. Research in the field still needs to be conducted, cooperative members need to go through intensive training and learning of cooperative governance before any other interventions. The blockchain can bring in technologies which will make the mission possible. Colony advocating for education and training while integrating cooperatives in disperse locations will mean more information sharing among the South African cooperative enterprises. The future research should concentrate on the research of all the blockchain technologies and its impact and relevance to cooperatives.

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Interrogating the potential role of agricultural cooperatives on township's local economic development

Mbokazi, NM¹

Orcid: <https://orcid.org/0000-0001-5764-1974>

Maharaj, P²

University of KwaZulu-Natal

Correspondence: mbokazivictordonda@gmail.com

Abstract

Cooperatives have been long recognised as a collaborative effort to help a group of individuals to address their social and economic needs. It is also adopted by the South African government to address the triple challenge of poverty, inequality, and unemployment. To that extent, cooperatives have been widely recognised as catalysts for economic development and have featured prominently in national, provincial, and local development strategies for inclusive growth. Agricultural cooperatives have been widely supported and promoted as a vehicle for smallholder farmers to directly participate in the mainstream economy of South Africa. Despite the optimism on the potential of cooperatives, the performance of cooperatives in the local economy is below expectations considering the enormous assistance from the government. Drawing on 15 face-to-face interviews with members of agricultural cooperatives in township in South Africa, this study interrogates the extent to which agricultural cooperative can enhance local economic development and sustain livelihoods. The interviews suggest that some cooperatives were found to empower, efficiently use resources, sustain livelihoods, and create job opportunities to the community. However, challenges like a lack of access to local markets, insufficient resources, as well as other underlying internal and external shocks are hindering the contribution of the cooperatives to the local economy. Nonetheless, these agricultural cooperatives demonstrated a great potential to grow in impact the local economy. What remains to be explained is how agricultural cooperatives can maximise this potential.

Keywords: Agricultural cooperatives, local economic development, local economy, small-holder farmers, township economy.

1 Introduction

Over the years South African government has actively promoted and supported the development of small business including cooperative enterprises as part of the strategy to help poor communities to actively reduce poverty, unemployment, and inequality. Despite this support given, the growth and performance of cooperatives in these communities has been noted to be stagnant due to un-suited environment that diminishes the way they function in enhancing local economic development (Gotyi et

al., 2021) A cooperative is formed by a group of individuals who either become consumers, producers, and/or workers, it is formed under certain guidelines and principles to achieve a common objective (Zeuli et al., 2004). This could be a group of smallholder farmers working together to increase their yield production by combining resources to achieve improved yield production. The term cooperative is diverse and found in different sectors of the economy. For our purpose, we rely on the scholarly definition provided by the International Cooperative Alliance (ICA), it defines a cooperative as an autonomous as-sociation of person united voluntarily to meet their everyday economic, social, and cultural needs and aspirations through a jointly owned and democratically con-trolled enterprise (ICA, 2012).

There are many different forms of cooperatives such as financial services, production and distribution, agriculture, home, and health care, however there is no general agreement on the types or forms of cooperatives available. This work draws on the delineation of the forms of cooperatives from Okem (2016a), which notes that cooperatives are categorised based on the membership structure and type of service provided. There are mainly four primary forms of cooperatives. These are consumer cooperatives (which ideally deals with the purchasing of goods in bulk and selling them at their value-added price), worker cooperatives (a group of workers may join together to start a business of which they concurrently become its employees), producer cooperatives (owned by a group of people who produce the same kind of goods), financial cooperatives (they provide financial assistance to their members and in certain occasions charge interest on their loans to generate more income).

Smallholder farmers use a cooperative strategy to collectively produce, use resources, sell, and make a profit to benefit themselves as members. The goal of the agricultural cooperatives is to help smallholder farmers enhance productivity and income by combining resources to promote the delivery of collective services and economic empowerment. Therefore, they are perceived as an economic vehicle for these farmers to improve their livelihoods through resources pooling and risk sharing (Mhembwe and Dube, 2017). Further, in all the forms of cooperatives available in South Africa, agricultural cooperatives have been increasingly pro-moted as a tool for enhancing economic development for subsistence farmers (Moloto, 2012). Given their primary ability to help small farmers enhance their bargaining power and become market competitive, South African agricultural cooperatives have received a considerable attention. Khuzwayo (2016) convincingly claims that it is mostly agricultural cooperatives that are seen as effective poverty reduction strategies. Previous studies have demonstrated interest in agricultural cooperatives (Xaba 2018; and Mntambo 2012), this work critically observes that there has been more emphasis on the success, failure, sustainability and social involvement without exploring their economic contribution at a local level.

A study conducted by Bandyambona (2014) in the Inanda, Ntuzuma and KwaMashu (INK) areas which is one of the most populous townships in Kwa-Zulu-Natal shows that agricultural cooperatives as part of the local economic development initiative (LED) based in townships still fail to achieve their purpose of creating employment and combating hunger. There is an increased number of cooperatives being formulated in townships to be part to the township economy, however due to lack of understanding of such a business model they tend not to survive nor be fully functional thus not significantly contributing to the local economy of the township (Charman, et al., 2020). In the light of these observations our study selectively explores agricultural cooperatives within a township setting because townships provide unique social systems and local economic activities. In this work, a case of Waterloo township was used to explore and gain insights on the nature of agricultural cooperatives, use of resources, impact cooperatives both social and economic. It thus argued that the failure of these township-based cooperatives in addressing the triple challenges such as poverty, unemployment, and an inviable local economy is a result of several internal and external challenges that this cooperative face.

Despite the effort and support provided to them, smallholder farmers in eThekweni townships are facing many challenges, such as access to funding, markets, information and resources, and these challenges continue to overshadow their efforts (Mutero et al., 2016). Nevertheless, studies (Khuzwayo, 2020; Khumalo, 2014 and Sifa 2014) attest to the fact that agricultural cooperatives provide a good collective structure to help small communities including townships to foster economic activities that will enhance their livelihoods. Therefore, following from the above, this article seeks to interrogate the extent to which agricultural cooperatives in a township contribute to the local economy and household livelihoods. The discussion centres on understanding the extent to which existing internal and external inter alia challenges affect the potential contribution of these cooperatives to the local economic development.

2 Materials and Methods

The phrase "township" or "location" in South Africa often refers to the racially segregated urban communities that were typically built on the periphery of towns and cities, and they were designated for nonwhites (Indians, Africans, and people of colour) from the late 19th century until the end of apartheid (Mbambo and Agbola, 2020). The study was conducted in Waterloo, which is one of eThekweni Municipality's townships. Waterloo is a newly established township which is geographically located in the Northern region of the eThekweni Municipality. The township is 12 kilometers away from Durban central and few kilometres away from Verulam which is the nearest village. Waterloo is characterised by low socio-economic status with high levels of unemployment. There are a limited number of economic activities in this township. There is a mixture of formal and informal economic activities with few street vendors

who sell various goods. Formal activities are dominated by small and large retail business.

The recent promotion and support of Small, Medium and Micro Enterprises (SMME) and cooperatives enterprise have found its niche in the township, and it has increased the presence of internal economic activities. There are also natural assets such as land, dams, and streams in the surroundings. We used a case study approach because it generates an in-depth understanding of a complex issue, such as to assess the effectiveness of the cooperative programme in contributing to the local economy. The case study approach also allows the researcher to draw lessons that could be learned and applied to other case studies and provide constructive recommendations for future practices.

In this work, a qualitative research method was used to explore the impact of agricultural cooperatives on the local economic development of Waterloo township and eThekweni Metropolitan at large. As this method sought to comprehend issues from the participants perspective, Leedy and Ormrod (2001) state that it ensures that the views of the participants are not detached from their natural context, and it allows the researcher to understand the thought, feelings, and behaviour of the investigated population. Therefore, from the above explanation, this method was chosen to allow the researcher to engage with the respondents.

For this research, non-random sampling, in particular, purposive sampling was adopted, the idea behind purposive sampling was to concentrate on individuals with traits who will be able to assist the researcher in pursuing the study objectives. This sampling method was convenience in the sense that the researcher had access to the database of all registered agricultural cooperatives in Waterloo, and it is accessible via the ward councillor's office. From the list of seven (7) registered agricultural cooperative in Waterloo five (5) were chosen based on their functioning status (meaning they have been operating for more than five years). This study consisted of a sample size of fifteen participants from five (5) agricultural cooperatives in Waterloo. The selection criteria included members who have been in the organisation for a long period and excluded new members. Selected agricultural cooperative were Phezukomkhona, Washoke, Yiba Nobuhle, Mangothobane and Abaphumeleli.

Interviews were conducted between January to March 2020 using a face-to-face method, as opposed to telephonic or mail. This was an opportunity to determine whether the interviewee understands the interview and whether they accepted voluntarily to participate in the study. Further, interviews were conducted in the site where the cooperatives were located to ensure the convenience of both the interviewer and interviewee and that the interviewees are comfortable with the interview session. A tape recorder was used to record information, and all interviews were conducted in

the participant's local language (isiZulu). The researcher conducted all the face-to-face interviews with participants. Each participant was interviewed separately in a quiet space, and each interview was approximately 30 to 40 minutes.

Ethical approval for this study was provided by the University of KwaZulu Natal Human Ethics Committee approval number: HSSREC/00000200/2019). Permission from the local authority was obtained; in this case, it was a ward councillor of the Waterloo township. Before the interviews begun, participants signed and provided approval or consent to participate on the study.

3 Results

From the findings, four key themes emerged. These were (1) resource availability and utilisation, (2) impact to the local economy, (3) the extent to which it impacts livelihoods, and (4) challenges of operating agricultural cooperatives in townships.

3.1 Resource availability and utilisation

The findings show a correlative relationship between the use of resources and their contribution to enhance the local economy. These resources are categorised in four main ways, i.e., human (skills, talents, and expertise), financial (funds, donations), social (networks or connections), physical (infrastructure), and natural (extracted from nature) resources. Using these resources depend on availability which varies on each cooperative, and this affects the extent to which they can have impact on the local economy of the township. Noted from the finding, cooperative do have access to some resources, however, they do not have full access to some of these resources such as financial and physical resources. This means they are sometimes forced to outsource those essential resources which are not available in their community. In all the agricultural cooperatives, farmers use their knowledge and capabilities to carry out the day-to-day functions in the fields, additionally they make use of expertise knowledge from other community members who are not be part of the cooperative.

Two of the cooperatives mentioned that they try to employ people from the community who have expertise in farming to assist them. They also note that it makes a significant impact in those people's lives. One cooperative highlighted that they have one member who is a university graduate in this field; they relied on his expert knowledge to guide them. Additionally, they use experts in the respective agricultural field, one of the participants stated the following:

'...we also a young member who is a natural science student, even though he is not around all the time as he stays in school, but he is always willing to help with the knowledge he has in the agricultural field.' (Mangothobane02, 2020).

role in the lives; therefore, we try by all means to open opportunities to them” (Abaphumeleli, 2020).

They also make use of existing networks they have with people in their daily life, e.g., church, stokvel, society groups, and other social groups. These networks are significant, as they further extend their market opportunities. Also, people from these interactions have become their target market.

to people from church request to buy our products and ladies from our stokvel support” (Washoke 02, 2020). One member stated that their cooperative sells their products to local communities such as churches and stokvels. By discovering these networks, they can withstand market related challenges. Another participant stated they also partner with other cooperatives. “During the Wednesdays in Umhlanga Framers market, we partner with Phezukomkhono because they have good spinach and carrot, we go with them to sell on our slot in the market” (Washoke 01, 2020).

Only two cooperatives mentioned that they have a working relationship, they pool together their produce on certain market days to be able to sell in bulk, this has assisted them to be competitive in the market. Since some of these cooperatives specialise in different products, the market requires them to sell a variety of products. Therefore, they partner with other cooperatives to maximise their income.

3.2 Impact on the local economy

As it has been argued by Moloto (2012) that the economic contribution of cooperatives is not measured by the amount of money that they generate but the economic benefit to the community however this heavily depends on how the cooperatives making income. It was noted that in some months, cooperatives find it hard to generate income for themselves since many factors determine their product and pricing; therefore, the member was asked to respond to the question of their monthly generation. These finding generally indicated that these cooperatives have a limited economic contribution to members lives. It further showed that they do not generate enough money, and the income does necessarily lead to a profit. The money that is generated is often used to cover farming expenses. “* ... § 2 ± . ° ✕ ® “ “ ± 2 , a « ° 2 ± “ our contribution to the entire community, while we sometimes buy small things like packaging material and other stuff from local retailers...” (Yiba Nobuhle 2020).

Nevertheless, these agricultural cooperatives were noted to have an indirect contribution, they do this in several ways; they create business opportunities for other local businesses by renting a market space to sell their produce at the local market, they hire farming machinery like tractors and irrigation pumps, they hire transport to take their products to the market, they sometime sell local small supermarkets to resell produce like vegetables. Participants stated that their contribution to the economy was

limited, even though their cooperatives employ members from the community. Nonetheless, they believe that the employment opportunities provided by these cooperatives is somehow helping to improve the household livelihoods of their employees. This shows that cooperatives do sustain daily living but does not lead to creating permanent or wealth generation per se.

3.3 Extent to which cooperatives impact livelihoods

The core objective of an LED strategy is to alleviate poverty and generate employment opportunities; therefore, we used these indicators to assess the effectiveness of agricultural cooperatives (as an LED strategy) towards achieving a significant contribution to the LED. The ICA (2005) identifies 'concern for the community' as one of the seven fundamental principles governing the cooperatives, stating that every cooperative should have an impact on the community in which they are located, or they are serving. This research aimed to interrogate the extent to which these agricultural cooperatives contribute to household livelihoods and the LED of Waterloo township. Thus far, the analysis above has demonstrated that agricultural cooperative in this township does, in some way, contribute to the household livelihoods; however, their contribution to the local economy is limited.

When participants were asked how they think the community benefit from the existence of their cooperative, a majority mentioned the impact it has on people's livelihoods rather than the economic impact on the community. However, few members openly acknowledge that their cooperatives are not as effective as they would have liked it to be, and their contribution to the economy was limited. *"I am not really sure hey, even though we sell to them and employ two people from the community, I think our contribution to the economy of Waterloo is not enough". (Washoke 01, 2020). "...we occasionally employ people from the community, and we pay them R60 an hour they spend in the garden which I think is not enough considering that these are seasonal jobs" (Mangothobane02, 2020).*

One member stated that their economic contribution was limited, even though their cooperative provided job security for two ordinary members from the community. Nonetheless, the employment opportunities provided by these cooperatives will in the long term improve the household livelihoods.

3.4 Challenges affecting agricultural cooperatives potential

It was discovered that there are challenges which are peculiar to all agricultural cooperatives; however, some are more severe in some cooperative and they hinder the contribution of these cooperatives to the local economy. Many people living in the township lacks basic training and necessary knowledge, but they can use their natural or inherent skills like planting to carry out agricultural activities, this was evident because most member had little to no formal training in farming, but they are able to

participate in daily activities of their cooperatives. The key factors driving agricultural cooperatives were education and training, skills, enthusiasm or passion, and family background.

From the findings, it is clear that members have little to no idea of how a cooperative should be operated as per the cooperative principles. For cooperatives to thrive, they should have equitable access to information for skills development, market and funding sources as reported in the follow excerpt:

“... we have had the same board over the past 7 years...” (Phezukomkhono02, 2020).

This shows that such cooperatives do not have a binding constitution that they adhere to as well as stipulate the regulations of members. Lack of understanding of this business model and cooperative principles, as well as its expectations, is a recipe for failure. The following are challenges by categorisation:

3.4.1 Lack of mutual trust

Cooperatives like Phezukomkhono and Mangothobane mentioned that there were some cases where members were not trustworthy with funds. This leads to the ethos of a cooperatives being broken. *“Some members left the cooperative after we found out that one of our board members used funds for their personal things, so I think this is the reason why we do not trust one another when it comes the money that we make”* (Phezukomkhono3, 2020).

It is for these reasons that the Phezukomkhono cooperative have decided to take some of their products and sell them individually to minimize such. *“Things that are easy to produce and available all seasons like spinach, we decided to sell individually after harvest because it has previously caused problems before were some money had gone missing. So we are*

Dividing and selling products individually defeated the whole purpose of being in a cooperative. Moreover, it is often argued that when members do not trust the cooperative or do not view it as a sustainable venture that will help them contribute to their livelihoods in the long run, they tend to have a strong desire to acquire capital and other benefits as quickly as possible. In this case, some members are more eager for financial gains hence they do not trust those who are responsible for finances in the cooperative. Therefore, trust becomes a stumbling block in the progress of these cooperatives because the cooperative vision is not the same amongst all members. When members do not trust one another, it becomes a challenge, but most of all it breaks the cooperative principle.

3.4.2 Lack of resources

Lack of vital farming resources prohibits farmers from increasing production to meet market demands. Production demand is rising, but the resources available to farmers are insufficient. It was discovered that most of these agricultural cooperatives have limited ownership of farming equipment, such as tractors and other essential farming tools; this often delays the farming process. The tractor that they used it were given by the municipal agricultural programme. It was said that the tractor is shared among other agricultural cooperatives with three different townships so there is a huge demand on the use of this tractor which results on some cooperatives not getting access to it. In such cases, the cooperatives outsource a tractor from other local service provider using their own funds which increases operational costs. They sometimes found it difficult even to get this tractor, as some members indicated that they have tried to request the tractor on several occasions. Still, they have failed and decided to hire a tractor from the local businesses.

3.4.3 Theft

Theft of crops and irrigation pipes in the three cooperatives (Phezukomkhono, Washoke, and Yiba Nobuhle) was found to be a cause of slow production, in turn, respondents noted that this forces them to do the same thing over again, therefore, leading to little or no progress in their endeavours. Theft of irrigation pipes has been a vast constrain for Phezukomkhono, and it has caused their water source to be inconsistent because they use traditional ways of watering plants, which are often laborious and insufficient for crops.

3.4.4 Funding assistance

Emerging agricultural cooperatives require financial assistance to sustain their daily operation and expand their business. Assistance may be provided in the form of infrastructure, assets, training, mentoring, startup capital, incentives and cash or services. Assisting in some or all the above ways would help them to develop into self sustainable cooperatives. It is more reasonable to assist cooperatives which have already begun and thus have an agenda or a sense of mission. Only three out of the five cooperative pointed out that they have been assisted by the one or two government stakeholders and officials. However, the assistance remains insufficient since it does not meet the financial needs of the cooperatives.

3.4.5 Market barriers

Smallholder farmers join a cooperative venture to become more competitive on the market, because selling as a collective give farmers advantage over those who are selling individually. However, cooperatives in townships have demonstrated to face significant challenges with accessing these markets. In any business form, market is one of the fundamental components to conduct sales. All five cooperatives used direct marketing strategies such as selling to neighbours and surrounding creches to attract

and sell their produce. Therefore, often they are directly required to travel to their customers (markets). All cooperatives have been noted to have had a similar issue concerning market access, and farmers reported that they had limited formal markets, and they believe that this could be the only way they would contribute to the economy of Waterloo. Three cooperatives have approached a local supermarket (Spar) but their proposal was rejected on the basis that they do not produce in large quantity and their products are not always up to a good standard. *“In terms of accessing formal markets, our local Spar does not want to buy produce from us because we produce small portions. Therefore,*

Abaphumeleli cooperative's primary market is community members. Yiba Nobuhle and Mangothobane cooperatives sell in the formal markets in Verulam and Phoenix. Currently, Phezukomkhono and Washoke cooperative sells what is on demand on the market, and therefore they have mastered the tricks of avoiding losses. However, Phezukomkhono as mentioned in the challenges section above, due to members not trusting each other, they sometimes divided the product and allowed each member to sell their portion, which limit their success in markets.

The purpose of this study was to assess the contribution of agricultural cooperatives to the local economic development of Waterloo. Views gathered from the in-depth interviews indicate that these agricultural cooperatives have limited impact on the economy of this township. However, to a certain extent they do contribute to the member's livelihoods. Moreover, it was discovered that there are challenges which are peculiar to all agricultural cooperatives, but some may have severe impact than the other and they hinder the contribution of these cooperatives.

4 Discussion of Research findings

Primarily, this research study interrogated the extent to which agricultural cooperatives can sustain a living and contribute to the local economic development of the township. The overall results on studied agricultural cooperatives indicate that even though these cooperatives are faced by several challenges ranging from internal to external challenges, they demonstrate a potential in enhancing township economies and sustaining community livelihoods. For cooperatives to reach the untapped potential, Fourie and Malan (2021) emphasise that cooperatives need an economically enabling environment that can allow cooperatives to thrive. The findings of this work concur to this argument because the results show that a township as a location does provide a suitable environment compared to rural locations. Generally, farmers use a cooperative model to address a problem of insufficient resources by pooling their resources together to achieve a critical mass (Cishe and Shisanya, 2019). While all cooperatives in this township use available resources, our findings suggest that members need more capacity to harness some of these resources. For example, one cooperative mentioned that they do not have the necessary skills to work the watery

plot, which suggests that a resource like land may be available, but since members do not have proper knowledge/skills of how to use it, they may not use it on its full capability. Thaba et al., (2015) reiterate that the primary purpose of engaging into a cooperative enterprise is to collectively involve members to access market, economic and social resources that are almost impossible for individuals to accumulate and utilise. Indeed, the findings shows that members leverage on resources like networks and collaborations with other cooperatives to remain competitive in the market.

Since cooperatives are member-centred, the study results show that members are primary beneficiaries of the work they do, they benefit by getting cheaper vegetables, earning cash, and supporting their families financially. However, given that agricultural cooperatives in Waterloo can extend employment opportunities beyond its members and engage in business with other local businesses in the community, it suggests that these cooperatives could potentially make a much more significant contribution to the local economy to this township. Ajates (2020) alludes that a cooperative's greater impact begins with its member benefiting either economically or socially and extends to a community level then scaleup to the wider region or country.

Despite the studied cooperative's ability to create job security for its members, they sometime find it difficult to extend those opportunities to the rest of the community without incurring more costs thus they have a limited wider impact. Shiferaw et al., (2011) argues that cooperatives should benefit the collective and should be transferable to members households. The interviews suggests that all the members of the cooperative indicated that they support their families either with food from the farm or with the money made through the sale of produce (agricultural wages). Yobe et al. (2020) acknowledges that agricultural cooperatives may be a viable way for self-employment opportunities through agricultural wages, however, members with larger households may choose to have other sources of income. In this research it was more common with younger (age 40 and below) members to have primary source of employment to maintain their day-to-day living and use a cooperative as a secondary source of income. Despite all agricultural cooperatives not paying salaries to its members, members reported to have monetary benefit, for example they save some money when buying vegetables from their cooperative since they sometimes get them at no cost or discounted prices as compared to buying at a regular supermarket, this may be an economic contribution which concurrently makes a positive impact to their livelihood.

Apart from the negative findings, this work critically notes that agricultural cooperatives in this township demonstrated a potential to enhance the standard of living for many households, however, this potential is debilitated by several challenges. The interviews suggest that agricultural cooperatives in Waterloo are not

performing at an optimum level and, as such, do not have a positive impact on the LED. This study notes that there are many challenges faced by agricultural cooperatives in Waterloo, these were categorised as internal and external factors. Internal factors are noted to be those challenges arising within the cooperative whether caused by member incompetence or performance. Limited access to relevant information/ education, lack of commitment, and lack of mutual trust were seen to be dominant factors that are common within all the cooperatives. There is complete lack of understanding of the relevant regulations governing cooperatives. As noted previously, failure of cooperatives may be determined by the insufficiency in technical information required to operate a sustainable cooperative (Xaba et al., 2018), findings shows that due to members limited access to information knowledge they lose out on information like new farming methods and skills that could make farming easier and more effective.

It is also important to point out that the degree to which members of the cooperative are equipped with information and skills have an impact on their cooperative overall performance. Participants revealed that only a few training courses have been offered to them and often they could not attend because of the location which was difficult to access as it was far from where they live. Therefore, it can be argued that their poor performance is a result of unkindness and fail to make a meaningful impact compared cooperatives that have received continuous skills training. Lack of skills directly results on the poor management which generally leads to internal conflict (Fourie and Malan, 2021).

Studies suggest that if cooperatives are appropriately managed and operated, they are likely to make a more significant impact on the member's socioeconomic status (Bandybona, 2014; Gotyi et al., 2021). Findings show that the management structure of these cooperatives is unregulated, which then causes the members to lose confidence in the management and this has created a lack of mutual trust. It was also found that the limited contribution made by cooperatives in the LED of Waterloo township was partly due to a lack of interest and unwillingness to participate in agricultural activities amongst some members which led to their cooperative being poorly managed. Some members were found to be joining a cooperative to solely gain financial benefits for examples some member joined agricultural cooperatives because they heard that they will receive funding from the government entities. They are often easily discouraged to continue when their expectations are not met or when challenges outweigh the benefits. Nevertheless, the interviews suggest that there are members whose attitudes is positive and are willing to continue being part of this venture despite the obstacles. The motive of joining a cooperative usually determines the effort members will contribute, therefore it appeared that members who joined because they wanted to get 'easy money' were the ones who did not contribute as much effort as those who were more supportive of collective agricultural benefits.

This has caused a problem for those who were committed to the cooperatives since they felt like the rewards earned benefited the 'free-rider' members.

The findings also revealed several external factors which impend the success of these ventures. The foremost concerned is the lack of resources, which play a significant role in enhancing the contribution of cooperatives to the LED. The emphasis on lack of proper infrastructure or facilities that makes the operation of the value chain stable like storage facilities and transportation was noted. Moreover, it was revealed that some cooperatives have a challenge of keeping their gardens secured, as a result it becomes exposed to the wild animals and some people in the community who plough without permission. Lastly, there is a significant lack of support, whether financial or psychosocial offered to the agricultural cooperatives in Waterloo, this becomes a challenge to them since the 'facilitators' of the programme are no longer available to provide necessary assistance to cooperatives. Consequently, what seem to be a problem in these selected agricultural cooperatives is the fact that idea of establishing an agricultural cooperative was introduced by government as a programme of poverty alleviation and employment creation strategy. An involuntarily participation has been also noted as a concern in previous studies (Moloto 2012, Gotyi et al., 2021) this is because the idea of initiating a cooperative was brought by state officials opposed to it being autonomous and voluntarily formed by its members. Evidence from the result suggest that this approach creates dependency because cooperatives continuously rely on the government support or guidance and fail to be autonomous. This transgresses one of the important cooperative principles of 'autonomous and independence'.

Cooperatives as an LED strategy receive limited financial support, skills development, and training, making them merely development projects to improve the lives of people in marginalized communities (Khumalo, 2014). Though some members mentioned being assisted with farming equipment, it also appeared that there has no form of financial assistance provided to cooperatives in Waterloo since their initiation. A study by Shava and Hofisi (2019) showed that a relatively short lifespan in the studied cooperatives was closely connected to insufficient funding and resources. One of the noticeable differences in the results of this study compared to existing studies, was the emphasis on the use of available resources. We argue that for cooperatives to be productive, they must be able to use all available resources within their communities before seeking assistance from outside the community, however, this does not intend to ignore the critical aspect of outsourced resources or opportunities needed by cooperatives. It has been expected to yield positive results and so far, it has not lived up to the expectation of employment creation for the communities. Only two from the five selected cooperatives reported that they provide short term to seasonal work to random community members.

Lack of access to the market has been emphasised in many previous studies (Khumalo 2014; Okem 2016; Shava and Hofisi 2019). These findings are consistent with our results, which observed market shortages as a challenge that hinder the success of cooperatives in South Africa. It is argued that smallholder agricultural cooperatives and their location are the key reasons for market limitations (Dlamini, 2010). Even though these agricultural cooperatives are placed in a township where there are economic activities supporting and contributing to the township economy, they still struggle to access an adequate market to sustain their business. All five cooperatives are facing a similar challenge of getting access to a commercial market where they will supply their produce, thus the informal market is used. It is not only challenging to win markets for their goods but also hectic and unpredictable. Most cooperatives find it difficult to obtain regular or formal markets for their produce and are thus confined to local markets. Some of these cooperatives have access to the formal markets in the villages; however, they encounter stiff competition since their production capacity is low. There is also a need to provide sufficient educational programmes to equip cooperative members with information necessary to operate a successful cooperative. The educational aspect of this support will allow the development of cooperatives to be autonomous and so address the current internal challenges and thus enhance the economic contribution of smallholder farmers.

5 Conclusions

The study interrogated the potential role of township agricultural cooperative in the local economic development by looking at the extent to which these cooperatives are able sustain livelihoods and contribute to local economic development of Waterloo township. Notwithstanding the challenges encountered by cooperatives, they remain an essential mechanism for enhancing socioeconomic growth and stimulating local economic development. As the government continues to invest on cooperative development to stimulate socioeconomic development in communities, the result from studied agricultural cooperatives indicate that their contribution remains marginal with limited employment opportunities. However, despite limited access to resources, cooperatives in townships show the potential to contribute to local economic development as well as providing more sustainable livelihood options for the community. These cooperatives can enhance household incomes, not only for members, but also non-members which could subsequently, lead to the development of community. However, they are currently hindered by internal and external challenges.

We argue that state funding and government official's overinvolvement in the establishment and functioning of cooperatives remain the prime suspects of failing cooperatives in South Africa. It is therefore plausible to conclude that the support given to cooperatives has been ineffective regardless of the state funds used for this programme rather it has created dependency and invalidated cooperative principles

and values. We further conclude by suggesting that for a cooperative model to attract interested individuals who are voluntary willing to participate, government must implement a cooperative consciousness raising educative programme. This programme can be done at a community level providing an in-depth understanding of a cooperative enterprise and clearly explaining what it entails to be a cooperative member. As previous studies have recommended (Okem, 2016b, Fourie and Malan, 2021), cooperative training and development can also be incorporated within the higher institutions like Technical and Vocational Education and Training (TVET) colleges where a structure cooperative training programme may be taught and allow potential members to enrol so they can have necessary education and training.

The movement story and its related tribulations will remain the subject of attention for the government, communities, private sector, and academic researchers as well as donor agencies that see value in helping the country develop a sustainable cooperative sector. Therefore, this work presents an opportunity for new studies to explore further on agricultural cooperatives based in townships and other local economic development issues.

Declaration of interest:

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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