

Youth's participation in agriculture: A fallacy or achievable possibility? Evidence from rural South Africa

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Background: The realisation of more youth involvement in the agricultural sector has proved to be elusive, so the question of the possibility of a youth-led agriculture needs further investigation.

Aim: The aim of the study was to assess whether there is potential for the rural youth to participate in agriculture by employing the typology formulation approach.

Setting: The study is premised on recent calls for strategies to reduce youth unemployment in sub-Saharan Africa by involving and enhancing the agricultural sector.

Method: A survey in questionnaire form was conducted with 224 youths from two districts in KwaZulu-Natal, South Africa. The Principal Components Analysis and K-Means Clustering were performed to determine the youth typologies and assess their potential.

Results: Five typologies were identified. Most youths (59.3%) were found in Typology 1 (those that see no benefits in farming) and in Typology 2 (older, experienced and with access to land). Typology 5 (male youths in agricultural cooperatives) had the lowest proportion of youths (5.7%). Participants in typologies 2, 3 and 5 were deemed to have high to moderate potential for successful engagement in farming. The highest potential was found in the typology with the least percentage of youths.

Conclusions: The typologies showed that youths have varying perceptions and aspirations regarding agriculture. While some show an interest and have the potential to participate in farming, others do not. Therefore, the blanket notion of the youth's lack of interest in agriculture should be qualified as it does not always hold. The heterogeneity in characteristics among the youths in these typologies, including their potential to participate in agriculture, expresses the differences in the kinds of support needed to increase their participation.

Keywords: typology formulation; the youth; agriculture; psychological capital; smallholder.

Introduction

The youth¹ are the future of agriculture in sub-Saharan Africa (SSA). However, getting youths to productively engage in agriculture, including its related value chains, has been difficult while success has been elusive (Irungu, Mbugua & Muia 2015; Magagula & Tsvakirai 2020; Proctor & Lucchesi 2012). Young people's participation has been limited, sporadic and not reflective of the investment (both money and effort) made in the sector thus far (Magagula & Tsvakirai 2020). The trend in youth labour hours in agriculture has been declining. For example, youth hours worked per week in this sector declined by 2.7% from 2008/2009 to 2010/2011; and 9.2% from 2005/2006 to 2011/2012 in Tanzania and Uganda, respectively (Maïga, Christiaensen & Palacios-Lopez 2015). There is also evidence that youths from Malawi, Nigeria and Tanzania are opting out of agriculture (Alliance for a Green Revolution in Africa 2015). Bezu and Holden (2014) revealed that only 9% of Ethiopian rural youths intended to work in agriculture. This evidence demonstrates the low participation of the youth in the farming sector. Furthermore, the lack of clear agricultural youth policies has also silently relegated youths in SSA, especially those in rural areas, to the periphery of agricultural development programmes (Kadzamira & Kazembe 2015).

It appears that young people are disillusioned when it comes to agriculture. Studies posit that the youth view agriculture as a sector of 'last resort and low productivity', shunning family farming and opting for wage employment in urban areas (Filmer & Fox 2014; Irungu et al. 2015;

1. There are several definitions for 'the youth' depending on context and country. However, this study adopts the African Youth Charter definition which says that 'the youth are people between the ages of 15 and 35 years' (African Union 2006).

Kadzamira & Kazembe 2015). This thesis emanates from the divergence in youth aspirations and what the agricultural sector can offer (Leavy & Smith 2010; Proctor & Lucchesi 2012). Some have linked their disillusionment to a lack of information and the slow integration of the fourth industrial revolution into the agricultural sector in Africa (Magagula & Tsvakirai 2020; Yeboah 2018). However, these arguments cannot explain the small number of success stories in the youth's farming observed in several countries in SSA (Irunguet al. 2015; Proctor & Lucchesi 2012). The biggest question is, 'what would make some youths participate, or not, in farming?' Understanding the typologies and characteristics of youths may reveal what determines their propensity to be even engaged in, never mind succeed in agriculture.

The discourse on the youth in agriculture is critical in SSA for both socio-economic and political reasons. There is a cost to youths not working, related to human capital development, health, poverty and social unrest, among others (Betcherman & Khan 2015; Filmer & Fox 2014). The economies in SSA have failed to create enough employment opportunities to absorb the ever-growing youth labour force. For example, in South Africa, the youth unemployment rate has increased to 43.2% among those 15–34 years (Statistics South Africa 2020), and 33.4% of them (15–24 years) are in multidimensional poverty (Frame, De Lannoy & Leibbrandt 2016). The situation is even worse for the bulk of young people who reside in rural communities (Filmer & Fox 2014; Sumberg & Hunt 2019). Given a projected increase in SSA's youth population of 2.6% per annum, the challenge facing the youth could be even greater in the future (Betcherman & Khan 2015). Thus, considering the current economic trajectory (rising youth unemployment and stunted economic growth), it is expedient to find solutions so that the youth may benefit from opportunities presented in agriculture.

Agriculture, though low in terms of its Gross Domestic Product (GDP) contribution, remains a key sector in making a livelihood for many households in developing countries, especially in rural communities (Kadzamira & Kazembe 2015; Proctor & Lucchesi 2012). The rise in the demand for food and increasing food prices expose the untapped employment and business potential in the sector (Filmer & Fox 2014). The projections that Africa's food market will grow by over 200% to US\$ 1 trillion, from 2010 to 2030, reveal greater prospects for youth engagement in farming (World Bank 2013). Such participation would also provide a lifeline to a sector with an ageing population of farmers, among other challenges (Swarts & Aliber 2013). However, seizing this opportunity means the creation of appropriate conditions for a growth in labour demand (Betcherman & Khan 2015). It also requires research and policies to show comprehensive understanding of the complex youth dynamics, due to spatial differences and heterogeneity in context, aspirations, personality characteristics and resource endowments. Unless such conditions and a true understanding exist, the notion of youth engagement in agriculture may remain a fallacy. Unfortunately, it could also

lead to the premature impression and conclusion that young people are not interested in farming.

There are several studies documented on youth interest/participation/perceptions in agriculture (Bezu & Holden 2014; Irungu et al. 2015; Kadzamira & Kazembe 2015; Magagula & Tsvakirai 2020; Proctor & Lucchesi 2012). The general focus has been on the traditional factors (education, skills, land, financial support, markets, information and communication technologies [ICT], and institutions) hindering the youth from actively participating in the sector. Few researchers attempted to integrate the non-cognitive factors in their analysis when addressing the youth's perceptions towards farming (Magagula & Tsvakirai 2020). None attempted to holistically integrate all the facets of psychological capital (PsyCap), an asset that deals with the mind-set influencing youths' decisions and behaviour (Luthans, Youssef-Morgan & Avolio 2015). This paper posits that though the traditional indicators are critical to youth engagement in farming, the psychological traits of the youths themselves are equally so. Understanding the youth's endowment with PsyCap provides a holistic and better explanation for their decision-making behaviour (Chipfupa & Wale 2018). Furthermore, consideration of the youth as a homogenous group, ignoring the contextual, gender, resource-based and non-cognitive differences is inappropriate (Swarts & Aliber 2013). It results in unsubstantiated claims and policies driven by sentiments rather than evidence (Sumberg & Hunt 2019). Unless the complexities of rural young people's lives are unpacked, it is impossible to design appropriate policies and programmes for supporting the youth in agriculture.

Youths' individual life preferences and aspirations are also bound to vary (Sumberg & Okali 2013), and thus it is normal that young people's interest in farming would differ. However, this implies that the value for money in agricultural youth programmes can only be realised if research and policy could differentiate between those with the potential and interest from those without. Such characterisation is missing in the current youth and agriculture literature (Sumberg & Okali 2013). This study focuses on the possibility of a youth-led agriculture, using South Africa as a case-study. It aims to develop typologies for youths in rural communities. Critical analysis of these typologies reveals answers to the following key questions: What type of youths would most likely successfully engage in farming and what type would not, even if support is provided? What support would be required by those in the different youth typologies? What are the implications of the results on agricultural development policies and programmes in SSA?

Youth and agriculture: A conceptual framework

Developing typologies for youths requires an understanding of the different individual, social, economic and institutional factors affecting their livelihood decisions and behaviour.

The literature shows that there is no single theory capable of explaining youths' livelihood or career choices, but that there is a need to integrate several theories in order to have a comprehensive understanding (Magagula & Tsvakirai 2020; Mukembo et al. 2014). The theories that help explain youths' decisions and behaviour include the Social Learning Theory, Theory of Planned Behaviour, Role Model Theory and the Human Capital Theory (HCT). While the Social Learning Theory focuses on the interaction of various social factors (socio-demographic, knowledge and perceptions) in determining career choices (Krumboltz & Mitchell 1990), the Theory of Planned Behaviour assesses how one's beliefs influence their decisions and behaviour (Ajzen 1991). The Role Model Theory emphasises the influence of role models on youths' decisions, while the HCT identifies the importance of skills, knowledge and abilities in their career choices (Hornbeck & Salamon 1991). Informed by these theories, the need to focus on socio-demographic characteristics, knowledge, perceptions, intentions, motivations and family relations as critical elements in the typology formulation is determined in this study.

Several agricultural studies which applied these theories found that rural youth livelihood choices are influenced by factors such as access to land, social networks, education, household size, parental financial support, age, role models, ICT, economic perceptions and marital status (Irungu et al. 2015; Magagula & Tsvakirai 2020; Proctor & Lucchesi 2012). The observed heterogeneity in the factors has implications for youth cognition, and hence value judgement and decisions regarding young people's propensity to engage in agricultural activities. This is why the youth are conceptualised as a dynamic and diverse group of people whose various aspirations in life are shaped by societal transformations and experiences (Proctor & Lucchesi 2012).

In addition to the above theories, the Psychological Capital Theory (PCT) to broaden the understanding of the differences in the rural youth's interest to participate in farming is also integrated in the study. The PCT deals with the role of PsyCap in determining human function, including decision making and behaviour (Youssef-Morgan & Luthans 2013). Individuals, endowed with positive PsyCap, are characterised by confidence in their ability to affect their livelihood, optimism about the future, perseverance, even in the face of adversities, as well as resilience (sustaining and bouncing back) (Luthans et al. 2015). PsyCap thus goes beyond what individuals know, their social relations and networks defining who each one is, and what they can become (Youssef-Morgan & Luthans 2013). Empirically, PsyCap has been measured in several recent studies and has been shown to significantly explain decisions about farming and behaviour related to climate change adaptation, water productivity, irrigation expansion and motivation to work, among others (Chipfupa & Wale 2020; Phakathi & Wale 2018; Wuepper, Zilberman & Sauer 2019).

The inclusion of PsyCap in youth typology formulation will help explain youths' decisions beyond their human, physical, financial, natural and social resources. Farming itself demands

some level of confidence, hope, optimism and resilience, given the different challenges and adversities encountered. PsyCap potentially affects the youth's aspirations, energy and hunger for success. It also affects people's ability to successfully utilise all other resources at their disposal to enhance their livelihoods (Phakathi & Wale 2018). Youths who are poorly endowed with positive PsyCap will likely not see the opportunities within the agricultural sector. Their lack of a positive mind-set is a deterrent in their potential capacity to productively engage in the sector and earn a livelihood. The study uses this conceptual framework to determine the key variables in the characterisation of the rural youth.

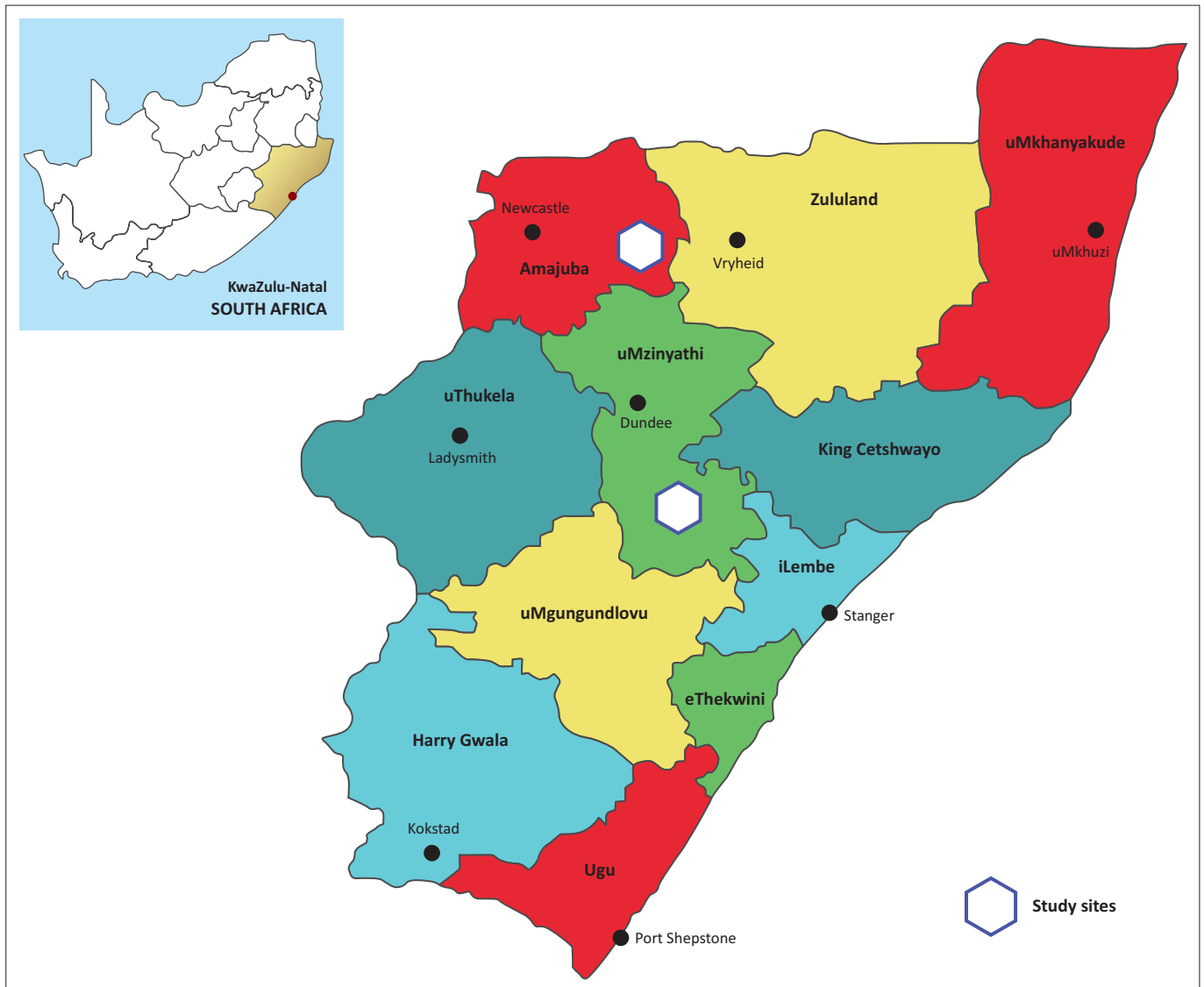
Study area

The study was conducted in Amajuba and uMzinyathi district municipalities in KwaZulu-Natal province, South Africa (Figure 1). The selection of the districts, predominately rural, was informed by their level of youth unemployment, potential land capability and the effects of drought. Youths constitute the majority (Amajuba – 38.7%; uMzinyathi – 40.2%) of the population in the study areas (Statistics South Africa 2018a). Recent youth unemployment statistics in the two districts are not readily available. However, provincial statistics show high youth unemployment in KwaZulu-Natal. About 45.9% of young people aged 15–34 years in the province are not in employment, education or training (Statistics South Africa 2020). Hence, the province has the highest share of people living in poverty (20.6%): that is a poverty incidence of 48.4% (Statistics South Africa 2018b).

The biophysical conditions in the study districts show potential for rain-fed farming. Land in Amajuba is classified as having moderate to high agricultural potential, while that in uMzinyathi is considered having marginal to moderate potential. Most of the soils are of medium depth, although some pockets of low- and high-depth soils do exist. In the two districts commercial land is set aside for redistribution which could also be parcelled to youths interested in starting their own farming businesses. The average rainfall in Amajuba ranges from 620 mm to 1265 mm per annum and that in uMzinyathi from 600 mm to 1200 mm per annum. However, both districts experience high evaporation threatening rain-fed crop production. Hence, irrigation farming remains an integral part of sustainable agricultural production in the districts.

Sampling, data collection and indicators of youth characteristics

The study employed a cross-sectional research design. It targeted rural youths (18–35 years) who never had formal employment. Youths under 18 years were excluded from the study, because most were at school still. A list of unemployed youths, registered with the municipalities in the two districts, provided the population of the study (though not all wards were part of the list, hence caution should be taken when extrapolating the results). Following Krejcie and Morgan (1970), the representative sample size was 217,



Source: Adapted from Metcalfe, M., 2018, 'Why, what and key learnings', in P. Christie & M. Monyokolo (eds.), *Learning about sustainable change in education in South Africa: The Jika iMfundo campaign 2015–2017*, SAIDE, Johannesburg

FIGURE 1: Map of KwaZulu-Natal district municipalities showing study sites.

assuming a 95% confidence level and 5% margin of error. Hence, 224 youths participated in the survey (Amajuba – 104, uMzinyathi – 120). Data collection was conducted through a semi-structured questionnaire. The questionnaire was pre-tested before the actual data collection to ensure common translation, consistency, reliability and relevance to the youth.

A review of literature helped to identify variables for inclusion in the typology formulation; that is factors that significantly affect participation in agriculture by the youth. Data were collected on youth demographic information (age, gender, level of education, marital status, role models) and resource endowment (physical and financial assets, social networks, access to extension, access to government support). A five-point Likert scale (1 – strongly disagree, and 5 – strongly agree) was used to collect data on the youths' managerial skills, perceptions on agriculture and PsyCap. An indirect questioning approach was taken in measuring PsyCap to reduce the bias in self-reported scores. Different

scenarios for each construct of PsyCap (self-confidence, optimism, hope and resilience) were presented to the participants to indicate the extent to which they would likely take the proposed actions in response to the scenarios. Tables 1, 2 and 3 show all the variables that were included in the youth typology formulation. For ease of analysis, principal components analysis (PCA) was performed on variables measuring managerial skills, perceptions of agriculture and PsyCap (see Table 1). The resulting indices, together with other variables, were included in the overall PCA (see results in Table 4).

Data analysis approach

An analysis of youth characteristics was conducted, using descriptive statistics; that is frequency tables, mean and standard deviation. Typology formulation was done through two complementary multivariate statistical approaches, that is PCA and K-means cluster analysis (KCA). The application of PCA reduced dimensionality in the dataset, while KCA

TABLE 1: Indicators for managerial skills, perceptions and psychological capital.

Broad category	Principal components	Description
Managerial skills	LEADER	Leadership qualities
	NOFIN_SKILLS	Lack of financial management skills
	INDEPENDENT	Independent – like to do their tasks alone
Perceptions of agriculture	AGRIC_BUSINESS	Believe that primary agriculture can be operated as a business and provide employment
	NOT_FOR_EDUC	Believe primary agriculture is not for the educated, and is laborious
	NO_IMPROVE	Have not seen primary agriculture improving the lives of their elders
	AVAEA	Believe that the youth can engage and earn a livelihood from AVAEA
	NEG_ATT	People close to them have a negative attitude towards agriculture
Psychological capital	RESILIENT	Resilient individuals
	LACK_CONF	Lack of self-confidence
	OPTIMISTIC	Optimistic and willing to take the initiative to address their challenges

AVAEA, Agricultural value-added economic activities.

determined clusters of similar youths, based on the retained factors from the PCA. Several studies have successfully applied the same approach to farming and livelihood typology determination (Chipfupa & Wale 2018; Yobe, Mudhara & Mafongoya 2019).

The Principal Components Analysis is a data reduction method that, through an algorithm, produces a few uncorrelated indices (principal components), which explain most of the variation in a dataset (Hair et al. 2014; Manly 2004). The objective is to reduce the number of variables to a few factors, without loss of most of the original information. The approach works best if the original variables are highly correlated. In the study, variables not meeting this criterion were dropped from the analysis. The Kaiser-Mayer-Olkin measure of sampling adequacy (KMO) and Bartlett's Sphericity test were used to determine the suitability of the data for PCA. A KMO value ≥ 0.5 and a statistically significant Bartlett's Sphericity test ($p < 0.05$) meant that there was sufficient correlation and the data were appropriate for PCA. To enhance the interpretability of the PCA results, the solution was rotated through the Varimax method. Only factors with an eigenvalue of 1, or more, were retained. According to Hair et al. (2014), given the nature of the data in social sciences, a solution that explains 60 or even less percentage of the variation in the data is acceptable. Factors with a loading of 0.4 and above were considered to have a strong influence on the principal components and were interpreted.

The retained principal components were used as input in the KCA. K-means Clustering Analysis is a method that uses the values of variables to group homogenous observations into classes (Manly 2004). K-means Clustering, after PCA has been shown as an efficient approach to dimension reduction (Ding & He 2004). Observations are allocated clusters through partitioning. First, given the predetermined number of clusters, initial cluster centres are calculated for each group. Observations

TABLE 2: Descriptive statistics of continuous youth indicators.

Indicator	Mean	SD
Youths' age	25.86	4.90
Education (years)	11.41	2.27
Experience in primary agriculture (years)	5.08	6.05
Land (hectares)	2.60	16.95
Value of physical assets owned (ZAR)	1424.57	1408.57
Perceptions of managerial and leadership capabilities*		
Whenever in a group or club, I often tend to be part of the leadership	3.37	1.46
I have attended a leadership/training seminar	2.17	1.43
I often share my concerns or ideas whenever I am in a meeting	4.21	0.88
I usually complete tasks late, but always make sure I finish them	3.03	1.45
I prefer to plan things before I do them	4.32	0.84
I prefer to do things by myself	3.84	1.33
I find it easy to allocate tasks and responsibilities to other people	3.21	1.43
I do not have exposure to financial recording and need training	3.48	1.53
I do not have exposure to business planning or the know-how to develop one	3.19	1.58
Perceptions of rain-fed agriculture*		
Rain-fed agriculture can provide employment opportunities for rural youths	4.10	1.01
Rain-fed agriculture can be run as a profitable business	4.16	0.95
Rain-fed agriculture is not for educated people	2.61	1.53
Rain-fed agriculture is laborious	3.01	1.36
Rain-fed agriculture is attractive to the youth	2.96	1.37
Rain-fed agriculture would be my last option as a career if I have options	2.28	1.41
I have seen elders improving their life through rain-fed agriculture	3.66	1.39
I prefer irrigated farming compared to rain-fed agriculture	3.77	1.40
Perceptions of AVAEAs*		
All agriculture-related jobs, including AVAEAs, are physically demanding	3.09	1.44
I prefer an office job to outside/fieldwork	2.81	1.51
I can be wealthy/rich through engagement in AVAEAs	4.26	0.90
Young people can also engage in AVAEAs related businesses	4.06	0.99
Perceptions of friends and relatives' opinions regarding agriculture*		
Most people known to me love agriculture and agriculture-related businesses	3.60	1.30
Most people known to me would support me if I initiated an agricultural business	4.19	0.83
Most people known to me perceive agriculture as a sector for old people	2.83	1.42
Most people known to me believe that agriculture-related jobs are not for the youth	2.91	1.39
Psychological capital scenario responses*		
Hope and optimism: What would you do if you were interested in farming but have no access to land?		
Engage your family so that they parcel out to you a piece of land	3.70	1.42
Talk to traditional leaders to check for the possibility of renting land	3.61	1.41
Do nothing and hope there will be available land soon	1.41	0.85
Resilient and persistent: What would you do if you were running a business and you have been suffering losses?		
Give up and forget about the business	1.57	1.10
Continue with the business and consult a business advisor	4.24	1.02
Continue with the business and change the way you run things	3.78	1.24
Self-confidence: To what extent would you do the following if you were nominated for a leadership position?		
Accept the nomination	3.60	1.58
Ask them to find someone else	2.38	1.52
Ask them to wait because you still want to think about it	2.07	1.35

Note: * Variables were measured on an increasing five-point Likert scale where 1 = strongly disagree and 5 = strongly agree.

AVAEA, Agricultural value-added economic activities; SD, standard deviation.

are then moved into a cluster with a centroid nearest to it. The process is repeated until stability is achieved and final cluster centres are calculated. The number of clusters was determined by checking the Analysis of Variance (ANOVA) output after KCA. The study settled for a number and solution with the ANOVA table showing a high significance level ($p < 0.01$) of most of the principal components in forming the final clusters.

Ethical considerations

All ethical considerations for the study were approved by the Humanities & Social Sciences Research Ethics Committee of the University of KwaZulu-Natal (Protocol reference No. HSS/1191/018).

TABLE 3: Descriptive statistics of the categorical youth characteristics indicators.

Indicator	Percent Youth
Male youths	39.0
Youths engaged in primary agriculture	56.1
Youths engaged in AVAEAs	3.6
Youths who benefited from a youth-support programme	15.7
Youths who received agriculture/farming related support	32.3
Youths with access to extension services	25.2
Youths with access to tractor services	3.6
Youths with access to credit	12.1
Youths who are members of an agriculture/business cooperative	7.6
Youth members of a youth club	25.2

AVAEA, Agricultural value-added economic activities.

TABLE 4: Principal components analysis results – Dimensions of rural youths' characteristics.

Indicators	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
AGE	0.274	0.680*	-0.105	0.221	0.036	-0.074	-0.068	-0.123	0.053	0.087
GENDER	0.013	-0.051	0.323	-0.150	-0.014	-0.111	0.638	-0.150	-0.204	0.218
EDUCATION	0.124	0.045	0.077	0.059	0.708	0.166	-0.060	-0.110	-0.020	-0.167
EXPERIENCE_AGRIC	-0.024	0.746	0.187	-0.182	0.034	0.083	0.003	-0.014	0.179	-0.093
BENEFICIARY	0.736	0.047	-0.019	-0.069	0.024	-0.030	0.085	-0.056	-0.160	0.159
TRAINING	0.703	0.001	0.102	0.035	0.044	-0.050	-0.026	0.273	-0.010	-0.190
CREDIT	0.022	0.249	0.272	0.116	-0.119	-0.643	0.135	-0.017	0.055	0.022
EXTENSION	0.650	0.080	0.128	0.063	0.091	0.037	0.125	-0.060	0.262	-0.147
ASSETS	0.006	0.026	0.047	0.045	0.790	-0.183	0.074	0.078	0.024	0.018
LAND_ACCESS	-0.065	0.631	-0.025	-0.109	0.042	-0.136	0.201	0.224	-0.214	-0.272
AGRIC_COOPERATIVE	0.176	0.094	-0.103	0.097	0.002	0.040	0.757	0.049	0.166	-0.145
YOUTH_CLUB	0.130	-0.089	0.276	0.060	0.067	-0.279	0.239	0.463	-0.134	-0.077
LEADER	0.027	-0.032	0.768	0.001	0.088	0.103	0.152	0.078	-0.037	-0.089
NOFIN_SKILLS	-0.147	-0.179	0.098	0.105	-0.170	-0.027	-0.003	-0.029	-0.045	0.685
INDEPENDENT	0.042	0.158	0.056	0.139	0.034	0.254	0.026	0.133	0.576	0.249
AGRIC_BUSINESS	-0.109	0.256	-0.144	-0.192	0.167	-0.042	0.268	0.496	0.176	0.262
NOT_FOR_EDUC	0.096	0.003	0.021	0.759	0.227	0.157	0.071	0.205	0.113	0.037
NO_IMPROVE	-0.024	-0.036	-0.044	-0.080	-0.030	-0.274	0.024	-0.147	0.770	-0.243
AVAEA	0.064	0.082	0.253	-0.695	0.086	0.058	0.095	0.325	0.091	-0.085
NEG_ATT	-0.020	0.082	0.183	0.152	-0.099	0.758	0.055	0.010	-0.009	0.001
RESILIENT	0.310	0.068	-0.126	-0.402	0.374	0.096	-0.037	0.081	-0.029	0.423
LACK_CONF	-0.115	-0.101	-0.673	0.125	-0.015	0.091	0.128	0.009	-0.061	-0.174
OPTIMISTIC	0.097	-0.040	0.023	0.004	-0.145	0.172	-0.344	0.670	-0.047	-0.049
Eigenvalues	2.62	1.77	1.64	1.49	1.33	1.24	1.13	1.12	1.07	1.00
Cumulative %	7.69	14.93	21.63	28.10	34.43	40.54	46.55	52.20	57.65	62.71

AVAEA, Agricultural value-added economic activities.

*The bold values/factor loadings were used to define the dimensions.

KMO Measure of Sampling Adequacy = 0.58; Bartlett's Test of Sphericity Chi-Square = 527.6, p -value = 0.000

Results and discussion

Youth characteristics

Tables 2 and 3 present results of the descriptive analysis of the characteristics of rural youths. Most of the youths were female (61%). This is a reflection of the labour migration patterns experienced in rural South Africa where there is a higher male out-migration, than female (Camlin, Snow & Hosegood 2014). The average level of education among the youths was matric (Grade 12). This meant few have had opportunities for acquiring a post-matric tertiary qualification for various reasons, including poor pass rates, lack of information, lack of finance and lack of career guidance, among others (Maila & Ross 2018). Thus, even if employment opportunities were available, the lack of skills would reduce their employability in the formal sector, relegating them to menial jobs. Hence, the importance of promoting youth participation in agriculture as a viable livelihood option.

Regarding perceptions of managerial and leadership capabilities, the results indicate a lack of leadership training, business planning and financial skills among rural youths. These issues are among those identified as impeding the take-off and growth of small businesses in South Africa (Mbonyané & Ladzani 2011). So without support, young people would have challenges in managing their agricultural enterprises. Youths' management style shows their preference to work alone (as an individual), although if need be, they would be willing to allocate tasks and responsibilities to other people. As reported by officials from the Department

of Agriculture in the two districts, trust plays a crucial role in such decisions.

The results show a firm belief that agriculture, both primary and agricultural value-added economic activities (AVAEA), could provide employment and business opportunities for young people. Magagula and Tsvakirai (2020) found similar results. However, there is still a large percentage of youths who expressed reservations about the sector. At least 48% said that agriculture is laborious, while 42% and 38%, respectively, believe that agriculture is unattractive, and not meant for the educated. When asked about their job preferences, 38.2% of participants would rather be in an office job than one in the field. Similar results were observed in a study in Ethiopia (Tadele & Gella 2012). Leavy and Hossain (2014), as well as White (2012) extensively discuss the negative values young people attach to farming and the implication it has for agrarian transformation. The findings demonstrated the heterogeneous preferences among young people and the need to identify, target and support those interested in the sector.

About two thirds (66.8%) of young people have the emotional support needed to motivate or encourage them to initiate their own small businesses in farming. People known to them with interest in and a positive view of agriculture could also affect their perceptions of farming. Most youths (85%) also believe that their families and friends would support them if they opt to pursue a career in farming. The responses also suggest that agriculture has improved the lives of people participating in the sector. Seventy percent of the participants reported having observed improvements in the lifestyle of those involved in the sector. Whether this translates to young people getting interested in farming is not known. In their study, Tadele and Gella (2012), found that improvement in agricultural incomes for some farmers did not necessarily lead to others wanting to be part of the sector.

The responses from the scenarios of PsyCap show a fairly high level of endowment. If faced with limited access to land, most youths would approach their families (71.3%), or engage community leaders (66.3%) to help, rather than do nothing (5%). They refuse to lose hope but choose to be optimistic, hoping for a better outcome. The youths' responses also show some level of resilience and persistence in the face of challenges in business. Only 9.8% said that difficulties would make them give up and forget about the business. The rest chose to persevere, but consult an advisor (89.2%), or evaluate their operations (72.2%) to improve performance. Though the youth's level of confidence is high, a percentage is not sure of their own leadership abilities. So if nominated to a leadership position, 32.3% would not accept, but ask the position to be given to someone else, while 21.6% would require time to decide. Lack of confidence, which usually manifests as low self-esteem, has been identified as a barrier to young people's lifelong learning and participation (Norman & Hyland 2003).

The youth's active involvement in agriculture in the study areas is low. Less than a third (31.8%) are employed and earn their livelihood by farming and AVAEAs (transport of agriculture products, processing). Those in this sector operate either as individuals (26.9%), or part of a cooperative of young people (4.9%). However, a good percentage of youths (24.2%) are partially involved in the sector as they are living in an agricultural household. Such youths have yet to make a career choice; so their participation is not reflective of their perceptions or interest in agriculture. The remaining 43.9% were not involved in farming or any AVAEAs. About 70.7% of youths indicated that they have access to agricultural land. However, they do not hold the right of use to this land as their access is through parents. This shows that the gap in the intergenerational transfer of land still exists and potentially affects youth participation in farming (Tadele & Gella 2012). White (2012) posits that young people's reluctance to farm could be an expression of their desire not to wait long before they may engage in independent farming. The study also showed that institutional support for young people in farming is lacking. Services aimed at the rural youth such as credit, agricultural extension and strong collective action organisations are very limited (Table 3). The provision of these services will enhance the youth's participation in agriculture.

Dimensions of rural youth characteristics

A principal components analysis of youth indicators resulted in the extraction of 10 principal component indices, or dimensions of characteristics of the rural youth (see results in Table 4). The extracted indices explained 62.7% of the total variation in the dataset. The KMO value was 0.58 and Bartlett's Test of Sphericity was significant ($p < 0.000$); hence the data were appropriate for the PCA. In the first dimension (BENEF) are the beneficiaries of agricultural support programmes. These youths also have easier access to agricultural training and extension services. In the second dimension (EXPERIENCE) fall older youths, experienced in farming with access to land. In the third dimension (SCONF_LEADER) are self-confident young people who exhibit some leadership qualities. The fourth dimension (AGRIC_AVAEA) represents youths who believe that agriculture is not for the educated and, also have no faith in the potential in AVAEA to provide a livelihood to young people. In the fifth dimension (ASSETS_EDUC) is found educated youth who are well endowed with assets. The sixth dimension (NEG_ATT) represents those whose networks have a negative attitude towards agriculture; they also have no or limited access to credit. In the seventh dimension (COOP) fall male youths who are members of agriculture cooperatives. In the eighth dimension (OPTIM) are optimistic young people who believe that agriculture could be operated as a business. The ninth dimension (NON_IMPR) represents youths who have not seen the benefit of engaging in agriculture; these youths are also more independent and enjoy working alone. In the tenth dimension (NOFIN_SKIL) are youths who lack financial skills. However, they exhibit characteristics of being resilient, and hence would

cope in stressful situations. The 10 principal components were used as cluster variables in the clustering process.

Typologies of rural youth

K-Means clustering results show that all dimensions, except one, were significant ($p < 0.01$) in formulating the clusters (see supplementary material). Fifteen observations were not included in the clustering process due to missing data. The dimensions which dominate the cluster centres define the characteristics of the youth in that cluster. Figure 2 shows the five youth typologies and their final cluster centres. The typologies were further characterised by their PsyCap endowment (Table 5). Typology 1 ($n = 65$; 31.1%) constitutes youths who have not observed any improvements due to farming in the lives of their elders. These youths are part of agricultural youth programmes and encounter challenges in accessing credit. Their perceptions of the sector are further influenced by the negative attitude of their close family and friends. Though they lack self-confidence, they are resilient and fairly optimistic about the future. Other studies have shown that agriculture is held in low esteem by some youths and their parents, especially in developing countries (Bezu & Holden 2014; Sumberg & Okali 2013; Tadele & Gella 2012). **Typology 2** ($n = 59$; 28.2%) constitutes older youths, with agricultural experience and access to land, but lacking financial management skills. A few could be members of agricultural cooperatives. Their negative experiences made them pessimistic about farming and life in general, and as such, they also lack self-confidence in their ability to transform their own lives.

Typology 3 ($n = 44$; 21.1%) represents youths who have confidence in their abilities to succeed even in the face of difficulties. Most such young people tend to be natural leaders

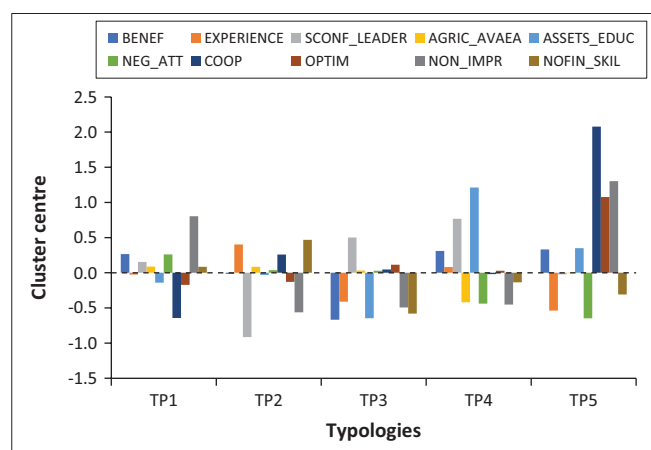


FIGURE 2: Final cluster centres from cluster analysis.

TABLE 5: Youth types and level of psychological capital endowment.

Psychological capital indices	Typo 1 ($n = 65$)		Typo 2 ($n = 59$)		Typo 3 ($n = 44$)		Typo 4 ($n = 29$)		Typo 5 ($n = 12$)	
	n	SD	n	SD	n	SD	n	SD	n	SD
RESILIENT	0.06	0.64	0.19	0.58	-0.92	1.56	0.51	0.45	0.16	0.96
LACK_CONF	-0.25	0.82	0.59	1.00	-0.03	0.95	-0.64	0.61	-0.08	1.20
OPTIMISTIC	0.17	0.98	-0.17	0.97	0.21	0.95	-0.33	1.03	0.08	1.15

Note: Typo, Typology; SD, standard deviation.

in their circle, due to their leadership qualities. They are also fairly optimistic individuals, though their ability to cope and bounce back is compromised, maybe due to lack of resources. Typology 4 ($n = 29$; 13.9%) includes highly educated youths, endowed with physical assets, especially those related to information and communication technology. These youths are also confident in themselves and tend to exhibit leadership qualities, compared to their peers. However, they seem to have little faith in the future, probably because they failed to secure employment despite their education. As noted in the introduction, youth unemployment is very high in South Africa (Statistics South Africa 2020). Typology 5 ($n = 12$; 5.7%) shows the lowest proportion of rural youths. It represents male youths who are members of agricultural cooperatives. They are fairly confident, optimistic and resilient, and believe that agriculture can be operated as a business. However, they have also not observed agriculture improving the lives of the community people currently engaged in the sector.

Potential for different youth typologies to engage in agriculture

The above description of the various youth typologies affirmed the argument in this study, that the rural youth are heterogeneous regarding their interest and potential to successfully engage in the agricultural sector. This is in line with other youth studies (Bezu & Holden 2014; Sumberg et al. 2012). While some youths show no interest, or their situation makes it difficult to participate in farming or AVAEAs, others have high hopes and see potential in the sector. Table 6 shows the percentage of youth in each typology, currently participating at different levels in the agricultural sector. It also shows the propensity of the different youth typologies to successfully engage in farming, based on an analysis of their characteristics. Typology 5 followed by Typologies 2 and 4, have the highest percentage of youths currently actively participating in farming. Typologies 4, 2 and 3 are the only groups that have some youths operating AVAEAs as small businesses. Typologies 3, 2 and 1 have the highest percentage of youths currently not involved in the sector.

The rating shows that the highest potential is found in the typology with the smallest population of youths. Those in Typology 5 were deemed to have the highest potential for successfully engaging in farming, followed by those in Typologies 3 and 2. So youths from these groups should be encouraged to seriously consider farming as a profession. Youths in Typology 5 require mentoring from successful farmers as models. Youths in Typology 3 require support with resources (both physical and financial) to enhance their capacity to cope with the challenges encountered in farming.

TABLE 6: Youth current participation (%) and the propensity to successfully engage in farming.

Typology	PrimaA	AVAEA	Partial	Not	Rating scale	Reasons for rating
Typology 1	23.1	0.0	32.3	44.6	Very low	Most likely to have negative perceptions of the sector and thus do not believe that the sector can have a significant impact on their lives
Typology 2	39.0	6.8	16.9	44.1	Medium	They have access to land but bad experiences in their farming ventures, reduced their belief in farming as a career choice
Typology 3	20.5	2.3	22.7	56.8	High	These youths are psychologically prepared to face challenges in the agricultural sector. They would be good managers.
Typology 4	37.9	6.9	31.0	31.0	Low	Highly educated youths are more likely to opt for opportunities in sectors other than agriculture
Typology 5	66.7	0	8.3	25.0	Very high	Fairly optimistic and believe that youths can successfully initiate and operate small agro-based businesses
Total	31.6	3.3	24.4	44.0	-	-

Note: Rating scale, rates the potential to successfully participate in farming; PrimaA, Actively engaged in primary agriculture; AVAEA, Actively involved in AVAEAs; Partial – Partially involved in agriculture; Not, Not engaged in farming.

AVAEA, Agricultural value-added economic activities.

Swarts and Aliber (2013) also indicated a relationship between the youth's interest in farming and access to resources for farming. Training in financial management, and programmes that build self-confidence, will enhance the agricultural performance of youths in Typology 2. Giuliani et al. (2017) also identified the lack of training in agricultural and financial practices as key to the youth's success in farming. These three groups would benefit from support, targeted at agricultural cooperatives, related to their formation and governance, focusing on accountability and collective action. The cooperatives would also act as vehicles for providing mentoring and financial management training to the same youths (Giuliani et al. 2017). Participants in Typology 2 were rated medium, because though they are endowed with land, their experience in the sector negatively affected their perceptions of farming as a career choice. However, given their demonstrated interest, their belief in agriculture could be revived through support, ranging from production and marketing advice, to programmes that seek to build both their cognitive and non-cognitive abilities, for example, mentoring and exchange visits.

Young people in Typology 1 have the lowest potential, despite some of them being currently actively engaged in primary agriculture. Given its rating, youths in this typology participate in farming, because they have no other option. Due to their perceptions and negative influences, they are likely to abandon farming as soon as opportunities in other sectors arise (Tadele & Gella 2012). Youths like this should be encouraged and supported to start small businesses in other sectors, such as manufacturing, retailing, arts and crafts and services, among others. In other areas, support is needed in the form of financial capital to sustain business operations at the infancy stage. Maluleke (2016) indicates that failure to access finances leads to the failure of many small businesses in South Africa. Similarly, a small proportion of youths in Typology 4 are currently engaged in farming, despite their limited potential to have success. This typology is also one of the three that boast a few youths currently operating small businesses in AVAEAs. Studies show that educated rural youths have a preference for employment in other sectors rather than agriculture (Irungu et al. 2015; Tadele & Gella 2012). However, Irungu et al. (2015) found that educated and skilful youths in Kenya are turning to farming, focusing on

higher-value markets and products, though it remains a second option. This demonstrates that it is critical to recognise that educated rural youths are interested in agriculture, but in activities rather higher up the value chain. Youths not currently engaged, or partially involved, but belonging to Typologies 5, 3 and 2, have the greatest prospects of future participation in farming. Agricultural programmes seeking to inculcate and stimulate the greater involvement of young people in the sector should focus on such youths.

The results for Typology 5 also suggest that rural male youths would be more attracted to farming than their female counterparts. Rietveld, Van der Burg and Groot (2020) found that male youths have easier access to land than females. The customary laws existing in most African communities are skewed towards the male child and economically disempower females (Bomuhangi, Doss & Meinzen-Dick 2011). Whenever they inherit land, women are seldom in control, hence young women's lack of interest (Rietveld et al. 2020).

Conclusions and policy implications

The findings of this study dispelled the blanket notion that young people are not interested in farming and affirmed the possibility of a youth-led agrarian transformation. However, as expected, not all youths would have an interest in the sector. The heterogeneous nature of youths, PsyCap and resource endowment shape the youth's aspirations and behaviour, regarding farming. In this study, therefore, is demonstrated the possibility of using typologies to identify youths who are psychologically and emotionally prepared to pursue their livelihood in farming. This is a critical step in forming an agricultural youth policy and various programmes, because it allows resources to be focused and targeted at only those with an interest and the potential to advance the sector. Policymakers and implementers should consider utilising similar approaches when designing agricultural youth programmes. Regarding youths with no interest in the sector, the approach makes it possible to develop appropriate programmes for their support.

The study has also shown that heterogeneous forms of support are required by the rural youth. Whilst some youths would require mentoring and training, or the development

of different skills (including non-cognitive skills), for others, strengthening their cooperatives, or support in initiating businesses in AVAEAs, would significantly alter their situation. In all cases, the support to young people should be provided as a package addressing two or more critical aspects. Going forward, it is important to note the effect of other people's experience in agriculture on young people's perceptions and interest in farming. Continuous exposure to negative experiences will indeed turn away many from the sector. Thus, development partners' programmes should strive to create opportunities for exposing youths to successful model farmers. This will provide those who are genuinely interested in farming with a different perspective on agriculture. Lastly, it is important to note the gender inequality factors that drive away young women from farming such as access to land and land rights.

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Competing interests

The authors declare that no competing interest exists.

Authors' contributions

U.C. gathered and prepared the data and edited, analysed and presented the manuscript; and also did the final revision of the article. A.T. edited and reviewed the manuscript and had substantial input.

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Data availability

The data that support the findings of this study are available from the corresponding author, [U.C.], upon reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official position of any affiliated agency of the authors.

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Appendix 1

TABLE 1-A1: ANOVA table from the *K*-Means Cluster Analysis.

Cluster variables	Cluster		Error		<i>F</i>	Sig.
	Mean Square	df	Mean Square	df		
BENEF	7.08	4	0.88	204	8.04	0.000
EXPERIENCE	5.17	4	0.92	204	5.63	0.000
SCONF_LEADER	19.77	4	0.63	204	31.27	0.000
AGRIC_AVAEA	1.52	4	0.99	204	1.54	0.193
ASSETS_EDUC	15.95	4	0.71	204	22.56	0.000
NEG_ATT	3.79	4	0.95	204	4.01	0.004
COOP	20.67	4	0.61	204	33.64	0.000
OPTIM	4.37	4	0.93	204	4.67	0.001
NON_IMPR	24.43	4	0.54	204	45.2	0.000
NOFIN_SKIL	7.47	4	0.87	204	8.56	0.000