A complex web of interactions: Personality traits and aspirations in the context of smallholder agriculture

Luzia Deißler[1*], Kai Mausch[2], Alice Karanja[3], Stepha McMullin[3], Ulrike Grote[1]

[1] *Leibniz University Hannover, Institute for Environmental Economics and World Trade, Germany*

[2] *Center for International Forestry Research (CIFOR)-World Agroforestry (ICRAF), Nairobi, Kenya and Bonn, Germany*

[3] *Center for International Forestry Research (CIFOR)-World Agroforestry (ICRAF), Nairobi, Kenya*

[*] **Corresponding Author:** Luzia Deißler: deissler@iuw.uni-hannover.de

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Abstract

Some recent research began to shift the focus of development efforts away from income and yield to more diverse concepts that consider people's intrinsic drivers and values, such as aspirations and personality traits. We aim to contribute to the literature by exploring the connections between intrinsic drivers. Hence, we analyze if and how the formation of aspirations relates to personality traits against the background of different socio-economic household characteristics. This research will help us provide practical insights for the successful design of development projects specifically tailored to the unique needs and aspirations of individuals and households. Our analyses are based on a primary data set of 272 smallholder farming households in rural and peri-urban Kenya. Structural Equation Modeling (SEM) results show a significant positive correlation of personality traits with aspirations (openness;

extraversion; conscientiousness), indicating that personality structures indeed correlate with the formation of aspirations in a rural, agricultural context. Furthermore, we show that household and respondent characteristics are associated with differences in education, income, and social aspirations. Hence, considering intrinsic factors for the prediction of human behavior has the potential to increase the efficiency of agricultural development projects and policies. We conclude that a contextualized understanding of aspirations can provide useful insights for development practice aiming to support smallholder farmers' livelihoods.

1 Introduction

The agricultural sector in sub-Saharan Africa (SSA) faces numerous present and urgent challenges that affect current farming systems (FAO, 2018; Horton et al., 2017; Rockström et al., 2009) and require sustainable solutions. Traditional development efforts often focus on increasing income (Frediani, 2010). However, these approaches do not always lead to success as the well-being of individuals and communities is defined differently among different contexts. Income is not a goal in itself for sustaining the needs of individuals and their families' basic primary needs, but rather the use of it (Nathan, 2005). Instead of solely focusing on tangible resources or other traditional welfare measures, assessing people's values and life goals to understand what drives and motivates them can provide practical insights for development research, projects and policies.

Farmers' decisions on land use and sustainable practices play an important role within the current global debate on climate change and sustainability (Giampietri et al., 2020; Gios et al., 2022; Menozzi et al., 2015). Moreover, psychosocial constructs are frequently being referred to for the evaluation of farmers behavior and decision-making regarding development projects and policies (Chipfupa & Wale, 2018; Giampietri et al., 2020; Mekonnen & Gerber, 2017; Menozzi et al., 2015). Recently, aspirations have received more attention as an approach to gain nuanced insights into people's life goals (Bernard & Taffesse, 2014; Horton et al., 2017), and their

subsequent decision-making. Since aspirations are theorized to be highly relevant for understanding the complex livelihood decisions of farmers, they can help align project or policy implementation with farmers' individual life goals in order to improve adoption and success. Aspirations can be viewed as drivers of a particular behavior that is supposed to lead to well-being in the future (Bernard & Taffesse, 2014). They can therefore provide additional details to broaden the understanding of decision-making processes and human behavior.

Amongst various external factors that influence the formation of aspirations (Ajzen, 1991; Bernard & Taffesse, 2014; Mausch et al., 2021; Ray, 2006), an important aspect under consideration is the impact of personality traits in this process (Roberts & Robins, 2000; Visser & Pozzebon, 2013). Personality traits were found to have significant influence on aspirations and life goals. However, this has so far only been investigated in studies in higher education settings in the global North, for example in Sweden with regard to individuals' business perceptions (Hansson & Sok, 2021). Furthermore, their impacts on decision-making processes have also only been examined in similar settings (Buelow & Cayton, 2020; Bühler et al., 2020; Zhao & Seibert, 2006) using artificial experimental designs (Byrne et al., 2015). The correlation of aspirations with decision-making behavior in the context of countries of the global South or agricultural settings, however, has not been investigated yet. However, there are emerging studies which have found differences in the influence of personality and aspirations across different economic decisions (Knapp et al., 2021), indicating the importance of context-specific analyses.

The objective of this research is the investigation of connections between the formation of aspirations and personality traits, and to evaluate the impact of socio-economic household and individual characteristics on these mechanisms. We aim to contribute to the literature on intrinsic drivers of decision-making, particularly in the context of agricultural settings in the global South. Towards this aim, we use econometric analyses of primary data of smallholder farming households from rural and peri-urban Kenya.

2 Theoretical and empirical approach

2.1 Aspirations

Smallholder farmers face continuous and often urgent challenges (i.a. increasing pressure on food production systems, extreme weather events, land degradation). Changes in livelihood strategies are not uncommon and contribute to risk management and increasing living standards (Ellis & Freeman, 2004). The frequently used sustainable livelihoods framework suggests numerous aspects that influence livelihood choices and strategies (Scoones, 1998). However, decisions and choices are not always the result of purely rational behavior (World Bank, 2007). Hence, not all decisions can be evaluated using standard indicators. Besides the typically considered factors such as those in the livelihood framework, intrinsic factors have recently gained attention in explaining decision-making (Mausch et al., 2018). In the pursuit of strategies and goals, it is not only 'hard' external factors that determine the outcome, but also the intrinsic drivers that shape people's goals and actions (Ajzen, 1991; Verkaart et al., 2018) as well as the effort they exert (Lybbert & Wydick, 2018). Thus, in the development context, many studies highlight the need to address aspirations and desires of farming households in the global South (Chipfupa & Wale, 2018; Lybbert & Wydick, 2018; Mausch et al., 2018; Mekonnen & Gerber, 2017; Roberts & Robins, 2000).

Aspirations can be interpreted as visions for the future and include diverse, individually defined, aspects and dimensions of well-being (Bernard & Taffesse, 2014). In the broader sense, aspirations are determined and shaped by other intrinsic factors, such as mindset, personal interests and skills (Mausch et al., 2018; Roberts & Robins, 2000), beliefs about the environment (Dolan et al., 2012), and extrinsic factors such as farmer characteristics, household factors, access to resources, social or political conditions (Mausch et al., 2018; Mekonnen & Gerber, 2017), as well as community peers (Chipfupa & Wale, 2018). These influences affect aspirations indirectly by shaping the aspirations window, within which individual aspirations are formed.

The aspiration window is a space of imaginable goals (Mausch et al., 2021; Ray, 2006). Bennike et al. (2020) stress the importance of imaginative horizons for the formation of the aspiration window. Those are affected by real and perceived limitations of specific outcomes in addition to the influence of social dynamics emerging from communities and general surroundings.

Finally, the gap between a desired level and the current status of a specific welfare dimension has been defined as the aspiration gap which, to some degree, determines a person's effort level. Ray (2006) argues that the aspiration gap can lead to investments in the future to achieve the aspired level. If the gap is too small, it can limit motivation and investment, and progress is bound to be slower than optimal (Janzen et al., 2017). Neither should the gap be too wide, as this could induce frustration and stagnation (Janzen et al., 2017; Ray, 2006).

Cognizant of this complex web of interactions that influence aspirations and subsequent choices and actions we conclude that aspirations shape decisions and the effort put in livelihood choices and thereby, are quite important for the agricultural development context.

2.2 Theoretical framework

Various theories of human behavior focus on the influence of numerous intercorrelated intrinsic and extrinsic factors on choices and decisions (Ajzen, 1991; Lybbert & Wydick, 2018; Ray, 2006; Sen, 1999). However, as stated by Ajzen (1991), a critical factor for someone's actual behavior is one's intention to act in a specific way. The 'Theory of Planned Behavior' provides a widely used model for explaining people's behavior (Ajzen, 1991). Behavior, or decision making, is influenced by different factors. Firstly, perceived behavioral control, which describes the perceived power and opportunity for someone to make a particular decision and take a corresponding action (Ajzen, 1991; Lybbert & Wydick, 2018). Secondly, subjective norms and attitudes, including societal structures and opinions on a particular topic, shape decisions. These aspects have a combined impact on an individual's intention to make a specific choice or whether to take or not to take a specific action to achieve well-being. It is notable that the drivers

of intention described by Ajzen (1991) are similar to the factors shaping aspirations. Moreover, aspirations can be highly relevant for understanding the individual valuation of well-being, hence, the way people decide to use their resources. Since aspirations are significantly associated with livelihood choices (Ajzen, 1991; Mausch et al., 2018; Verkaart et al., 2018), they should be included in a framework describing individual decision-making. To shed light on the specific formation of choices and the interlinkage between extrinsic and intrinsic factors and their impact on well-being, aspirations and their role in livelihood strategies and decision-making play an important role.

The first step in understanding that process is refining the understanding of aspirations and their formation. Figure 1 shows our conceptual framework for the formation of aspirations in the context of smallholder agriculture. External factors, such as resources and subjective norms provide the frame of the theoretically feasible, whereas individual preferences and personality

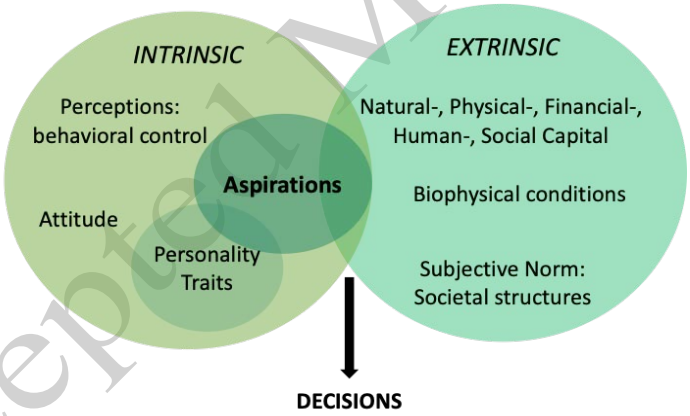

Figure 1. Conceptual framework of the formation of aspirations (Ajzen, 1991; Bernard & Taffesse, 2014; Mausch et al., 2021).

traits account for the intrinsic attributes. Both parts influence the aspiration window and subsequent formation of aspirations.

Additionally, besides the stated factors, there is evidence for a correlation between personality traits, major life goals and aspirations (Roberts & Robins, 2000; Visser & Pozzebon, 2013). It was shown that personality traits can be directly linked to specific economic decisions (Zhao & Seibert, 2006). Gutman and Akerman (2008) suggest that individual self-perception influences

aspirations, indicating a relationship between personality traits and aspirations. Yet, most findings are based on samples within higher education settings in the global North. Thus, examining the transferability of these findings to agricultural households' decision-making could provide useful insights for the application in development projects. Exploring the correlation of personality traits with aspirations is a first step towards this direction. Most studies rely on the Five-Factor Model or Big Five (Table 1), which is a commonly used concept for measuring personality traits (i.a. Buelow and Cayton, 2020; Bühler et al., 2020; Byrne et al., 2015; Nishimura and Suzuki, 2016; Xu, 2020). It includes aspects that capture a person's extraversion, agreeableness, conscientiousness, neuroticism, and openness (McCrae & John, 1992). Although these traits are more commonly used in the global North, it was found that it can also be applied in studies in the global South such as Thailand and Vietnam (Bühler et al., 2019, 2020).

Table 1. Description of the Big Five (Costa & McCrae, 2017; Xu, 2020).

Personality traits – Big Five	
Openness	open to new information; fantasy, feelings, actions, ideas, values
Conscientiousness	efficient, hardworking, organized; competence, dutifulness, achievement striving, self-discipline
Extraversion	outgoing and social; assertiveness, activity, excitement seeking, positive emotions
Agreeableness	kind, empathic, cooperative; straightforwardness, altruism, compliance, modesty
Neuroticism	anxiety, further negative emotions (e.g. depression, vulnerability)

2.3 Data

Our analysis uses primary data collected as part of the Fruit Tree Portfolio (FTP) project carried out by World Agroforestry (McMullin et al., 2019). The project aimed to close seasonal dietary gaps in rural households by providing location-specific portfolios of a diversity of selected fruit trees and annual crops (McMullin et al., 2019). The data for this study was collected in 2021 across three Kenyan counties (Laikipia, Tharaka Nithi, Kitui) covering humid to semi-arid agro-ecological zones. The total sample consisted of 272 households. The survey included general socio-economic characteristics, personality traits and aspirations. Socio-economic household

characteristics captured the extrinsic factors stated in the theoretical framework (Chapter 2.2), covering financial-, physical-, social- and human capital (Table 2). Data on personality traits (Big Five) were collected following the German Socio-Economic Panel (SOEP) (Caliendo et al., 2011).[2] Aspirations were captured following the methodology of (Bernard & Taffesse, 2014).[3] The use of Likert scales to capture current and aspirational levels of income, education, and social status worked quite well in the smallholder context based on the quality of data collected. This was enabled by thorough enumerator training, which capacitated the team to facilitate a comprehensive understanding of the scales by the smallholder farming respondents.

[2] Table A (Appendix) shows the two questions per personality trait asked within the questionnaire, following a five point Likert scale. The Big Five traits are then computed by adding up the Likert scale points and calculating the average score per trait.

[3] The questionnaire included two questions for capturing aspirations per each welfare dimension (income, education, social status), followed by one question regarding the importance of each dimension (Table A, Appendix). First, respondents are asked to establish a scale of 1-10, 1 representing the person in their community with the lowest score and 10 representing the person with the highest score. On this scale, respondents rank themselves according to their current status. Second, respondents state the status they would like to achieve in the future (can be higher than 10). Finally, respondents rank the welfare dimensions according to their personal importance.

Table 2. Description of the variables used in the correlation analyses.

VARIABLE	Explanation
Aspirations	Level of education, income and social status wanted to achieve
Household characteristics	
total income	Total monthly HH income (KW)
access to credit	Access to credit services
farm size	Size of the entire farm (acres)
number of extension visits	Number of extension visits during the last 12 months
shocks	Number of shocks experienced in the last three years (climatic, biological, economic, other)
HH size	Number of household nucleus members
gender HH	Gender of the HH head, binary (0=female, 1=male)
education HH head	Highest level of education achieved by the household's head
food security	Number of months without enough food during the last year (using Months of Adequate Household Food Provisioning – MAHFP)
Respondent characteristics	
gender	Gender of the respondent, binary (0=female, 1=male)
age	Age of the respondent (in years)
education	Highest level of education achieved by the respondent
membership	Number of different groups/organizations the respondent is a member of
travel	Number of travels outside of one's own village for one month
media use per week	Number of times media was used during one week (television, radio, internet)

The general sample characteristics are presented in Table B (Appendix). Of all households, 21% are headed by women, with the highest proportion of female-headed households in Laikipia at 39%. The main source of household income is wages (43%), while the usual occupation of the household head is casual labor, and farming for the spouse. While households located in Kitui farm the biggest areas (2.35 acres), their average monthly household income is lowest with 5,648 Kenyan Shilling[4]. General aspirations are lowest in Kitui as well, and highest in in Tharaka Nithi, mainly based on comparatively high educational aspirations.

2.4 Methodology

Previous studies used correlation models to examine the relationship between the Big Five and aspirations (Buelow & Cayton, 2020; Byrne et al., 2015; Roberts & Robins, 2000; Xu, 2020). To detangle the complex relationships and to account for the intangibility of the variables we performed descriptive analyses and Structural Equation Modelling (SEM) in STATA 14.

[4] 51.51 US Dollar based on exchange rate for time of data collection (2021) derived from World Bank 2022 (109.64).

SEM allows us to treat personality traits and aspirations as latent variables when analyzing their relationship. Thus, SEM takes into account that these variables cannot be observed directly, which can lead to measurement errors. SEM compiles these latent variables according to their observed indicator variables (Bollen & Noble, 2011; Fan et al., 2016; Gallagher & Brown, 2013). It consists of two parts, the measurement model that contains the measurement of the latent variables (constructs) based on their indicators (items), and the structural model that describes the relationship between the latent variables (Hair et al., 2017). Each personality trait (ξ_a) consists of two respective indicators (x_i, x_j), whereas the aspirations construct consists of three indicators (x_i, x_j, x_k). We specified the SEM model according to the literature and proxy general aspirations by education (x_i), income (x_j) and social aspirations (x_k) (Bernard & Taffesse, 2014), while each personality trait (ξ_a) consists of two respective indicators (x_i, x_j), as described in the data section (Caliendo et al., 2011) (Figure 2).

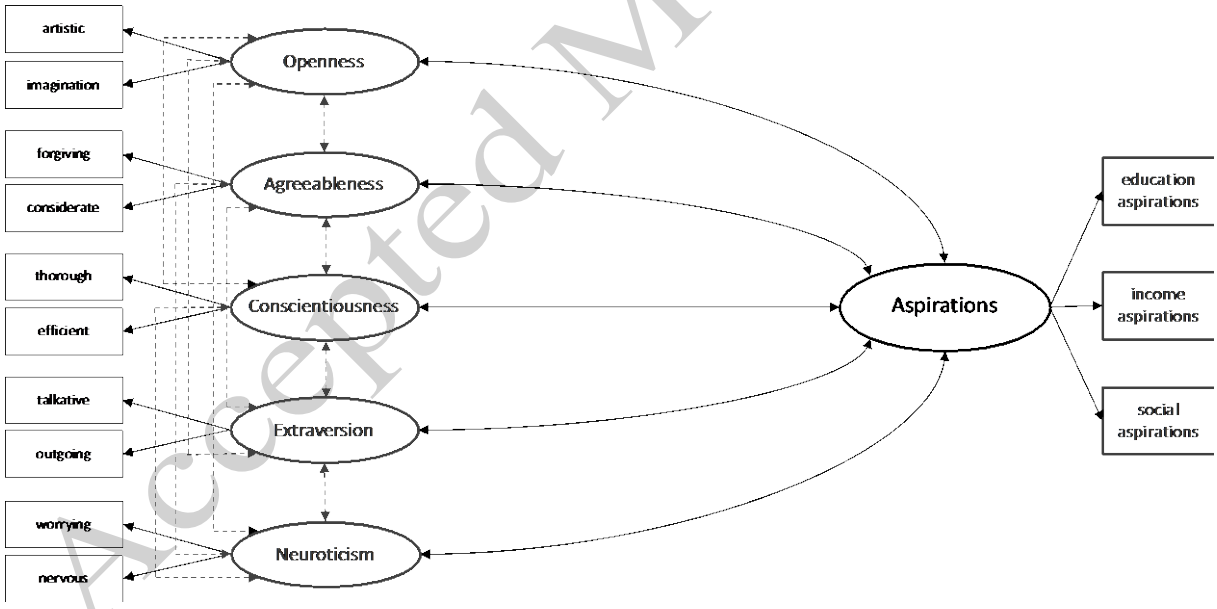

Figure 2. Model specification of the SEM measurement- (◄►) and structural model (◄-►).

Information on the respective questions is shown in the Appendix, Table A. We used the aspirations gap as the indicator for aspirations, based on the assumption by Ray (2006) that the aspirations gap is the immediate driver of actions and decisions. We further hypothesized that the personality traits are intercorrelated with each other (indicated by the dotted line arrows).

The first step is the confirmatory factor analysis (CFA) as part of the measurement model (shown exemplary for a latent construct with two items):

$$x_i = \lambda_{ia}\xi_a + \delta_i \,, \quad \text{Eq. 1}$$

$$x_j = \lambda_{ja}\xi_a + \delta_j \quad \text{Eq. 2}$$

With ξ_1 as the latent variable or factor, x_i/x_j as the observed variable or item, λ_i/λ_j is the factor loading that represents the respective difference in the item per one unit change in the factor and δ_i/δ_j as the respective error terms of the items (Bollen & Noble, 2011). In a second step, SEM calculates the covariance between the latent variables (Bollen & Noble, 2011; Jeon, 2015), representing their respective intercorrelation. The estimated coefficients provide information on the correlation of our variables of interest.

To find and confirm external determinants of aspirations for contextualizing the formation of aspirations, we analyzed differences in variables of interest (Table 2) to examine the relationship between factors derived from previous literature and aspirations. The variables include socio-economic household characteristics such as income, access to credit, farm size, extension visits, shocks, food security and household head characteristics. Further, we included variables regarding the respondent and account for gender, age, education, memberships in groups or organizations, travel frequency and media use. For the aspiration measure, we normalized each dimension (income, education and social status) and computed an aggregate index (Bernard & Taffesse, 2014). The aggregated index of the aspirations gap allows an assessment of the overall ambitions, or drive, towards achieving more in life (Bernard & Taffesse, 2014; Ray, 2006). By using the following equation (3), the values for each dimension were normalized to make them comparable across communities and dimensions (Bernard & Taffesse, 2014; LaRue et al., 2021):

$$A_i = \sum k \left(\frac{a_i^k - \mu^k}{\sigma^k}\right) * W_i^k \quad \text{Eq. 3}$$

With k as the respective dimension, a_i^k as the value for the aspirations regarding dimension k for individual i, σ^k and μ^k as the standard deviation and the community sample mean of the values for the aspirations and W_i^k as the specific weight (ranking) the respondents assigned to the respective dimension. However, we did not only use the aspiration index (Bernard & Taffesse, 2014), but also looked at income, educational and social aspirations separately (LaRue et al., 2021). This allowed us to identify the importance that is placed on each dimension and shows what welfare aspects might be more important than others. We conducted Welch's T-tests to identify significant differences between those variables regarding high or low aspirations. Aspirations were classified high or low if the values are above or below average:

Low/high: $A_{index} < 0.04$ / $A_{index} \geq 0.04$ Eq. 4

$A_{education} \leq 0.01$ / $A_{education} > 0.01$ Eq. 5

$A_{income} \leq 0.01$ / $A_{income} > 0.01$ Eq. 6

$A_{social} \leq 0.01$ / $A_{social} > 0.01$ Eq. 7

3 Results

3.1 Connection between personality, aspirations and adoption

We investigated the correlation between personality traits and aspirations. In the following chapter we discuss the association between these two intrinsic factors and its implication for the decision-making behavior of smallholder farmers in Kenya. The results from the Confirmatory Factor Analysis (CFA) on the latent variables are presented in Table 3. They show a good fit of the measurement model for the Big Five personality traits and aspirations. The observed variables for each latent construct are statistically significant with standardized factor loadings above 0.3 (Kang & Ahn, 2021). However, the indicator questions for neuroticism did not result in a valid latent variable. Subsequently, we used the respective indicator questions themselves in the following path analysis.

Table 3. Factor Loadings of Measurement Model.

A. Estimates of factor loadings

Factors	Items	Standardized factor loadings	SE	*p*-value	SMC
Agreeableness	forgiving	0.49	0.07	<0.01	0.24
	considerate	0.50	0.07	<0.01	0.25
Openness	artistic	0.52	0.06	<0.01	0.27
	imagination	0.80	0.07	<0.01	0.64
Conscientiousness	thorough	0.40	0.07	<0.01	0.16
	efficient	0.60	0.09	<0.01	0.35
Extraversion	talkative	0.43	0.07	<0.01	0.18
	outgoing	0.74	0.08	<0.01	0.55
Neuroticism	worrying	0.48	0.55	0.38	0.23
	nervous	0.80	0.89	0.37	0.63
Aspirations	educ. aspirations	0.72	0.09	<0.01	0.51
	inc. aspirations	0.33	0.09	<0.01	0.11
	soc. aspirations	0.33	0.08	<0.01	0.11

B. Covariances of measurement error

Item 1	Item 2	Standardized correlation coefficient	SE	*p*-value
forgiving	talkative	-0.22	0.08	<0.01
imagination	efficient	0.55	0.13	<0.01
worrying	nervous	0.38	0.05	<0.01

Note: SMC = squared multiple correlations

Table 4 and Figure 3 show the estimates from the structural model which analyzed the covariance between the latent variables. Table 4 includes all theoretically possible relationships and their respective standardized correlation coefficients. Except for neuroticism, all personality traits are intercorrelated. The lack of correlation here might be a result of the non-significant factor loadings (Table 3) that indicate that the construct of neuroticism is not identified correctly. The strongest positive correlation exists between agreeableness and conscientiousness, extraversion and conscientiousness and openness and agreeableness. The results show that three of the five personality traits significantly correlate with aspirations. Openness (0.41), conscientiousness (0.35) and extraversion (0.31) show a positive correlation coefficient. Furthermore, the neuroticism indicator nervousness, also significantly correlates with aspirations (-0.13), indicating that individuals that are prone to nervousness or anxiety are less likely to have higher aspirations.

Table 4. Estimates of the Structural Model.

Relationship	Standardized correlation coefficient	SE	*p*-value
Big Five personality traits			
Openness ↔ Agreeableness	0.74	0.12	<0.01
Agreeableness↔ Conscientiousness	0.82	0.16	<0.01
Conscientiousness ↔ Extraversion	0.81	0.13	<0.01
Extraversion ↔ Openness	0.59	0.09	<0.01
Openness ↔ Conscientiousness	0.47	0.12	<0.01
Agreeableness ↔ Extraversion	0.95	0.16	<0.01
Personality Traits - Aspirations			
Openness ↔ Aspirations	0.41	0.10	<0.01
Agreeableness ↔ Aspirations	0.04	0.13	0.74
Conscientiousness ↔ Aspirations	0.35	0.13	<0.05
Extraversion ↔ Aspirations	0.31	0.11	<0.01
worrying ↔ Aspirations	-0.07	0.08	0.40
nervous ↔ Aspirations	-0.16	0.08	<0.10
Fit indices: χ^2 (*p*-value) = 0.1129; RMSEA = 0.031; CFI = 0.0.970; TLI = 0.947			

Note: RMSEA = root mean squared error of approximation; CFI = comparative normed fit index; TLI = Tucker-Lewis index

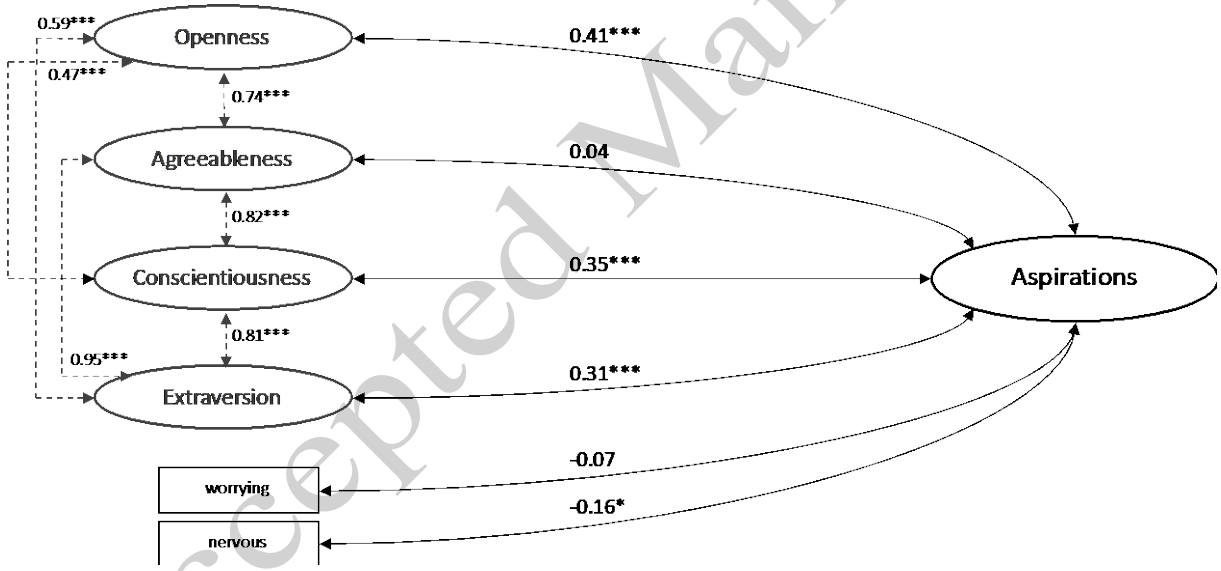

Figure 3. Path diagram presenting the estimated covariance coefficients from the structural model.

This confirms our hypothesis that intrinsic factors such as personality traits do in fact, significantly correlate with the formation of aspirations. Conscientiousness is usually associated with efficient and hardworking individuals (Costa & McCrae, 2017; Xu, 2020). In relation to aspirations, the literature is inconsistent, reporting positive or insignificant correlations of conscientiousness with (including economic) aspirations (Nishimura & Suzuki, 2016; Roberts & Robins, 2000; Visser & Pozzebon, 2013). Considering education and income aspirations as

achievement-oriented goals, our results are consistent with Roberts and Robins (2000), who found high values for conscientiousness resulting in a significant effect on economic and achievement-oriented life goals.

Moreover, the results suggest that individuals that are open to new experiences and ideas, seeking excitement and socially outgoing also have a higher aspirations gap (Costa & McCrae, 1997; Xu, 2020; Zhao & Seibert, 2006). These are characteristics that can expand a person's aspiration window by providing information and ideas that might be passing by more close-minded individuals. Information and social networks play an important role for aspirations and in turn for livelihood choices and strategies of smallholder farming households. Agreeableness and the indicators of neuroticism did not have a significant effect on farmers' aspiration gap in our study.

As described earlier, SEM offers several advantages in dealing with theoretical constructs and hypothetical relationships. On the one hand, due to the limitations of the model, only correlations could be analyzed, not causality. On the other hand, however, considering that the data were collected after the actual intervention, it is reasonable to examine only correlations, as it would have been difficult to prove causality *ex post*.

3.2 Correlation analysis

Aspirations are not only determined by personality, but also shaped by current context. We examined specific contextual variables and their correlation with educational-, income related-, and social aspirations to form a comprehensive idea of aspirations in a smallholder context. To this end, we examined the mean difference between individuals with above-average (high) and below-average (low) aspirations.

Table 5 presents the results from the correlation analyses. Educational aspirations are significantly correlated with a higher number of extension visits, more frequent travels outside of one's home village, smaller households, higher food security in terms of Months of Adequate

Household Food Provisioning (MAHFP), higher education attainment by the household head or respondent, as well as a younger respondent and a larger number of memberships (to groups/ organizations). In households with high educational aspirations of the respondents, human capital, proxied by information (extension visits; travels outside of the village), education, age and social networks (memberships), is significantly higher. By providing positive examples, new ideas, different experiences, or new ways of looking at things, these aspects can have an increasing impact on the formation of aspirations (Chipfupa & Wale, 2018). It was shown that present resources function as restraining or enhancing factors to what is achievable (Elias et al., 2018). Moreover, higher food security also seems to provide a base for higher aspirations. Based on the 'Hierarchy of Needs', people are more likely to aspire complex future goals if their basic primary needs are fulfilled first (Maslow, 1943). The fulfillment of immediate needs is one of the primary drivers of decisions in rural Kenyan households (Mausch et al., 2021). Differing effects of household and respondent characteristics could therefore be due to differences in the ability to satisfy basic needs. Not having to spend the imaginative or cognitive capacity on worrying about the availability of food allows individuals to aspire for more than the satisfaction of basic needs (Nathan, 2005).

Table 5. T-Test/Mann-Whitney results on household and individual characteristics of respondents with below or above average aspirations.

	Education Aspirations			Income Aspirations			Social Aspirations		
Variables	low	high	mean diff.	low	high	mean diff.	low	high	mean diff.
Extrinsic factors									
monthly HH income (KSh)	5898	5897	-0.10	5739	6023	284.1	6066	5738	-328.0
access to credit	0.62	0.66	0.04	0.67	0.62	-0.06	0.67	0.62	-0.05
farm size (ac)	1.96	1.83	-0.13	2.16	1.69	-0.46***	2.07	1.73	-0.34**
agric. training	0.57	0.65	0.08	0.60	0.61	0.01	0.52	0.70	0.18***
extension visits	0.68	1.06	0.38*	0.79	0.94	0.15	0.85	0.90	0.05
travel	5.55	7.56	2.01**	5.85	7.16	1.31	5.86	7.25	1.39*
shocks	1.11	1.18	0.07	1.08	1.20	0.12	1.04	1.25	0.21**
Household characteristics									
HH size	6.17	5.33	-0.84***	5.76	5.72	-0.03	5.65	5.82	0.17
gender head	0.79	0.78	-0.01	0.76	0.82	0.06	0.83	0.75	-0.08*
education head	3.24	3.54	0.30*	3.46	3.35	-0.11	3.60	3.20	-0.39**
MAHFP	9.45	9.94	0.50*	9.36	9.98	0.62**	10.0	9.39	-0.65**
Respondent characteristics									
gender resp.	0.26	0.23	-0.03	0.26	0.23	-0.03	0.25	0.23	-0.02
age resp.	47.4	43.5	-3.96**	47.0	44.2	-2.75*	44.8	46.1	1.28
education resp.	3.16	3.46	0.30*	3.29	3.33	0.03	3.27	3.35	0.08
membership	1.01	1.16	0.14*	1.12	1.06	-0.06	1.11	1.07	-0.03
media use	9.54	9.62	0.09	9.33	9.78	0.44	9.04	10.1	1.05*

Note: Low and high refer to below and above average aspirations. T-test/Welch mean differences are displayed. *** p<0.01, ** p<0.05, * p<0.1. HH = household, KSh = Kenya Shilling, MAHFP = Months of Adequate Household Food Provisioning

High aspirations regarding future income is associated with smaller farms, higher food security (MAHFP), and younger age of respondents. However, our results suggest that the determinants of aspirations are complex. On the one hand, food secure farmers might have the capacity to aspire more diverse life goals (including income and education) (Nathan, 2005). On the other hand, households with significantly smaller farms might rely more heavily on other income sources to cover immediate needs such as food, and with that, have higher aspirations for future income. Mausch et al. (2021) found a similar effect for households from another Kenyan county (Turkana) that is characterized by difficult agricultural and economic conditions, where decision-making is based on the satisfaction of immediate needs rather than of the fulfillment of specific aspirations. Similar to educational aspirations, younger respondents also have higher income aspirations, in line with a previous study on aspirations in rural Kenya (LaRue et al.,

2021). People at an older age may already have reached a considerable level of education and income. Therefore, aspirations for further increases may be lower than for people who have not yet reached a certain level of relative prosperity.

Social aspirations appear to depend mostly on resources and household characteristics. They are positively associated with agricultural training, travelling outside of the village and more frequent media use. Social aspirations can be linked with a broader information network and higher exposure to peers (Chipfupa & Wale, 2018). Furthermore, respondents in households that are worse off regarding the education level of the household head, food security (MAHFP), farm size and have experienced a higher number of shocks, have higher social aspirations than their counterparts. In fact, one would expect that households that are more disadvantaged would also be more likely to focus on their immediate needs than on the pursuit of social status. Nonetheless, the complexity of the formation of aspirations suggests that greater exposure to peers and information may also override the focus on immediate needs. Additionally, households within which the respondent stated high social aspirations are more likely to be female headed.

It is notable that the three dimensions show different combinations of their determining factors. Some of these factors might not directly determine or control aspirations, they do however, limit them (Nathan, 2005). The aggregate aspiration index (Table 6) shows consistent negative association of farm size and consistent positive effects of agricultural training and experiences of shocks with above average aspirations. Moreover, respondents from female headed households in general, show higher aspirations. Nevertheless, the effects differ across the factors and dimensions of aspirations under consideration.

Table 6. T-Test/Mann-Whitney results on household and individual characteristics of respondents with below or above average aspirations.

	Aspiration index		
Variables	< average	> average	mean diff.
Extrinsic factors			
monthly HH income (KSh)	5899	5896	-3.539
access to credit	0.66	0.62	-0.04
farm size (ac)	2.05	1.68	-0.37**
agric. training	0.58	0.65	0.07*
number of extension visits	0.75	1.03	0.28
travel	6.52	6.67	0.15
shocks	1.05	1.28	0.23**
Household characteristics			
HH size	5.74	5.74	0.00
gender HH head	0.82	0.75	-0.07*
education HH head	3.51	3.24	-0.27
MAHFP	9.69	9.72	0.03
Respondent characteristics			
gender respondent	0.26	0.21	-0.05
age respondent	46.0	44.6	-1.34
education respondent	3.30	3.33	0.03
membership	1.10	1.08	-0.02
media use	9.23	10.06	0.83

Note: T-test/Welch mean differences are displayed. *** p<0.01, ** p<0.05, * p<0.1. HH = household, KSh = Kenya Shilling, MAHFP = Months of Adequate Household Food Provisioning

Our results suggest that aggregating diverse directions of aspirations may mask individual differences in the importance of aspects of well-being based on differing backgrounds and preferences. Effects and preferences can overlap and influence each other at the individual level, but also interact within the household and the wider community. While income aspirations may be seen as part of basic human needs, social aspirations can be considered a human need higher up the “Hierarchy of Needs”, which only comes into focus once the first basic needs have been satisfactorily fulfilled. Thus, the aggregate aspiration index could be a useful tool for assessing the general attitude towards the future, as well as the individual's agency and proactivity. However, when it comes to identifying specific socioeconomic characteristics that play a role in the formation of aspirations, looking at the individual aspiration dimensions is more likely to lead to a clearer picture.

4 Conclusion

We identified the role that personality traits as intrinsic factors play for the formation of aspirations and examined the influence of socio-economic household characteristics as control variables in this process. The aim of our research was to gain insights into the intrinsic influences of smallholder farmers' aspirations towards an improved understanding of their decision-making. We provide insights for agricultural development projects and policies to understand the underlying mechanisms of decision-making. Ensuring the alignment of project goals with individual goals could significantly change adoption dynamics and the identification of clusters that could best utilize specific support mechanisms such as sustainable agricultural practices (integrating trees in farming systems, crop rotation and irrigation schemes). We found that three of the five investigated personality traits indeed significantly correlate with aspirations. These traits paint a picture of personality structures that might be conducive to high aspirations while facilitating the basis for proactive behavior. Open-minded, socially outgoing and conscientious individuals will most likely have higher aspirations, which in turn can lead to higher susceptibility to novel technologies and approaches.

Nevertheless, extrinsic factors also play an important role in this system. Our results suggest that different types of aspirations (e.g. education, income) are connected to different factors (e.g. food security, household size, age, group membership), indicating that understanding these differences with regard to the direction of aspirations is crucial. Moreover, most of the determining factors derived from the literature are rather inconsistent across settings. Therefore, it is necessary to contextualize methods and results in order to understand the process, which we aimed to contribute to by focusing on an agricultural setting within the global South. While social and human capital interact positively with educational and social aspirations, poverty is an essential factor that was found to shift the focus from complex future aspirations towards the satisfaction of immediate needs. This may warrant future research as it relates to different target

groups for agricultural development efforts and could add to a more differentiated approach for the poorest segments as compared to those slightly better off.

Analyzing aspirations and different livelihood strategies prior to the design of agricultural development projects and policies can improve the suitability of these interventions for the target group. Research and projects must acknowledge that there is no 'one size fits all' solution for development. Individuals interact differently with opportunities and propositions based on their individual aspirations. For example, more introverted people, who may also have lower aspirations, might not only be more difficult to reach, but also need tailored interaction and support to realize and seize opportunities. Whereas achievement-oriented, outgoing individuals are more likely to need less support to adopt new approaches.

Future research needs to explore these complex connections in more detail, using quantitative methods to examine context specific correlations. This process could also be extended towards actual behavior, by assessing real life responses to interventions. By doing so, the role of personality traits and aspirations in a concrete context could be identified, further deepening the understanding of behavior in the agricultural development context, for achieving positive and sustainable livelihoods and well-being outcomes for smallholder farmers in the global South.

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Appendix

Table A. Questionnaire sections on personality traits and aspirations.

Variable	Question	Scale
Aspirations		
social status present	Imagine the person with the highest level of social status in your community, this represents a 10. The one with the lowest level of social status in the community is represented with a 1. What is the level of social status that you have at present? (on the scale from 1-10)	self-set scale (1-10)
social aspirations	What is the level of social status that you would like to achieve? (could be higher than 10)	self-set scale (starting with 1)
income present	Imagine the person with the highest level of income in your community, this represents a 10. The one with the lowest income in the community is represented with a 1. What is the level of income that you have at present? (on the scale from 1-10)	self-set scale (1-10)
income aspirations	What is the level of income that you would like to achieve? (could be higher than 10)	self-set scale (starting with 1)
education present	Imagine the person with the highest level of education in your community, this represents a 10. The one with the lowest education in the community is represented with a 1. What is the level of education that you have at present? (on the scale from 1-10)	self-set scale (1-10)
education aspirations	What is the level of education that you would like to achieve? (could be higher than 10)	self-set scale (starting with 1)
Ranking of the three dimensions		
We have asked you about three dimensions - income, social status and education. Now I would like you to tell me which of these three dimensions are the most important for you. Please assort 20 beans to the three dimensions, according to their importance for you. No beans assorted to a dimension means this dimension is of no importance for you. The more beans you assort to one dimension, the more important.		
rank_in	How many beans would you allot for annual income?	number (0-20)
rank_soc	How many beans would you allot for social status?	number (0-20)
rank_ed	How many beans would you allot for education?	number (0-20)
Big Five		
Do you see yourself as someone who…		
bf1	… works thoroughly?	Likert scale (1-5)

bf2	… is talkative?	Likert scale (1-5)
bf3	… worries a lot?	Likert scale (1-5)
bf4	… has a forgiving nature?	Likert scale (1-5)
bf5	… is outgoing, sociable?	Likert scale (1-5)
bf6	… gets nervous easily?	Likert scale (1-5)
bf7	… values artistic, aesthetic experiences?	Likert scale (1-5)
bf8	... is considerate and kind to almost everyone?	Likert scale (1-5)
bf9	… does tasks efficiently?	Likert scale (1-5)
bf10	… has an active imagination?	Likert scale (1-5)

Note: Own Source. Survey 2021.

Table B. Characteristics of the 272 sample households.

	LAIKIPIA *(N=93)*		THARAKA NITHI *(N=89)*		KITUI *(N=90)*		Total (*N=272*)	
VARIABLE	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Household head and respondent characteristics								
gender HH head (% female)	0.39	0.49	0.12	0.33	0.11	0.32	0.21	0.41
age HH head	51.3	14.0	47.0	13.7	50.8	13.2	49.7	13.7
main occupation HH head	farming		casual labor		casual labor		casual labor	
education HH head	3.24	1.47	3.62	1.60	3.29	1.67	3.40	1.59
gender resp. (% female)	0.75	0.43	0.77	0.42	0.74	0.44	0.24	0.43
age respondent	46.5	13.5	42.5	13.4	47.3	13.6	45.4	13.6
occupation respondent	farming		farming		farming		farming	
education respondent	3.17	1.53	3.42	1.60	3.31	1.57	3.31	1.56
Household characteristics								
HH size	5.88	2.96	5.21	2.23	6.18	2.56	5.74	2.65
number of children	3.19	2.15	2.31	1.27	2.86	1.59	2.79	1.75
farm size (ac)	1.78	1.28	1.56	1.26	2.35	1.76	1.90	1.48
monthly HH income (KSh)	5950	3407	6093	3556	5648	3770	5898	3580
main income source	wage (43.2 %)		wage (32.9%)		wage (51.8%)		wage (42.6%)	
MAHFP	8.84	3.72	10.50	2.92	9.79	2.62	9.71	3.02
number of extension visits	0.97	2.25	1.17	2.45	0.49	1.02	0.87	2.02
number of shocks (last 3 yrs)	1.16	1.03	1.06	0.97	1.23	0.82	1.15	0.94
Decision-making								
agricultural	head		joint		joint		head	
market	head		joint		joint		joint	
livestock	head		joint		head		head	
income off farm business	head		head		joint		head	
income employment	head		joint		joint		joint	
major expenditures	head		joint		joint		head	
minor expenditures	head		spouse		spouse		spouse	
loans	head		joint		joint		joint	
Respondent characteristics								
access to credit	0.61	0.49	0.67	0.47	0.65	0.48	0.64	0.48
number of days travelled outside of the village (for one month)	3.89	4.91	8.06	9.91	7.91	10.1	6.58	8.81
number of memberships	0.96	0.84	1.03	0.74	1.28	0.78	1.09	0.80
Aspirations								
education aspirations	-0.01	0.29	0.04	0.27	0.01	0.23	0.01	0.26
income aspirations	0.00	0.34	0.02	0.34	0.01	0.33	0.01	0.34
social aspirations	0.03	0.36	0.02	0.20	-0.01	0.23	0.01	0.23
aspiration index	0.02	0.61	0.08	0.56	0.01	0.51	0.03	0.56
Personality Traits (Big Five)								
agreeableness	4.42	0.77	4.34	0.63	4.71	0.64	4.41	0.76
openness	3.70	0.98	3.70	0.92	4.29	0.89	3.88	0.99
conscientiousness	4.23	0.73	4.49	0.61	4.59	0.66	4.42	0.73
extraversion	3.83	1.02	4.00	0.89	4.24	0.96	4.01	1.00
neuroticism	2.54	1.04	2.63	1.00	2.42	1.05	2.52	1.04

Note: Own source.