Building Self-reliance: A Framework to Evaluate Smallholder Coffee Farmers' Pursuit of Commercialization

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Keywords

coffee, commercialization, external facilitator, Peru, self-reliance, smallholder

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Abstract

This study examines the application of a self-reliance framework for practitioners and evaluators to better understand the capacities and intrinsic factors impacting smallholder coffee farmers' commercialization behaviors. We surveyed 40 smallholder coffee producers in Peru using a quantitative instrument. Data were analyzed to determine if statistical relationships exist between farmers' self-reliance (measured via knowledge and skills, attitudes, and aspirations) and their commercialization behaviors. Findings indicate the self-reliance framework effectively illustrates relationships between farmers' aspirations, knowledge and skills and their commercialization behaviors, while future, additional studies are needed to better measure and understand the role of commercialization-related attitudes. Practitioners can leverage the study's findings by using a self-reliance framework to infer farmers' likeliness to pursue sustainable commercialization practices and align their trainings and design interventions based on evaluation findings. The conceptual self-reliance framework is the first of its kind applied for smallholder coffee commercialization. The findings demonstrate that self-reliance concepts employed recently in other contexts may potentially be used similarly by extension and development facilitators.

Introduction

Smallholder farmers manage the vast majority of the world's farms and produce a substantial portion of the world's food on small plots of land (Food and Agriculture Organization [FAO], 2014a). However, many of the 800 million people internationally who go to sleep hungry each night belong to smallholder households (United States Agency for International Development [USAID], 2019a; World Bank, 2013), and 65% of the world's poorest adults have been employed through agriculture (World Bank, 2016). Expectedly, to address the foreseen challenges of the world's population reaching 9 billion by 2050, investments in smallholder farming and markets are critical (USAID, 2019a).

Lifting rural households from poverty through sustainable livelihood opportunities in small-scale agriculture has become increasingly complex and difficult in a globalized world and food system. While commercialization is often considered an important development opportunity, smallholder farmers' lack of access to improved agricultural technologies and methods, coupled with infrastructural constraints, often reduces farm productivity and the capacity to produce adequate quantities to sell profitably in markets (Arias et al., 2013). Limited access to input markets, including extension and finance, can also affect productivity and commercialization outcomes (Arias et al., 2013). Moreover, extension, provided by the government in many developing countries, is frequently under-resourced, with constrained mobility to reach rural clients and communities (Swanson & Rajalahti, 2010), and microfinance organizations and input dealers commonly perceive too great a risk in offering loans or credit to small farmers (Agribusiness Commercial Legal and Institutional Reform Diagnostic [AgCLIR], 2016; Mpuga, 2010). Finally, transaction costs (e.g., costs of transportation to output markets), especially selling small quantities of produce, further present risks and barriers for smallholder farmers and constrain commercialization opportunities (Arias et al., 2013).

This study explored the factors driving smallholder coffee farmers' commercialization behaviors in Peru, who face similar issues to those cited above. Most of Peru's coffee farmers are smallholders who cultivate small plots of land (average of three hectares/7.4 acres) (United States Department of Agriculture Foreign Agricultural Service [USDA], 2018). Additionally, small coffee producers may suffer from volatility of the international market, and along the coffee value chain, small farmers disproportionately experience reductions in incomes (Talbot, 1997). According to Borella et al. (2015), smallholder coffee farmers who struggle to diversify and access market information and credit are also more vulnerable to environmental degradation and pests and diseases such as coffee leaf rust. Withstanding such challenges, peer mobilization and collective actions have demonstrated potential to improve commercialization outcomes for small coffee producers: when smallholder coffee farmers have successfully formed associations or cooperatives, they often received better prices, improved their post-harvest methods and handling, and mobilized to develop collective marketing strategies (USDA, 2018; Wollni & Zeller, 2007). More established and organized associations have facilitated farmers' access to agricultural loans and linkages directly with consumer markets (USDA, 2018).

Despite the risks and low agricultural output frequently associated with smallholder farmers, international development organizations and researchers have generally agreed that investments in agricultural development are crucial for poverty reduction (Fanzo, 2017; International Fund for Agricultural Development [IFAD], 2016). The private sector has also increased investments in smallholder farmers, often supported by collaborations with donors or governments (Amadu et al., 2017; USAID, 2019b). A partner for this study, Shared-X, a Peru-based company, has implemented a model with social and economic ambitions for specialty crop

production and marketing, including coffee. The company (Shared-X, n.d.) defined their Impact Farming model as facilitating "…access to modern technology and specialty markets for smallholder farmers, ultimately creating empowerment in global communities while promoting renewable sustainable environments" (p. 1).

In advancing commercialization, often these public, private, or nonprofit external facilitators are critical to catalyze collective action, provide technical assistance (TA), and build capacities of farmers to engage in marketing activities (Best et al., 2006; Devaux et al., 2017). However, over-dependency on such external support, especially financially, can diminish opportunities for small-scale farmers to become self-reliant and continue improving their practices (e.g., using new marketing techniques) (Bebbington et al., 1996; Community Empowerment Network [CEN], 2010). Therefore, research indicates external facilitators should be intentional in their efforts to ensure smallholder farmers are positioned and aspire to implement long-term changes with limited outside assistance.

Conceptual Framework

The conceptual framework for this study was developed based on previous research and applications related to self-reliance and external assistance in development contexts, which will now be reviewed before introducing the model. Research on self-reliance in rural development has commonly focused on communities and community-level projects (Binns & Nel, 1999; Jamieson & Chisakala, 2016). However, the present study focuses on individual farmers' self-reliance in commercialization, rather than community-level self-reliance, to align with research claiming significant heterogeneity among rural households' agricultural systems, including in their market access (De Janvry et al., 1991; Steinke et al., 2019).

The self-reliance concept explored in this study integrates components from a USAID theory of change that proposed self-reliance is determined by a country's commitment and capacity to its own development (USAID, 2018). The agency has aimed to use self-reliance metrics to reposition aid programs and country-level relationships to reduce long-term dependency. Indicators have been applied to map the positions of countries on the development spectrum to inform intervention and partnership strategies and ultimately make decisions about transitioning countries away from donor funding based on self-reliance achievements (USAID, 2018).

Nongovernmental organizations (NGOs) have also promoted self-reliance to achieve sustainable development. For instance, the Hunger Project, an NGO committed to ending hunger, claims self-reliance is determined by community members' capacity and confidence to operate as agents of their own development (The Hunger Project, n.d.). The organization draws a contrast between self-reliance and self-sufficiency by claiming self-sufficiency often implies needing no external support for one's basic needs, while self-reliance is accomplished by having limited outside help with links to local resources and services. Finally, another NGO, CEN (2010), claimed dependency is a "learned helplessness," while self-reliance is the capacity to think and act independently (p. 1). CEN suggests that often a project's volunteers or consultants work with communities to solve development problems and leave the people unable (and lacking self-reliance) to continue without their support (CEN, 2010).

The researchers integrated these conceptual definitions of self-reliance to create this study's conceptual model (see Figure 1). To guide practitioners' evaluation of self-reliance and commercialization, this synthesis was framed using modified components from the Targeting Outcomes of Programs (TOP) evaluation model (Rockwell & Bennett, 2004), which expanded

upon the original Bennett's Hierarchy model (Bennett, 1975). The TOP model proposes that evaluation begins in the first stages of program planning, and specific intended outcomes and measurable changes should be explicit in the design of interventions. In this study, the model's intended change is smallholder coffee farmers' improved commercialization behaviors achieved via enhanced self-reliance, and the survey instrument, developed from the model, aimed to measure and predict smallholder farmers' advancement in commercialization methods.

Figure 1
Conceptual Model Illustrating How Building Self-Reliance is Posited to Improve Commercialization Outcomes
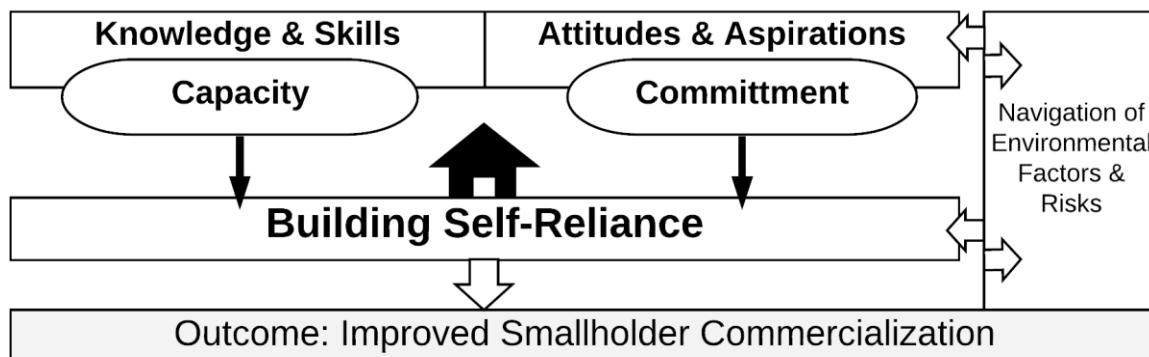
Note. Knowledge, Skills, Attitudes, and Aspirations modified from Bennett (1975).

As demonstrated in the model, the change in farmers' self-reliance is proposed as a prerequisite to improving commercialization behaviors. Self-reliance is directly determined by sub-variables, capacity and commitment (USAID, 2018). Further, capacity is proposed as a function of farmers' knowledge and skills, and commitment as a function of attitudes and aspirations (Bennett, 1975). Not visible in the model are specific modes of action (individual variables measured in the study), based on existing literature relating to commercialization capacity and commitment, such as pooling produce, access to credit, and peer-to-peer cohesion and mobilization (see Table 1) (Catholic Relief Services, 2013; Lowitt et al., 2015). The model posits that smallholder farmers can adopt the modes of action to mitigate environmental barriers or risks impacting their commercialization pursuits. Finally, to examine relationships between self-reliance and the commercialization outcomes, the researchers also measured farmers' engagement in a variety of commercialization behaviors.

Purpose and Objectives
The purpose of the study was to understand how building self-reliance may influence smallholder coffee farmers' advancement in their commercialization. The research objectives were to:
1.   Describe smallholder farmers' recent experiences with different sources and types of extension and technical assistance.
2.   Explore whether relationships exist between smallholder farmers' self-reliance and their coffee commercialization behaviors.

Methods

Data Collection and Participants

We trained Peruvian agribusiness students with previous survey and data collection experience to administer oral questionnaires in the local language (Spanish) using culturally-appropriate techniques. Data collection was not impacted by the 2020 coronavirus disease (COVID-19) pandemic and occurred before international travel restrictions were enacted between Peru and the United States in March 2020.

Forty adult (18+) smallholder coffee farmers ($N = 40$), based in three central highland communities in the Junín and Pasco regions of Peru, participated in this study. We conducted purposive, multi-stage sampling by initially partnering with the Shared-X company to recruit volunteer farmers for the study. We also employed snowball sampling in the field when coffee farmers suggested additional participants to survey. Some farmers previously sold coffee or had current arrangements to produce for Shared-X while others operated fully independent of Shared-X. Shared-X and representatives from the farming communities were asked to help recruit a diverse, representative sample of participants resulting in 57.5 % men and 42.5 % women farmers spanning in age from 20 to over 60.

Instrumentation

We developed the instrument (self-reliance questionnaire) to measure variables of interest using primarily Likert-type scales. Separate indices were constructed for the knowledge and skills, attitudes, and aspirations variables framed similarly to previously proposed constructs by Bennett (1975). Additional Likert-type items pertaining to farmers' commercialization behaviors were included as outcome variables. Finally, we also asked farmers questions pertaining to their demographics, formal education level, and recent external and technical support.

The self-reliance questionnaire integrated concepts from the previously discussed USAID (2018) framework that proposed self-reliance is determined by development commitment and capacity. Participants assessed their perceived commercialization knowledge and skills, attitudes, and aspirations (KSAA) with indices comprised of items found in Table 1, which were derived from research on modes of action a smallholder farmer may demonstrate related to capacity and commitment in commercialization. For the KSAA indices, the five-point response scale was 1 = *Strongly disagree;* 2 = *Disagree;* 3 = *Neutral;* 4 = *Agree; and* 5 = *Strongly agree*. The scale indicated farmers' self-reported level of agreement with affirmative statements (see Table 1).

Table 1
Study Variables and Descriptions

Construct	Description and no. of items	*M*	*post-hoc* Cronbach's alpha
Knowledge and skills	Mean of 10 Likert-type scale items. I know how to transport my produce to my desired buyer (i.e. where to source/arrange transportation). I know how to access buyer and market information to help me sell my produce for a good price. I know how to create a business plan for my production/farming. I know how to follow a business plan for my production/farming. I know how to create a business plan for my marketing. I know how to follow a business plan for my marketing. I know how to access an agricultural loan or credit. I know how to manage a loan properly, so I don't default on the loan. I know what coffee varieties will be most productive and give me the best harvests. I know how to mobilize a group of farmers to work together.	3.48	.78
Attitude	Mean of six Likert-type scale items. Selling my coffee at market is the best way to support my family. Using fertilizer on my coffee will improve my harvests and yield. Selective harvesting practices will improve the quality of my coffee. Growing my farming business will generate more money to support my household in the future. Working together with other farmers will help me make more money. Taking some risks is necessary in order to grow my business and market my produce.	4.17	.36
Aspiration	Mean of five Likert-type scale items. I hope to invest more in my farming business for it to grow. I hope to work to build trust with other farmers to strengthen group work or association. I hope to learn from peer farmers here who produce and market to make good money. I hope to explore new marketing opportunities.	4.63	.65

	I am committed to pursuing commercialization to gain more income for my household.		
Self-reliance (KSAA)	Mean of 21 Likert-type scale items [a]. Self-reliance was comprised of all knowledge and skills, attitudes, and aspirations items (listed above) together.	3.95	.72

Note. Respondents were requested to indicate their agreement or disagreement with affirmative statements. [a] Likert-type five-point scale response options included *Strongly disagree* (1), *Disagree* (2), *Neutral* (3), *Agree* (4), and *Strongly agree* (5).

We also surveyed farmers on six items about their commercialization behaviors using this five-point response scale for self-reported frequency performing a certain behavior: 1 = *Never* 2 = *Rarely* 3 = *Sometimes* 4 = *Often* 5 = *Always*. These distinct behaviors included business record-keeping and planning, collective marketing/pooling produce, accessing prices and market information, and engaging in extension.

Prior to data collection in Peru, the survey instrument was reviewed by a seven-member panel of experts for content and face validity which included survey design specialists, University of Florida and Peruvian extension professionals, and international agricultural development researchers. Additionally, a team of native Spanish speakers, Peruvian extension professionals, and Shared-X employees contributed to the translation of the instrument from English to Spanish and its review for cultural sensitivity.

The accuracy and consistency of the indices used to measure self-reliance were estimated using Cronbach's alpha coefficient, deemed an appropriate indicator of internal consistency reliability for an index-based survey design (Ary et al., 2019). Using Cronbach's alpha, a coefficient of .90 or greater is considered high reliability (on a scale of 0 to 1). However, reliability is often more difficult to measure for personality variables and in these instances, coefficients above .60 are generally accepted (Ary et al., 2019). The knowledge and skills, aspirations, and combined self-reliance (KSAA) constructs had acceptable coefficients (see Table 1). The coefficient (.72) for combined self-reliance indicates the overall instrument is reliable. However, the coefficient of the five-item attitude construct was inadequate to infer reliability, even after removing one item.

Data Analysis

We applied descriptive analysis to calculate frequencies illustrating farmers' demographics and previous external support. Then we conducted correlational analysis, using Spearman's correlation coefficient, to all of the KSAA and behavior variables (combined constructs and individual items) to examine strength and direction of association between pairs. Next, based on strength of association, KSAA and behavior variable pairs were consolidated into a final correlation matrix with nine items. Finally, we constructed three multiple linear regression models to further explore and illustrate relationships found between KSAA and behavior variables. *Post hoc* measures were employed to follow the assumption of linearity.

Results

Demographics and External Assistance

Most producers interviewed (85%) were formally educated until the primary or secondary level while only 10% reported tertiary/university schooling. The majority of farmers lacked TA pluralism over the last year: 80% of farmers indicated they received TA from private

sector, 12.5% of farmers via the government and 12.5% from a farmer association (see Table 2). NGOs, donors, and research institutions were the least reported sources. Examining the types of external support in the last year, only 7.5% of all farmers indicated they received assistance or training related to financing or agricultural credit. 52.5% of all farmers received support in the form of exchange or provision of goods or services. 47.5% of farmers received some sort of training or education over the past year. Finally, the majority of farmers (92.5%) indicated receiving no business planning external support or assistance in the previous year.

Table 2

Recent Experience with Technical Assistance and Extension

External support	*n*	%
Technical support in last year		
Yes	34	85.0
No	6	15.0
Provider/sources of support in last year		
NGO or donor	2	5.0
Government	5	12.5
Private sector or input dealer	32	80.0
Farmer association	5	12.5
Research institute	1	2.5
Type of external support in last year		
Education/training	19	47.5
Finances or credit	3	7.5
Exchange of goods or services	21	52.5
Harvest exchange or split costs	8	20.0
Marketing	10	25.0
Business planning	3	7.5
Donor project participant in last 3 years		
Yes	8	20.0
No	32	80.0

Note. $N = 40$

Relationships Between Self-reliance and Commercialization

Knowledge and skills had the lowest combined mean ($M = 3.48$) among the three self-reliance indices. The mean of the combined attitude items was 4.17, and the aspirations combined mean was the greatest of the three ($M = 4.63$) (see Table 1). The first correlational analysis procedure (see Table 3) applied Spearman's correlations (r_s) to explore strength and direction of association between pairs of individual behavioral frequency variables and the combined self-reliance construct (KSAA) variables. The correlations in this and other analyses ranged from small ($< .01$) to large ($> .50$) (Cohen, 1988). Combined knowledge and skills correlated with taking written marketing records ($r_s = .352$) and combined aspirations correlated with learning and extension ($r_s = .447$). The combined self-reliance (KSAA) construct also had a significant association with engagement in extension ($r_s = .373$).

Table 3

Correlation Matrix of Self-reliance Constructs and Producer Behaviors

	1	2	3	4	5	6	7	8	9	10
1 Behav. frequency: Market prices before selling	-									
2 Behav. frequency: Sell to preferred buyer	-.257	-								
3 Behav. frequency: Written production records	.028	.283	-							
4 Behav. frequency: Written marketing records	.055	.231	.433**	-						
5 Behav. frequency: Learning or extension activities	.182	-.068	.252	-.073	-					
6 Behav. frequency: Pooling production	.181	.073	.219	.261	-.166	-				
7 Knowledge and skills combined	.079	.243	.312	.352*	.226	.008	-			
8 Attitude combined	.129	-.042	-.093	-.119	.228	.010	-.015	-		
9 Aspiration combined	.070	-.011	-.095	-.001	.447**	-.239	.173	.570**	-	
10 Self-reliance combined (KSAA)	.086	.123	.199	.260	.373*	-.061	.840**	.415**	.572**	-

Note. $N = 34\text{-}40$. Correlation coefficients are Spearman's correlations. * significant at $p \leq .05$. ** significant at $p \leq .001$.

A correlation matrix was also constructed to examine correlations between the individual self-reliance (KSAA) and behavior variables, omitting attitude variables due to their unacceptable reliability measurements. From this matrix, with all 22 behavior, knowledge and skills, and aspiration individual variables, a consolidated, final matrix (see Table 4) was created containing only variables with significant associations greater than .400. The three behaviors most strongly correlated with the self-reliance variables were taking written production records, taking written marketing records, and engaging in learning and extension. Three knowledge and skills variables had strong associations with at least one behavior: transport product, access agricultural loan or credit, and know more productive coffee varieties. Additionally, three aspiration variables (invest in my ag business for growth, explore new marketing opportunities,

and committed to commercialization for increase household income) correlated with behavior variables in the consolidated matrix.

Table 4

Correlation Matrix with Consolidated Self-reliance Construct Variables

		1	2	3	4	5	6	7	8	9
1	Behav. frequency: Written production records	-								
2	Behav. frequency: Written marketing records	.433**	-							
3	Behav. frequency: Learning or extension activities	.252	-.073	-						
4	Knowledge and skills: Transport product	.225	.238	.487**	-					
5	Knowledge and skills: Access agricultural loan/credit	.237	.440**	.459**	.420**	-				
6	Knowledge and skills: Know more productive varieties	.437**	.235	.307	.174	.369*	-			
7	Aspiration: Invest in my ag business for growth	-.057	.037	.405**	.410**	.319*	.239	-		
8	Aspiration: Explore new marketing opportunities	.099	.099	.472**	.319*	.463**	.154	.292	-	
9	Aspiration: Committed to commercialization for household income	-.028	-.061	.454**	.211	.321*	.083	.436**	.773**	-

Note. n = 35-40. Correlation coefficients are Spearman's correlations. * significant at $p \leq .05$. ** significant at $p \leq .001$. Variables included were selected by correlation coefficients $\geq \pm .400$.

　　　Three statistical models were built applying multiple linear regression to better interpret relationships of predictor variables with the criterion variables (Frey, 2016). The first model, the Extension and Learning Model, analyzed farmers' engagement in extension and learning behaviors predicted by farmers' knowledge and skills and aspirations (see Table 5). The model, statistically significant ($p \leq .001$), explained approximately 54% of variance in engagement in extension and learning activities. Also notable, knowledge and skills to transport product showed a significant relationship ($p \leq .001$) with engagement in learning and extension activities with a standardized regression coefficient (beta) of .580 (see Table 6).

Table 5

Results of Multiple Regression of Farmers' Behavioral Frequency Predicted by Self-reliance Variables

	N	R	R^2	Adjusted R^2	F	p
Extension and Learning Model	39	.738	.544	.475	7.875	< .001**
Production Records Model	39	.533	.284	.223	4.626	.008*
Marketing Records Model	36	.509	.259	.190	3.732	.021*

Note. * significant at $p \leq .05$. ** significant at $p \leq .001$. Extension and Learning Model = frequency of extension and learning activities predicted by knowledge and skills: create marketing business plan, knowledge and skills: transport product, aspiration: invest in my ag business for growth, aspiration: committed to commercialization for household income, and aspiration: explore new marketing opportunities. Production Records Model = frequency of taking written production records predicted by knowledge and skills: know more productive varieties, knowledge and skills: transport product, and knowledge and skills: access agricultural loan or credit. Marketing Records Model = frequency of taking written marketing records predicted by knowledge and skills: know more productive varieties, knowledge and skills: transport product, and knowledge and skills: access agricultural loan or credit

Table 6

Self-reliance Variable Coefficients from Multiple Regression of Farmers' Behavioral Frequency Predicted by Self-Reliance Variables

	Extension and Learning Model (β)	Production Records Model (β)	Marketing Records Model (β)
Knowledge and skills: Create marketing business plan	-.158		
Knowledge and skills: Transport product	.580**	.053	.141
Knowledge and skills: Know more productive varieties		.451*	-.032
Knowledge and skills: Access agricultural loan or credit		.160	.473*
Aspiration: Invest in my ag business for growth	.109		
Aspiration: Committed to commercialization for household income	.183		
Aspiration: Explore new marketing opportunities	.077		

Note. Beta is the standardized coefficient. * significant at $p \leq .05$. ** significant at $p \leq .001$.

The second model, the Production Records Model, explored farmers' frequency of taking written production records predicted by knowledge and skills: know more productive varieties, knowledge and skills: transport product, and knowledge and skills: access agricultural loan or credit (see Table 5). The model was statistically significant ($p \leq .05$) and explained approximately 28% of variance in engagement in taking written production records. Knowledge and skills to know more productive varieties had a significant relationship ($p \leq .05$) with taking written production records reflected by its beta coefficient of .451 (see Table 6).

The Marketing Records Model was the final model and examined farmers' frequency of taking written marketing records predicted by knowledge and skills: know more productive varieties, knowledge and skills: transport product, and knowledge and skills: access agricultural loan or credit (see Table 5). The model explained approximately 26% of variance in engagement in taking written marketing records and was statistically significant ($p \leq .05$). Knowledge and skills to access an agricultural loan or credit had a significant relationship ($p \leq .05$) with taking written marketing records reflected by its beta coefficient of .473 (see Table 6).

Discussion

The self-reliance framework explored in this study can improve practitioners' and evaluators' understanding of the capacities and intrinsic factors impacting smallholder coffee farmers' commercialization behaviors. Findings indicate farmers' aspirations, knowledge and skills relate with their commercialization behaviors while additional research is needed to better measure and understand commercialization attitudes. The results also infer self-reliance concepts applied recently in other development contexts may be used similarly by extension and development facilitators focusing on the smallholder household commercialization level.

Statistical findings suggest smallholder farmers' knowledge and skills play a paramount role in shaping their commercialization behaviors. Among the self-reliance variables examined, the three knowledge and skills variables (transport product, access agricultural loan or credit, and know more productive coffee varieties) most strongly associated with farmers' behaviors encompassed a relatively diverse array of capacity areas. While practitioners have more traditionally addressed such commercialization capacities and knowledge and skills, it is important to highlight this study's potentially innovative insights pertaining to farmers' commercialization aspirations. The three aspiration variables (invest in my ag business for growth, explore new marketing opportunities, and committed to commercialization to increase household income), that correlated with commercialization behaviors, concentrated primarily on wanting to invest and grow the coffee business. This suggests farmers who see coffee production as a lucrative venture with opportunities for expansion would pursue more advanced commercialization practices. Contrarily, if farmers do not see coffee farming as rewarding for them or their households, they may invest more time and efforts toward other activities and treat coffee commercialization as a secondary occupation.

Researchers and practitioners should carefully consider how attitudes are incorporated and measured in future evaluations and should not discount inclusion of attitudes in self-reliance frameworks. The dearth of literature empirically examining smallholder household's commitment to commercialization may have contributed to the low reliability for attitudes in this study. Moreover, FAO (2014b) claimed that most previous research has concentrated on farmers' assets and education, but a gap exists in understanding how farmers' attitudes impact their commercialization outcomes. Thus, little experience and literature were available to inform the design of the attitudes construct.

It is important to contrast the novel application of this study's model with related, previous approaches to inform investments in future inquires and practice. Development organizations have used the terms empowerment, confidence, and motivation to promote self-reliance (CEN, 2010; Hunger Project, n.d.). However, documentation is limited or vague as to whether these organizations actually measure dimensions of attitudes and aspirations to account for intrinsic factors like was done in the present study. Furthermore, while widely used, empowerment is a contested concept, and Calvès (2009) suggested international development

actors often disregard complex social and power dynamics and peoples' autonomy and address and measure empowerment as a predetermined status they decide another person should work to achieve. Thus, a project may document a farmer's participation in many trainings, but it should not be assumed the farmer now feels "empowered" to pursue commercialization. Using the self-reliance framework, measuring farmers' self-reported attitudes and aspirations, can avoid problematically equating farmers' technical capacities with their intrinsic empowerment or commitment.

This study also builds awareness on potential connections between farmers' self-reliance and their engagement in extension and learning. The Extension and Learning Model suggests farmers who embody the knowledge and skills and aspirations components of self-reliance engage in more extension and learning activities. It could also be argued inversely, based on the correlational results, that when farmers are more involved with extension, they become more self-reliant. This has implications for targeting farmers who may be deprived of linkages with extension assistance, to build their self-reliance to pursue commercialization. While the study did not directly examine associations between extension engagement and commercialization, research has illustrated that extension is critical to connect smallholder farmers with technologies and markets (Suvedi & Kaplowitz, 2016). Thus, findings would suggest farmers who participate in and seek more extension are better prepared and able to pursue commercialization.

Farmers' sourcing and types of extension and technical support should also be considered for self-reliance implications. As the global agriculture sector has changed, so has extension, "transitioning from a focus on technology transfer to a focus on facilitating a range of interventions in complex contexts" (Suvedi and Kaplowitz, 2016, p. iii). Additionally, extension systems now often include public, private sector, and NGO services (Norton & Alwang, 2020). One indicator of more sustainable engagement with extension may be pluralistic sourcing which was lacking among the farmers sampled with 80% of farmers' external support over the last year from the private sector. Farmers who engage with numerous sources of extension, providing different services and benefits, may exhibit greater self-reliance over the long-term (e.g., when one provider discontinues or cannot offer certain types of services). Peer association, collective action, and farmer-to-farmer systems may also be local, sustainable sources for smallholder farmers to diversify access to assistance and extension and in turn increase their self-reliance (Silvert et al., 2021; Simpson et al., 2015). Moreover, research has even indicated farmers may learn more from their peers than outside practitioners (Suvedi & Kaplowitz, 2016; Van den Ban & Hawkins, 2002).

Recommendations

In addition to implications for extension professionals, program planners can apply findings from this study to target and screen farmers for participation in commercialization-focused interventions. IFAD (2019) describes targeting as intentional efforts aiming to ensure a specific group of people benefit from a development intervention. Using the variables found to be most important in this study, practitioners can develop a simple survey tool to strategically screen for and target farmers who exhibit self-reliance or identify gaps and needs the intervention should address to boost self-reliance.

Beyond initial targeting and planning, self-reliance evaluation metrics could also infer whether farmers already working with an external partner are effectively shifting toward sustainable, more advanced commercialization. Using evaluation at standardized intervals, findings would suggest whether self-reliance is being achieved or whether approaches by the

external facilitator should be modified to reduce dependency on outside support and promote ownership by farmers. For temporary development interventions, an approach similar to that of USAID (2018) could be used to inform decisions on transitioning smallholders farmers away from donor funding based on measured self-reliance accomplishments.

In additional to practical implications, the study's findings build a case for researchers to continue exploring linkages between smallholders' self-reliance and their commercialization. While this study is an important step toward development of a reliable self-reliance construct and instrument, a qualitative or multimethod study could draw additional insights on self-reliance, especially because research has suggested gender and social factors may influence smallholder commercialization behaviors (Tavenner et al., 2019). A qualitative inquiry could dig deeper and better appreciate the rich diversity and household dynamics among smallholder farmers.

Limitations in the present study include the sample size and sampling techniques. Increasing the sample size in future research is recommended as this study's findings are not generalizable beyond the population examined. A larger sample would also improve the statistical power of analyses (Israel, 2009). Additionally, while the researchers were constrained by logistics and budget, random sampling methods are encouraged in future inquiries.

This study's findings can contribute significantly to understanding how external facilitators can evaluate smallholder coffee farmers' needs and provide targeted assistance to promote advancement of commercialization practices. The evaluation of self-reliance accounts for important factors relating to both an individual's capacity to navigate the constraints of their environment and the intrinsic commitment and motivation to pursue behavior changes. Future studies are encouraged to refine the self-reliance framework based on applications in different contexts.

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