Farm Production and Market Access of Certified Coffee Farmers in Dak Lak, Vietnam

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Introduction

Rural livelihood augmentation has long been a crucial challenge for the effectiveness of Vietnamese government policies in the coffee sector. Although Vietnam remains the world's most competitive coffee producers, there now are still thousands of rural farmers struggling against the extreme coffee price volatility and losing hope to improve their primary source of income. Thus, the sustainable future of the industry is being questioned upon various problems such as climate change and deforestation, intensive conventional farming, aging coffee trees, unbalanced power relation between marketers, spot market transaction and the traditional price mechanism, and foremost the small-scale production system. In this regard, the Vietnamese government has launched the sustainable-certified coffee program of which coordinating production and distribution with leading coffee processors/exporters are believed to bring better market access, new product development (standardized and higher quality), and improvement of farmers' welfare. However, these new institutional arrangements have not only gained successes but also many failures. Therefore, the overall objective of our study was to discuss the future development of sustainable-certified coffee in terms of production efficiency and factors that influence farmers' access to high-value markets in Dak Lak.

Methodology

Stochastic Frontier Production Model

$ln(y_i) = \beta_0 + \sum \beta_i ln(x_{ij}) + V_i - U_i, i = 1, 2, ..., n$ where i refers to the i^{th} coffee farm in the sample; y_i is the coffee yield (ton/hectare); x_{ij} are input variables per hectare used by i^{th} farm

The technical inefficiency effects (Coelli 1995, Coelli and Battese 1995) are defined as:
$|U_i| = \delta_0 + \delta_1 Z_1 + \delta_2 Z_2 + \delta_3 Z_3 + ... + \delta_{11} Z_{11} + W_i$ where Z_i are farm-specific variables

Categories	Farmer	Percentage
TE < 40	0	0
40 ≤ TE < 50	1	0.546
50 ≤ TE < 60	4	2.186
60 ≤ TE < 70	8	4.372
70 ≤ TE < 80	17	9.290
80 ≤ TE < 90	45	24.590
90 ≤ TE	108	59.016
Total	183	100.000
Min	45.4635	
Max	98.0241	
Mean	88.245762	
SD	9.8345411	

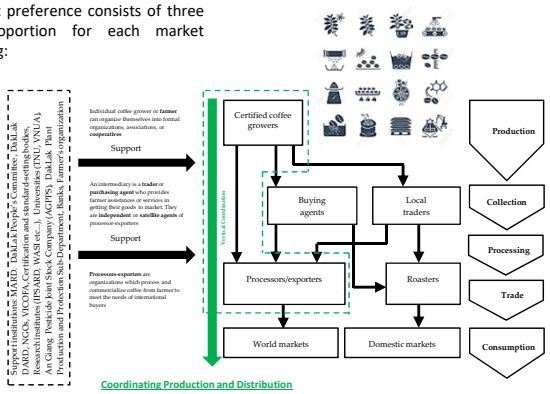
Seemingly Unrelated Regression Model

The SUR model (Zellner 1962, Zellner and Huang 1962) of market preference consists of three single equations to simultaneously estimate the sale proportion for each market (processors/exporters, buying agents, local traders) as the following:

$$PCSE_i = \alpha_{ie} + \sum_{l=1}^{9} \beta_{iel} TCA + \sum_{m=1}^{7} \gamma_{iem} DSC + \varepsilon_{ie}$$

$$PCSA_i = \alpha_{ia} + \sum_{l=1}^{9} \beta_{ial} TCA + \sum_{m=1}^{7} \gamma_{iam} DSC + \varepsilon_{ia}$$

$$PCST_i = \alpha_{it} + \sum_{l=1}^{9} \beta_{itl} TCA + \sum_{m=1}^{7} \gamma_{itm} DSC + \varepsilon_{it}$$



Variables	Processor/Exporter		Buying Agent		Local Trader	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Constant	0.501 ***	0.073	0.439 ***	0.077	0.066	0.071
UCER	−0.004	0.018	0.050 **	0.025	0.116 ***	0.022
INFO	−0.004	0.021	0.035	0.023	−0.030	0.021
COM	0.021	0.031	0.044 **	0.017	−0.019	0.020
PORT	−0.030	0.026	−0.097 ***	0.025	−0.021	0.017
GRAD	0.005	0.018	−0.002	0.017	−0.012	0.018
PAY	0.035 *	0.018	0.005	0.021	−0.003	0.017
DELI	0.001	0.021	−0.001	0.020	−0.015	0.019
QUAN	0.037 **	0.017	0.092 ***	0.020	0.074 ***	0.020
TRUS	−0.002	0.023	−0.011	0.018	0.039 **	0.018
AGE	−0.002 *	0.001	0.002 *	0.001	0.001	0.001
GEN	−0.017	0.022	0.037	0.024	−0.016	0.023
EDU	−0.009 **	0.004	0.000	0.005	0.006	0.004
ETHN	0.096 ***	0.031	−0.073 **	0.034	−0.046	0.032
EXPE	0.000	0.004	−0.002	0.004	−0.001	0.004
FARM	−0.075 ***	0.016	0.036 **	0.016	0.036 **	0.016
LOC	−0.036	0.031	−0.071	0.034	0.012	0.031
RMSE	0.127		0.149		0.140	
R-sq	0.247		0.393		0.392	
Chi-square	56.88 ***		94.25 ***		95.39 ***	

Variables		Coef.	SE	t-ratio
Production frontier				
Constant/intercept	β0	1.6208	0.4035	4.0174*
NPK fertilizer	β1	0.4092	0.0342	11.9549*
Organic fertilizer	β2	0.0757	0.0237	3.1968*
Manure	β3	0.0716	0.0165	4.3527*
Pesticide	β4	0.0038	0.0105	0.3650
Water	β5	0.0799	0.0156	5.1305*
Hired labor	β6	0.0003	0.0163	0.0202
Family labor	β7	0.1053	0.0276	3.8133*
Depreciation	β8	0.0152	0.0150	1.0124
Other cost	β9	0.0073	0.0156	0.4687
Technical inefficiency				
Constant/intercept	δ0	0.8404	0.2344	3.5857*
Age	δ1	-0.0002	0.0027	-0.0606
Gender	δ2	0.0492	0.0731	0.6722
Education level	δ3	-0.0348	0.0145	-2.4029*
Ethnic	δ4	0.0882	0.0699	1.2619
Farming experience	δ5	-0.0222	0.0130	-1.7124
Household size	δ6	-0.0731	0.0275	-2.6579*
Farm size	δ7	0.1557	0.0880	1.7695
Labor/land ratio	δ8	0.0442	0.0260	1.7009
Coop. membership	δ9	-0.3842	0.1892	-2.0309*
Extension	δ10	-0.0088	0.0522	-0.1684
Credit	δ11	-8.96E-6	3.60E-6	-2.4845*
Variance of parameters				
Sigma-squared	σ^2	0.0491	0.0192	2.5556*
Gamma	γ	0.9179	0.0408	22.4995*
Log likelihood function			140.0706	
LR test of one side error			93.6163	
Mean of exp (Ui)			88.2458	

Results

The sustainable-certified farmers have been exercising poor farming practices such as excessive use of fertilizer, over-irrigation, improper pruning, pesticide overuse, and choice of old varieties in replantation process.

The results from SFA show that sustainable coffee farmers in Dak Lak obtained the average technical efficiency level of 88.24%. The technical efficiency ranged from 45.5% to 98.0%, hence sustainable coffee farmers could reach 9.97% of cost saving if they achieve the technical efficiency level of their most efficient counterparts. Education, household size, cooperative membership, and credit had significant and positive effects on technical efficiency.

Certified coffee farmers are marketing their coffee beans to different markets of exporter/processor, buying agent, and local trader. Significant SUR estimated variables that influence certified coffee farmers' market access are transaction cost attributes (price uncertainty, market competition, transportation cost, payment speed, and sale agreement) and socioeconomic characteristics of farmer (age, ethnic, farming experience, location, and certificate ownership).

Conclusion

Social relationships embedded in economic activities explain the most preferred access to spot markets of buying agent. The study suggests that improving education, credit access, and collective actions are essential for sustainable coffee farmers to mitigate the effect of small-scale production. Given the need for vertical coordination, farmers should be engaged in more direct market channels.

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