Unveiling the shift of smallholders' Cash Crop Farming from Coffee-orchard to Khat in Sidama region, Ethiopia

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Abstract

The study unveiled the recent competing shifting of cash cropping smallholders' farmland use from coffee and orchard fruits to khat farming based on the empirical evidence collected from the Sidama region, Ethiopia. Despite the national economic and sociocultural importance of coffee in Ethiopia, large tracts of coffee farmland are being cleared and converted to khat cropping in Sidama, Ethiopia. A mixed research design with both quantitative and qualitative approaches was used. The sampling technique was multistage. The multistage sampling technique that combined purposive, stratification and simple random sampling techniques was used. Two woredas, namely Dara and Aleta Chuko were purposely selected, and from Dara, 190 respondents were randomly selected from three kebeles, and from Aleta Chuko, 192 respondents were selected randomly from three kebeles, and a total of 382 farm households were selected from the study area. Primary data was collected using survey questionnaires, interviews, observation, and focus group discussions. The logistic regression technique was used to identify the determinants of farmland shift from coffee and orchard fruit farming to khat farming. The study revealed that in one district of the study area, khat plantation coverage increased from 86 hectares in 2018/19 to 170 hectares in 2019/20. In this district, from twenty-four kebeles (the smallest administrative unit), sixteen kebeles were coffee producers. Currently, three of them are converted by khat cropping. Among other factors, market bureaucracy, market access, and income strongly contributed to the shift of coffee farmland into khat farming. Furthermore, the study revealed that the shift is poverty-induced and is an alternative to the ever-challenging smallholder's livelihood, and the expansion of khat farming brought negative sociocultural and political consequences to the local community. On the contrary, the government follows non-involvement farmland use policy to khat production and marketing for undefined reasons. We confirmed some actors, such as local state authorities, brokers, and traders have networked interests in khat production and marketing. The study contributes to policy debate, dialogue, and inputs on cash crop farming.

Keywords/Phrases: Cash Cropping, Coffee, Khat, Farmland Use, Sidama-Ethiopia, Smallholders

1   Introduction

Regardless of the changes in terms of policy and regime, since the 1950s, the agricultural sector has been recognized as the center for economic development, but declining agricultural development records. That is why the controversy over the claim of economic growth and the inability of 80% of the total agrarian community to access the necessities of life has been continuing (Berhanu, 2014; Lie & Mesfin, 2018). According to Rahmato (2009), more than two-thirds of the country's population practices agriculture while still it is undergoing a slow but steady process of decline, which is evidenced by diminishing resources, increasing vulnerability, and rural

poverty. The sector can neither develop and transform itself nor transform the peasant livelihoods and lifestyles.

Coffee is one of the firstborn cash crops in Ethiopia and symbolizes the country as the origin of the genetic diversity of *Coffea arabica*. It grows in Kaffa, Illubabore, and Wellega, known for their premium qualities and unique coffee names; Yirgachefe, Sidama, Jimma, Nekemnt, Harar, and Limu of global coffee markets and some amounts in other parts of the country. Ethiopian coffee is seen as "black gold" for the national economy, which has been and remains the leading cash crop and export commodity which accounts for more than 4% of the national GDP, 10% of agricultural production, and more than 37% of total export earnings (see also Degaga, 2020; Ward et al., 2016). Where 95% of the national coffee production comes from smallholder farmers, more than 4.3 million smallholder farmers are involved in coffee farming and 25% (15 million) of the Ethiopian population directly or indirectly depend on coffee production, processing, and marketing (Mekuria, Neuhoff and Köpke, 2004; Tefera and Tefera, 2013; Ministry of Agriculture [MoA], 2016) is worth $836.6 million 2.8% of world annual coffee export value in 2018/19. Coffee has different sociocultural values like serving to welcome guests with the exceptional ceremony "*Buna kella*", where coffee is made with butter in Sidama, Oromo, Wolayta, and Gamo Gofa, cultural event commemoration. Such traditional coffee drinking ceremony for different public gatherings is essential for the social value of sharing ideas, a symbol of harmony and strengthening relationships, and discussing a solution to community problems in addition to the economic benefits to the smallholders in Ethiopia.

Cash crop farming in Ethiopia faces pressing challenges of institutional constraints, unfavorable policy frameworks, imperfect credit markets, corrupted marketing environment, inappropriate choice of cash crop varieties, and illegal market interlinks, which increase smallholders' debt burden by village money lenders (Berhanu, 2014; Debela, 2007). Recently, Khat (*Catha edulis*) has become the most competitive threat to coffee and orchard fruit farming (Wassie & Pauline, 2018). Nevertheless, 61% of national export is gained from coffee, the expansion

of khat plantations setbacks coffee production (Siddiqui, 2015), and the threat of endangered unique coffee species. Khat plantation brought a variety of socio-cultural and economic crisis to the smallholders and local communities (Siddiqui, 2015). Khat plant coverage dramatically increased in Ethiopia; in 1954, it only covered 3000 hectares of national land and by 1961, it had grown to 6997 hectares. After 37 years, in 1998, the total area of land under khat cultivation was estimated at 78,570 hectares, which dramatically increased to 163,227 hectares in 2008, 204,648 hectares in 2011, and 248,964 hectares in 2015 (Binalfew, 2017). According to the official reports of the districts and field observation, from the total farming land in the two woredas, 17,842 hectares of land is covered by coffee, 14,357 hectares of land is covered by Khat, and 4976-hectares of land is covered by fruit farming.

The total land cover of the khat plantation multiplies more than 82 times within a half-century. The growing demands for marketing and consumption of khat have become a major concern for Eastern African countries, particularly Djibouti, Somalia, and Ethiopia (Binalfew, 2017). Ethiopian coffee production and marketing, on the other hand, have increased marginally at a rate of 0.3 percent (Tefera & Tefera, 2013), as evidenced by a decrease in Ethiopian contribution to global coffee market shares from 4.35 percent (2010/11) to 2.8 percent (2018/19).

Despite coffee's national economic and socio-cultural importance in Ethiopia, large tracts of coffee farmland are being cleared and converted to khat cropping. Preliminary observations in one of the study area's districts indicate that khat was recently introduced as a cash crop in a district previously known for having the highest coffee production. However, currently, smallholders in this area have specialized in chat production, and chat plants now cover over 10,000 hectares of farmland. Nonetheless, Sidama is one of Ethiopia's most renowned coffee producers; however, its smallholder farmers recently dramatically switched to khat plantations. To this end, the primary objective of the research is: why Sidama smallholder farmers are shifting from coffee and orchard fruits farming to khat cropping. The paper addresses this question and investigates the

extent to which determinant factors contribute to the change of coffee and orchard fruits into khat cultivation agribusiness dynamics in Sidama, Ethiopia.

2 Materials and Methods

2.1 Description of the Study Area

Sidama is the 10th regional state in Ethiopia since June 2020. It is located approximately 275 km south of Addis Ababa. Sidama became the tenth regional state in November 2020; formerly, it was one of the administrative zones of the Sothern Nations Nationalities and People's Regional State of Ethiopia. It is found between $6^0 10$' to $7^0 05$' North latitude and $38^0 21$' to $39^0 11$' East longitude. It is bordered by the Oromia region in the southern, northern, and eastern directions; the Gedeo zone and the Oromia region in the southern direction. Their system of production largely contributed to maintaining environmental conservation and sustainability, mainly in the highlands and midlands. The Sidama livelihood strategies are mixed agriculture where major crops growing are Enset (*Ensete ventricosum*), coffee, orchard fruits, maize, wheat, teff, barley, haricot bean, and khat more recently (CSA, 2007; Lemessa, 2002). Then, the Dara and Aleta Chuko districts ('*woredas*') of the Sidama are selected purposively to achieve the research objectives. These two woredas were selected purposively based on coffee production and the current massive farmland changes from coffee and orchard fruit into khat cropping. These woredas were considered strata as identified using the production and shift classification.'

Aleta Chuko and Dara woredas' main agricultural products are Coffee, Enset ('*kochoo*'), pineapple, and khat. These woreda has an irrigational dam on the Gidawo River that supports the agricultural production of major fruits like mango, pineapple, orange, and avocado, among others and contributes to the region, the nation, and exporting. These woredas' altitude is from 1400 to 2300 meters above sea level, and their mean annual temperature ranges from 10 to 26 ^{0}C with an average annual rainfall of 1100 to 1400mm per year.

2.2 Data and Methodology

The study applied both quantitative and qualitative data-collecting methods. Quantitative data was collected from smallholder farmers of the Dara and Aleta Chuko districts (woredas) of the Sidama. These two woredas were selected purposively based on the coffee production and the current massive farmland changes from coffee and orchard fruits into khat cropping. The smallholder farmers' household survey was conducted on 382 smallholders chosen by a multistage sampling strategy. These woredas were considered as strata as identified using the production and shift classification. From each stratum, the lowest administrative unit called '*kebele*', namely, Setamo, Kumato & Sofa (from Dara woreda), Mangudo, Teso, and Debicha (from Aleta Chuko woreda) were ranked and selected from the highest to lowest coffee and khat production volumes with the help of senior experts at woredas. Then, the survey questionnaire was distributed to kebeles using proportional distribution mechanisms.

The survey was conducted by data collectors and enumerators with the Paper Assisted Personal Interview (PAPI) technique at six kebeles under the supervision of researchers. 352 observations were used for analysis, and the remaining 30 survey questionnaires were discarded because of incompleteness. The quantitative data was analyzed using the probability model of the logit regression technique to examine the significance of contributing factors to determine the decision of smallholder farming switched from coffee farming to khat cropping.

Qualitative data was gathered using focus group discussions (FGDs) with smallholders, government officials, and woreda senior experts and officials with field observation farmland. We conducted two FGDs with senior experts, one from each woreda, and two FGDs with smallholder farmers, one from each woreda. So, a total of four FGDS were undertaken. To get evidence-based information, two FGDs with higher government officials and senior experts were made. The officials and experts were selected from woreda-level administration. So, two FGDs (one FGD in Darra with 3 participants and another FGD in Aleta Chuko with 4 participants) with high government officials and senior experts were undertaken. Moreover, farmers also participated, and two additional FGDs with farmers (one FGD in Dara with three farmers and 1 FGD in Aleta Chuko woreda with three farmers) were conducted.

The interview data was obtained from higher woreda officials, and a total of three semi-structured interviews were conducted. The qualitative data was analyzed using thematic content analysis and narrative analysis to triangulate, supplement, and verify the quantitative data results. In analyzing the data, the income implication of changing farmland from coffee to khat production is used to measure the livelihood resilience of farm households. The three authors were equally responsible for writing the full research report.

2.3 Sampling Techniques and Sample Distribution

The households' sample size is taken from Dara and Aleta Chuko woredas. The total sample size of smallholders determined by using the following (Kothari, 2004) formula.

$$n = \frac{Z^2.p.q.N}{e^2(N-1)+Z^2.p.q} = \frac{1.96^2(0.5)(0.5)(64,775)}{0.05^2(64,774)+1.96^2(0.5)(0.5)}$$

$$n = 382$$

Where: N = total population, n = expected sample size, e = accepted error margin, $q.p$ = standard deviation, & Z^2 = standard deviation at a given confidence level.

The P-value assumes 50 % (0.5), an assumption is also made for any particular outcome to have a 5% marginal error and 95% confidence interval of certainty (α=0.05). Accordingly, by inserting an N of 64,775 households, e of 0.05, and Z of 1.96 from the statistical table at a given confidence level, a sample size of 382 smallholder farmers was taken. This sample was distributed proportionally using the following formula:

$$nx = \frac{NX.n}{N}$$

Where: nx = sample size in x woreda, n = Estimated final sample size, Nx = Total number of households x woreda, and N = Total number of households in two woreda's.

Accordingly, Nx in Dara and Aleta Chuko woredas were 32, 335, and 32,440 respectively. Therefore, by inserting Nx of 32,335 and 32,440 for Dara and Chuko woreda and n of 382 and N of 64,775, the selected sample of Dara and Aleta Chuko woredas' are 190 and 192 respectively. Then, 6 kebeles of Dara and Aleta Chuko correspondents (from each kebeles) were selected using a proportional sampling technique.

Table 1. Distribution of sample respondents

Woreda (District)	Kebele	Total Households	Sample Households
Dara	Qumato	32,335	64
	Setamo,		61
	Safa		65
Aleta Chuko	Tesso	32,440	63
	Debicha		65
	Mangudo		64
Total		64775	382

Source: Authors' calculation based on a survey (2021)

2.4 Theoretical Framework of the Study

Countries have different sociocultural backgrounds and historical experiences. The development policy, strategies, and priorities should accommodate such diversities. Ethiopia has diversified communities with differentiated historical and sociocultural setups and different ecological, topographical, and agroecological resources. Therefore, development approaches and strategies in Ethiopia are expected to address such diversities. This study used the rural sociology area growth approach (Shortall, 2004) and structural functionalism which take into account multiculturalism, the sociological backgrounds of

a specific area, and local contexts of development bring a shift from relying on sectoral policy (agriculture) alone into spatial (rural) policies which emphasize the development of a rural society based on the bottom-up path (Riggs, 1964; Shortall, 2004) which expedite rural smallholders to improve their livelihood & living conditions from local contexts & sociocultural backgrounds and attain socio-economic development. Santini et al. (2012) argue that an area-based development approach is a breakthrough point to sustainable economic growth by targeting a defined geographical area that is characterized by common sociocultural setups, complex development problems using a learning process and people-centered development endeavors aimed at sustaining and widely diffused improvement of social welfare and nation-building. According to Fonjong, (2004) and Hassan et al. (2002), context aligns with government agricultural policy choices; farming incentives, agricultural financing, and marketing infrastructure networking strongly affect the productivity of rural farmers.

Structural functionalism and area-based development approaches enable the specific geo-location, rural smallholder farmers, to improve cultivation land-use techniques and conserve the environment (Riggs, 1964; Santini et al., 2012), aligning with their sociocultural and historical backgrounds. The indigenous techniques will be flourishing to empower rural residents for effective management from farmland to market and consumption processes and establishing specific banking industries with the help of strong state institutional supports and the highest commitment for comprehensive agricultural development project financing and financial services, including insurance packages which ultimately strengthening the community well-being in augmenting productivity and profitability of smallholders.

2.5 Empirical Model of the Study

To identify the factors that affect the decision of smallholder farmers to change their farmland use from coffee to khat farming, the probability model of logit regression function is applied as follows:

$$Z_h = \beta_{xh} + e_h \tag{1}$$

Where $Z = 1$ if a farmer changes his part of farmland from coffee and orchard fruit crops into khat crop farming, $Z = 0$ otherwise, $\beta =$ vector of parameters to be estimated, $x =$ vector of explanatory variables and $e =$ is the error term.

According to Gujarati & Porter (2004), binary choice models are well-established models often used to analyze the adoption probability as they assume occurrences between two alternatives (in this case, a household switched into khat farming and a household that didn't change. The linear probability model, which is expressed as a linear function of the explanatory variables, is computationally simple. Following (Gujarati & Porter, 2004), the logistic regression technique is specified as follows:

$$P_i = E(Y = 1|x) = \frac{1}{1 + e^{-(\alpha + \beta_1 x_1)}} \tag{2}$$

For the case of explanation, we write (1) as;

$$P_i = E(Y = 1|x) = \frac{1}{1 + e^{Z_i}} \tag{3}$$

Where: $Z_i = \alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots\ldots + \beta_n x_n$

The probability that a given household decision to change is expressed by (3) while the probability of not is:

$$1 - P_i = \frac{1}{1 + e^{Z_i}} \tag{4}$$

Therefore, we can write;

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{Z_i}}{1 + e^{Z_i}} = x'\beta + e \tag{5}$$

Now, $\left(\frac{P_i}{1 - P_i}\right)$ is simply the odds ratio in favor of changing farmland from other coffee and orchard fruit farming to khat farming;

Where: *Pi*: represents the probability of that i^{th} household making a certain choice for the given explanatory variables (X_i), *e*: represents the base of natural logarithms (2.718), X_i: represents the ith household explanatory variables, n_i: represents the number of explanatory variables, $i = 1, 2, 3 \ldots, n$, and, β represents regression parameters to be estimated, and β is the coefficients of X_i.

Hence, to know the factors that affect the decision of smallholder farmers farming changes into khat farming, the following final model is presented and estimated by using a binary logistic regression model;

$$chan_h = \beta_0 + \beta_1 gend + \beta_2 age + \beta_3 edu + \\ \beta_4 fams + \beta_5 land + \beta_6 exjob + \beta_7 exp \\ + \beta_8 mark + \beta_9 burea + \beta_{10} incent + \varepsilon_h \quad (6)$$

Table 2. Definition and measurement of dependent and independent variables

Variable	Code	Measurement	Variable type
Change of farmland from coffee/ orchard fruits into khat	chan	=1 if a farmer changes farmland from coffee/ orchard fruits into khat and =0 otherwise	Dummy
Gender	gend	=1 for men and = 0 for women,	Dummy
Age-	age	Yearly age of the farmer	Continuous
Education level	edu	Last class completed	Continuous
family size	fams	Family size in number	Continuous
Land size	land	Land size in hectare	Continuous
Extra Job	exjob	having an extra job, =1 if a farmer has extra job beyond farming and = 0 otherwise	Dummy
Market access of coffee	Mark	=1 if the farmer can have market access for coffee at any time and = 0 otherwise	Dummy
bureaucratic procedures in coffee marketing	burea	=1 if the coffee marketing if bureaucratic for the farmer and = 0 otherwise,	Dummy
Agricultural policy incentives for coffee farming,	incent	=1 if there is an incentive for the coffee farmer and = 0 otherwise	Dummy

Note: = β - are vectors of parameters to be estimated and ε_h - error term

3 Results and Discussions

3.1 Socioeconomic characteristics of the respondents

The randomly selected farm households' gender distribution, educational level and whether they have extra job beyond cash crop farming are presented in table 3.

As presented in the table, 82.7% of the farm households were male farmers, and 17.3% were female farmers. As it is common in Ethiopia and the study area, most of the household heads are male farmers. In our survey, the farm respondents' educational status was also presented: 44.4% of the farm households are illiterate, 30.4% of the respondents completed grade four, 16.5% of the respondents completed grade eight, 6.8% of them completed grade twelve and the remaining 1.9% of them are com-

pleted degree and above. This result implies that most of the farm households did not finish the primary level of education. So, the national and regional government should design a framework where farmers at least can complete basic schooling in their community because farm productivity and income level of cash crop farmers increase with an increase in years of schooling of those farmers. In our study, the farmers who have additional jobs beyond cash crop farming and those who did not have any additional jobs were determined. According to our survey, 80.7% of the farm households did not have any additional jobs beyond cash crop farming and were not generating any additional income. However, the remaining 19.3% of the farmers have extra jobs, which were additional income-generating activities. These types of economic activities are known as off-farm activities.

Table 3. Socio-economic characteristics of the respondents

	Type	Number	Percent
Gender of Respondents	Male	291	82.7%
	Female	61	17.3%
	Total	352	100.0%
Educational Status of Respondents	Illiterate	156	44.4%
	Grade 1-4	107	30.4%
	Grade 5-8	58	16.5%
	Grade 9-12	24	6.8%
	Degree and above	7	1.9%
	Total	352	100.0%
Additional Job	Respondents having extra job	68	19.3%
	Respondents with non-extra job	284	80.7%
	Total	352	100.0%

Source: Own survey, march 2021

3.2 Types of Cash Crops and Land use Coverage

According to the official reports of the two districts' agricultural offices and researchers' field observations (2021), the study areas are the potential producer of different cash crops in Ethiopia. The main cash crops produced by smallholder farmers of Aleta Chuko and Dara districts are coffee, khat (introduced in half of the 1990s and currently the most preferable plant), avocado, mango, pineapple, papaya, banana, sugarcane, apple, and buckthorn. From the total farming land in the two woredas, 17,842 hectares of land is covered by coffee, 14,357 hectares of land is covered by Khat, and 4976 hectares of land is covered by fruit farming.

3.3 Factors Determining Smallholder Farmers Shift into Khat Cropping

The Sidama smallholders grow coffee plants and orchard fruits in connection with their sociocultural values and experiences, just as their forefathers did. They have recently shifted to khat cropping. For Sidamas, particularly, coffee is the sociocultural crop that commemorates different communal ceremonies, communal rituals, and artifacts that serve as decorative guests welcoming coffee ceremonies, strengthening relationships and friendships among them. Due to the coffee market fluctuation, decreasing farmland sizes, and limitation of livelihood alternatives,

smallholder farmers' livelihoods have been facing different challenges from time to time, and the existing livelihood strategies couldn't accommodate smallholder farmers switching to khat plantations. As Mengistu et al., 2009; Southern Nations (2001) reported, most of the time, the Sidama lowland areas are vulnerable to the food-insecurity crisis has prevailed and become more pronounced since 2002, up to 58.8% of farmers are food insecure in some areas along with the increasing population pressure results to fragmentation of farmlands, land degradation, reduction of fallow periods and shifts in cropping patterns. This scenario forces smallholders to look for different alternatives to cash crop production.

Nowadays, smallholders in the study area are continually shifting from coffee and orchard fruits to khat cropping. We found that, currently, cash crop production choices in smallholders are determined by the yield and revenue generated from it. For instance, comparing coffee and khat cropping, khat can generate frequent and higher income than coffee farming. For the smallholder farmer who farms coffee, the maximum estimated income would be $429 per hectare with a 5-6 quintals per hectare productivity ratio. On the other hand, in the same smallholder farmer farms khat, the estimated income could surpass $2857 per hectare within a year. In concurring with this finding, Govereh et al. (1999) confirmed the profitability of growing a particular crop rela-

tive to other crops & the market structure number of competing buying firms in the market particular crop relative to other crops. For example, in Dara district khat plantation increased from 86 hectares in 2018/19 to 170 hectares in 2019/20. The following (figure-1 below) shows the coffee-fruits farmland use change dynamics as figure-1 A(1) and A(2) show the productive khat farmland in the study area as figure-1 B(1) and B(2). Smallholders cleared orchard fruits (except avocado) farmland.

Recently, smallholders have been attracted to produce avocado because it has become the main industrial raw material for oil production at Yirgalem Integrated Agro-Industrial Park. After this industry started its operation, for instance, in Dara Woreda, the avocado farmland size increased from 68 hectares in 2018/19 to 168 hectares in 2019/20 only in one fiscal year. Therefore, if smallholders can get incentives and attractive market access, they can sustain to produce orchard fruits and coffee.

Figure 1. Khat Farmland Expansion in Sidama Smallholder Farmers [Photo credit: Researchers' during fieldwork (March 2021)]

The logistic regression result (Table below) presented having extra jobs beyond farming, coffee market access, and coffee marketing bureaucratic procedures were found to be strongly significant in affecting the farmers' land-use decision to switch to khat farming. Having extra jobs beyond farming, positively affect farmers' decision at a 1% level of significance. This result implies that the probability of the decision to switch to khat farming significantly increases as a farmer has an extra job and decreases with those farmers who haven't an extra job. Due to the shortening of alternative livelihood strategies, smallholder farmers' attitudes shifted to khat cropping as the livelihood mechanism. The coffee price fluctuation at local and world markets aggravated the

situation of debilitating farmers' survival (Lemessa, 2002). Coffee market access affects the farmers' decision to change their part of the land use from coffee and fruit farming to khat farming negatively at a 1% level of significance.

This result implies that the probability of changing from coffee and fruit farming to khat farming reduces reliable coffee market access and vice versa. The coffee market access differs from farmer to farmer due to other exogenous variables such as membership in agricultural unions and others. The smallholders who could not provide their coffee products to the market (local or international) market themselves without brokers are discouraged to grow coffee and shift to khat cultivation. Thus, market distortion

could substantially affect coffee production. The bureaucratic hurdle of the coffee marketing process is also affecting farmers' decisions to switch to khat farming at a 1% significance level. Coffee farmers face bureaucratic hurdles in the coffee marketing process compared to khat marketing procedures, which could be sold without any procedures.

Favorable coffee market opportunities incentivize smallholders to grow coffee. For example, due to coffee price increased from US $0.4/kg to US $0.93/kg in 2019/20, smallholders were motivated to replant coffee and orchard fruits. Again, the Ethiopian government enacted a new proclamation in January 2019, which enabled smallholders to export coffee to the foreign market through their coffee brand and licenses to motivate them to grow coffee. However, as the district's senior official stated, "The enforcement of the proclamation has exposed to rent-seeking behavior among local state authorities, previous coffee exporters and middlemen/brokers. The previous exporters and brokers tried to own the coffee exporting license as they have their coffee farmland."

On the other hand, when there is the availability of conducive market and pricing systems with the establishment of local resource-oriented industries like Yirgalem Integrated Agro-Industrial Park, motivate smallholders to revisit their land-use choices. The fundamental reason for smallholders to shift to khat plantations is poverty-induced and endangered livelihood status. In this regard, (Binalfew, 2017) present khat enjoys a relatively stable price in the domestic and international markets, while coffee suffers from fluctuating export volumes and prices. With market incentives and ever-increasing khat demand, Ethiopian smallholders were forced to allocate their scarce farmland to khat production. Similarly, the poor coffee farm management systems and failure to inject new technologies into coffee production, inadequate extension services, and lack of designated institutions that provide technical support from farm to marketing on coffee, a significant number of farmers switched to khat production over the past years, and khat become more owing to the high demand as well as price (Tefera & Tefera, 2013) locally and internationally.

Table 4. Estimates of binary logit regression model shows factors affecting farmers' change from coffee and orchard fruits into Khat farming

Dependent variable (Chan)	$\varepsilon \pm$ SE	z-value	p-value
Gend	-0.6876093 $\pm$ 0.3554021	-1.93	0.053
Age	-0.1606995 $\pm$ 0.181697	-0.88	0.376
Edu	-0.0672717 $\pm$ 0.1551356	-0.43	0.665
Fams	0.007839 $\pm$ 0.0840846	0.09	0.926
Land	0.187541 $\pm$ 0.2040173	0.92	0.358
Exjob	1.215888 $\pm$ 0.336921	3.61	0.000
Exp	-0.0007471 $\pm$ 0.0015466	-0.48	0.629
Mark	-1.584274 $\pm$ 0.3974704	-3.99	0.000
Burea	2.49584 $\pm$ 0.3447292	7.24	0.000
Incent	-0.4905375 $\pm$ 0.4896925	-1.00	0.316
Constant	0.7869545 $\pm$ 0.9466739	0.83	0.406

Logistic regression
Number of obs = 352   Wald chi2(10) = 119.51   *significant at 5%
Prob > chi^2 = 0.000   PseudoR2 = 0.3975   **significant at 1%

3.4 Marginal Effects of the Logistic Regression

Sidama is one of the highest coffee producers in Ethiopia. More recently, coffee production has become endangered, and a lot of coffee farmlands have changed into khat plantations. Previously, in

Dara woreda, from twenty-four (24) kebeles, sixteen (16) kebeles were coffee producers. However, currently, three kebeles (Kumato, Safa, and Adamie) are switched into khat cropping. The same is true in Aleta Chuko woreda, where khat has been intro-

duced in Aleta Chuko as a cash crop. Nowadays, the smallholders specialize in khat production are more than 10,000 hectares covered with khat plants. Instead of the local state authorities not officially recognizing khat cropping as the cash crop and not providing technical assistance and agricultural extension services, khat cultivation increased radically. The senior expert who has carefully understood the existing cash cropping change dynamics of Sidamas smallholders expresses and termed khat "Green Cash", which means that it can generate frequent highest income and plantation dramatically expand without considering the Sidamas ancestral sociocultural coffee plants which are known as "Black Gold" which refers to the color of roasted coffee which has the highest national economic importance.

The predicting effect of independent variables on the decision to change farmland uses into khat farming is possible by using marginal effects. The partial differentiation concerning each independent variable in the changing farmland function indicates the effects of a unit change in those explanatory variables on the expected value of changing farmland decisions. As the empirical evidence shows, having extra jobs that potentially generate income for households, market access for coffee, and the bureaucratic process of coffee marketing are found to be significant in affecting the probability of changing coffee and fruit farming into khat farming.

Table 5. Marginal effects of independent variables on decision to change plot of coffee and orchard fruits farmland to khat farming

Variable	dy/dx	Standard error	z-value	p-value
Gend	-0.1678502	0.08636	-1.94	0.052
Age	-0.0392279	0.0443	-0.89	0.376
Edu	-0.0164215	0.03779	-0.43	0.664
Fams	0.0019136	0.02053	0.09	0.926
Land	0.0457801	0.04968	0.92	0.357
Exjob*	0.2946717	0.07632	3.86	0.000
Exp	-0.0001824	0.00038	-0.48	0.629
Mark*	-0.3751847	0.08225	-4.56	0.000
Burea*	0.5411587	0.05561	9.73	0.000
Incent*	-0.1213686	0.12173	-1.00	0.319

(*)dy/dx is for discrete change of dummy variable from 0 to 1
Source: Model output from STATA12 (2021)

The marginal effect result of the logistic regression presented (Table 5 above) revealed that keeping other explanatory variables constant, having an extra job in addition to farming increases the expected probability of changing part of the land from coffee and orchard fruits to khat by 0.2946. Hence, the availability of alternative livelihood mechanisms increases khat farming. This change might be due to additional income that can finance the initial huge cost of switching the farmland use to khat farming. Similarly, the bureaucratic process of coffee marketing increases the expected probability of changing coffee and orchard fruits to khat farming by about 0.5411 times. Furthermore, keeping all other explanatory variables constant, for farmers who have simple, convenient, and easiest coffee marketing access at any time, the probability of changing coffee to khat farming is very low. Smallholder farmers don't beneficiary from coffee farming vis-à-vis their production volume due to middlemen intervention during marketing (especially during harvesting seasons) and fluctuating coffee marketing, which discouraged them from staying on coffee production.

3.5 Socioeconomic Implications of Khat Cropping in Sidama, Ethiopia

As discussed in the earlier sections, the radical expansion of khat plants is the new phenomenon of smallholder farmers in Sidama. The introduction of

khat as a cash crop in the study area has different socioeconomic implications.

3.6 Economic and Livelihood Dynamics of Khat Plantation

Because of declining farmland sizes, increasing population, inflation of food items, and consumption of goods-services prices, smallholder farmers' livelihoods become threatening and sometimes depressingly challenging. Smallholders are the first-line victims of this scenario whose ways of life are subsistence and restricted with limited livelihood strategies. Sidama smallholders' livelihood strategies largely depend on coffee, Enset and orchard fruits, and limited staple food production systems. Recently, khat cultivation has emerged as a new livelihood alternative. Khat is relatively productive compared to coffee and fruits, which generate high income with a small plot of farmland size.

A smallholder who produces coffee might get 5000-6000kg/hectare per annum, which generates a maximum of US $171/year. If a farmer cultivates khat, he earns an estimated total income of US $571 to $857/quarter with an estimated total income of $US 1714 to 2571 per annum from the half (0.5) hectare of land. Khat cropping provides immense contributions to generate income, which significantly affects the smallholders' likelihood status.

Table 6. Economic and livelihood dynamics of Khat plantation

Type of cash crops their income return per year			
Cash crop type	Land size	Revenue return per year	Preference for farmers and their choices
Coffee	1 hectare	171-175 USD	Second
Khat	0.5 hectare	1714-2571 USD	First
Income from Khat production and income shares:			
Cash crop type	Total income per year	Share for a small holder farmer	Share of income for Illegal money lenders
Khat	2857 USD	1714 USD (60%)	1143 USD (40%)
Khat production and its public revenue contribution for the local government			
District	Khat Sale by loading trucks per year	Revenue per one loading truck	Total income for the local government
Aleta Chuko	1880	228 USD	428, 571 USD
Dara	1350	225 USD	303,750 USD

Because of the economic comparative advantage of khat, smallholders skewed into khat plantations to secure their livelihood. Unattractive coffee market mechanism (market bureaucracy), which benefits the exporters, the richest merchants, and brokers (farm-market), coffee diseases, weather conditions variability, and the highest coffee production costs are the driving factors to khat cropping. In this regard, FGD participant farmer stated;

> *I often observe the government continuously deceptive and misunderstand the realities of coffee and our livelihood on the ground. As the income of the traders [exporters] and the national government's foreign currency gain increases, the government considers our income to increases as well. But the reality is completely different in that we aren't the beneficiaries as per our production and efforts rather middlemen and coffee exporters are the beneficiaries even after the establishment of the Ethiopian commodity exchange.*

Though khat generates the highest income, the net income which goes to the smallholders (particularly, the poor) will be a maximum of 60-75% of the gross market value of the khat. During the off-harvest season, or khat plantation stage, poor farmers face a severe shortage of income and are challenged with food insecurity. The brokers use this as an opportunity to consult the main traders (the shadow khat

traders at the centers), who can borrow money from the smallholders with a precondition of allocating a plot of farmland to grow khat as a bond. If agreed, borrowing money will be facilitated without written agreement. During harvest season, the moneylender will immediately collect the debt, or the smallholder is expected to sell at a cheaper price, as can be observed in table 6 above. If the khat generates the estimated US $2857 revenues per annum, the smallholder gets a maximum of US $1714 (60%) of the total revenues. The remaining amount will go to the illegal money lenders' accounts to refund debt at a high-interest rate. The role of brokers is to facilitate borrowing from central traders to smallholders and negotiate to produce khat. Even though the khat is economically productive, most smallholders' livelihood remains in a vicious circle of poverty, "most smallholders are still eating roasted grain with coffee." Furthermore, the smallholders' saving culture is poor as a participant explains;

> *Most of my residents have got the highest income from khat. However, they spent almost all income on immediate consumption & local alcohol drinking instead of saving and investing in productive expenditures. Not only this but most of the time, the household head is the male and is not supposed to give money to his wife for the necessary household items and expenses. I recommend the state should establish a forced saving institute for cash crop income in our contexts.*

On the other hand, some self-sufficient smallholder farmers who endure the influence of brokers and central traders in producing and marketing khat enormously improve their families' livelihood and transform their economic activities. Khat production and marketing is also one of the major sources of public revenue for the local governments of Sidama. As you can see from Table 6 above, only in the Aleta Chuko district, the local government collects an estimated amount of US $428571/annum from 1880 loading trucks (lorries) with the rate of US $228 per loading truck. Though the local government does not officially recognize that as a cash crop, the "cadres", [political leadership] want smallholders to stay on khat production since "officials are chewing khat indirectly, they are beneficiaries during cash transactions through undue networks with khat mar-

keting. "khat marketing and tax collection system is not consistent and most of the time it is exposed to corruption and its marketing and taxation system is exposed to rent-seeking behaviors among actors (local state authorities, dealers, transporters, brokers). The actors in khat production and marketing systems have vested interests, and it got little attention from the government. The overall assessment of the study showed that khat cropping yields more productivity compared to other cash crops in terms of the economic point of view. So, the government of Ethiopia should give due attention and work for a transparent taxing system and penalize those officials who are participating in corrupt activities in the market. Moreover, the government should subsidize those farmers who are producing coffee, which is one of the main export items that bring foreign currency from abroad.

3.7 Sociopolitical Dynamics of Khat Cropping

The government gives inadequate attention to coffee farming. However, coffee production contributes 25% of the GDP, 37% of national export earnings, and 25% of the population's livelihood to the Ethiopian economy (MoA, 2016; Siddiqui, 2015; Tefera & Tefera, 2013). We have found that agricultural experts are available at kebele levels but not in the case of coffee farming. In each district, there is at least one expert at a kebele level for cereal crop & horticulture farming but not for coffee farming. The attention given by the government to coffee farming is rhetorical in the provision of technical and strategic support for coffee smallholders. The professional extension service packages are unavailable in the study area. Such as traditional compost preparations, best coffee seedling, prevention and control of coffee diseases, plucking and control coffee noxious weeds, coffee processing technology, credit facilities, a conducive marketing environment, and eliminating of trading barriers, including middlemen interference with coffee farming unavailable in the study area.

As we discussed earlier, the above factors and economic comparative advantages of khat plantations are expanding in the study area, which is a disaster for the coffee sector. This expansion has brought different sociocultural and political consequences to society. After the introduction of khat as a cash crop

into Sidama smallholders in the last two decades, the availability of khat to the market has increased, and a significant number of youths and even teenagers have started to consume (chewing) khat, local socio-cultural values overlooked & changed, social disciplines undermined, ethical behaviors violation becomes common, theft activities (crime committing) expanded, health association and psycho-social problems emerged crises. In line with this, WHO 2006; Abdelwahab et al., 2015; Gunaid et al., 2007; Hassan et al., 2002) found that the health effects of khat consumption are gastrointestinal system and central nervous system dysfunctionalities, diabetes mellitus, severe cancer, anxiety, and irritability.

Regarding expansion of khat production in the area, a cash crops farmer explains;

> *Previously, except for khat, we planted them not as a means of livelihood but rather as the tradition of sociocultural plants that symbolize us [Sidama]. Nowadays, due to the decreasing of our farmland size, limitation of our livelihood mechanism alternatives, and inflation, it has become the main means of our livelihood strategies. Nowadays, our livelihoods rely on its production and marketing.*

The smallholders are spraying different harmful chemicals to accelerate the growth of khat, which are harmful to human health, and chemicals affect the land fertility, and the farms are no longer used for cultivating other crops. Khat consumers directly take these chemicals, which affect their health status alongside its narcotic and drug addiction effects. However, the explicit effects of those chemicals should be examined by laboratory/experimental for further explanation. The social crisis and debt burden risks also worsen. A participant during a focus group discussion at Dara Woreda explains his experience with condolence:

> *The son of our neighbor harvested the khat plant and sold it at the market without his father's being informed....as soon as his father knew about his son's theft act... his father's suicide. When we investigated the case, we found that the farmer was in debt, which would be repaid during harvest season, and his son was addicted to different drug abuses.*

The other farmers also stated his point of view on the sociocultural effects of khat cropping, the farmer emotionally expressed;

> *We aren't fond of khat planting since our children are victims, we lose our socio-cultural values, and we are losing our social capital... we feel as if we betrayed our hereditary legacy, and our children don't want to go to school rather than asking us to buy a motor bicycle for khat trading-transportation purposes, we are losing youth generation because of the availability of khat at each corner of farmland or local towns ... What do we have to do?! ...we are forced to grow khat for survival and respond to our endangered livelihood status.*

The Ethiopian government has given little attention to the farmland use policy of khat production, marketing, and consumption. The government has a policy of non-engagement, which does not give a clear policy to either encourage or discourage it. Empirically, the study found that the state does not officially recognize khat cropping and provide extension services and technical support to khat smallholders as agricultural activities, but an annual plan on khat's plantation, production, and marketing transactions is prepared. Again, local governments collect a significant amount of public revenue from khat marketing. Here, we can understand that the political economy (power and authority economy) of the state, which affects the economic choices of the society, does not pay due attention to farmland use policy sustainability and all-inclusive development of smallholders. The inappropriateness of policy and political decisions favor the political elite and actors' interest in the production, marketing, and consumption of khat. In such a way, the state political economy could not contribute to a deeper understanding of the pro-poor development, rather astute to political power sustenance not fostering underlying political and economic processes shaping development targeted to build sustainable and holistic development for the smallholders in particular.

4   Conclusion

This study is an effort to analyze the factors that affect farmers to change their part of farmland from coffee and fruit farming to Khat farming in Sidama,

particularly in the Aleta Chuko and Dara districts, using the logistic regression technique. Moreover, the study presented livelihood changes and sociopolitical dynamics of khat production in the study area. Khat cropping is radically expanding in the study area, and smallholder farmers are switching from coffee and orchard fruit farming to Khat plantations. The result of the binary logistic regression showed that having extra jobs in addition to farming and bureaucratic coffee marketing processes are found to be significant in affecting the farmer's decision to change their part of the land from coffee and fruits farming to Khat farming positively. However, good coffee market access for farmers is adversely affecting the decision to shift coffee and fruit farmlands to Khat farming and is strongly significant in the study area. The marginal effect result also shows that having extra jobs in addition to farming and the bureaucratic coffee marketing process increases the expected probability of changing part of the land from coffee and orchard fruits to Khat farming. However, good coffee market access for farmers decreases the expected probability of changing part of the land from coffee and orchard fruits to Khat farming.

According to the qualitative data collected from interviews and FGDs, these cash-cropping changes from coffee and fruit farming to khat farming are fundamentally poverty-induced changes and khat farming is giving relatively high revenue for the farmers, and Khat enjoys stable production and marketing opportunities. Recently, coffee farming faced and will be facing a looming condition due to the expansion of khat plantation vis-à-vis stymied adverse spillover effects of khat on the sociocultural values of the society.

The competitive advantage with attractive market incentives of khat cropping interspersed actors' interest, and the vicious circle of smallholder farmers' livelihoods brought poverty-induced farm land-use changes into khat crop plantation smallholder farmers in the study area. However, the government rhetorically claims and continuously considers coffee as the strategic cash crop of Ethiopia, and coffee production is its priority sector while practically provisioned integrated extension service packages are unavailable. The coffee sector still did not have coffee agriculture experts even at the woreda level, no

incentive packages for coffee smallholders such as interest-free or low-interest rate credit facilities, provision of expertise coffee production, seedling, warehousing, and packaging including (value addition) consultancy services and creating conducive marketing environment which eliminates trading barriers including middlemen's interference and farming inputs supplies at the ground are almost nonexistent.

Conflict of Interest

The authors declares that there is no conflict of interest.

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