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DETERMINANTS OF SMALLHOLDERS' PREFERENCE TO HYBRIDS – PROSPECT FOR UPGRADING TO HIGH-VALUE FOOD CHAINS

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Abstract. Hybrid coordination systems (marketing cooperatives and contracts) are in place in agriculture to link smallholder farmers to the global agri-food value chains. With the framework of transaction cost economics, this study, however, is particularly designed to investigate the key determinants pushing dairy farmers to hybrids (marketing cooperatives and contracts), viz. spot market channels in the local food chains. A household survey of 415 smallholder dairy farmers was designed. Data collection was administered using trained enumerators. A multinomial logistic regression model was employed to analyze data and to identify the significant determinants. The results indicate that high transaction costs and resource constraints were found driving farmers to cooperative engagement and contracts, implying that hybrids were found to be a solution to farmers' constraints of access to information and institutional absence, as well as resource constraints. Policy makers and development partners are advised to strengthen cooperative societies and contract enforcement mechanisms. Providing information and resources to increase smallholders' capacity with resources appear to be interventions which will enable the agricultural marketing system to properly function by serving smallholders in linking to the global food chains.

Key words: contract, cooperatives, hybrids, mlogit, smallholder

INTRODUCTION

Agricultural markets in Sub-Saharan Africa and East Asia are underperforming owing to the prevalence of factors such as poor transport infrastructure, asymmetric information and high transaction costs[1] (Dorward et al., 2004). Producers are largely smallholders with no market power individually and face challenges of information asymmetry undermining market participation (Salami et al., 2010). Institutional arrangements such as contracting and cooperatives (hybrids) are being used worldwide, particularly in developing countries to mitigate information asymmetry and transaction costs. However, such institutional arrangement are associated with prevailing of coordination risk and smallholder exclusion (Dorward et al., 2004; Ito et al., 2012; Oya, 2012; Abebe et al., 2013; Zylberberg, 2013). The absence of market information and the lack of intermediary institutions to facilitate exchange weaken the market potential of smallholders. Rural transactions are thin exposing smallholders to opportunistic buyers and hence gains from the market are severely diminished. The fragmented and informal nature of rural markets reduces incentives to increase marketable surplus (more than their subsistence demand) for market supply. The combination of unfavourable factors stimulates farmers to search for alternative coordination mechanisms – contracts and cooperatives.

[1] Transaction costs are costs that are specific to an exchange and involve ex ante searching and negotiation costs and ex post monitoring costs (Williamson, 1979).

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Institutions to standardize product quality, to provide information and to enforce a contract are either missing or weak (Trienekens, 2011). These affect the exchange transactions among actors in the food supply chain implying high costs of searching and negotiation (Gebremedhin et al., 2009). Actors are driven to relational transactions to acquire quality products from producers and to ensure secure supply source. The prevalence of high transaction costs to search for buyers, to negotiate transactions and to monitor agreements influence market participation and stimulate smallholders in search of alternative coordination mechanisms.

Quality and price uncertainty, the frequency of transactions and asset-specific investments cause high transaction costs which play a major role in the organization of firms (Williamson, 1979). Transaction costs depend on product characteristics, such as perishability, but also on buyer-specific input or quality requirements (Jang and Olson, 2010). In spot markets, prices guide relationships between actors. Spot market transactions hamper the flow of information as it is based on individual interest. Smallholders also fail to meet specific chain requirements as they are supplying produce to the market (Jang and Olson, 2010). In the rural markets of many developing countries, standards for measuring quality and quantity are rare, leading to quantity and quality adulteration which escalate transaction costs for both producers and buyers. Substandard units of measurement and quality may push actors to hybrids: contracts or cooperatives (Dorward et al., 2004).

Access to technology, input and credit markets also constrain agricultural markets in developing countries. The classical policy prescription would be for government to provide an appropriate framework for market actors to enter and carry out the various functions on the one hand, and for rules to be enforced, on the other. In developing countries government's support in supply of inputs, technology and credit to farmers are prevalent. The government tries to improve the marketing system by directly intervening in ill-functioning markets; input, technology and credit markets. However, evidence suggests that both market and government fail in their efforts to develop agricultural marketing systems in developing countries (Dorward et al., 2004; Jayne et al., 2010). Government's failure is the result of weak institutions that fail to provide market information, enforce contracts, and standardize quality. Hence, government may fail to create the appropriate platform and conditions for attracting private companies to perform the various agricultural marketing functions efficiently. These conditions further include the organization of transportation and communication infrastructure, credit markets, research and development. Government intervention in input and technology dissemination also faces its own financial, distributional and manpower constraints, and thus government rations resources, usually resulting in a general underinvestment in agriculture (Jayne et al., 2003).

In addition, the inefficient input and credit markets hinder full market participation of smallholders. The problem is critical when they are resource-constrained and their asset possession affects adoption of market oriented products like biofuel crops in Malawi (Maonga et al., 2015). In the context of imperfect markets, smallholder farmers face barriers in accessing credit, inputs and technology affecting their adjustment to meet the requirements of buyers, such as processors or retailers (Swinnen and Maertens, 2007).

Theory and empirical evidence suggest that hybrids (contracts and cooperatives) can address the various challenges of institutional failure, market imperfections and resource constraints though smallholder participation remains in contest (Ito et al., 2012; Zylberberg, 2013). Alternative marketing arrangements such as cooperatives and contracting with processors or buyers are viable options for agricultural producers. Contracts and cooperatives are being used by producers of, for instance, fruits, vegetables, and dairy products in Africa, Asia and Latin America in order to access agricultural inputs and credit (Bolwig et al., 2009; Dries et al., 2009; Maertens and Swinnen, 2009; Miyata et al., 2009). Contracts and cooperatives are hybrids (Williamson, 1991) which may ratify challenges of producers revealed in the form of high transaction costs and resource constraints (Barrette et al., 2012; Oya, 2012; Abebe et al., 2013; Abebaw & Haile, 2013). Therefore, using insights from transaction cost economics (TCE), this paper analyzes the drivers of dairy farmers to contract and cooperative engagement in Northern Ethiopia. This paper thus aims to identify key determinants for the adoption of contract or cooperatives viz. spot markets in the context of local dairy supply chain.

The remaining part of the paper is organized as follows: the next section presents the data and methodology. The third section summarizes dairy production and marketing in Ethiopia together with the results and the discussion. Finally, the paper ends up with conclusions and policy implications.

Table 1. Summary of independent variables and the expected signs
Tabela 1. Zestawienie zmiennych niezależnych i spodziewanych znaków

Variable Zmienna	Expected sign in relation to spot markets Spodziewany znak na miejscowym rynku	
	contract umowa	cooperatives spółdzielnie
Market characteristics – Charakterystyka rynku		
Distance to market Odległość od rynku	+	+
Access to market information Dostęp do informacji o rynku	–	–
Participation in local administration Udział w administracji lokalnej	+	+
Actor characteristics – Charakterystyka podmiotów		
Wealth – Majątek	+	–
Access to ARDO – Dostęp do ARDO	+	+
Human capital – Kapitał ludzki	+/–	+
Social capital – Kapitał społeczny	+	+

Source: own elaboration.
Źródło: opracowanie własne.

MATERIALS AND METHODS

Data

The research site is the Northern Ethiopian highlands. The region is predominantly agrarian which represents the rest of the country and more than 80% of the population is agricultural and employed in crop farming and livestock rearing (CSA, 2008). Mutli-stage sampling was adopted in that Tigray region and four districts (locally called Woreda) namely Degua Temben, Enderta, Hintalo Wajirat, and Kilite Aulalo) were purposively selected in consultation with the district agricultural officers. The districts were selected based on the livestock potential and the presence of contracts and cooperatives. A structured questionnaire was distributed to 415 randomly selected rural households. Data collection was administered through trained enumerators from May-July 2010. List of the farmers was obtained from 'tabia'[2] rural development offices and size-based proportional samples were selected from each district to address the equal representation of the population in each tabia.

The model and estimated effects of the independents

Smallholder's decision to engage in contract or cooperative (choice of the hybrid systems viz. spot market) is a discrete choice as described by Masten and Saussier (2002), and it is made based on the relative net benefits of the available coordination mechanism. Formally,

$$C^* = C_i^h \text{ if } B_i^h > B_i^s$$
$$\text{or} \qquad (1)$$
$$C^* = C_i^s \text{ if } B_i^h \leq B_i^s$$

where C^* is the governance structure chosen and B_i^h is the benefit from coordination h (hybrid coordination) and B_i^s is the benefit from coordination.

Net benefits for farmers may be the increase in yield due to the access to inputs and technology or the growth in income due to the reduction in transaction costs from

[2] Tabia is the smallest administrative unit.

searching market information. However, transactions costs cannot be measured directly but they are affected by observable characteristics such as market characteristics (e.g., availability of information, distance, and the presence of institutions) and actor characteristics (e.g., as resource ownership, human capital and social capital). In summary, the benefit from the chosen coordination mechanism is a function of a set of characteristics X and can be formally specified as:

$$B^h = \beta X + u \quad (2)$$

To operationalize equation (2), the decision process by dairy farmers is estimated, in which the choice of coordination mechanism is a function of X composed of the two sets of characteristics: market characteristics and actor-specific characteristics which reflect resource constraints of individual actors. The choice of a particular coordination mechanism can then be estimated using the following multinomial logistic regression:

$$\Pr(C_i^* = j/X = \frac{\exp(BX)}{\sum_{j=1}^{3} \exp(BX)}, j = 1, 2, 3 \ldots m \quad (3)$$

where m is the number of alternative coordination mechanisms (spot market, contract and cooperative). The summary of independent variables and their expected sign are depicted on Table 1.

RESULTS AND DISCUSSION

Dairy production and marketing in Ethiopia

It is an old tradition and common practice in rural Ethiopia to possess a few dairy cows mixed with crop farming to provide the household with milk supply. A large number of farmers possess local breed cows that are less productive, and only a small amount can be marketed. Modern dairying began in 1947 when Ethiopia received the first batch of 300 Friesian and Brown Swiss dairy cattle from the United Nations Relief and Rehabilitation Administration. Following the introduction of these exotic dairy cattle, research institutions and government-owned dairy processing firms emerged (UNIDO, 2009). Nevertheless, the effort to modernize the sector was limited to the surroundings of Addis Ababa, the national capital. A number of smallholder and a few commercial dairy farms are operating mainly in the urban and peri-urban areas of the national capital. For example, traditional markets cover 75% of the dairy supply in Addis Ababa (Francesconi et al., 2010). As a result, the sector has remained traditional and small scale.

The Ethiopian livestock population is increasing annually and it is estimated to be the largest in Africa consisting of nearly 54 million cattle in 2013 (FAO, 2015). Milk production has shown steady increase from 720,000 tons in 1991 to 4 million tons (FAO, 2015). Nevertheless, a small amount (4.69%) of milk was offered for sale in 2013 (CSA, 2013). What is offered on the market rarely meets minimum quality and safety standards due to quality variability, lack of cooling technology and processing conditions. Most rural households possess dairy cattle and the 2010 estimate of livestock population in Tigray is more than 3.6 million of which more than 1.87 million animals are female indigenous, 8,601 were female hybrid, and 2,887 were female exotic breed cows. The traditional sector prevails in the supply of dairy products. Cooperatives carry out the collection, storage and processing functions so as to extend the shelf life of milk.

Despite the small per capita milk consumption, the large cattle population and an increase in the volume of milk production, domestic milk production fails to fully satisfy the local demand, imported dairy products (Fig. 1) fill the demand gap (Mohamed et al., 2004; Sintayehu et al., 2008). The import and export performance of the dairy sector from 1993–2012 is depicted in Figure 1. The figure indicates a negative trade balance on dairy products and growth potential of the dairy industry.

Market access is a key bottleneck to the expansion of smallholder milk production and processing. A large number of dairy farmers rely on informal milk markets except those living near the national capital. Formal access to a market with processors and milk groups is mainly practiced around Addis Ababa (Francesconi et al., 2010). Many of the fresh milk producers, however, are located far from formal marketing outlets. Dairy farmers who are far from formal markets traditionally process milk to butter, cheese and sour milk and sell it in local markets (Muriuki et al., 2001). In Ethiopia, a market-oriented dairy production system is at its infant stage. However, the emergence of marketing cooperatives and contract schemes may motivate smallholder dairy farmers to offer milk to the market in various regions of the country. Though the market is highly informal, smallholder dairying provides households with a regular income in different parts of the country. The dairy package program that aims to empower farmers

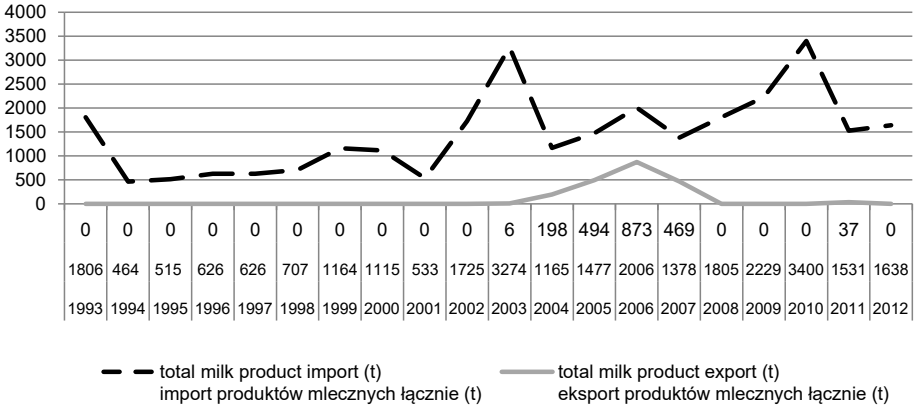

Fig. 1. Import and export of dairy products (t), 1993–2012
Source: calculated from FAO (2015).
Rys. 1. Import i eksport produktów mlecznych (t) w latach 1993–2012
Źródło: obliczenia na podstawie FAO (2015).

with dairy cattle for small-scale dairy production at household level is stimulating farmers to participate in dairy production and helping farmers to raise income and welfare gains (Mohamed et al., 2004).

In the dairy supply chain, fresh milk is widely distributed through marketing cooperatives as they possess shared storage, cooling and processing technology. Marketing cooperatives in the dairy sector are established with credit facilities and processing technology provided by government and non-government organizations. They are managed by the members themselves. Written and oral contracts are also employed in the dairy sector. The written contracts are initiated by buyers stipulating the volume of milk supply, the quality, the price per liter and the delivery time and place. Oral contracts are largely employed in the dairy sector where bar and restaurant owners agree with dairy farmers. Oral contracts in the dairy sector specify the quantity, price, delivery time and date.

Descriptive statistics

The summary statistics depicted on Table 2 indicate that dairy farmers use marketing cooperatives, contracts and spot markets. More than 47% of the dairy farmers engage in marketing cooperatives. The rest 26.48% and 26.22% of the farmers supply milk using spot markets and contracts respectively.

In terms of participation in local administration, 71.6% of the contracting dairy farmers are involved in local security and social courts; whereas 62.1% of the spot market dairy farmers and 63.9% of the cooperative dairy farmers participate in local administration. This suggests that contracting dairy farmers participate relatively more in the local administration.

With respect to land holding, spot market dairy farmers possess relatively more land (1.04 ha) in contrast to contracting dairy farmers (on average 0.89 ha)

Table 2. Coordination mechanisms employed by dairy farmers
Tabela 2. Mechanizmy koordynacji stosowane przez hodowców bydła mlecznego

Coordination type Sposób koordynacji	Dairy farmers Hodowcy bydła mlecznego	
	number liczba	%
Spot Market Miejscowy rynek	103	26.48
Contract Umowa	102	26.22
Cooperatives Spółdzielnie	184	47.30
Total Łącznie	389	100.00

Source: calculated from own survey data.
Źródło: obliczenia własne na podstawie danych ankietowych.

Table 3. Summary statistics of dairy farmers' demographic and economic characteristics
Tabela 3. Podsumowanie danych statystycznych dotyczących charakterystyki demograficznej i ekonomicznej

Variable Zmienna	Market Rynek		Contract Umowa		Cooperative Spółdzielnia	
	Mean Średnia	Standard deviation Odchylenie standardowe	Mean Średnia	Standard deviation Odchylenie standardowe	Mean Średnia	Standard deviation Odchylenie standardowe
Distance to market (km) Odległość od rynku (km)	8.55	6.46	7.17*	5.99	5.73***	6.33
Distance to asphalt road (km) Odległość od drogi asfaltowej (km)	8.68	13.19	4.16***	4.95	15.13***	19.86
Administration participation Udział aministracji	0.62	0.49	0.72*	0.45	0.64	0.48
Land size (ha) Powierzchnia gruntu (ha)	1.04	0.72	0.89*	0.60	0.79***	0.80
No. of tropical livestock unit five years ago Liczebność żywca zwrotnikowego 5 lat temu	3.19	3.46	2.87	2.55	2.40**	2.74
Distance to ARDO (km) Odległość od ARDO (km)	3.52	3.14	4.41*	6.19	2.27***	3.09
Farmer association member Członkostwo w stowarzyszeniu rolników	0.23	0.43	0.20	0.40	0.25	0.43
Sex household head Płeć głowy rodziny gospodarstwa	0.74	0.44	0.71	0.46	0.79	0.41
Age household head (years) Wiek głowy rodziny gospodarstwa (lata)	44.61	11.57	42.79	11.72	44.34	12.15
No. of active family members Liczba aktywnych członków rodziny	2.99	1.32	3.14	1.41	3.16	1.40
Production experience (years) Doświadczenie w produkcji (lata)	3.41	3.85	4.00	4.27	4.32**	4.34
Education (years) Wykształcenie (lata)	2.94	2.88	2.22**	2.72	2.98	3.32
No. of observation Liczba obserwacji	103		102		184	

Source: calculated from own survey data.
*,**,***, significant at the 10, 5, and 1% significance levels for t-test.
Źródło: obliczenia własne na podstawie danych ankietowych.
*,**,*** poziom istotności 10%, 5% i 1%.

and cooperative dairy farmers (0.79 ha). Concerning the amount of tropical livestock units (TLU), spot market dairy farmers own more livestock (3.19 TLU) compared to contracting dairy farmers (2.87 TLU) and cooperative dairy farmers (2.40 TLU). This also suggests that contracting and cooperative dairy farmers are constrained in terms of resources.

Differences are also observed regarding the location of households from the ARDO; i.e., contracting dairy farmers reside farther away (4.41 km) than spot market dairy farmers (3.52 km) and cooperative dairy farmers (2.27 km). The experience of household heads in dairy production and marketing is relatively longer for cooperative dairy farmers (4.32 years) than

contracting dairy farmers (4.00 years) and spot market dairy farmers (3.41 years). In terms of the educational background, spot market dairy farmers and cooperative dairy farmers had three years of schooling on average, while contracting dairy farmers had two years of education on average.

Model result and discussion

A multinomial logistic regression model was run for dairy farmers and the marginal effects are presented in Table 4. The independence of irrelevant alternatives (IIA) specification test for the multinomial logit model was conducted to check whether the ratio of the probabilities of choosing any two alternatives is independent of the attributes of any other alternative in the choice set (Hausman and McFadden, 1984). The test result indicates no evidence to reject the null ($\chi^2 = 1.90$, $p \leq 0.99$) implying that the difference in the coefficients is not systematic and the ratio of the probability of choosing contracts from spot markets is independent from the attributes of cooperatives.

Market characteristics are captured by distance to market, access to market information and participation in local administration. Producers who are located farther from the market may be driven to contracts or cooperatives as these hybrid systems help reduce costs for searching and transportation (Abdulai and Birachi, 2008). Institutional infrastructure refers to contract enforcement institutions that facilitate agreement-based transactions in agricultural trade and that are generally weak in the context of developing countries (Trienekens, 2011). Accordingly, farmers who participate in the local administration are more likely to engage in contracts.

For dairy farmers who are closer to an asphalt road, milk collection is enhanced. Buyers drive or rent cars to collect milk from dairy farmers and farmers away from asphalt road are constrained to access contractors. The result indicates that if the farmer is located one kilometer further from an asphalt road, the propensity to contract is reduced by a percentage point.

Land capital is found to influence producers' participation in contracting. However, the effect of land is nonlinear, which is found to have a positive but decreasing effect on the likelihood to contract. Better-off farmers may supply a larger volume to the market which may push them to look for a secured market in terms of contracts. The result indicates that an increase in the size of land by one hectare will lead to a 25.3% increase in the probability of contracting. The result also indicates that when the size of the land is more than 1.1 hectare, the propensity to contract decreases.

Moreover, the distance to ARDO which is associated with access to technology, inputs and credit is found to be a key driver for dairy farmers to participate in contracts. Smallholder farmers are constrained in accessing credit, input and technology which may force farmers to depend on government channels (ARDO). In Ethiopia, the rural development offices often manage and administer the distribution of credit and input (Gebremedhin et al., 2009). Proximity to these offices may affect farmers' move to hybrid systems. Farmers located farther from the rural development offices may favor contracting channel to cope with the resource constraints they face. Accordingly, the result indicates that those dairy farmers who are located farther from the rural development offices are pushed to contract. A kilometer increase in the distance to ARDO would result in a 1.6% increase in the propensity to contract. The result suggests that distance to ARDO affects the access to technology, input and credit, and those who are farther from the office may get access to these resources from contractors.

Relatively educated household heads are expected to have better skills and knowledge in making informed decisions and less vulnerable to opportunistic behaviour (Davis and Gillespie, 2007). Dairy farmers' contract participation is also found to be negatively affected by the level of education of the household's head. Per year of being in education, the propensity to contract reduces by 1.8%.

Cooperative engagement of the dairy farmers is found to be affected by the distance to market, distance to an asphalt road, land size, amount of tropical livestock units and distance to an ARDO. If they are closer to the market, they collect and retail milk directly to the consumers which enables them to get better prices. The model result reveals that if a farmer is closer by a kilometer, it will result in 1% decrease in the likelihood of cooperative engagement. Nevertheless, dairy farmers who are distant from an asphalt road are pushed to cooperatives as they are not convenient for contractors. The model result reveals that 1 kilometer increase in distance from asphalt road increases the propensity to engage in cooperatives by 1 percentage point.

The initial wealth of the actor may matter as poor households face high transaction costs as they have little market power and perhaps need to join cooperatives as these offer market power and facilitate the acquisition of

Table 4. Determinants of dairy farmers' choice of contract or cooperative engagement
Tabela 4. Czynniki wpływające na wybór umowy lub formy współpracy rolników

Factor Czynnik	Contract Umowa		Cooperative Spółdzielnia	
	Marginal effect Wpływ marginalny	Standard error Błąd standardowy	Marginal effect Wpływ marginalny	Standard error Błąd standardowy
Distance to market – Odległość od rynku	0.001	0.003	–0.010*	0.005
Distance to asphalt road – Odległość od drogi asfaltowej	–0.010***	0.002	0.010***	0.002
Administrative participation – Udział aministracji	0.054	0.047	0.015	0.065
Land size (ha) – Powierzchnia gruntu (ha)	0.253***	0.086	–0.459***	0.110
Land size (ha^2) – Powierzchnia gruntu (ha^2)	–0.115***	0.036	0.158***	0.042
Tropical livestock unit$^+$ – Jednostka żywca zwrotnikowego$^+$	0.020	0.018	–0.039*	0.020
Tropical livestock unit^2 – Jednostka żywca zwrotnikowego^2	–0.002	0.001	0.002*	0.001
Distance to ARDO – Odległość od ARDO	0.016***	0.006	–0.021**	0.011
Member of farmer asso Liczba członków stowarzyszenia rolników	–0.076	0.048	0.063	0.070
Sex of the household head Płeć głowy rodziny gospodarstwa	–0.001	0.051	0.037	0.069
Age of the household head Wiek głowy rodziny gospodarstwa	–0.012	0.011	0.001	0.014
Age^2 – Wiek^2	0.000	0.000	0.000	0.000
Number of active family members Liczba aktywnych członków rodziny	0.017	0.017	0.011	0.024
Production experience – Doświadczenie w produkcji	0.001	0.006	0.012	0.008
Education (years) – Wykształcenie (lata)	–0.018**	0.008	0.010	0.010
No. of observations – Liczba obserwacji	389			
Wald chi^2 (30) – Test Walda chi^2 (30)	88.12***			
McFadden R^2 –	13.1			
Count R^2 – Obliczenie R^2	32			

$^+$ Number of tropical livestock unit before five years (recall data).
*,**,*** Significant at the 10%, 5%, and 1% significance levels.
Source: calculated from own survey data.
$^+$ Liczba jednostek żywca zwrotnikowego przed upływem pięciu lat (dane historyczne).
*,**,*** Poziom istotności 10%, 5% i 1%.
Źródło: obliczenia własne na podstawie danych ankietowych.

technology and inputs (Abebaw and Haile, 2013). Poor households may be constrained to access contract-based transactions as they offer small amounts to the market which results in high transactions costs for the buyers (Davis and Gillespie, 2007; Abdulai and Birachi, 2008). Smaller land size is associated with the inability to invest in quality and production which makes farmers offer small amounts to the market. It also shows that farmers are too poor to acquire inputs and technology. As they are asset poor, they may engage in cooperatives

as a source of market power and resource supply. The relationship between land capital and cooperative participation is non-linear. The result indicates that a hectare increase in land may reduce the propensity to engage in cooperatives by 45.9%, but the propensity to engage in cooperatives raises if the size of the land is larger than 1.45 ha. Similar results are also observed for the number of tropical livestock units. The results indicate a non-linear relationship between TLU and the probability of cooperative engagement. An increase in the number of TLU results in a decline in the propensity to engage in cooperatives, but the effect reverses when TLU is larger than 10.

Distance to ARDO is found to influence cooperative engagement negatively. Those who are located farther from an ARDO are less likely to engage in cooperatives and more likely to engage in contract. Accordingly, the result indicates that those dairy farmers who are located farther from the rural development offices favor contracts and are less interested in cooperatives. 1 kilometer increase in the distance would result in 2.1% decrease in the probability of cooperative engagement. The finding may imply that those who are closer to an ARDO are highly stimulated and motivated by the experts in the ARDO to form cooperatives.

The findings of the paper characterize that hybrid systems, especially cooperatives are largely applied in the dairy subsector. The determinants of contract or cooperative engagement are analyzed for dairy products and the key determinants are broadly classified as market characteristics and actor characteristics. As it is inferred from the results, marketing cooperative is largely applied by dairy farmers. This implies that highly perishable products may require quick transportation and a guaranteed market or storage and cooling technology to preserve the quality thus fostering contracting or cooperative engagement. These findings complement the findings of Bolwig et al. (2009), Dries et al. (2009), Miyata et al. (2009). Smallholder farmers are moved to contracts to have a secured market or to cooperatives if they contain storage, cooling and processing equipment in common. Due to the high degree of perishability and the consequent provision of storage, cooling and processing services, dairy farmers rely more on cooperatives. Contracts are also found to be solutions for high searching costs. Farmers who are located farther from the market are more likely to contract, which suggest that contracts contribute to the reduction of transaction costs. Cooperatives on the other hand attract smallholders who are closer to the market as cooperatives foster market power and stimulate smallholders to offer what they have to the market.

Credit and input constraints stimulate farmers to cooperative engagement. Farmers' proximity to ARDO is positively associated with access to resources and technology as ARDO facilitates the provision of credit, inputs and extension services. It is also found that farmers who are located closer to the ARDO are less likely to prefer contracts. Farmers who are located farther from ARDO are employing contracts more, implying that contracts may appear to fill the credit and input market imperfection prevailing in rural Tigray.

Relatively rich farmers are more likely to engage in contracts due to the larger volume they offer to the market and their expectation of secured markets. Poor farmers, on the other hand, are pushed to collectively offer their produce to the market via cooperatives as they individually offer small amounts to the market. Poor farmers are also engaged in cooperatives expecting organized credit and input support from the government and non-governmental organizations. Wholesalers and retailer also promote poor and smallholder farmers to collectively supply produce through cooperatives so as to minimize searching and inspection costs.

CONCLUSIONS

The study findings suggest that distance to market, asphalt roads, ARDO, land size, TLU, and education are found determinants to cooperative enagement and contract particptaion. More specifically, the facilitation and the promotion of hybrids serve as a mechanism to extend the shelf life of perishable products. Instituting quality assurance and contract enforcement mechanisms also promote linkages between buyers and farmers and help to link to the high-value chains. Farmers sparingly use processing technology to prevent the perishability which calls for support regarding capacity (training and credit) building. Training and capacity building support will improve the gains of farmers and upgrade the dairy supply chains. Contracting and cooperatives also serve farmers to access credit and technology; which may relieve the government's sole involvement in the distribution of these resources. Cooperatives attract resource poor farmers and build the capacity of smallholders by providing services such as collection, cooling,

processing and secured market. Cooperatives capacitate dairy farmers with credit, modern technology and extension services and linking farmers with markets. Considering the product characteristics, strengthening marketing cooperatives should aim at upgrading the supply chain help link to the global food chains. Cooperatives are more likely to supply products that meet the quality and quantity standards which may attract high value chains which in turn facilitate upgrading of the local food chains.

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UWARUNKOWANIA WYBORU SYSTEMÓW HYBRYDOWYCH PRZEZ WŁAŚCICIELI MAŁYCH GOSPODARSTW ROLNYCH – PERSPEKTYWA UNOWOCZEŚNIENIA ŁAŃCUCHÓW ŻYWNOŚCI O WYSOKIEJ WARTOŚCI

Streszczenie. Koordynacja systemów hybrydowych funkcjonujących w rolnictwie (umów i współpracy rynkowej) umożliwia zaistnienie małych gospodarstw rolnych w globalnym łańcuchu żywnościowym. W niniejszym artykule, odnosząc się do ekonomicznych kosztów działalności, próbowano wskazać kluczowe czynniki, które decydują o współdziałaniu właścicieli małych gospodarstw rolnych w systemach hybrydowych, tj. w ramach łańcucha żywności dostarczanej na rynek lokalny. W trakcie badania przeprowadzono ankiety w grupie 415 właścicieli małych gospodarstw rolnych. Do analizy danych i w celu zidentyfikowania najważniejszych czynników zastosowano wielomianowy logistyczny model regresji. Wykazano, że wysokie koszty transakcji i ograniczone zasoby były głównym czynnikiem podejmowania współpracy i podpisywania umów, co oznacza, że systemy hybrydowe uznawano za dobre rozwiązanie wobec ograniczonego dostępu do informacji i zasobów oraz braku działania w ramach istniejących instytucji. Decydenci i partnerzy w dziedzinie rozwoju powinni zatem wspierać spółdzielczość i mechanizmy określone w umowach. Dostarczanie informacji i wspieranie pozycji właścicieli małych gospodarstw rolnych powinno umożliwić im dostęp do systemu rynkowego ułatwiającego właściwe funkcjonowanie, tak aby mogli uczestniczyć w globalnym łańcuchu żywnościowym.

Słowa kluczowe: umowa, spółdzielnie, systemy hybrydowe, mlogit, małe gospodarstwo

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