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FOOD SCIENCE & TECHNOLOGY | RESEARCH ARTICLE

Institutions, production and transaction costs in the value chain of organic tomatoes and sweet peppers in tourist hotels, Unguja and Arusha

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Abstract: The aim of this paper was to evaluate production and transaction costs in organic tomatoes and sweet peppers value chain. The study was conducted in Arusha and Unguja. A preliminary survey was conducted in 2014, and then a stratified sampling procedure was used to select a sample of producers, tourist hoteliers and suppliers. The regions Arusha and Unguja were selected purposively and key informant interviews and snowballing sampling procedures were also used. The Heckman's procedure was used to analyze factors affecting the probability and extent of participation in tomatoes and sweet peppers markets. The probit results from the Heckman's two-stage process show that ownership of assets such as storage facilities, transportation assets and being under contract farming or farmers cooperatives increased the probability of market participation, while the heckit results (OLS corrected for selectivity bias) shows that experience in marketing increased the quantities of tomatoes and sweet peppers marketed while high marketing costs such as mobile phone costs decreased the quantities of tomatoes and sweet peppers marketed. Organic producers' cooperatives and collective marketing strategies are the possible solutions to reduce transaction costs, improve

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PUBLIC INTEREST STATEMENT

Transactions costs are the embodiment of barriers to market participation by smallholder farmers and have been used as a definitional characteristic of smallholders and as factors responsible for significant market failures in developing countries. Transaction costs raise the prices paid by the buyers and reduce the prices received by the sellers of the products. In developing countries transaction costs have been the major causes of market failure and barriers to entry for the producers and suppliers of the products. Institution arrangement such as contract farming and farmers' cooperatives have been the solutions to reduce the transaction costs and the barriers to entry by the organic tomatoes and sweet peppers producers tourism market in Arusha and Unguja in Tanzania.

access to the tourism market, and increasing shelf life by having collective storage facilities and transport. Policy changes that will ensure producers sell under cooperatives and collective marketing strategies should be implemented to improve producers' market access.

Subjects: Econometric Modeling

Keywords: Tourism sector; production and transaction costs; market challenges; producers' cooperatives; collective marketing strategies; linkage opportunities

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1. Background

In Sub-Saharan Africa (SSA) the tourism sector has been growing substantially, contributing about 3% of its Gross Domestic Product (GDP) (World Travel and Tourism Council, 2014). In Tanzania, the sector contributed about 13% of the total GDP in 2013 (Travel & Council, 2014). However, the sector has been criticized for having high external leakages (for example, less utilization of the local food products) that could support the economic development of the local people (Telfer & Wall, 2000; Torres, 2003). The agriculture sector is one of the sectors that could benefit well, through the linkage with the tourism sector. It is approximated that, about one-third of the spending by the tourist constitute food products (Torres, 2003). Tomatoes and sweet peppers are among the vegetables grown at large in Tanzania. The production of tomatoes was dominant in the Mainland with most of it produced at the end of the long rainy season. On average the production of the crop was 11.99 tons/ha in the long rainy and 13.27 tons/ha in the short rainy seasons (National Sample Census of Agriculture, 2012). The Southern Highlands, Northern Highlands and Morogoro Region are among the leading areas for the crop production (Putter and Koesveld, 2007). The production of tomatoes and sweet peppers at the peak prices requires high input costs such as the high application of fungicides and pesticides during the high rainy season at the end of May (De & Koesveld, 2007). This limits the possibility of the supply of quality products. The tourism sector market can create a backward and forward linkage and improve market and production for the crop; however, it requires quality throughout the year. Organic products offer a good opportunity to supply quality food products in the sector, as they are of high quality, healthier and ecologically sound (Chang, Griffith, & Zepeda, 2003).

The efforts to increase the benefits of tourism to the host nations have been increasing the number of tourists visiting the home countries, the length of stay and tourist overall expenditures by promoting the tourism attractions in the host countries (Tohid Ardahaey, 2011). The alternative way to enhance the benefits of tourism is to expand the backward economic linkage by increasing the number of local food products consumed in the tourism sector (Telfer & Wall, 2000). However, the participation of the poor has been limited by inadequate education and training, high tourism sector quality requirements and lack of economic and social capital (Torres, 2004). Studies by Nguni (2014) and Wineaster (2013) on the challenges of tourism and agriculture linkage in Tanzania have listed demand and supply related challenges such as the poor quality of supplied products, limited quantity of supplied products, contract violations and high transaction costs. While some other studies on participation listed transaction cost as the main challenge to smallholder markets access. Key, Sadoulet, and Januvry (2000) in the study of the market participation of Mexican corn farmers found that both Fixed Transaction Costs (FTCs) and Proportional Transaction Costs (PTCs) have effects on market participation. The fixed transaction costs are invariant to the volume being traded and include things such as (a) searching for the market information and trade partners (b) bargaining for the products before the sale and (c) enforcement of the agreements made. On the other hand, proportional transaction costs are variant to the volume being traded such as transport and distance to the market (Mmbando, Wale, & Baiyegunhi,

2015). Goetz (1992) in the study of the market participation of the Senegalese grain farmers identified that fixed transaction costs were the major causes of failure to participate in markets. In their study, it was found that improved market information increased the probability of participation by sellers, while access to cereals-processing technology increases quantities transacted by both sellers and buyers. Mmbando et al. (2015) on the study of the market participation of pigeon pea farmers in Tanzania identified fixed transaction costs associated with market information and household characteristics such as gender and education level of the household head had a statistically significant influence on market participation. Proportional transaction costs (distance to market) and variables such as output prices, farm size, labour force, membership of farmer associations and geographical location of households influenced both market participation and intensity of participation. These studies on market access did not list institutional setup or arrangement as a problem in accessing the markets. Institutional environment refers to the broader social-economic framework in which institutional arrangements are found. The institutional arrangement is a set of rules governing specific groups of people in meeting specific objectives. It has its importance in reducing transaction costs that also affect access to the tourism markets (Eaton, Meijerink, & Bijman, 2008). Therefore, for the tourism sector to enhance rural development, it needs products that are cheap to produce, easily available locally and of high quality to meet the demand of the tourism sector. The sector also needs a good institutional setup that will mobilize production and link producers to the tourism market. Tanzania has about 115 000 ha of certified organic production, about 33% of organic producers in East Africa (Tow, 2011). These producers are an opportunity for the country to supply quality organic products to the tourism sector. Organic production in Tanzania and East Africa had been exporting based (Issakul, Pawelzik, Jatisatienr, Jatisatienr, & Vearasilp, 2007). Tourism market is an alternative to the export market in Tanzania.

This paper aimed at evaluating production and transaction costs of actors in the organic tomatoes and sweet peppers value chain as limited production by organic tomatoes and sweet peppers producers and high transactions costs limits producers' access to markets. But the difference from other studies done above on market access, this paper will look on the role of institutions such as contract farming or farmers cooperatives in influencing access to markets and removing the barriers to markets or market failure. The research question put forward is what type of institutions are needed (formal and informal) to reduce transaction costs and improve the economic performance of smallholder organic tomatoes and sweet peppers producers.

Moreover, this study was motivated by the development of the tourism sector in Tanzania which contributed to about 13% of the GDP in 2013 (Travel & Council, 2014). This is a substantial growth which implies an important employment opportunity to the organic producers in the country. The major focus on organic products in Tanzania was the export market (Issakul et al., 2007). The tourism sector market in this regard saves as an alternative to the export market that was the major focus for organic products in Tanzania.

2. Literature review

Transactions costs are the embodiment of barriers to market participation by smallholder farmers and have been used as a definitional characteristic of smallholders and as factors responsible for significant market failures in developing countries (Mmbando et al., 2015). They are the costs associated with the market exchange of goods and services which some are observable and others are unobservable costs in the exchange process (Bwalya, 2013; Jordaan & Grové, 2013; Mmbando et al., 2015). In principle, transaction costs raise the prices paid by the buyers of goods and services and lower the prices received by the sellers of goods and services (de Janvry & Sadoulet, 2006; Key et al., 2000). The organic tomatoes and sweet peppers farmers may participate in the markets for the exchange of goods and services either as buyers, sellers or decide not to participate in the markets depending on the prices (de Janvry & Sadoulet, 2006; Key et al., 2000). Market participation is determined by comparing the utility obtained from selling, buying, and remaining self-sufficient in a particular commodity (Key et al., 2000). The utility is increasing in the decision price

for sellers and decreasing in the decision price for buyers (Figure 1). Hence, starting from autarky point C_0 , a household who faces no fixed transaction costs will be better off selling at market prices above $\tilde{p} + t_p^s$, thereby obtaining utility V_0^s as shown in Figure 1 by the half-line C_0D_0 . Similarly, the household will be indifferent between buying and being self-sufficient if $P^m + t_p^b = \tilde{P}$, and better off buying at any market price below $\tilde{P} - t_p^b$, thereby obtaining utility V_0^b as shown in Figure 1 by the half-line B_0A_0 . The optimal market participation for a household is to follow the path $A_0B_0C_0D_0$. In the particular case of no PTCs, points B_0 and C_0 are identical. Households facing a market price P^m and both PTCs and FTCs can achieve utility V^s as sellers and utility V^b as buyers. As shown in Figure 1, if the household faces a market price above $\underline{P}^s + t_p^s$, it is better off selling (half-line CD), whereas, for market prices below, it is better off not selling. Hence, the household will buy the good if the market price is below $\underline{P}^b - t_p^b$ (half line BA in Figure 1). The optimal market participation for a household is to follow the path ABCD, buying for market prices below $\underline{P}^b - t_p^b$, being self-sufficient for market prices $\underline{P}^b - t_p^b < P^m < \underline{P}^s + t_p^s$, and selling for market prices above $\underline{P}^s + t_p^s$. V^a is the utility under the autarky.

3. Methodology

This study was conducted in the Northern tourist circuit of Tanzania Mainland, in the city of Arusha and in Unguja, Zanzibar. The data collection started with the preliminary survey in 2014 to better understand the tourism sector value chain and actors. Then, purposively two regions were selected for actual data collection: Unguja, Zanzibar and Arusha, Tanzania mainland based on the regions that were well developed in the tourism sector and organic sector in Tanzania. Since the population of actors was not the same (homogenous). Stratified sampling was used to select a sample from the different stratum of actors identified in the preliminary survey, producers, suppliers/traders and tourist hoteliers. The population of organic producers was 100 in Arusha of which all the 100 organic producers were registered and certified according to Meru Sustainable Land Company (MESULA) and around 2100 in Unguja of which approximately 300 were registered and certified according to the Union of Organic Vegetable Producers in Western Unguja (UWAMWEMA). The sample selected in Table 2 from the population of organic producers included only registered and certified producers. The population of tourist hotels in Unguja was 237 according to the Zanzibar Commission for Tourism and was 108 for Arusha, while that of traders/suppliers for Arusha and Unguja was unknown since there was no source of data on the actual population of suppliers to the tourism sector (Table 1).

Figure 1. Household indirect utility under proportional and fixed transactions costs.

Source: (de Janvry & Sadoulet, 2006; Key et al., 2000)

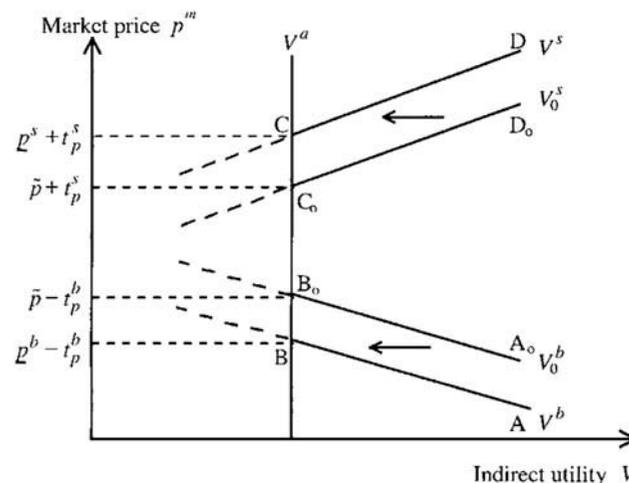


Table 1. Population of actors

Population	Producers (registered and certified)	Suppliers/traders	Tourist hotels
Unguja	300	-	237
Arusha	100	-	108
Total	400	-	345

Then, using the formula for calculating the finite and infinite population for the population of organic tomatoes and sweet peppers producers (Israel, 1991). The sample from each stratum was obtained and established the sampling boundary.

$$n = N / (1 + Ne^2) \tag{1}$$

Where: n = sample size, N = population size and e = the level of precision desired for the sample. The population of suppliers and traders since was not easy to establish it a snowballing procedure was introduced based on the reference of the sample of 82 producers obtained using infinite population sample table at 10% level of precision (Israel, 1991), 71 tourist hoteliers in Zanzibar and 51 tourist hoteliers in Arusha obtained by using the formula for calculating finite population sample (Table 2).

The study design used was a Cross-sectional Study Design (CSD). While the tourism sector is broad this study focused on the tourist hotels¹ as a potential market for organic produce. For the purpose of understanding the value chain and key actors in tomatoes and sweet peppers marketing, key informant interview was done. Snowball sampling procedure was used to identify actors, including, tourist hoteliers, organic tomatoes and sweet peppers suppliers and producers. Snowballing sampling started with 51 tourist hoteliers, and 16 organic tomatoes and sweet peppers producers in Tanzania mainland (Arusha) and 71 tourist hoteliers and 5 leaders of organic producers in Unguja, Zanzibar. A list of hoteliers and organic producers was obtained from grassroots NGOs for organic producers. Through snowballing, 31 organic tomatoes and sweet peppers suppliers and 25 tomatoes and sweet peppers producers were identified and included in the sample in Tanzania Mainland (Arusha). In Unguja, Zanzibar, 24 organic tomatoes and sweet peppers suppliers and 36 organic producers were also identified and included in the sample. The data were collected using structured questionnaire interview.

3.1. Conceptual model

To incorporate transactions costs into an agricultural household model framework, it is convenient to specify market participation as a choice variable (Key et al., 2000). That is, in addition to deciding how much of each good *i* to consume *C_i*, produce *q_i*, and use as an input *X_i*, the household also decides how much of each good to “market” *m_i* (where *m_i* is positive when it is a sale and negative when it is a purchase).

If there were no transactions costs, the household’s objective would be to maximize the utility function:

$$u(C_a C_m C_i; Z_u) \tag{2}$$

Table 2. Sample of actors

Sample	Producers(registered and certified)	Suppliers	Tourist hoteliers
Arusha	41	31	51
Unguja	41	24	71
Total	82	55	122

where: C_a = household food (tomatoes and sweet peppers in this case); C_m = purchased good; C_l = home time subject to:

$$\sum_{i=1}^N P_i^m m_i + T = 0 \text{ (Cash constraints)} \tag{3}$$

$$q_i - x_i + A_i - m_i - c_i = 0, \quad i = 1 \dots \dots \dots N \text{ (Resource balance)} \tag{4}$$

$$G(q, x; z_q) = 0 \text{ (Production technology)} \tag{5}$$

$$C_i q_i, x_i \geq 0 \text{ (Non-negativity constraint)} \tag{6}$$

where: p_i is the market price of good i , A_i is an endowment in good i , T is exogenous transfers and other incomes, z_u and z_q are exogenous shifters in utility and production, respectively, and G represents the production technology.

Considering that in economic terms, transaction costs are costs paid by buyers but not received by sellers, and/or the costs paid by sellers but not received by buyers (Key et al., 2000), they effectively raise the price paid by a buyer and lower the price received by a seller (Mmbando et al., 2015). Although these costs are mostly unobservable and cannot be easily recorded, factors that explain them can be observed (Ellemare & Arrett, 2006).

Therefore, by introducing and expressing the transaction costs in monetary terms, the cash constraint becomes.

$$\sum_{i=1}^N \left[P_i^m - t_{pi}^s(z_i^s) \delta_i^s + \left(P_i^m + t_{pi}^b(z_i^b) \right) \delta_i^b \right] m_i + T = 0 \tag{7}$$

Where: δ_i^s is equal to one if $m_i > 0$ and zero otherwise and δ_i^b is equal to one if $m_i < 0$ and zero otherwise. Introduction of transaction costs imply that the price effectively received by the seller is lower than the market price, P_i^m by the unobservable amount t_{pi}^s , and the price effectively paid by the buyer is greater than P_i^m by the unobservable amount t_{pi}^b . The transaction costs are expressed by the observable exogenous characteristics z_i^s and z_i^b that affects these costs when selling and buying. As such, under transaction costs, the household's objective can be expressed by Equations (2) and (4) to (7), while to derive the supply and demand equations, we define the Lagrangian:

$$L = u(c; z_u) + \sum_{i=1}^N \mu_i (q_i - x_i + A_i - m_i - c_i) + \theta G(q, x; z_q) + \lambda \left[\sum_{i=1}^N \left[\left(P_i^m - t_{pi}^s \right) \delta_i^s + \left(P_i^m + t_{pi}^b \right) \delta_i^b \right] m_i + T \right] \tag{8}$$

Where μ_i , θ , and λ are the Lagrange multipliers associated with the resource balance, the technology constraint, and the cash constraint, respectively. Because the transaction costs create discontinuities in the Lagrangian, the optimal solution cannot be found by simply solving the first order conditions (de Janvry & Sadoulet, 2006; Key et al., 2000). The solution is decomposed in two steps, solving first for the optimal solution conditional on the market participation regime, and then choosing the market participation regime that leads to the highest level of utility. Under the usual assumptions for utility and technology, the conditional optimal supply and demand are obtained by solving for the first order conditions are as follows:

$$\frac{\partial u}{\partial c_i} - \mu_i = 0, \quad i = \{i/c_i > 0\} \text{ (for consumption goods)} \tag{9}$$

$$-\mu_i + \theta \frac{\partial G}{\partial q_i} = 0, \quad \{i = i/q_i > 0\} \text{ (for outputs)} \tag{10}$$

$$-\mu_i + \theta \frac{\partial G}{\partial x_i} = 0, \quad \{i = i/x_i > 0\} \text{ (for inputs)} \tag{11}$$

$$\mu_i + \lambda \left[(p_i^m - t_{pi}^s) \delta_i^s + (p_i^m + t_{pi}^b) \delta_i^b \right] = 0 \text{ (for traded goods)} \quad (12)$$

The decision prices P_i is given by:

$$P_i = p_i^m - t_{pi}^s, \text{ if } m_i > 0, \text{ for sellers}$$

$$P_i = p_i^m + t_{pi}^b, \text{ if } m_i < 0, \text{ for buyers}$$

$$P_i = \mu_i/\lambda, \text{ if } m_i = 0, \text{ for self sufficient}$$

Where: \tilde{P}_i is the autarky shadow price. Using the decision prices P_i and the first order conditions, utility maximization subject to the technological constraint leads to a system of output supply equations $q(p, z_q)$ and input demand equations. Utility maximization subject to the income constraint leads to a system of demand equations for consumer goods $c(p, y, z_u)$.

$$\sum_{i=1}^N P_i C_i = y = \sum_{i=1}^N \left[P_i (q_i - x_i + A_i) - t_{pi}^s \delta_i^b \right] + T \quad (13)$$

The household supply curves for home-produced goods as a function of the market price under fixed transaction costs (FTCs) and proportional transaction costs (PTCs) can be derived by let $q(P^m, z_q)$ be the supply curve without transaction costs. Then with transaction costs, the supply curve is:

$$q^s = q(p^m - t_p^s, z_q) \text{ for sellers} \quad (14)$$

$$q^b = q(p^m + t_p^b, z_q) \text{ for buyers} \quad (15)$$

$$q^a = q\left(\frac{z_q}{P},\right) \text{ for autarky} \quad (16)$$

The transaction costs shift the supply curve upward for sellers and downward for buyers. Making the supply curve discontinuous with three distinct regions:

$$q^b = \text{buyers supply curve for market prices below } \tilde{P} - t_p^b \quad (17)$$

$$q^s = \text{sellers supply curve for market prices below } \tilde{P} + t_p^s \quad (18)$$

$$q^a = \text{autarky prices between the two thresholds} \quad (19)$$

This implies that fixed transaction costs delay entry into the market as a seller until market price reaches a higher level of $\tilde{P} - t_p^s$. Similarly, they delay entry into a market as a buyer until the market price is as low as $\tilde{P} - t_p^b$. The household remains self-sufficient between these two thresholds. A household will switch from autarky to selling when the price that it receives is high enough to compensate for transaction costs.

3.2. Empirical model estimation

Assuming linear expression:

$$q(P, z_q) = P\beta_m + z_q\beta_a \text{ (for supply functions)} \quad (20)$$

$$t_p^s = -z_t^s \beta_p^s \text{ (for PTCs for sellers)} \quad (21)$$

$$t_p^b = -z_t^b \beta_p^b \text{ (for PTCs for buyers)} \quad (22)$$

The linear expression for supply by sellers become (q^s)

$$q^s = P^m \beta_m + z_t^s \beta_t^s + z_q \beta_q \tag{23}$$

And by the buyers (q^b)

$$q^b = P^m \beta_m + z_t^b \beta_t^b + z_q \beta_q \tag{24}$$

And for the autarky households (q^a)

$$q^a = z_q \beta_q^a + z_c \beta_c^a \tag{25}$$

For production thresholds, linear expressions for (q^s) are used such that:

$$\underline{q^s} = z_t^s \alpha_t^s + z_q \alpha_q^s + z_c \alpha_c^s \tag{26}$$

And for (q^b) such that:

$$\underline{q^b} = z_t^b \alpha_t^b + z_q \alpha_q^b + z_c \alpha_c^b \tag{27}$$

The econometric expression is obtained by adding an error term to the supply functions:

$$q^s = P^m \beta_m + z_t^s \beta_t^s + z_q \beta_q + \mu_i \text{ (sellers supply equation)} \tag{28}$$

$$\equiv x_i \beta_i + \mu_i \tag{29}$$

$$\underline{q^s} = z_t^s \alpha_t^s + z_q \alpha_q^s + z_c \alpha_c^s + \mu_2 \text{ (sellers thresholds)} \tag{30}$$

$$\equiv x_2 \alpha_2 + \mu_2 \tag{31}$$

Where x_i is a vector of exogenous explanatory variables such as household characteristics and location characteristics that influence market participation. The market participation indicator variable (q^s) for the commodity is defined as:

$$q^s = 1 \text{ if } P^m \leq \tilde{P} - t_f^s \text{ (when a household sells)} \tag{32}$$

$$q^s = 0, \text{ if } \tilde{P} - t_f^s \leq P^m < \tilde{P} + t_f^s \text{ (when the household does not sell)} \tag{33}$$

3.3. Data analysis

The analysis was done based on the decision of the household to participate in the tourism markets. The first decision was that of whether to sell tomatoes and sweet peppers to the tourism market and the second was on how much to sell (Goetz, 1992; Key et al., 2000). Since some household did not participate in the tourism market using an ordinary least square (OLS) regression would have lead into model selectivity bias (Alene et al., 2008; Mmbando et al., 2015). To avoid the selectivity biases for the household that did not participate in the tourism market, Heckman's two-step selection model has been used to select for the household that participated in the tourism market. The first part of the model is the probit model estimating the probability of participating in the tourism market. While the second part is the (OLS) that the selectivity biases have been corrected estimating the extent of market participation.

The model takes the following form:

```
heckman Sold_Crop_1_Tour_Htl Sex Age Edu_level Region Dist_htl_km Contct_frmng Stor_fac_tom
Obt_mrk_info Tot_trans_cost_tom, twostep select(Amnt_Sold_prod_tom = Hhld_size Size_1
Organic_understand Exp_crop_1 Tot_mkt_cost_tom Mkt_prce_trad_tom) rhoforce
```

Where by (Table 3):

Table 3. Variable descriptions

Variable	Description	Measurements
The first part of the probability of selling or the probit model		
Sold_Crop_1_Tour_Htl	Selling crop to the tourism market	Dummy variable: yes, no (1,0)
Sex	Sex of the respondent	Dummy variable: male, female (1,0)
Age	Age of the respondent	Complete years
Edu_level	Education level	Complete years of schooling
Region	The region the respondent was interviewed	Categorical variable: (1) Arusha, (3) Unguja
Dist_htl_km	Distance to the tourism market	Distance in km
Contct_frmng	Contract farming	Dummy variable: yes, no (1,0)
Stor_fac_tom	Ownership of storage facilities	Dummy variable: yes, no (1,0)
Obt_mrk_info	Source of marketing information	Categorical variable: (1) Through close relationship with actors to obtain marketing information (2) Through friends and relatives (3) Through suppliers (4) Market survey (5) Competition (6) Marketing information was not available
Tot_trans_cost_tom	Transportation costs	TZS
The second part on the extent of market participation		
Amnt_Sold_prod_tom	Amount sold	Amount in kg
Size_1	Size of the area cultivated	Acres
Organic_understand	Awareness of organic products	Dummy variable: yes, no (1,0)
Exp_crop_1	Experiences	Complete years
Tot_mkt_cost_tom	Total marketing costs	TZS
Mkt_prce_trad_tom	The market price for the product	TZS

4. Results and discussion

This section presents the results on production particularly the input production costs and transaction costs. It further gives the description and theory on variables included in the model such as age, sex, education and region. Then the difference in transaction and production costs between the producers under contract farming and those not under contract farming and those under organic and conventional production. The important variables that are influencing market participation decision under transaction costs and the quantities marketed have also been discussed, the variables such as prices, marketing costs and production of surplus (Alene et al., 2008; Mmbando et al., 2015). Furthermore, the type of institutions that existed in tomatoes and sweet peppers marketing and how they have influenced the tourism market access. Lastly, the household model of transaction costs for the producers where institutions such as contract farming have been included in the model is presented.

4.1. Age of the respondents or actors

Age in agricultural activities has been associated with the labour force participating in agricultural activities (Alene et al., 2008). This result is consistent with the theory that the younger population is less involved in agricultural activities and tend to migrate to the urban areas for activities other than agricultural activities (Alene et al., 2008). On average the producers were older, 44 years than the suppliers or traders 39 years and tourist hoteliers 37 years (Table 4). These results indicated the younger population is more involved with the activities located in the urban centres like the tourism sector and trading.

Table 4. Age of the respondent/Actor

Type of actor	Region	n	Minimum	Maximum	Mean	Std. Deviation
Hotelier	Arusha	51	22.00	70.00	38.98	11.15
	Unguja, Zanzibar	71	20.00	56.00	35.17	8.48
	Total	122	20.00	70.00	36.76	9.82
Supplier	Arusha	31	21.00	71.00	40.58	10.38
	Unguja, Zanzibar	24	21.00	52.00	37.87	8.05
	Total	55	21.00	71.00	39.40	9.44
Producer	Arusha	41	23.00	72.00	42.05	10.44
	Unguja, Zanzibar	41	23.00	80.00	45.29	11.30
	Total	82	23.00	80.00	43.67	10.94

4.2. Sex of the respondents or actors

Sex of the respondents has an influence on the economic activities that the households are involved. In tomatoes and sweet peppers production, female households in Unguja were more engaged in the agricultural activities 89% than male households. The male households were more involved in the hotels 63% than the female households (Table 5). The finding from another study by Alene et al. (2008) indicated the same that female respondents were more participating in the supply of labour for agricultural activities.

4.3. Education levels of the respondents or actors

The education levels are associated with the ability to interpreting information and to negotiate on transactions. Mmbando et al. (2015) found that highly educated households were more participating in the maize and pigeon pea markets than less educated households. On average producers had 9 years of education Table 6 indicating the ability to interpreting information and negotiating on the transaction.

4.4. Region

The regions are differentiated in the endowments with transportation facilities and communication infrastructures that have an influence on the transaction costs (Goetz, 1992). The regions with more transportation facilities and communication infrastructures are hypothesized to have fewer transaction costs (Goetz, 1992). Approximately, 53% of actors were interviewed in Unguja, Zanzibar and 48% in Arusha (Table 7). These regions were expected to have a difference in transaction costs that influence market access due to their difference in transportation and communication infrastructures.

4.5. Institutional arrangements

4.5.1. Contract farming

Throughout history, institutions have been devised by human beings to create order and reduce uncertainty in exchange (North, 1991). According to North (1991) in transaction cost terms,

Table 5. Sex of the respondents or actors

Sex of the respondent/Actor	Arusha						Unguja, Zanzibar					
	Hotelier		Supplier		Producer		Hotelier		Supplier		Producer	
	n	%	n	%	n	%	n	%	n	%	n	%
Female	18	45.0	11	27.5	11	27.5	3	10.7	0	0.0	25	89.3
Male	33	39.8	20	24.1	30	36.1	68	63.0	24	22.2	16	14.8

Table 6. Education levels of the respondents or actors

Type of actor	Region	n	Minimum	Maximum	Mean	Std. Deviation
Producer	Arusha	41	7	13	8.27	2.03
	Zanzibar	41	2	15	8.78	2.99
	Total	82	2	15	8.52	2.55
Total	Arusha	41	7	13	8.27	2.03
	Zanzibar	41	2	15	8.78	2.99
	Total	82	2	15	8.52	2.55

Table 7. Region the respondents were interviewed

	n	%
Arusha	123	47.5
Zanzibar	136	52.5
Total	259	100.0

institutions reduce transaction and production costs per exchange so that the potential gains from trade are realizable. Institutional environments are a broader social-economic framework in which institutional arrangements are found. According to Eaton et al. (2008), Institutional arrangements help to reduce transaction cost as rational producers will choose the form of governance in the framework of an institution that reduces transactions cost. The analysis indicated that all organic producers (100%) in Tanzania Mainland (Arusha) were under contract farming with a company supporting organic producers (Table 8). These producers were selling organic products through a collective marketing strategy organized by Meru Sustainable Land Co. Ltd. (MESULA).

In Tanzania Zanzibar (Unguja), about 4% of organic producers were under contract farming with producers' organization called the Union of Organic Vegetables Producers in Western Unguja (UWAMWIMA). Organic producers under contract farming with MESULA and UWAMWIMA were not incurring the costs of searching for information on markets and prices. The organization assisted producers in finding the market and channelling the products to the tourist hoteliers market. This enabled farmers to access tourist markets by selling through the organization.

However, in Tanzania Mainland (Arusha) about 27% of conventional producers produced tomatoes and 32% produced sweet peppers were under contract farming with suppliers of conventional products (Table 8). Producers under contract farming with suppliers in Tanzania Mainland (Arusha) were assisted to obtain synthetic input such as fertilizers, pesticides, improved seeds and sometimes the cost of land preparation and cultivation with the agreements that, conventional producers will sell tomatoes and sweet peppers to these suppliers. However, organic producers' contractual relationships were found more organized than conventional through organic farmers' organization UWAMWIMA and Meru Sustainable Land Co Ltd (MESULA). This organization and the company have been searching for a different market for products collected from producers. The market outlet includes tourist hoteliers market, supermarket, expatriates, specialized organic products outlets established with the support of the organization and company and farmers' markets through the organization and the company's selling points.

4.5.2. Opportunities for rural development through market linkage

Organic producers in Zanzibar were organized into small production groups, sold products through their group leaders who also collect products and supplies to the tourist hotels through

Table 8. Contract farming

	Tanzania Mainland (Arusha)						Tanzania Zanzibar (Unguja)										
	Tomatoes			Sweet pepper			Tomatoes			Sweet pepper							
	Conventional		Organic	Conventional		Organic	Conventional		Organic	Conventional		Organic					
	n	%	n	%	n	%	n	%	n	%	n	%					
Contract for farming	No	16	72.7	0	0.0	13	68.4	0	0.0	0	0.0	96.3	0	0.0	27		
96.4																	
	Yes	6	27.3	13	100.0	6	31.6	13	100.0	0	0.0	1	3.7	0	0.0	1	3.6

UWAMWIMA, major organic farmer group. UWAMWIMA had about 2100 producers; 700 were under the Participatory Guarantee System (PGS), while 1400 were not under PGS. This organization is an opportunity to mobilize organic production and ensure continuity in the supply of quality organic product. Furthermore, the Organic producers in Zanzibar had a range of products produced, mainly fruits: watermelon, mangoes, cucumber, pineapples, avocados, passion fruits, papaya, sweet melon, shocks hock and banana and vegetables: amaranths, eggplants, tomatoes, okra, sweet papers, carrot, onions, cabbages, Irish potatoes, lettuce, zucchini, broccoli, white cabbage, red cabbage, green paper, pumpkin and spinach. A range of products like this will ensure that the demand by the tourist hoteliers is sustained. Lastly, the market for tomatoes and sweet peppers is available as Zanzibar has about 237 tourist hotels, with the increasing number of organic producers. This is an opportunity for organic producers to be linked with the growing number of tourist hotels through UWAMWIMA. Organic products will improve quality as demanded by the tourist hotels. As it is approximated about one-third of tourist expenditures constitute food and beverage products (Torres, 2003, 2004).

Organic producers in Tanzania Mainland (Arusha) were also organized into production groups that were established like the Meru Sustainable Land (MESULA) initiatives. MESULA supports about 100 organic farmers of about four farmers groups; Mapambano, Ovegro, Jabali Water Farm and Bwawani Farm Group. This institutional arrangement is an opportunity to boost organic production. They also have a range of products to meet the demand for tourist hoteliers. Organic producers in Tanzania Mainland (Arusha) had been growing organic products like green beans, peas, tomato, spinach, herbs, peppers, and lettuce. Also, the numbers of tourist hotels have been increased to approximately 98 hotels currently. This is an opportunity for organic farmers to supply quality products to the hotels in the region. Organic Farming Supporting Groups (OFSGs) like MESULA and UWAMWIMA are also an opportunity for smallholder organic producers to access the tourist market through Collective Marketing Strategy (CMS).

4.6. Delays in payments by different actors (contracts violation)

To reduce transaction cost, the contract is one of the ways actors in the market can ensure the reduction of the cost of exchanging goods and services (Williamson, 1981). Timely payments were one among the contract specifications by actors in the marketing of tomatoes and sweet peppers, however, lack of trust among actors (dishonest), or the desire to obtain more gains in the market led some actors to breach the contract. Unfaithful actors sold the products to different actors who offer higher prices or purposely delayed the payments to reinvest the capital (money) and paid suppliers and producers late. The findings show that in Tanzania Mainland (Arusha) 64% of tomatoes and sweet peppers suppliers and all producers (100%) who entered contracts with tourist hoteliers were not paid on time. Likewise, in Tanzania Zanzibar (Unguja), 44% of suppliers were not paid on time (Table 9). Also, actors in the marketing of tomatoes and sweet peppers were afraid of entering formal contracts. Some of the tourist hoteliers in Unguja, Zanzibar, for example, claimed that, for the suppliers or producers to get a contract with them, they must register their business. This was like avoiding contracts; for smallholder producers’

Table 9. Delays in payments by different actors (contract violation)

		Tanzania Mainland (Arusha)				Tanzania Zanzibar (Unguja)			
		Supplier		Producer		Supplier		Producer	
		n	%	n	%	n	%	n	%
Timely payment for purchased tomatoes in tourist hotels	No	7	64	1	100	4	44	0	0
	Yes	4	36	0	0	5	56	0	0
Timely payment for purchased sweet pepper in tourist hotels	No	7	64	1	100	4	44	0	0
	Yes	4	36	0	0	5	56	0	0

This data is based on producers and suppliers who ensured contract with tourist hoteliers. There were very few producers and suppliers who ensured contract with tourist hoteliers (not full sample)

registering a business is expensive, due to their smallness in the capital. It is also not common for producers to register to farm as a business in Tanzania and very few producers have registered to farm as a business.

4.7. Total marketing costs

The total costs associated with marketing included the payments for marketing fees or market levy, brokers and communication costs. According to Goetz (1992), improved market information increases the probability of participation by sellers. Therefore communication infrastructures were vital in increasing access to the tourism market. Access to the tourism market included payments for the fees associated with marketing that actors paid. The results indicate producers had less cost for marketing than were the suppliers (Table 10). This is explained by the fact that many producers sold tomatoes and sweet peppers on the farm and the marketing cost that they incurred were mainly the communicating costs. The communication costs were some of the costs that were partly observable when mobile phones were used and their costs were accounted for. However, if the producers decided to use the other means of communication like direct visiting the tourist hotels, quantification was not possible and the costs associated with communication was unobservable.

4.8. Market prices

Prices influence the decision of producers to participate in the market as a seller, buyer or not to participate in the markets (de Janvry & Sadoulet, 2006; Goetz, 1992; Key et al., 2000). When the prices are low producers may decide not to sell tomatoes and sweet peppers and instead buy tomatoes and sweet peppers. Likewise when the prices are high producers may decide to sell and not to buy tomatoes and sweet peppers. The utility that producers achieve is, therefore, a function of the market prices as prices become the decision for market participation. The analysis indicates that the market prices received by producers who participated in the tourism market were TZS 1250 for tomatoes and TZS 1375 for sweet peppers (Table 11). The suppliers received the prices higher than producers it was TZS 1952 for tomatoes and TZS 1976 for sweet peppers. The difference in prices between producers and suppliers is explained by the difference in marketing costs between the producers and suppliers. Suppliers increased the margin to cover the costs of goods sold. Again, many producers sold their tomatoes and sweet peppers on the farm; this explains why the prices they received were lower than that of the producers.

4.9. Quantities of tomatoes and sweet peppers sold to the tourism market

The decision of the household to participate in the markets is depending on the amount of production for a surplus that can be marketed. The quantities to be sold is the second decision that the household decide after the first decision of whether to participate in the market as a buyer, seller or not to participate (de Janvry & Sadoulet, 2006; Goetz, 1992; Key et al., 2000). However, the prices for the output may also determine the quantities to be sold in the market (de Janvry & Sadoulet, 2006; Goetz, 1992; Key et al., 2000). On average the producers sold 10,727 kg of tomatoes and 5284 kg of sweet peppers (Table 12). The production of tomatoes was higher than that of sweet peppers but the prices for sweet peppers was also higher than that of tomatoes. This could imply the amount marketed of sweet peppers is more influenced by the prices than tomatoes that are more influenced by the quantity produced.

4.10. Production and transaction costs under contracts farming and organic and convention production

Proportional transaction costs are variant to the volume being transacted (Alene et al., 2008; Jordaan & Grové, 2013; Mmbando et al., 2015). The cost of input production, labour and handling were higher for conventional producers under contract farming than organic producers under contract farming in both crops except the handling costs for tomatoes (Table 13). This is explained by the fact that tomatoes were more perishable than sweet peppers. According to Alene et al. (2008), the transaction costs of transport is proportional to the volume transacted. This was the reason transport costs and marketing costs were proportional to the volume being transacted and higher for producers with large

Table 10. Total marketing costs

	Producer					Supplier				
	n	Max	Min	Mean	Standard Deviation	n	Max	Mini	Mean	Standard Deviation
Total marketing cost for tomatoes	82	4 290 000	0	111 812	488 070	55	53 290 000	0	3 447 896	10 109 189
Total marketing cost for pepper	82	4 250 000	0	98 674	475 873	55	22 447 500	0	1 138 460	3 063 306

Table 11. Market prices of tomatoes and sweet peppers

Type of actor		The market price of tomatoes from tourist hotels	The market price of pepper from tourist hotels
Supplier	n	47	45
	Minimum	625	700
	Maximum	3000	3500
	Mean	1952.94	1976.16
	Std. Deviation	515.616	722.542
Producer	n	8	8
	Minimum	700	700
	Maximum	2500	2500
	Mean	1250.00	1375.00
	Std. Deviation	592.814	589.794
Total	n	55	53
	Minimum	625	700
	Maximum	3000	3500
	Mean	1850.69	1885.42
	Std. Deviation	578.433	731.971

Table 12. Quantities of tomatoes and sweet peppers sold to the tourism market

	n	Minimum	Maximum	Mean	Std. Deviation
Amount of tomatoes sold in kg	52	60	307 200	10 726.67	45 390.620
Amount of sweet pepper sold in kg	47	40	189 000	5284.06	27 448.935

volume sold to the tourism market. The results indicated transportation and marketing costs were higher for organic producers under contract farming than conventional producers under the contracts farming (Table 13).

4.11. Factors determining organic tomatoes and sweet peppers producers to participate in the tourism markets

This analysis relies on the factors that influence producers of tomatoes and sweet peppers to participate in the tourism market. The striking results are that ownership of assets like storage facilities such as cold trucks for storing and transporting tomatoes and sweet peppers increases the probability of participating in the tourism market (Table 14). This result is consistent with the other finding by Bwalya (2013) and Goetz (1992) that found ownership of assets for production and transporting the products to the market such as oxen reduces variable transaction costs faced by households leading to higher levels of market participation. The results indicated further that producers under contract farming increased the probability of participating in the markets for both crops. Alene et al. (2008) found that institutions arrangements such as collective marketing in Kenya increase the probability of participating in the maize markets by lowering the transaction costs. Again the producers who managed to pay for transportation costs increased their probability

Table 13. Production and transaction costs under contracts farming and organic and convention production

	Conventional						Organic					
	Contract for farming						Contract for farming					
	No			Yes			No			Yes		
	n	Mean	Standard Deviation	n	Mean	Standard Deviation	n	Mean	Standard Deviation	n	Mean	Standard Deviation
Total Input cost for tomatoes	16	465 000	703 361	6	725 166	739 856	26	67 230	76 717	14	37 785	50 960
Total Input cost for pepper	16	257 812	617 452	6	633 833	702 532	26	45 576	85 013	14	36 500	59 252
Total labour cost for tomatoes	16	690 312	1 700 621	6	957 833	954 091	26	73 423	101 912	14	123 464	131 196
Total labour cost for pepper	16	541 968	1 571 197	6	476 000	795 349	26	33 153	75 299	14	100 892	153,872
Total handling cost for tomatoes	16	543 250	1 990 157	6	32 666	50 622	26	14 423	73 543	14	49 785	83 816
Total handling cost for sweet pepper	16	88 062	299 161	6	46 000	54 479	26	14 423	73,543	14	18 857	43 956
Total transport cost for tomatoes	16	31 000	79 094	6	45 000	110 227	26	36 315	53 360	14	145 892	198 494
Total transport cost for sweet pepper	16	39 250	77 041	6	80 000	125 379	26	18 373	38 417	14	84 892	147 544
Total marketing cost for tomatoes	16	295 256	1 066 576	6	83 000	99 796	26	16 942	71 374	14	250 429	241 438
Total marketing cost for pepper	16	279 313	1 059 358	6	74 833	101 117	26	14 923	71 455	14	177 536	164 133

of participating in the tourism market (Table 14). This implied access to transportation facilities increased participation in the tourism markets. This result is consistent with the findings from another study by (Goetz, 1992) that the region with more communication and transportation infrastructures had lower transaction costs and increased their probability of participating in the markets. The other variables, sex, age, education levels, region, distance to the tourism market, and access to the marketing information were not significant (Table 14).

4.12. Factors influencing the quantities of organic tomatoes and sweet peppers sold to the tourism markets

This analysis relies on the factors influencing the quantity of tomatoes and sweet peppers marketed by the producers. Interesting, producers with more experiences increased the quantities of tomatoes and sweet peppers marketed (Table 15). The results are similar to the results by Bwalya (2013) that found experience in maize marketing makes certain information and search costs low. Goetz (1992) found that due to the prevalence of social networks. Experienced households may also have greater contacts and increased trust gained through repeated exchange with the same parties. Further, the marketing costs that involved payments of levy, brokers and mobile phone costs in marketing reduce the quantities of tomatoes and sweet peppers marketed (Table 15). However, Goetz (1992) found that marketing information increased the probability of participating in the markets. The costs of marketing such as communication or mobile phone costs were higher such that they reduced the quantities of tomatoes and sweet peppers marketed. Other variables like household size, size of the area cultivated, awareness of organic products and market prices were not significant.

5. Conclusions and recommendations

Since the results of section 4.11 indicated those producers of both tomatoes and sweet peppers under contract farming increased their probability of participation in the tourism market. Institutional arrangements (e.g., contract farming) are a potential solution to improve linkages between the agriculture sector and the tourism sector. Institutions major roles in facilitating the linkages include improving market access, creating awareness for organic products and reducing transaction cost, for example, searching for market and related information costs. The organic producers under contract farming were incurring less cost in search of information on prices and markets. The organization for organic producers under contract farming was responsible for searching for information and a new market for agricultural products. Furthermore, producers involved in contract farming increased their access to the tourism markets than those not involved in contract farming.

Since the results of section 4.12 indicated that, the total cost of marketing that included market levy, brokers and communication or mobile phone costs decreased the quantities of tomatoes and sweet peppers marketed. This implies transactions costs of communication or information search limited producers' access to the tourist markets, as costs increased with decreased access to the tourism market. However, the longer the distance producers in Zanzibar were, the number of tourist hotels and focus on tourism markets enabled producers to access the market.

The objective of this study was to evaluate production and transaction costs in the value chain for organic tomatoes and sweet peppers. Then identify the institutional arrangements that could have reduced the transaction costs. There is enough evidence based on the results under section 4.12 that producers under the contract farming increase the probability of participating in the tourism market for tomatoes and sweet peppers. Therefore, contract farming or producers cooperatives reduce transaction costs associated with the exchange of tomato and sweet peppers.

Based on the results on section 4.11 that both tomatoes and sweet peppers producers under contract farming increased their probability of participation in the tourism market, it is recommended that sustainability of the organization to continue offering support to producers under the contract needs to be ensured particularly the organic producers. There is a need by the NGOs supporting organic producers to build the capacity of producers within the local community. This is because once these supporting organizations exit, sustainability of production under organic producers will be compromised. The producers under organic farming are currently motivated by the promising efforts of their organization to search for better markets of the products.

Table 14. Factors determining organic tomatoes and sweet peppers producers to participate in the tourism markets

Heckman selection model—two-step estimates				Number of observation =		57
(regression model with sample selection)				Censored observation =		10
				Uncensored observation =		47
				Wald chi2(9) =		38.01
				Prob > chi2 =		0.0000
	Tomatoes			Sweet peppers		
	Coef.	(Std.Err.)	z	Coef.	(Std.Err.)	z
Sold_Crop_1_Tour_Htl						
Sex	-0.019	(0.11)	-0.17	-0.09	(0.10)	-0.88
Age	-0.00	(0.00)	-0.65	-0.00	(0.01)	-0.29
Edu_level	-0.01	(0.02)	-0.71	0.03	(0.03)	1.43
Region	0.11	(0.08)	1.36	0.02	(0.09)	0.31
Dist_htl_km	-0.00	(0.01)	-0.29	0.01	(0.01)	1.56
Stor_fac_tom	1.15	(0.23)	4.99***	0.83	(0.39)	2.15**
Contct_frmng	0.27	(0.13)	2.01**	0.32	(0.16)	1.99**
Obt_mrk_info	-0.06	(0.06)	-1.02	-0.09	(0.06)	-1.52
Tot_trans_tom	1.11e-06	(0.52e-07)	2.02**	2.79e-06	(2.61e-07)	3.67***
_cons	0.31	(0.41)	0.74	-0.04	(0.41)	-0.09

* = Significance at 10% ** = significance at 5% and *** = significance at 1%

Table 15. Factors influencing the quantities of organic tomatoes and sweet peppers sold to the tourism markets

Amnt_Sold_tom	Tomatoes			Sweet peppers		
	Coef.	(Std.Err).	z	Coef.	(Std.Err).	z
Hhld_size	-0.06	(0.11)	-0.56	0.14	(0.11)	1.35
Size_1	-0.16	(0.46)	-0.36	-0.38	(0.70)	-0.55
Organic_understand	0.48	(0.69)	0.70	-0.01	(0.65)	-0.01
Exp_crop_1	0.17	(0.09)	1.78*	0.10	(0.07)	1.45
Tot_mkt_cost_tom	-3.52e-06	(1.25e-06)	-2.82***	-6.22e-06	(2.05e-06)	-3.03***
Mkt_prce_tom	-0.00	(0.00)	-0.40	-0.01	(0.00)	-0.67
_cons	0.74	(0.91)	0.81	0.13	(0.08)	0.16
mills						
Lambda	-0.48	(0.22)	-2.16**	-0.31	(0.24)	1.96**

* = Significance at 10% ** = significance at 5% and *** = significance at 1%

Based on the results in section 4.12 that the marketing costs such as communication costs decreased the quantities of tomatoes and sweet peppers marketed, it is recommended that, Improvements in agricultural marketing information systems like the use of farm radios will improve and reduce communication costs or search and information costs that producers and suppliers/traders have been incurring in search for information by cutting down mobile phones costs. This will also enable planning of production for producers based on demand; and will enable suppliers/traders to schedule and plan their supply by moving products from surplus to deficit areas at least cost possible.

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Note

1. "Tourist hotels/hoteliers" in this study means the destination for foreign visitors, as they were health conscious on food products. The focus market for organic products in Tanzania and East Africa was export market (Issakul et al., 2007). Hence, tourist hotels in this case were considered as an alternative to export market. Research also indicates that, about 90% of consumers of organic products were foreign visitors or tourists, expatriates and affluent people (Sangkumchaliang & Huang, 2012). Though, local people could also visit and stay in tourist hotels.

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