



Original Research Article

Determinants of smallholder market participation among banana growers in bench Maji Zone, Southwest Ethiopia

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Smallholder farmers face many constraints that impede them from taking advantage of market opportunities. This research, therefore, aimed at assessing the factors affecting smallholder commercialization so as to maximize the contribution of the fruit sector to income and livelihood in Bench Maji Zone, Ethiopia. Primary data were collected from 115 banana producers selected by using simple random sampling technique. Heckman two-step selection model was used to analyze the factors affecting smallholder market participation in the study area. The finding of the study revealed that fruits were the second important components of smallholders' income in the area constituting 18 percent of total annual income. However, the participation of smallholder banana growers in market was determined by different factors such as age, household size, extension service, income, land holding, proximity to road and livestock ownership. Since tackling the constraints of smallholders' market participation will improve the contribution of the fruit sector to producers, attention has to be due in alleviating the problems associated with fruit commercialization in the area.

Key words: Crop commercialization, smallholder, market participation, Heckman two-step model, banana

INTRODUCTION

Smallholder cultivation is the hallmark of agriculture in much of sub-Saharan Africa, Latin America and South Asia, where intensity and density of poverty still remains high (IFAD, 2011). One important route to reduce poverty in rural areas is to enhance the market participation of rural farmers, as this can increase the net returns to agricultural production (World Bank, 2007). The importance of market participation to economic growth and poverty reduction arises from the fact that market participation leads to market-oriented production where the household specializes in the production of those goods for which it holds comparative advantage (Njeri and Kim, 2016). To put it differently, markets offer households the opportunity to specialize according to comparative advantage and thereby enjoy welfare gains from the trade (Inayatullah, 2012). Thus, access by smallholder farmers to transparent and competitive markets is a fundamental part of any pro-poor

growth strategy.

In sub-Saharan Africa, more than two-thirds of the holdings have an average size of less than one hectare and account for over 90% of agricultural output (IFAD, 2011). In Ethiopia, in particular, smallholders cultivate over 96% of the total agricultural land with the average smallholder cultivating less than one hectare of arable land and consuming more than 65% of the total production within the household (EEA, 2006). There is widespread agreement that smallholder farmers require improved access to agricultural markets to raise their farm productivity and living standards (Chamberlin and Jayne, 2011). Hence, the existence of low-cost, well-integrated and efficient rural markets is a key element in agricultural commercialization (Moti et al., 2009). Commercializing smallholder farmers is part of an agricultural transformation process in which individual farms shift from

a highly subsistence-oriented production towards more specialized production targeting markets both for their input procurement and output supply (Ibid).

Markets allow farmers to benefit from increased production (Steve and Keats, 2013). However, small-scale farmers face many constraints that impede them from taking advantage of market opportunities (Fischer and Qaim, 2012). One drawback regarding smallholder farmers is that they lack marketing knowledge and skills to sell their products and as a result, many of them often opt for lower prices at farm gate or in the local markets (Gyau et al., 2016). Limited access to guaranteed markets for produce and for the acquisition of inputs is another major problem confronting smallholders (Ramatu et al., 2006). Due to their small surpluses in production, smallholders are also generally exposed to higher degree of risk and transaction costs (IFAD, 2011). Smallholders in remote areas face higher input costs, lower output prices, fewer buyers competing for their surplus production, and weak access to supporting services, which together result in disincentives to adopt new technologies and produce for the market (Chamberlin and Jayne, 2011). One reason for remaining at the subsistence farming level is the high cost of marketing (Patrick et al., 2015). Consequently, most of smallholders practice either subsistence farming or operate largely in local markets (IFAD, 2011).

Banana is a major fruit crop grown in many developed and developing countries (Molla, 2017). It is the world's most popular fruit and one of the world's most important staple foods, along with rice, wheat and maize (Jason et al., 2014). FAO (2004) stated that banana is the world's second most important fruit crop after oil palm. Banana is also the most commonly consumed fruits in the world and of great importance to small-scale farmers in the developing countries of the tropics and subtropics (Robinson and Saucio, 2010). About 87% of the entire bananas grown worldwide are produced by small-scale farmers for consumption or sale to local and regional markets (Frison et al., 2004). This makes banana to be the prime leading fruit crop in terms of volume and value in the world market (Woldu et al., 2015).

In Ethiopia, banana is the leading fruit crop among other fruit types in terms of consumption and production. Banana in Ethiopia covers about 59.64% (53,956.16 hectares) of the total fruit area, about 68.00% (478,251.04 tones) of the total fruits produced, and about 38.30% (2,574,035) of the total fruit producing farmers (CSA, 2014). The fact that it produces fruit throughout the year adds to its importance as a cash crop for its growers (Daniel, 1999). Especially in Southwestern Ethiopia, banana is providing great socioeconomic importance to the wellbeing of smallholder farmers in terms of securing food, generating cash income and job creation. However, the production of banana is challenged by market related factors. Though market access is crucial in smallholder development since it creates the necessary demand, offers remunerative prices, thereby

increasing smallholder incomes (Ramatu et al., 2006), it is not possible for the smallholder farmers to integrate with the market and enjoy the benefits of commercialization unless the already existing hurdles are removed and better environment is created (Bernard et al., 2007). It is, therefore, on this basis this research was conducted with the aim of identifying the factors affecting smallholder market participation so that the contribution of the fruit sector to income and livelihood would be improved.

METHODOLOGY

Description of the Study Area

This study was conducted in Bench Maji Zone. Bench Maji is one of the Zones of the Ethiopian Southern Nations, Nationalities, and Peoples' Region (SNNPR). Bench Maji is bordered on the south by the Ilemi Triangle, on the west by South Sudan, on the northwest by the Gambela Region, on the north by Sheka, on the northeast by Keffa, and on the east by Dehub Omo.

The main food crops in this Zone include maize, *godere* (taro root), and enset. Major cash crops in the area include cereal crops (maize, rice, sorghum), pulse crops (linseed, sesame, nug), and fruits (bananas, avocado, mango). However, coffee is the primary cash crop. In addition, the zone is well-known for its rich biodiversity and conducive agro-ecology to grow different tuber and root crops, and livestock.

Source and Method of Data Collection

Primary data were collected through structured questionnaire for the purpose of this study. Three stage sampling was employed to select sample banana growers. In the first stage, two districts were selected purposively based on fruits production potential and accessibility to market. In the second stage, two kebeles from Semen Bench district and three kebeles from Dehub Bench district were selected purposively. Finally, 115 respondents were selected by using simple random sampling technique.

Method of Data Analysis

Data were analyzed using descriptive statistics tools like mean, percentage, tabular presentation and pie chart. Heckman two-step model was also used to analyze the factors affecting smallholders' participation in banana marketing.

In determining smallholders' participation in banana marketing, HCI (household cropping index) was used to determine both household and crop specific level of commercialization. The advantage of using this approach is that it avoids the use of crude distinctions as commercialized and non-commercialized farms.

Mathematically it is expressed as:

$$HCI = \frac{\text{Total Volume of Fruit Sold}}{\text{Total Volume of Fruit Produce}} \times$$

100

The index measures the extent to which household crop production is oriented towards the market. A value of zero would imply a totally subsistence oriented household; the closer the index is to 1, the higher the degree of commercialization (Paul et al., 1999; Govereh et al., 1999).

To identify the factors affecting market participation decision of households, the Heckman two-step model was used. Heckman has developed a two-step estimation procedure model that corrects for sample selectivity bias. Since participation in banana marketing is represented by a binary variable, those who participate may not sell all their banana products which implies that the decision to sell and the decision of how much to sell are two separate decisions. If two decisions are involved, such as participation and quantity of banana *output* sales, Heckman (1979) two-step estimation procedure is appropriate. Thus, Heckman two-step selection model involved estimation of two equations: First, is whether a household participated in the banana market or not, and second is the extent of market participation (quantity of banana sold). The quantity of banana sales were conditional on the decision to participate in the market.

The first stage of the Heckman model (a "participation equation") attempts to capture factors affecting market participation decision. This equation is used to construct a selectivity term known as the „Inverse Mills Ratio“ which is added to the second stage „outcome equation“ that explains factors affecting quantity of marketed surplus. The inverse Mills ratio is a variable for controlling bias due to sample selection (Heckman, 1979). The second stage involves including the Mills ratio to the quantity of marketed surplus equation and estimating the equation using Ordinary Least Squares (OLS). If the coefficient of the „selectivity“ term is significant then the hypothesis that an unobserved selection process governs the participation equation is confirmed.

$$(Y1 = 1) = P(Q_i > 0) = X1\alpha + \epsilon \quad (\text{Market Participation}) \quad \text{eq 1}$$

$$Q1 = Z1\beta + \mu \quad (\text{Quantity of output sold}) \quad \text{eq 2}$$

Equation 1 defines the market participation model where Y1 takes the value of one if a household made any positive sales to the market and zero if no sales were made. Q1 is the quantity sold and X1 and Z1 define factors that affect the discrete probability of participation.

RESULT AND DISCUSSION

Socio-economic Characteristics of the Respondents

Out of the total producers, 60.90 percent of the respondents participated in banana market at commercial level and the

remaining 39.10 percent of them produced banana at subsistence level. Regarding sex of the respondents, 92.20 percent of them were male headed households and the remaining 7.80 percent of them were female headed households. Out of the total respondents, 10.40 percent of them were unmarried and 89.60 percent of them were married. The educational attainment of the respondents in the table (Table 1) shows that 33.90 percent of them were unable to read and write; whereas, 66.10 percent of the respondents were able to read and write.

In terms of market participation for banana growers, the mean age was 33.07 years old; the mean household size was 5.97; and the mean years of experience was about 8.53 years for participants. For non-participants, the mean age was 38.80 years old; the mean household size was 6.07; and the mean years of experience was about 12.18 years.

Table 2 shows that 47 percent of the respondents had access to agricultural extension service; whereas, the remaining 53 percent of the respondents did not have access to extension service. In terms of market participation, 62.86 percent of banana growers did have access to extension services and the remaining 37.78 percent of them did not have access to extension service. This implies that participants have more access to extension service than non-participants.

Regarding access to credit, 46.10 percent of the respondents did have access to credit; whereas, the remaining 53.90 percent of them did not have access to credit service. Out of those respondents who had access to credit, none of the credit was borrowed for the purpose of fruits production. Regarding access to market information, 30.40 percent of the respondents had access to market information from informal sources (like neighbors and brokers); whereas, the remaining 69.60 percent of the respondents did not have any access to information. The uniqueness in the area regarding market information is that there was no formal source of market information through which information regarding output price disseminated to producers.

Table 3 shows out of the total banana growers, the mean landholding for participants was 1.22 hectares and the holding for those of non-participants was 1.04 hectares of land. Regarding livestock ownership for banana growers, the mean livestock ownership in TLU for participants was 3.11; whereas, the mean livestock ownership in TLU for non-participants was 3.70.

Major Sources of Income

In the study area rural households earn income from different sources. The major sources of income in the area were classified in to three categories as farm income, off-farm income and non-farm income. Farm income is the income that households earn from their direct engagement in different farming activities. The major farming activities in the area are the production of coffee, cereal crops

Table 1. Demographic Information of Banana Growers

Description		Participant	Non participant	Total
Sex	Female	2	7	7.80%
	Male	68	38	92.20%
Marital status	Unmarried	11	1	10.40%
	married	59	44	89.60%
Education	Illiterate	25	14	33.90%
	Literate	45	31	66.10%
Age (years)	Mean	33.07	38.80	35.31
	Std. Dev	7.14	5.94	7.24
Household Size (number)	Mean	5.97	6.07	6.01
	Std. Dev	2.13	1.60	1.94
Experience (years)	Mean	8.53	12.18	9.96
	Std. Dev	4.13	5.05	4.83

Table 2. Access to Basic Services

Access to Services		Participant	Non participant	Total
Extension Service	Yes	44	17	47%
	No	26	28	53%
Credit Service	Yes	32	21	46.10%
	No	38	24	53.90%
Market Information	Yes	40	40	30.40%
	No	30	5	69.60%

Table 3. Information Regarding Asset Ownership

Description		Participant	Non participant	Total
Land holding (ha)	Mean	1.22	1.04	1.15
Tropical Livestock Unit (TLU)	Mean	3.11	3.70	3.34

Table 4. Sources of household income

No	Sources	Amount (ETB)	
1.	Farm Income	Coffee	8,627.65
		Cereal crops	3,285.94
		Fruits	3,595.35
		Animal husbandry	3,385.40
2.	Off-farm Income	165.10	
3.	Non-farm income	874.51	
Total Income		19,933.95	

(mainly maize), fruits and vegetables, and staple foods like enset. Crops like maize, vegetables, and enset are used mainly for domestic consumption. Regarding off-farm activities, it is the income that is earned from farmers' engagement in income generating activities during off-farm period. The major source of off-farm income in the area is daily labor. Whereas, non-farm income is defined as the income earned from non-farm activities like petty trade, handicraft, and other non-farm sources.

The above in Table 4 shows that the total annual income that was earned by households from farm, off-farm, and

non-farm income sources is 19,933.95 Ethiopian birr. Out of the total household income, coffee accounted for 8,627.65 ETB, cereal crops accounted for 3,285.94 ETB, fruits accounted for 3,595.35 ETB, and animal husbandry accounted for 3,385.40 ETB. In addition, the mean annual off-farm income per household is 165.10 ETB and the mean annual non-farm income is about 874.51 ETB. This implies that farming provides the largest proportion of income for households.

The pie chart (Figure 1) shows that the largest contributor to household income is coffee. Coffee accounted

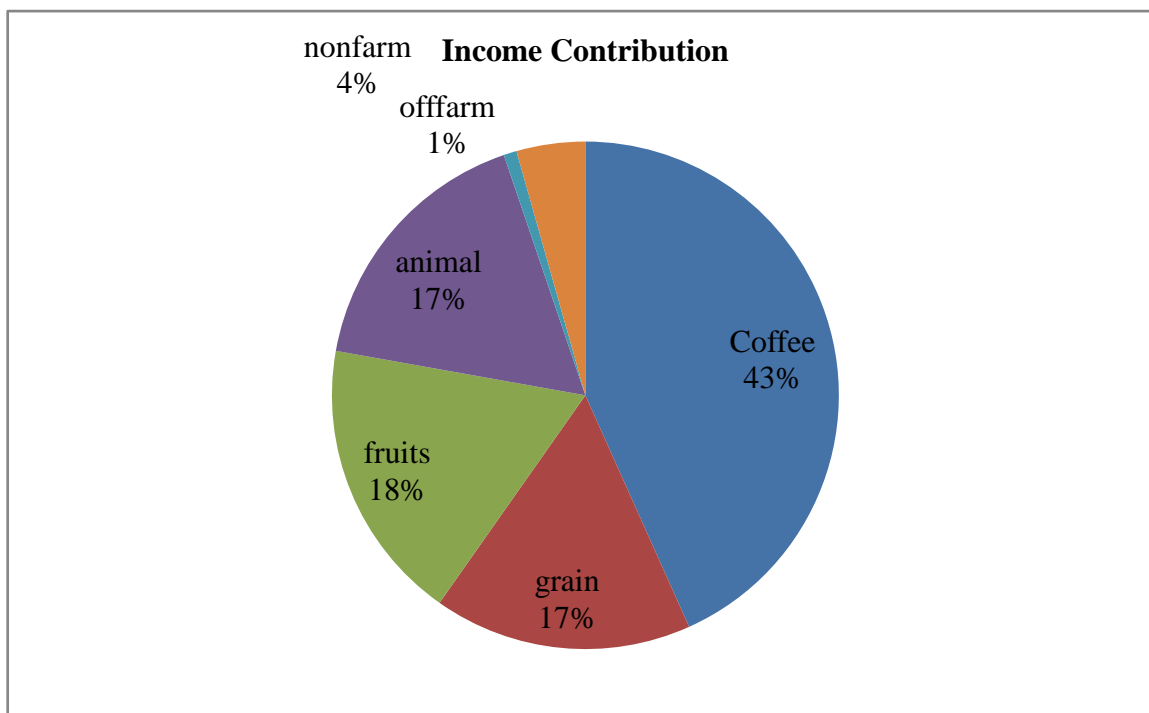


Figure 1: Contribution of fruits for household income

for 43 percent of the total annual household income in the area. Fruits are the second important components of household income in the area. Fruits accounted for 18% of the household income in the area. The production of cereal crops and animal husbandry each accounted for 17% of the total annual household income. Off-farm income contributed 1% to households' income, and the remaining 4% of household income is accounted from non-farm income sources.

Determinants of Market Participation for Banana Fruits

Heckman's two step model was used to analyze the factors affecting smallholder banana growers' market participation. The model chi-square tests applying appropriate degrees of freedom indicate that the overall goodness of fit for the Heckman selection model is statistically significant at a probability of less than 1% level of significance. This shows that jointly the independent variables included in the selection model regression explain the level of market participation.

In Table 5, the regression result shows that age of the household head was significantly associated with households' market participation for banana at less than 1% significance level. Contrary to prior expectation age was found to be negatively associated with market participation. This implies that household's tendency to participate in banana marketing decreases as he/she gets older and older. Thus, those households who are younger

have higher tendencies to be engaged in commercial level of banana production as they would be more active in accessing market information through the use of mobile phone and other devices. This finding concurs with the finding of Barret et al (2007) who noted that younger people participated more in the market because they are more receptive to new ideas and are less risk averse than the older people. Another finding by Samuel and Sharp (2008) noted that as farmers get older they may be unable to spend the time and energy needed for the production and marketing of cash crops. In contrary to our finding, a finding by Christopher et al (2014) revealed that farmer's age had a positive and significant impact on the decision to participate in the market.

In terms of analyzing the factors affecting the quantity of banana supplied in the market, the first step of the regression result revealed that household size had positively and significantly affected the participation of households in banana products market and the supply of banana to the market. The positive association between household size and quantity of banana supplied in the market indicates households' with more members likely to actively participate in market. Consistent to this finding, Nuri et al (2016) found that a household with more number of labor produce (family size) highly participate in market.

An access to extension service was significantly associated with households' market participation for banana fruits at less than 1% significance level. The extension service delivered in the area in relation to the

Table 5. Determinants of Market Participation

Heckman selection model -- two-step estimates (regression model with sample selection)		Number of obs = 115 Censored obs = 45 Uncensored obs = 70 Wald chi2(8) = 80.15 Prob> chi2 = 0.0000		
Quantity sold	Coef.	Std. Err.	z	P> z
Age	-2.618399	13.93243	-0.19	0.851
Household size	79.30345	36.40401	2.18	0.029**
Fruit Income	.1342451	.0183909	7.30	0.000***
Land holding	154.9659	108.3979	1.43	0.153
Extension service	305.942	170.8604	1.79	0.073*
Access to information	-87.27057	155.8602	-0.56	0.576
Livestock (TLU)	-88.62384	41.71225	-2.12	0.034**
Low price (perception)	70.89277	146.4099	-0.48	0.628
_constant	-953.5889	367.5182	-2.59	0.009***
MPI Banana				
age	-.0586728	.022091	-2.66	0.008***
Household size	.2170069	.0914165	2.37	0.018**
Proximity to road	-.8796201	.3642894	-2.41	0.016**
Fruitincome	.000218	.0001259	1.73	0.083*
Land holding	.4788873	.2120075	2.26	0.024**
Extension service	.9969722	.3329673	2.99	0.003***
Access to information	-.4842662	.3807888	-1.27	0.203
Livestock (TLU)	-.1583499	.0866662	-1.83	0.068*
Low price (perception)	-.0930689	.3237002	-0.29	0.774
_constant	1.063982	1.033938	1.03	0.303
Mills Lambda	544.6226	316.0605	1.72	0.085
rho	0.97313			
sigma	559.65907			

agronomic practices producers had to perform contributed positively in enhancing the productivity of banana in the area. Consistent with prior expectation, extension service was positively associated with households' market participation. Consistent to our finding, Christopher et al (2014) pointed out that the number of extension visits from government workers had a positive and significant effect on the decision to participate in the market. Our finding concurs with the finding of Apind et al (2015) who found that the coefficient of extension services is positive and significantly influenced the extent of market participation among the rice farmers. Another finding by Berhanu et al (2009) revealed that the expansion of the agricultural services had significant impact on the intensity of input use, agricultural productivity and market participation of Ethiopian smallholders.

There was a significant and positive association between total income from fruit production and households' market participation at less than 10% significance level. The high income generated by the fruit sector was found as an important motivational factor for household's to participate in market. In addition, the fruit (banana) potential to generate income throughout the year was also created as a bonanza for producers and traders to enter into the banana

industry. This finding concurs with the finding of Osmani and Hossain (2015) who reported that farmers' decision on market entry is significantly related to the amount of farm income.

Another explanatory variable which was found to have negative association with market participation is proximity to road. Proximity to road significantly affected household's market participation at less than 5% significance level. This implies that the farther from main road, the lesser will be household's tendency to participate in market. Our finding concurs with the finding of Getahun (2015) who reported negative association between nearness to road and adoption of fruit-tree based agroforestry system. Getahun (2015) noted that the nearer to the main road, the better would be access to information and market. Another finding on commercialization of smallholders in Ethiopia by Berhanu and Moti (2010) noted that proximity to all-weather road encourages market orientation due to its effect of reducing marketing costs. Accordingly, households further away from market places have lower market participation (Ibid). A finding by Efa et al (2016) also revealed that as the distance from the nearest market increases, variable transport costs increase and this discourages smallholder farmers from selling high volumes

of teff. A study conducted in Kenya on factors influencing smallholder farmers' market participation revealed that distance to the market significantly reduces the percentage of sales volume for milk (Omiti et al., 2009).

Total land holding was significantly associated with households' market participation at less than 5% significance level. Consistent with prior expectation, total land holding cultivated for banana was positively associated with households' market participation. The more land allotted to banana growing, more quantity would be supplied to the market. Consistent to our finding, Rehima (2006) found expanding the area under crop increased the marketable supply of the crop.

Another variable which was significantly associated with market participation was livestock ownership. Contrary to prior expectation, livestock ownership negatively affected smallholder banana growers' market participation. This might be due to the competitive nature of the two enterprises (the banana fruit and the livestock enterprise) for land. The limited resource available for smallholders in the area created a competitive relationship between banana enterprise and livestock enterprise. Thus, an increase in the production of the livestock enterprise will reduce the crop enterprise (banana). Consistent to our finding, a finding by Moti et al (2009) noted that ownership of livestock negatively affected participation in the crop market because it distracts farmers from alternative sources of income. Another finding by Rehima (2006) revealed that farmers with more TLU tend to specialize in livestock production.

In terms of the factors affecting the quantity of banana supplied in the market, three factors such as household size, income from fruit products and extension service positively and significantly affected the supply of banana to the market. On the contrary, livestock ownership negatively and significantly affected the supply of banana to the market.

Inverse Mills Ratio

The Inverse Mills Ratio (λ) or selectivity bias correction factor has significantly affected the marketed surplus of banana at less than 10% significance level. This discloses the fact that there is sample selection bias; which implies the existence of some unobserved factors responsible for banana growers' likelihood to participate in market and thereby the level of market participation. The positive sign of λ shows that there are unobserved factors that are positively affecting both participation decision and marketed surplus of banana justifying the appropriateness of the Heckman model for identifying the determinants of banana market participation and marketed surplus.

The ρ is positive; this indicates that unobserved factors are positively correlated with one another. $\sigma = 559.65907$ represents the adjusted standard error

for the level of market participation equation regression; and the correlation coefficient between the unobserved factors that determine decision in to market participation and unobservables that determine participation level is given by $\rho = 0.97313$.

CONCLUSION AND RECOMMENDATION

Smallholder commercialization of fruits production is an important part of agricultural transformation to reduce poverty in rural Ethiopia. The result of this study revealed that the contribution of fruits to total household income in the study area accounted for more than 18%. This implies that fruits are the second most important component of household income and livelihood in the study area. However, the contribution of the fruits sector to household income and livelihood is affected by different micro-level factors hindering smallholders' market participation.

Smallholders' market participation for banana was affected by factors like age, household size, extension service, income from fruit products, proximity to road, livestock ownership and land size. Out of the seven explanatory variables significantly affected smallholder commercialization of banana in the area, three of them (age, proximity to road and livestock ownership) negatively associated with market participation and four of them (household size, landholding, income and extension service) were positively associated with smallholder market participation. Since fruits significantly contributed for smallholders' income, production of fruits in the area should be enhanced. In addition, working on tackling the factors affecting market entry and participation of smallholders in fruits markets will enhance the fruits' sector contribution to rural income and livelihood.

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Conflict of interests

The authors declare that they have no conflicting interests.

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