



An Analysis of the Factors Influencing Participation by Smallholder Farmers in Indigenous Leafy Vegetables (ILVs) Production: A Case of Mapuzi Village, Eastern Cape Province of South Africa

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ABSTRACT The study aimed at determining factors that influence participation in Indigenous Leafy Vegetables (ILVs) production at Mapuzi village, Eastern Cape Province. A sample of 50 smallholder farmers was drawn from the study area using stratified sampling and simple random procedure, and a questionnaire was used as a data collection tool. Descriptive statistics and Binary logistic regression were used as data analysis tools. Descriptive results revealed that females were more dominant in the production of ILVs when compared to males. The regression results revealed a higher likelihood for factors such as level of income, access to market and size of land owned to influence participation in ILVs production. The paper concludes that level of income and access to market for ILVs encourages smallholder farmers to participate in ILVs production while the size of land owned by smallholder farmers limits farmers to participate in the production of ILVs.

INTRODUCTION

Concerning the production status of ILVs in South Africa, Wemali (2015) authenticates that Indigenous Leafy Vegetables (ILVs) are threatened by rapid adoption of highly improved varieties of commercial crops and the loss of ILVs resulted to the loss of knowledge linked to production, utilisation and conservation of ILVs hence their production is lower. In this regard, ILVs have recently received considerable attention for their contribution to food and nutrition security and opportunities for enhancing smallholder farmers' livelihoods (Maseko et al. 2017). However, in South Africa the production of ILVs is not popularly on large scale but farmers and households commonly practise production of ILVs for subsistence consumption (DAFF 2013; Maseko et al. 2017). The reason could be that, South African education about farming previously focused mainly on exotic vegetable production at an expense of ILVs (Modi et al. 2006). For this study, ILVs are defined as vegetables which are either genuinely native to a region or which were introduced to a region for long enough to have evolved through natural pro-

cesses or farmer selection (Van Rensburg et al. 2007; Vorster et al. 2008).

Recently several, studies confirm a lower production of ILVs which ultimately leads to poor consumption and utilisation of ILVs within the rural households of South Africa (DAFF 2013; Maseko et al. 2017; Senyolo et al. 2018). To this end, Mayekiso et al. (2017) note that the production of ILVs is influenced by perception related and institutional factors rather than socio-economic factors of households. This is in contradiction with the findings of Otieno et al. (2016) who concluded that production of ILVs is influenced by farmers' socio-economic factors. To this end, the factors that could be influencing the decision for smallholder farmers to participate or not to participate in the production of ILV are not conclusive.

This could be a reason that, several studies earlier mentioned certain demographics of a household such as age, gender, and level of income in South African households to be influencing participation in ILVs production (Vorster and Jansen Van Rensburg 2005; Ndengwa 2016). For instance, Oladele (2011) discovered that older people are the majority producers of ILVs since they recognise the leaves for their health properties and ability to prevent diseases, while on one hand Matenge et al. (2012) states that young

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people prefer consuming “modern foods” and do not want to eat indigenous and traditional foods. Regarding gender, women are identified as the main players in the production of ILVs, the reason is that, ILVs require very little income to start the business of selling these vegetables when compared with starting the business of exotic vegetable production (Gockowski et al. 2003; Shackleton et al. 2010). Household income is also noted as one of the socio-economic factors that influence participation in the production of ILVs by farmers (Vorster et al. 2007). For instance, Shonshai (2016) mentions that, most households which do not have constant income benefit from the sales of ILVs. The income that is derived from sales of ILVs may cover costs such as hospital bills, education fees and clothing. Also, perception related factors such as labelling ILVs as poor mans’ food, ILVs as weeds and cultural beliefs associated with indigenous plants led to poor participation in the production of ILVs and ultimately decreased utilisation of ILVs (Smith and Eyzaguirre 2007; Shava et al. 2009; Matenge et al. 2012).

Thus far, socio-economic and perception related factors are given as much attention as factors that influence participation in the production of ILVs. Nevertheless, there are also institutional factors and environmental factors to mention few that could be influencing participation in the production of ILVs. For instance, in Tanzania, Good Seed Initiative (GSI) program was invented by the government so as to promote production and consumption of nutrient-dense ILVs to reduce malnutrition through diet diversification (Ochieng et al. 2016). In addition, several countries in Africa are encouraged by the government officials to produce ILVs in order to sustain their livelihoods, these countries include Ghana, Ethiopia, Tanzania, Uganda, Nigeria and Kenya (Kwenin et al. 2011; Ayinde et al. 2016; Gido et al. 2016; Aleni 2017). However, in South Africa, ILVs are largely treated as weed by some research and extension personnel and farmers are criticized for not keeping this weed population under control, thus classifying ILVs as unworthy of the space it occupies in the fields and home gardens (Mavengahama 2013). To this end, Senyolo et al. (2018) suggest that institutions in South Africa such as government, policy, investments are still required to promote production

of ILVs and adding value to these vegetables and their products for higher value market. This could ultimately influence participation in the production of ILVs by smallholder farmers.

Raleting and Obi (2015) also argue that in South Africa, the specific roles of institutions in intermediating production and marketing within the smallholder sector have not been fully investigated and understood particularly in the former lands. This mediation also includes production of ILVs since they could be falling under vegetable production system if they were produced in a conventional manner by smallholder farmers. This paper therefore calls to determine factors that are influencing smallholder farmers to participate in the production of ILVs.

Objectives

1. To profile demographic characteristics of smallholder farmers.
2. To determine factors influencing participation in production of ILVs.

MATERIAL AND METHODS

Study Area

The study was conducted in the Mapuzi Village, of King Sabata Dalindyebo local municipality, (KSDLM) Eastern Cape province of South Africa. The King Sabata Dalindyebo Local Municipality is a local municipality situated in the District of OR Tambo District Municipality in the inland of Eastern Cape Province in South Africa. The KSDLM covers an area of 3027 square kilometres (km²) and currently has 36 wards as against 35 prior 2016 local government accommodating an estimated population of 494 000 people in 117 623 households [KSD LM Integrated Development Plan (IDP) 2018/2019]. The study area was purposively selected to accommodate smallholder farmers producing ILVs and the fact that the area has a nursery that provides ILVs seedlings to its local residences.

Data Collection

Data was collected from smallholder farmers using a structured questionnaire. Fifty (50) farmers which included those who produce and not producing ILVs were interviewed in regard to

factors influencing participation in the production of ILVs from the study area and a face to face interview approach was employed. First section of the questionnaire required the demographic characteristics of farmers and the second section of the questionnaire entailed questions relating to factors influencing farmers to produce ILVs.

The study used purposive and simple random sampling procedure. The purposive sampling technique which was used is a non-probability sampling method whereby the researcher purposively interviews individuals meeting the criteria of interest with the hope that they will provide in-depth information required for the research project (Leedy and Ormrod 2005). Simple Random Sampling (SRS) is a method of selection of a sample comprising of several sampling units out of the population with all the sampling units standing an equal chance of being selected. The population was stratified into two groups, that is, farmers of ILVs and non-farmers of ILVs. This means that, both producers and non-producers of ILVs (two strata) were taken as unit of analysis. From the two strata 25 producers were purposely selected and to remove the element of bias, particularly given the small sample size of the total farming population in the study area, which is 25 producers of ILVs, therefore a simple random procedure was also employed to select 25 non-producers. With stratified sampling procedure, the researcher divides the population into separate groups, called strata. Then, a probability sample, which is referred to as simple random sample was drawn from each group.

Data Analysis

Data was coded in Microsoft Excel 2016 and then exported into SPSS (version 25) for analysis. A descriptive analysis to profile households' demographic characteristics was used in a form of percentages, mean and frequencies. The binary logistic regression analysis was performed to determine factors that influence farmers' decision of producing ILVs or not to produce ILVs. Binary logistic regression is useful when a dependent variable is dichotomous (Chan 2005). The model, according to Liao (1994), has only two categories in the endogenous variable re-

sulting from several categorical predictor variables. From the study area, it was assumed that a farmer is faced with two choices subject to production of ILVs. This means that a farmer may choose to participate or not to participate in the production of ILVs and farmer production status was taken as a dependent variable against six (6) independent variables as indicated in Table 3. The binary logistic regression model as illustrated in equation below was used to estimate that influence farmers' participation in ILVs production (Gujarati 1992).

$$\ln = \frac{p(y = 1/X)}{1 - p(y = \frac{1}{X})} = \alpha + \beta_1 X_1 + \beta_n X_n \dots \dots \dots$$

Where:

P= predicted probability of participation in ILVs.

1-P= predicted probability of non-participation in ILVs.

α = the constant of the equation.

β = the coefficient of the independent variables.

X= independent variables.

RESULTS

This section presents research results based on descriptive and empirical results. To address the objectives of the study, this section summarises basic sample statistics of smallholder farmers followed by factors that influence participation in ILVs production by smallholder farmers.

A total of 25 participants in ILV production were considered for this paper, with a mean household-head age of 42 years. The respondents from the study area were ranging between the minimum age of 21 years and a maximum age of 61 years as shown in Table 1. The median education level was two (2) which implies that, on average, respondents were educated up to the level of primary education. The education level for the producers was ranging between the minimum of one (1) and a maximum of three (3); 1 indicating that the respondent never attended school with 3 representing a producer that has matric.

The descriptive statistics results also reveal that the sample considered had more females than males with an average monthly income ranging between R1000-R3000. The income of the producers of ILVs was ranging between the minimum income of less than R1000 and more than R3500 per month as indicated in Table 1.

Table 1: Basic sample statistics summary of participants towards production of ILVs from the study area

<i>Variables</i>	<i>N</i>	<i>Mean</i>	<i>Std deviation</i>	<i>Skewness</i>	<i>Minimum</i>	<i>Maximum</i>
Gender	25	1.72	.458	-1.044	1	2
Age	25	41.96	12.551	-.235	21	61
Education	25	2.00	.500	0.000	1	3
Level of income	25	1.96	.351	-.673	1	3
ATM	25	1.16	.374	1.975	1	2
DTM	25	1.12	.332	2.491	1	2
ATES	25	1.20	.408	1.597	1	2
ATC	25	1.16	.374	1.975	1	2
ATAL	25	1.80	.408	-1.597	1	2
OSS	25	1.76	.436	-1.297	1	2
SLO	25	3.04	.455	.194	2	4
MTO	25	1.30	.476	.822	1	2

Key: Gender (1= male; 2= female), Age (actual age of a respondent), Education (1= Never went to school; 2= primary school; 3= secondary school), Level of income (per month) (1= less than R1000; 2= between R1000 and R3000; 3= over R3000), Access to market (ATM) (1=yes; 2=no), Distance to market (DTM) (1=yes; 2=no), Access to extension service (ATES) (1=yes; 2=no), Access to credit(ATC) (1=yes; 2=no), Access to arable land (ATAL) (1=yes; 2=no); Ownership status (OSS) (1=own; 2=lease; 3=borrowed), Membership to a farmer organisation (MTO) (1=yes; 2=no)

The descriptive results also indicate that on average, the producers do not have access to market, access to extension services, access to credit for their produce and they also claimed that distance to market also influence their participation in the markets regarding selling of ILVs. These were represented with a minimum of 1; indicating access and a maximum of 2; indicating no access to the above-mentioned institutions as presented in Table 1. Furthermore, descriptive results indicate that, smallholder farmers have access to arable land for production and it is not borrowed nor leased land; instead the land is owned by the smallholder farmers. The size of land owned by smallholder farmers is ranging between the minimum of 2 hectares to a maximum of 4 hectares.

A total of 25 non- participants in ILV production was considered for this study, with a mean household-head age of 54 years. The respondents of non-producers from the study area were ranging between the minimum age of 34 years and to a maximum age of 73 years as shown in Table 2. The median education level was 1.68 which is almost equivalent to 2; and this implies that, on average, respondents were educated up to primary education. The level of education for the non- producers was ranging between the minimum of one (1) and a maximum of three (3); 1 indicating that a respondent never attended school with 3 representing a non-producer that has matric.

The descriptive results also show that there were more female non-participants from the considered sample than males, with an average monthly income of between R1000-R3000. The income of the non- producers of ILVs was ranging between the minimum income of less than R1000 and income more than R3500 per month as indicated in Table 2. Descriptive results further reveal that on average, the non- producers have access to market, access to credit and they further claimed that distance to market is closer to them in relation to production of their exotic vegetables instead of ILVs. These were represented with a minimum of 1; indicating access and a maximum of 2; indicating no access to the above-mentioned institutions as indicated in the Table 2. Also, descriptive results indicate that, the size of land owned by smallholder farmers ranges between the minimum of 1hectare to a maximum of 3hectares. However, households claimed to be utilising most of the land for other exotic vegetables such as maize, pumpkins, beans and other crops instead of producing ILVs. Also, the respondents claimed to belong to a farmer organisation within the community which assists them to improve their farming skills as shown in Table 2.

Regarding empirical results, six explanatory variables that were fitted in the binary regression model as shown in Table 3. From the six

Table 2: Basic sample statistics summary of non-participants towards production of ILVs

<i>Variables</i>	<i>N</i>	<i>Mean</i>	<i>Std deviation</i>	<i>Skewness</i>	<i>Minimum</i>	<i>Maximum</i>
Gender	25	1.76	.436	-1.297	1	2
Age	25	54.48	11.836	-.007	34	73
Education	25	1.68	.557	-.010	1	3
Level of income	25	2.40	.557	-.282	1	3
ATM	25	1.76	.436	-1.297	1	2
DTM	25	1.76	.436	-1.297	1	2
ATES	25	1.40	.500	.435	1	2
ATC	25	1.64	.490	-.621	1	2
SLO	25	2.28	.678	-.410	1	3
MTO	25	1.84	.374	-1.975	1	2

Key: Gender (1= male; 2= female), Age (actual age of a respondent), Education (1= Never went to school; 2= primary school; 3= secondary school), Level of income (per month) (1= less than R1000; 2= between R1000 and R3000; 3= over R3000), Access to market (ATM) (1=yes; 2=no), Distance to market (DTM) (1=yes; 2=no), Access to extension service (ATES) (1=yes; 2=no), Access to credit (ATC) (1=yes; 2=no), Membership to a farmer organisation (MTO) (1=yes; 2=no)

explanatory variables, only three variables had a significant role in influencing farmers' participation in the production of ILVs. From the three significant explanatory variables (level of income, size of land owned, access to market for ILVs), two variables had positive signs, which implies that an increase from these variables may mean higher probability for increased participation in the production of ILVs. Furthermore, one variable had a negative sign which may suggest an increase from this variable may mean a lower probability for small holder farmers to participate in the production of ILVs.

DISCUSSION

This section discusses the research findings based on the paper results. This means that, descriptive results and empirical results are dis-

cussed in detail relating to the recent studies done in the subject of the paper.

Descriptive Results for Participants in the Production of ILVs

Age of a Farmer

Descriptive results reveal that most farmers participating in the production of ILVs are middle-aged (42) farmers. Similar findings were also revealed by Shackleton et al. (2010) and Otieno et al. (2016) stating that most farmers participating in the production of ILVs are middle-aged or elderly females. This could be a reason that the youth does not consume nor participate in ILV production since they do not want to be labelled as old fashioned (Jansen Van Rensburg et al. 2007; Mpala et al. 2013).

Table 3: Institutional factors influencing participation in ILV production

<i>Independent variables</i>	<i>B</i>	<i>S.E.</i>	<i>Wald</i>	<i>Sig.</i>
Constant	-1.365	6.329	.046	.829
Gender	.953	1.651	.333	.564
Age	-.018	.067	.076	.783
Education	-1.619	1.459	1.231	.267
Income	2.747	1.651	2.768	.096**
Size of land owned	-2.836	1.026	7.646	.006*
Access to market	3.800	1.366	7.744	.005*
Model Summary				
(-2) Log likelihood	21.974			
Cox & Snell R Square	.612			
Nagelkerke R Square	.816			

Note: ** and * indicate significance at 0.1 (10%) and 0.01(1%) probability levels, respectively

Education Level of a Farmer

Concerning the level of education of farmers, descriptive results reveal that smallholder farmers from the study area are educated up to primary level. Shackleton et al. (2010) also discovered similar findings, pointing out that most farmers producing ILVs have limited formal education. This could be a reason that smallholder farmers with no formal education are limited to employment opportunities. Instead, such farmers opt to focus on producing ILVs as their source of food and source of income. Otieno et al. (2016) also came to a similar conclusion, assigning that level of education positively influences participation in the production of ILVs.

Gender of a Farmer

With reference to the gender of a farmer, descriptive results confirmed female dominance in the participation of ILV production. Similar findings were earlier discovered by Hart and Vorster (2006) and Vorster et al. (2008) confirming that in most rural areas, women tend to dominate in the production of ILVs production. This could be a reason that women have a better understanding of distinguishing between undesirable indigenous plant species which are hoed or pulled out and those that belong to the local collection of leafy vegetables species which are harvested for subsistence use (Dweba and Mearns 2011). Similar findings were recently discovered by Ayinde et al. (2016) stating that women are known to be more involved in the production of ILVs when compared to men.

Size of Land Owned

Descriptive results revealed that most of the land owned by smallholder is not used for ILVs production. Smallholder farmers claimed to be utilising most of the land for other exotic vegetables such as maize, pumpkins, beans and other crops instead of producing ILVs. This could be a reason that ILVs are not cultivated in a conventional manner, but they are mostly gathered from cultivated fields, fallowed land and the veldt (Venter et al. 2007; Mavengahama 2013; Mayekiso 2016).

Lastly, smallholder farmers reported that they lack institutional support, as they do not have access to market for ILVs, do not have access to extension services regarding production of ILVs and they do not have access to credit. Similar comparable findings were recently discovered by Muchara et al. (2018) recording common challenges experienced in production of ILVs and these challenges included pests, poor seed quality, drought, lack of transport to markets, lack of agronomic and utilisation information and poor marketing channels. Thus, such challenges could be addressed only if institutional support was not lacking for smallholder farmers. With the given ILVs production challenges thus far, it is apparent that these challenges inhibit participation in the production of ILVs and ultimately lower the supply of ILVs to the consumers hence they are commonly available in the informal markets and limited to certain indigenous vegetables.

Descriptive Results for Non-participants in the Production of ILVs

Age of a Farmer

Regarding age, descriptive results reveal that middle-aged smallholder farmers are non-participants in the production of ILVs. These results may therefore suggest that middle to older aged respondents do not participate in the production of ILVs, they rather harvest these vegetables freely from home gardens, fields and from the wild. This is because literature relating to ILVs cultivation and utilisation states that middle age and older people have a better knowledge concerning edible indigenous plants which could be used for food (Gido et al. 2016).

Education Level of a Farmer

Concerning education, descriptive results revealed that non producers of ILVs are educated up to primary level. This therefore obstructs participation in the production of ILVs by smallholder farmers as their level of education is associated with limited knowledge regarding the benefits linked to ILV production participation. Similar comparable findings were also discovered by Mayekiso (2016) suggesting that the attainment of formal education by smallholder

farmers, may help them improve their cultivation knowledge of ILVs, which may lead to increased production of these vegetables and perhaps becoming a positive contributor towards production of ILVs.

Level of Income for a Farmer

Concerning the income for non-producers, descriptive results reveal that non participants in ILVs production do not have farm income. These results may suggest that the respondents rely mostly on social grants for living and smallholder farmers may not have resources or knowledge regarding the production of ILVs which could also assist them to supplement their household income. Thus far, Vorster et al. 2007; Wemali 2015 argues that, regardless of the label given to ILVs by certain households, households with many members who do not supplement income for the household could rely on more ILVs to supplement their household income.

Access to Market

Descriptive results reveal that most of the non-producers of ILVs have access to market. This explains that such farmers have access to market for other crops such as cabbage, beetroot, spinach other than market access for ILVs. Bua and Onang (2017) point out several constraints associated with production of ILVs, these constraints included lack of quality seed, competition from exotic vegetables, low market demand, pests and diseases infestation. These constraints could therefore lead to poor interest of participation in the production of ILVs by farmers. This perhaps puts these vegetables in competition with exotic vegetables which already have market and ultimately leading to a lower or no demand of ILVs.

Access to Credit

Descriptive results reveal that most of the non-producers of ILVs have access to credit. These results explain that smallholder farmers have access to credit regarding other farming activities other than producing ILVs. This could be a reason that farming system in South Africa is focusing mainly on commercial crops and

therefore inhibits participation in the production of ILVs. This therefore limits the food system in South Africa at the same time preventing the production of ILVs as a development of business venture in the South African farming. Thus far, limited access to credit for certain farming activities which include ILVs production is not promoting participation in the production of ILVs by farmers.

Empirical Results on Factors Influencing Participation in the Production of ILVs

Level of Income

A positive relationship between the level of income and participation in the production of ILVs was confirmed by regression estimates as indicated in Table 3. These results therefore suggest that as income increases, there is a higher probability of increased participation in the production of ILVs. Based on the results and availability of a nursery for ILVs seedlings from the study area, one may therefore assume that households do not only produce ILVs for subsistence consumption, but they also produce ILVs for selling them in local markets. The sales of ILVs could generate income for farmers and this could possibly increase participation in the production of ILVs by farmers. Similar findings were also shared by Hughes and Ebert (2013) stating that ILVs have a significant contribution towards household income. Nyembe (2015) later shared similar findings highlighting that with the popular trading of ILVs in the informal markets in Limpopo and Kwa-Zulu Natal (KZN) provinces of South Africa, there could be a potential for commercial value of ILVs only if their production could be enhanced to promote their market availability. Shonshai (2016) argues that, recently, many households which do not have constant income benefit from the sales of ILVs and the income generated from ILVs could address other households needs such as clothing, education fees, hospital bills.

Size of Land Owned

Regarding size of the land owned, a negative association was confirmed by regression estimates between the size of land owned and participation in ILV production. These results

therefore suggest that, households with limited land for production are more likely to be discouraged to participate in the production of ILVs. Based on the study results, an assumption would be that, households would rather opt to produce other crops from the available land at an expense of ILVs. This could be a reason that such crops have positions in the market when compared to ILVs which are mostly produced for subsistence purposes. Similar comparable findings were also discovered by Shackleton et al. (2010) arguing that production of ILVs within rural farming communities is commonly on small-scale and is for subsistence purposes. This is because most of the cultivated land is used for the production of maize and exotic crops such as cabbage, potatoes, spinach.

Access to Market

Regression estimates confirmed a positive significant association between access to market for ILVs and participation in ILV production. The results therefore suggest that, smallholder farmers are likely to consider ILV production, as long as they have access to market for ILVs and ILVs' products. These findings further suggest that ILV production may be market driven, where production is motivated by producing more of these vegetables not only for subsistence use but for commercial purposes as well. Similar comparable findings were earlier discovered by Ebert (2014) stating that ILVs have a great potential to play a major role in a more diversified and sustainable food production system. However, there must be greater investment in long-term research and breeding programs; and improved seed supply sources for these vegetables to ensure they become competitive in the marketplace (Ebert 2014; Maseko et al. 2017). This type of investment could be essential since several studies in Africa found weak market chains for ILVs, poor seed system, lack of information on best cultivation practices and the low demand of ILVs which prevents farmers from producing ILVs as earlier noted by Mwangi and Mumbi (2006 and DAFF (2013). Recently, Senyolo et al. (2018) also argue that although farmers make higher returns from ILVs, it is still difficult for them to enter the mainstream market for ILVs.

CONCLUSION

The paper concludes that most producers of ILVs from the study area were women. This means that women are the major participants in the production of ILVs. Also, the paper further concludes that factors such as level of income and access to market of ILVs are the factors that positively influence participation in the production of ILVs by smallholder farmers. This means that, level of income and access to market for ILVs encourages smallholder farmers to participate in ILVs production. Furthermore, the study concludes that the size of land owned is one of the factors that negatively influences participation in the production of ILVs. This explains that the size of land owned by smallholder farmers limits farmers to participate in the production of ILVs.

RECOMMENDATIONS

The results from the study discovered that the level of income, size of land owned and access to market for ILVs influence participation of smallholder farmers towards production of ILVs. Therefore, the study recommends that, government officials such as South African Department of Agriculture, relevant departments, research institutes and policy makers encourage group marketing to equip farmers with marketing knowledge relating to ILVs. Establishment of local selling points in rural settlements for the farmers may assist to promote the sales of ILVs and ILVs products, this may ultimately supplement households' income which may lead to higher levels of income. Education regarding the process of obtaining land by farmers should be encouraged as to equip the farmers with knowledge of accessing arable land and assisting them to understand the terms and conditions of obtaining land. In summary, if all the above-mentioned matters could be attended to, they could therefore trigger improved participation in the production of ILVs by farmers.

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