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LABOUR CHOICE DECISIONS AMONG CASSAVA CROP FARMERS IN AKWA IBOM STATE, NIGERIA

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Abstract

The study used primary data collected from 90 cassava farmers through a multi stage sampling technique to examine the determinants of labour choice decision among cassava crop farmers in Akwa Ibom State, Nigeria. Data were analyzed using descriptive statistics, multinomial logit regression and Ordinary Least Square (OLS) regression. Findings revealed that cassava production in the study area was dominated by young, and educated (75.6%), female (68.9%) farmers, with an average household size and farming experience of 6 persons and 10 years respectively. The multinomial logit result showed that while household size and labour cost significantly influenced the choice of borrowed labour, farming experience, educational level, income of farmers and farmer's age significantly influenced the choice of hired labour for cassava production. Also, the coefficient for farm size was positive and significantly related to the choice of both borrowed and hired labour. The study further revealed that cassava production in the study area was profitable with a gross margin of ₦ 154,840 and net income of ₦125, 590. The Ordinary Least Square result revealed that family labour, hired labour, age of farmers, farming experience, household size and farm size impacted severely on cassava output in the study area. This suggest the need to pursue policies that would enhance access to land and encourage economical land holdings, advocate and intensify campaigns on the profitability of cassava production and increased participation of farmers, especially younger people in cassava production in the study area as the way out.

Keywords*: Decisions, labour choice, Cassava production, Akwa Ibom State.*

1. Introduction

Agricultural production in Nigeria (unlike the developed world) continue to be labour intensive with more than 90% of population being small scale farmers, cultivating less than two hectares and utilizing unpaid labour as a major source of farm labour supply (Arikpo et al., 2009). Our inability to develop and utilize the Nation's manpower resources effectively and efficiently, especially in the rural sector is one of the remote causes of the failures of past agricultural development programmes launched by successive governments of Nigeria (Okunade, 1998). Agricultural production resources are classified into land, labour, capital

and entrepreneurship. Labor as one of the production resources accounts for 90% of production in agriculture (Choudhury & Musa, 1984). It is an integral part of farm production and account for 70% of total production costs (Nweke, 1980). Shaib, Aliyu, and Bakshi (1997) documented that over 90% of all task in the non mechanized production system depends on human labour, while for mechanized production system, between 50-60% of the task depends on human labour. Bulk of the labour requirement for agricultural production activities in Nigeria is supplied by women (FAO, 1995). While men focused primarily in bush clearing, cultivation, felling and ploughing or tilling the land, women have been estimated to do 75% of hoeing and weeding, 60 %of harvesting, 80% of transporting crops homes and 90% of processing (Steady, 2001). Studies such as Ezedinma (2000), Bassey and Okon, (2008) and Upton (1992) reported that labour cost constituted a significant proportion of total cost of agricultural production in Nigeria.

Cassava production is one of the numerous agricultural production activities that is labour intensive. In the study area, while men feature prominently in bush clearing and harvesting, women are involved mainly in the planting, weeding and harvesting phases. Labour use in small holder cassava farm in the study area is classified into family, hired and borrowed or group labour. However, the supply and use of these labour has been limited by several factors such as: declining share of family labour (Nweke, 1996), type and nature of enterprises (Upton, 1992), age at which children are considered as potential labour, farm size as well as rural- urban drift which result in scarcity of labour and rising labour wage rate in the farm sector,. In terms of labour utilization, Mayra and mehra, (1990) and Oruche, (1980) reported that family labour account for 75% of labour force in agriculture and varies with farm size. In addition to family labour, most households do hire labour for their farm work. The quantity of labour hired would depend on the cash available to the farmer. Okorji (1983) posited that hired labour contributed about 40% of the total labour supply and is mainly used for tedious tasks like land preparation and weeding. Apart from hired labour, farmers age grades, associations, and groups occasionally organized themselves into work groups and exchange labour. According to Upton (1992), payment for this kind of labour is mostly through food, drinks and at times music entertainment done at the end of the task.

Of recent, there has been a sharp decline in labour supply for agricultural production in the country. This is attributed to a host of factors such as rural-urban migration, increase enrolment in school, increased employment opportunities accompanying industrialization, urbanization, increase enrolment in school, increased employment opportunities accompanying industrialization, urbanization as well as increased off farm employment (Ezedinma, 1991; Nweke,1980; Onwueme & Sinha, 1991) .Because of the increased participation of labour in off-farm activities which culminated in scarcity of farm labour and rising labour wage rate, there is great fear that agricultural growth and development may be retarded and our whole effort of reducing hunger by 2015 and achieving self sufficiency by 2020 would be a mirage. Hence, effort should be directed towards ensuring efficient choice allocation and utilization of available agricultural labour force. Labour choice for crop production is determined by a range of socioeconomic factors. Hence, knowledge of such factors has to be known so as to be able to establish their degree of influence. In line with this, the study aimed at determining those factors that determine labour choice allocation in cassava production in the study area. It would also estimate the production function of cassava and analyze those factors influencing cassava production in the study area.

2. The Study Area

The study was carried out in Akwa Ibom State, Nigeria. It has a total land mass of 7,246 square kilometers and estimated population of 3,920,208 million people (NPC, 2006). The area falls within the humid tropics with two distinctive seasons (dry and wet seasons), with

temperature of about 30^0C and lies between latitude 4^0 32^1 and 5^033^1 North and longitude 7^025^1 and 8^025^1 East. The State is agrarian and is well suited for the production of both permanent and arable crops due to her favorable climatic conditions. Majority of inhabitants are predominantly peasant farmers cultivating food and cash crops. They also embark on small, medium and large scale livestock production as well as in marketing of their products.

2.1 Sampling Procedure and Data Collection

The study made use of primary data that were collected through a multistage random sampling in 2013. First, three Agricultural Zones were selected from the existing six where intensive cultivation of cassava is carried out. They were Oron, Eket and Uyo. Next, two (2) Local government Areas were selected from each of the three Agricultural Zones making a total of six. The selected L.G.Areas were Esit Eket and Onna L.G.A from Eket Zone, Itu and Uyo L.G.A from Uyo Zone, Mbo and Udung Uko L.G.A from Oron Zone. Beyond this, one (1) village was selected from each of the six Local Government Areas. Finally, 90 were selected and administered with questionnaires in the ratio of fifteen (15) per village.

2.2 Method of Data Analysis

Simple descriptive statistics (mean, frequency, percentages) was used to analyze the demographic characteristics of respondents. Multinomial logit regression was used to estimate the influence of socioeconomic factors on cassava farmer's labour choice decisions. Lastly, Ordinary Least Square (OLS) multiple regression was used to measure the influence of socio-economic variables on output of cassava in the study area.

The study empirical models are presented below:

(i) Three labour choice decisions were available for farmers namely borrowed labour, hired labour and family labour. The dependent variable was assign one if the farmer choose borrowed labour, two if the farmer choose hired labour and three if the farmer choose family labour.

2.2.1 Model specification

According to Enete (2003), in multinomial logit model, a set of coefficients $\beta^{(1)}, \beta^{(2)}, \beta^{(3)}$ are estimated as;

$$\Pr (Z = 1) = \frac{\ell x \beta^{(1)}}{\ell x \beta^{(1)} + \ell x \beta^{(2)} + \ell x \beta^{(3)}} \quad (1)$$

$$\Pr (Z = 2) = \frac{\ell x \beta^{(2)}}{\ell x \beta^{(1)} + \ell x \beta^{(2)} + \ell x \beta^{(3)}} \quad (2)$$

$$\Pr (Z = 3) = \frac{\ell x \beta^{(3)}}{\ell x \beta^{(1)} + \ell x \beta^{(2)} + \ell x \beta^{(3)}} \quad (3)$$

Since there exist more than one solution to $\beta^{(1)}, \beta^{(2)}, \beta^{(3)}$ that leads to the same probabilities for Z=1, Z=2, Z=3, the model is unidentified. In order to identify the model, one of $\beta^{(1)}, \beta^{(2)}, \beta^{(3)}$ is arbitrarily equated to 0. Assuming $\beta^{(2)} = 0$, then the remaining coefficient $\beta^{(1)}, \beta^{(3)}$ will measure the change relative to Z = 2 (hired labour in this case). In other words, we will be comparing the choice of hired labour with other labour choice decisions of the farmers. Setting $\beta^{(2)} = 0$, the above equation becomes:

$$\Pr (Z = 1) = \frac{\ell x \beta^{(1)}}{\ell x \beta^{(1)} + 1 + \ell x \beta^{(3)}} \quad (4)$$

$$\Pr(Z = 2) = \frac{\ell x\beta^{(2)}}{\ell x\beta^{(1)}+1+\ell x\beta^{(3)}} \quad (5)$$

$$\Pr(Z = 3) = \frac{\ell x\beta^{(3)}}{\ell x\beta^{(1)}+1+\ell x\beta^{(3)}} \quad (6)$$

The relative probability of Z=1 to the base category is given as

$$\frac{\Pr(Z=1)}{\Pr(Z=3)} = \ell^{x\beta^{(1)}} \quad (7)$$

Assuming we call equation (7) the relative likelihood and assume that X and $\beta_k^{(1)}$ are vectors equal to $X_1, X_2..X_k$ and $\beta_1^{(1)}, \beta_2^{(1)} \ldots \beta_k^{(1)}$ respectively, the ratio of relative likelihood for one unit change in X_i relative to the base category is then:

$$\frac{e^{\beta_1^{(1)}X_1 + \beta_i^{(1)}(X_{i+1}) \ldots + \beta_K^{(1)}X_k}}{e^{\beta_1^{(1)}X_1 + \beta_i^{(1)}(X_{i+1}) \ldots + \beta_K^{(1)}X_k}} = e^{\beta_1^{(1)}} \quad (8)$$

Hence, the exponential value of a coefficient is the relative likelihood ratio for a unit change in the corresponding variable (StatCorp,1999 in Enete,2003)

2.2.2 The Multiple Regression Model

In order to determine the effect of labour choice decision and socioeconomic variables on cassava output, the multiple linear regressions which involved the Ordinary Least Square (OLS) estimation was employed. Of the four functional forms (Linear, Double log, Semi-log and Exponential) that were estimated, the linear model was chosen as the lead equation based on econometric, economic and statistical significance such as: sign of coefficients, theoretical justification, R^2 and statistical significance of coefficient.

The implicit form of the model for cassava output in the study area is implicitly stated as follows:

$Y = (X_1, X_2, X_3, X_4, \ldots, X_9, + U)$ (9)

Where Y = output of cassava (Kg),

X_1 = Family labour (mandays)

X_2 = Hired labour (mandays)

X_3 = Borrowed labour (mandays),

X_4 = Age of farmers(in years),

X_5 = Farming experience (in years)

X_6 = Educational level (years)

X_7 = Household size (number)

X_8 = Farm size (hectare)

X_9 = Gender of farmer (Male = 1 otherwise 0)

U = error term

The model can be stated explicitly as:

$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + \ldots b_9X_9 + U$ (10)

Where $b_1 \ldots b_{11}$ are coefficients to be examined and

$X_1 \ldots X_9$ are the explanatory variables defined in equation (9) above

3. Result and Discussion

3.1 Demographic Characteristics of Respondents

From Table 1 which shows the socio-economic characteristics of respondents, the dominant age group was 31-40 years (44.4%),followed by 41 and above (33%) before 0-30% years (17%). This showed that farmers were at their youthful age. In terms of experience, farmers were quite experienced with average experience of 9.5 years. 53.3% had between 1 and 5 years of experience, 30% had between 6and 10 years of experience while 16.7 % also had over 10 years of experience. This is likely to impact positively on cassava production as experienced have been found to enhance the use of improved technology (Bassey & Okon, 2008). Experienced people are believed to have learned through several years of trials and errors. Gender wise, a higher percentage (68.91%) were female. This might be attributed to increased advocacy for women involvement in agriculture. 48.9% had a household size of 5-10, followed by 35.6% who had a household size of less than 5 while 15.5% had a household size of 6-10 with an average household size of 6. This indicated the prevalence of abundant labor for cassava production in the study area. As for finance, a greater percent of farmers (55.6%) financed their cassava production through their personal savings, 41.1% borrowed from friends and relatives while 3.3% financed through banks and other financial institution. This is capable of impacting negatively on the adoption and use of improved varieties of cassava and other inputs. Educationally, majority (75.6%) were literate.32.2% attended primary school, 43.4% attended secondary school while 24.4% had no formal education. None of the sampled farmers attended post secondary school. This high literacy rate is capable of impacting positively on cassava output. Lastly, numerous respondent (53.35%) used hired labor, 35.6% used family labor while 11.1% made use of borrowed labor. This is surprising given the high household size prevalence in the study area. This, therefore, shows the unavailability of family labor for farm work in the study area and is likely going to increase the cost of cassava production in the study area.

3.2 Socioeconomic Determinants of Labour Choice Decisions

Table 2 presents the result of the multinomial logit regression analysis of the demographic characteristics of farmers affecting labour type decision by cassava farmers in the study area. The Pseudo R^2 value of 56.16% showed a higher explanatory power of the factors. The Probability > Chi^2 (0.0000) indicated that the model has a strong explanatory power. The base labour choice decision was family labour. The reason for the choice of family as a base choice activity by the multi- nomial logit regression may not be unconnected with the fact that almost all farmers made use of family labour in almost all their farm operation. Farmers only sought for either borrowed or hired labour after exhausting their household labour. Oruche (1980) and Mayra et.al (1990) documented that family labour accounted for 75% of labour force in agriculture.

From the result, in comparison with family labour, the probability that cassava farmers choose hired labour was positive and significantly related to farming experience at the 10% significant level. This implied that experienced farmers would rather opt for more hired labour than borrowed labour, presumably, as a complement to family labour.

Household size also affected the choice of borrowed labor at the 5% probability level. Farmers with large household sizes would in addition to family labour opt for borrowed labour that is cheaper compared to hired labour. Bamine, Fabiyi and Manyong, (2002) reported that large family size was associated with greater labour force for timely execution of farming activities. Other studies such as Nandi Gunn and Yukushi (2011) and Bassey and Okon (2008) reported that large household size impacted positively on cassava production.

Table 1. Demographic Characteristics of Cassava Farmers

Variable	Number	Frequency
Age		
0-30	17	18.9
31-40	40	44
41 and above	33	36.7
Farming Experience		
Less than 5 years	48	53.3
6-10 years	27	30
More than 10 years	15	16.7
Educational background		
No formal Education	22	24.4
Primary school	39	43.4
Secondary school	29	32.2
Gender		
Male	28	31.1
Female	62	68.9
Household size		
Less than 5	44	48.9
5-10	32	35.6
Greater than 10	14	15.5
Sources of Finance		
Personal savings	50	55.6
Friends and Relatives	37	41.1
Cooperative Society	3	3.3
Labor source		
Family Labor	32	35.6
Borrowed Labor	10	11.1
Hired Labor	48	53.5

Source: Computed from field survey data, 2013.

Educational attainment positively and significantly affected the choice of hired labour at the 10 % level of probability. This showed that farmers with higher educational attainment would prefer hired labour to their borrowed counterpart. The reason may be because most highly educated farmers have gainful employment outside the farm sector and tend to have less time for farm work, they prefer to hire labour for their farm work. Nzeulor (2002) reported that higher educational attainment is associated with lower participation in farm operation.

The coefficient for farm size was positive and significantly influenced the choice of both borrowed and hired labour at the 5 and 1% respectively. This is in line with a priori expectation because farmers with large farm sizes would in addition to hired labour, engaged borrowed and family labour, so as to meet their large farm size requirement.

Result further revealed that in comparison to family labour, the probability that cassava farmers choose hired labour was positive and significantly related to the income status of farmers at the 1 percent level. This implied that farmers within the high income group would opt for hired labour. This is the case because majority of high income earners dominate the political class and other social organization and at the end have little or no time for their farm work. In most cases, the numbers of hours they invest in farm work are often so insignificant.

Ufiem(2000) reported that low income farmers participated more in farming activities than their high income counterpart.

The coefficient for farmer's age was positive and impacted positively on the choice of hired labour. Its coefficient was 0.6635 with t-stat of 2.631, implying that in addition to family labour, aged farmers prefers more hired labour to their borrowed counterpart. The reason is because, cassava production is tedious and requires more energy in all stages of its operation, as such old people may not be energetic enough to undertake those difficult tasks and a result prefer to hire labour. Oyilimba (2002), reported that the use of hired labour was more common among household headed by old people because such households were likely to have larger farms.

The prevailing labour costs in the study area significantly and positively influence the choice of borrowed labour at the 5% level of significance. This is in line with a priori expectation because if the prevailing labor cost per manday is high in the study area, most farmers who may be unable to afford it would definitely opt for borrowed labor to supplement family labour.

Table 2. Multinomial Logit Regression Result for Factors Influencing Choice of Labour Use by Cassava Farmers in the Study Area

Variable	**Borrowed labour**	**Hired labour**
Constant	18.674* (9.465)	31.285*** (9.0002)
Farming experience	0.2576 (0.2137)	0.9425* (0.4779)
Household size	0.7154** (0.2942)	-0.0294 (-0.3454)
Educational level	-0.2187 (0.1959)	0.4762*** (0.1387)
Farm size	3.8941** (1.7376)	6.8763*** (1.8425)
Income of farmer	0.2863 (0.2461)	2.2841* (1.1460)
Age of farmer	-0.1963 (0.1781)	0.6635** (0.2521)
Labour cost	1.6732** (0.6528)	-0.1825 (-0.1609)
Gender	-0.5173 (-4.0351)	0.0824 (0.1065)
LR Chi^2 = 68.32, No. of observation = 90	Prob Chi^2 = 0.0000 Pseudo R^2 = 0.5616	LR Chi^2 = 68.32,

Source: Field Survey, 2013.

Note: N/B, ***denotes P $\leq$ 0.01,** P $\leq$ 0.05 and * denote P $\leq$ 0.1. The base activity/ outcome index is family labour(Comparison category). Figures in brackets are standard errors.

3.3 Average Costs and Returns in Cassava Production in the Study Area

The average cost and return of cassava farmers in the study area is presented in Table 3. From the Table, average total revenue from cassava output is ₦ 209,350 with a total cost of ₦ 121, 060. Variable cost accounted for 75.83 percent of total cost of production while fixed

costs constituted 24.17 percent. Of this, labor cost constituted 67.09 and 50.89 percentages of the total variable cost and total cost of production respectively. Beyond this, farmers had a Gross margin (GM) and Net profit of ₦154,840 and ₦125,590. Hence, it can be inferred that cassava production was profitable in the study area. In Savannah and Rainforest Zone, (Osemeobo, 2004) reported that labor cost accounted for 85.6 and 86.3 percent of cassava production cost.

Table 3. Cost and Return Analysis for Cassava Farmers per 0.75 Hectare

Items	Units	Value (₦)
Revenue items		
Sales of cassava tubers	bags	191,200
Sales of cuttings	bundles	18,150
Total Revenue		209,350
Cost items		
(i) Variable cost		
(a) Labour cost	mandays	61,600
(b) Cost of cuttings	Bundles	11,800
(c) Transportation	Naira	16,800
(d) Cost of empty bags	Naira	1,600
Total variable cost		91,810
(ii) Fixed Cost		
(a) Land		26,000
(b) Depreciation		3,250
Total Fixed Cost		29,250
Total Cost(TVC+ TFC)		121,060
Gross Margin(TR-TVC)		154,840
Net Income (GM-TFC)		125,590

Source: Computed from field survey data,2013. **Note:**₦160 is equivalent to 1 US $

3.4 Determinants of Output for Labor Choice in Cassava Production

Table 4 presents the result of the determinants of output of labour type utilized in cassava production in the study area. Of the four functional forms (Linear, double log, semi-log and exponential) that were estimated, the semi-log model was chosen as the lead equation due to the high R^2 value and the significant number of explanatory variables.

Result revealed that the coefficient of hired and family labour exerted positivesignificant influence on output of cassava at the 1 and 5 percentages level respectively. This indicated that increasing these variables would increase cassava output. These findings are in line with a priori expectation because cassava production is labour intensive. Because of the tedious and rigorous nature of cassava production, more borrowed and hired labour are sought for as a supplement to family labour by farmers.Achoja, Idoge, Ukwuaba and Esowhode (2012) and Bassey and Okon (2008) reported that cassava production was labour intensive.

Farmer's age impacted negatively on Cassava output at the 1 percent level, indicating that Cassava output reduces with increasing age of farmers. This is expected because, in addition to the rigorous nature of Cassava production which aged farmers cannot cope with, they are also risk averse, conservative and hence unproductive. This finding compares favorably with Ogundari and Ojo (2006).

The coefficient for farming experience was positive and significant at the 5 level, implying that Cassava output would increase with increasing experience. Highly experienced farmers are known to have accumulated enough knowledge through several years of trial and

error. This finding supports Bassey and Okon (2008) and Gbigbi, Bassey and Okon (2010) respectively.

Household size impacted negatively on cassava output. From its coefficient, increasing household size would decrease output by 3.142 percent. This result is surprising given that large household size was supposed to imply abundant labour for cassava production. The plausible explanation to this is that the abundant household size in the study area is engaged in other economic activities rather than cassava production. This result agrees with Namdi et.al (2011).

The coefficient for farm size was positive and significantly related to yam output at the 5 percent level. Its value was 124.011 with t-statistics of 2.392, implying that increasing farm size would increase Cassava output. This can be attributed to economy of scale. This result agrees with those of Namdi et.al (2011), Achoja et.al (2012), Ogundari and Ojo (2006).

Table 4. Estimate of the Determinants of Cassava Output for Labour Type Utilization

Variable	Linear	Semilog(A)	Double-log	Exponential
Intercept	963.430** (303.729	1587.62 (1315.34)	9.117 (2.2187)***	2.109 (1.889)
Family labour	0.968 (1.536)	1.792** (0.873)	0.027 (0.072)	-0.008 (-0.044)
Hired labour	0.007 (0.029)	0.741* (0.383)	-0.079 (-0.325)	3.549* (1.787)
Borrowed labour	1.837** (0.781)	-0.9731 (0.719)	1.103 (1.214)	-0.1537 (0.662)
Age of farmer	-6.435 (-3.215)	437.256* (218.846)	-0.556** (-0.258)	-2.914 (-2.991)
Farming experience	-1.973 (3.606)	0.970** (0.458)	0.731*** (0.235)	121.281** (50.261)
Educational level	7.661 (-24.398)	11.418 (12.277)	0.0704 (0.053)	-0.682 (-0.666)
Household size	9.514** (3.587)	102.972*** (-32.772)	1.165 (1.238)	4.227*** (1.402)
Farm size	98.718* (51.793)	124.011** (51.844)	0.035 (0.031)	121.52** (59.539)
Gender	0.0259 (0.024)	0.0046 (0.005)	-0.089 (-0.323)	-0.984* (0.492)
R^2	0.583	0.719	0.514	0.623
F ratio	2.464	3.271	1.251	0.908
No. of observation	90	90	90	90

Source: Field Survey, 2013. N/B, figures in brackets are standard errors. *** Significant at 1%,**significant at 5%, and *significant at 10%. (A) is the lead equation.

4. Conclusion and Recommedations

The study examined the determinants of labour choice decision among cassava farmers in Akwa Ibom State, Nigeria. The base labour choice decision (activity) was family labour. Result of multinomial logit regression revealed that farming experience, educational level, income status and age of farmers were positive and significantly related to the probability of choosing hired labour while household size and prevailing labour cost in the study area

impacted positively on the choice of borrowed labour. Also, the coefficient for farm size was positive and significantly related to the choice of both borrowed and hired labour. The study further revealed that cassava production in the study area was profitable with a gross margin of ₦ 154,840 and net income of ₦125, 590. Result of multiple regression revealed that hired labour, family labour, farming experience and farm size, age of farmers and household size of farmers were significant determinants of cassava output in the study area

The following recommendations are proffered from the findings:

- Farm size had a positive, significant impact on the choice of both hired and hired labour and also impacted positively on cassava output, hence, policies that would enhance economical size holdings and enhance access to land should be pursued.
- The study revealed that cassava production was profitable in the study area. In spite of this, much of the abundant household sizes were used for other economic activities such as off farm works. Thus, campaign on the profitability of cassava production in the study area should be advocated and intensified.
- Cassava output was found to decrease with increasing age of farmers, therefore, effort should be directed toward encouraging younger people to people to go into cassava production. Apart from providing start-up capital for unemployed youths and young school leavers, other incentives like farm inputs, subsidies, grants and guarantee schemes should be evolved and made available to cassava farmers.

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