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RISK SOURCES AND MANAGEMENT STRATEGIES AMONG CASSAVA FARMERS IN ABIA STATE, NIGERIA

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Abstract

This study identified sources of risk and risk management strategies among cassava farmers in Abia State, Nigeria. A total of 518 cassava farmers were randomly selected from four local government areas and data were collected using structured interview schedule. Descriptive statistics such as mean, percentages and frequency were used to present data. Likert attitudinal scale was used to evaluate the risk attitude of cassava farmers. Results showed that the mean age and household size of the farmers was 48 years and 7 persons respectively, with 59.9% of the farmers being females. Main sources of risk in cassava production as identified by the cassava farmers were erratic rainfall (77.2%), inadequate credit facilities (70.3%), low price of output (69.1%), cassava pest and disease (59.1%), high cost of inputs (57.5%) and inadequate market for produce (51.7%). The Likert attitudinal scale showed that 69.5% of the farmers were risk averse. Some risk reducing strategies were not employed by the farmers, reason being that they are either not available or difficult to implement. The most popular risk reducing strategy used was enterprise diversification (100.0%).The study recommended that cassava farmers with support from government and private sector should develop comprehensive risk management strategies with maximum benefit when used in combination, also agricultural policy makers should make policies that will encourage cassava farmers to use formal insurance, cooperative marketing and forward contracting more as a means of reducing social and market risks.

Key words**:** *cassava farmers, sources of risk, risk management strategies*

INTRODUCTION

Cassava farming is a common agricultural venture in Nigeria, providing food and job for a large number of households and serving also as a cash crop for farmers. In recognition of the dominant role played by the crop towards food security and development of rural households, various cassava programmes and policies had been implemented by successive Nigeria governments over the years to raise farmers' efficiency and productivity in cassava production [20]. However, according to [30], despite the implemented programmes and policies to boost cassava production in Nigeria, the sub-sector still produces below its potential. Some reasons posited for this situation, are that farming seasons in Nigeria are not adequately planned for and forecasted and cassava farmers usually base their production activities on guess estimates. The consequence is an increase of risk and uncertainties which could lead to decrease in cassava output.

Cassava farming in Nigeria is highly characterized by risks ranging from adverse climate changes, pests and diseases, marketing/price risk, institutional risks to human risks, which in turn leads to uncertainties [24]. Cassava farmers operate on the edge of extreme uncertainty, sometimes falling just below, and sometimes rising just above the threshold of survival. They have limited knowledge whether rainfall will be good or bad over a season; the prices they will receive for produce sold or whether their crops will be infected by disease. These risks are not under the control of farmers but some farmers have developed ways of coping and managing them [4,32].

Risk is an uncertainty that affects an individual's welfare and is often associated with adversity and loss [12]. Agricultural risks originate from different sources ranging from

production risk to marketing risk, and from financial risk to institutional risk [7]. Production risk emanates from adverse change in weather conditions, pests and diseases attack, breakdown or unavailability of equipment and spare parts and poor farm decisions by the farm household, while institutional risks often arise from inconsistent government policies and programmes.

Analysing risks facing small scale farmers is essential to good planning in agricultural production and innovation [18]. Risk is believed to play an important role in the investment decisions of individual farmers [1, 40]. Taking more risk can increase a cassava farmer's expected profit. However, cassava farmers (like most farmers) are generally risk averse, which is why they are willing to pay a premium to reduce exposure to risk. If cassava famers can manage the risks on their farm at an acceptable cost, they will become better off as a result [15,37]. The method of managing risk and the extent to which different types of risks are managed depend on factors such as farmers degree of risk aversion, cost involved, relative magnitude of risk, correlation of the risk with other risks, other sources of indemnity, a farmers perception of the nature of risk and the farmers income and wealth [32,38].

Attitudes to risk are often related to the financial and social status of the farmer to accept a small gain or loss. The more risk-averse a farmer is, the more likely the farmer is to make managerial decisions that emphasize the goal of reducing variation in income, rather than the goal of maximizing income and vice versa [17]. For these reasons, farm households' attitudes towards risk are vital in understanding their behaviour towards adoption of new technology and managerial decisions [2,33,40].

Cassava production in Nigeria cannot attain optimum level without technical expertise in all aspects of its production including risk management. Risk management has become an issue of great concern to policy makers and stakeholders in agricultural sector. Identification of risks facing cassava farmers is relevant to enhance productivity through re-evaluation of current policies of the government and formation of new policies for the agricultural sector with cassava farmers as the focal point. The findings from this study are expected to assist in extending the frontiers of knowledge and guide government institutions such as the ADPs (Agricultural Development Programme) and FMARD (Federal Ministry of Agriculture and Rural Development) towards achieving their mandates.

To this end, this study intends to:

(i) describe socio-economic characteristics of cassava farmers in the study area;

(ii) identify risks faced by cassava farmers in the study area;

(iii) determine risk attitude of cassava farmers in the study area; and identify risk management strategies used by cassava farmers in the study area.

MATERIALS AND METHODS

Study Area

The study was conducted in Abia State. The State was chosen because it ranks high among the cassava producing States in south eastern part of Nigeria. Abia State is located between latitudes $5^{0}47^{1}$ N and $6^{0}12^{1}$ North of the Equator and between longitudes $7^{0}23^{1}$ E and $8^{0}02^{1}$ East of the Greenwich Meridian [35]. The State occupies an area of about 5,834 square kilometres and is bounded by Imo State at the western border; Ebonyi and Enugu States at the north; Cross River and Akwa-Ibom States at the east and Rivers State at the south. The projected population stood at 3,460,616 with an annual growth rate of 2.7 percent [29]. The State is divided into 17 Local Government Areas (LGAs), which are grouped into three (3) agricultural zones, namely, Aba, Ohafia and Umuahia zones. Aba zone is made up of 7 extension blocks, Ohafia Zone is made up of 5 extension blocks and Umuahia Zone is made up of 5 extension blocks. Agriculture is the dominant economic activity and main source of employment in the State providing employment and income for more than sixty (60) percent of the entire population [5].

Sampling Technique

The study adopted a multi-stage random

sampling technique. In the first stage, two agricultural zones out of the three agricultural zones in the State were randomly selected (Ohafia and Umuahia Agricultural zones). Two extension blocks(equivalent of LGA's) were selected randomly from each of the two agricultural zones, giving a total of four extension blocks. Ohafia block and Arochukwu block were selected from Ohafia zone, while Ikwuano block and Isi-ala Ngwa North block were selected from Umuahia Agricultural zone. The third stage involved selection of two extension circles from each of the selected blocks, giving a total of eight (8) circles. Elu and Ebem Ohafia circles were selected from Ohafia block, Amuru and Abam circles were selected from Arochukwu block. Umudike and Amaoba circles were selected from Ikwuano block while Apu-na-Ekpu and Ama-Asaa Nsulu circles were selected from Isi-ala Ngwa North block. A list of registered cassava farmers in each selected circle was obtained from Abia State Ministry of Agriculture. The formula used in selecting sample size proportionate to the population of registered cassava farmers is given as [19]:

$$n = \frac{N}{1+N(e)^2}$$

n = sample size,
N= the finite population,
e = limit of tolerable error,
1= unity

Table 1 shows the number of cassava farmers from the selected agricultural zones that were used for the study. The limit of tolerable error was chosen at 0.05 probability level to provide for an adequate confidence level. Applying the above formula, Ohafia and Umuahia agricultural zones had 501 and 1,142 registered cassava farmers, respectively. Elu (137 farmers) and Ebem (95 farmers) were selected from Ohafia LGA, Amuru (116 farmers) and Abam (153 farmers) were selected from Arochukwu LGA. Umudike (354 farmers) and Amaoba (242 farmers) were selected from Ikwuano LGA, while Apu- na- Ekpu Umuoha (321 farmers) and Ama- Asaa Nsulu (225 farmers) were selected from Isi-ala Ngwa North LGA. Thus a total of 518 cassava farmers were interviewed. The average population density of 118 persons per square kilometre masks the disparity that exists between the densely.

Table 1. Population of registered cassava farmers in Abia State, Nigeria

Agricultural Zone	Number of registered cassava farmers	Selected circles	Number of respondents	Sample size
Ohafia	501	Elu Ebem Amuru Abam	137 95 116 153	222
Umuahia	1,142	Umudike Amaoba Apu- na-Ekpu Ama-Asaa Nsulu	354 242 321 225	296
Total	1,643	8	518	518

Source: [9]

The survey was carried out in January to March, 2015 and data were collected on farmers' socio economic characteristics such as age, sex, marital status, household size and level of formal education. Furthermore, data on sources of risk (production risk, marketing risk, financial and institutional risk), risk attitude and management strategies (preventive, mitigating and coping strategies) were collected. Data were collected with the use of a pre-tested structured interview schedule. Four (4) enumerators, two (2) for each agricultural zone, were employed to administer the interview schedule.

Method of Data Analysis

Descriptive statistics such as mean, percentages and frequency were used to describe socio-economic characteristics of cassava farmers (objective i); identify risks facing cassava farmers (objective ii) and risk management strategies used by small scale cassava farmers (objective iv). Likert attitudinal scale (LAS) was used to determine the risk attitude of respondents (objective iii).

A 5-point Likert scale was used to measure cassava farmers' attitude towards risk. The farmers were asked questions graded on a five point likert scale, the responses are Strongly Disagree (SD), Disagree (D), Undecided/Neutral (U), Agree (A) and Strongly Agree (SA). The responses were

given scores of 1,2,3,4 and 5, respectively. The values were added to obtain a score of 15, which was then divided by 5 to obtain 3.0, taken as the mean (risk neutral). Farmers with mean score less than 3.0 were taken as risk averse while those with mean score above 3.0 were risk preference. To avoid bias in the result, both negative and positive responses were analysed. Also, how well the statements reflect on the risk attitude of the farmers were tested based on the score obtained, before making conclusions.

RESULTS AND DISCUSSIONS

Socio-Economic Characteristics

Table 2 shows that 27.8%, 24.7% and 20.1% of the cassava farmers were within age brackets of 31-40 years, 41-50 years and 21-30 years respectively. The mean age of the farmers is 48 years. [25,28] asserted that the risk bearing abilities and innovativeness of a farmer depend on his mental capacity to cope with the daily challenges of farming, and his ability to do manual work decreases with advancing age. Table 2 also shows that 59.9% of the cassava farmers were female, while 41.1% were male. This indicates that females were more involved in cassava farming in the area and supports the findings of [23] that women are the backbone of agricultural sector and responsible for 80% of the food produced in Nigeria. Majority (72.2%) of the farmers were married while 13.5% were single. The added responsibility of marriage could be the reason to venture into cassava farming for household sustenance. About 51.0% of the cassava farmers had between 6-10 persons as household members with mean household size of 7 persons. [36] reported that large household size could lead to economic inefficiency where small farm sizes are available for cultivation. The finding confirms [21] assertion that rural farm households in Nigeria are characterized by moderate to large household size. Table 2 further shows that majority of the cassava farmers (88.7%) had one form of formal education or the other while 11.2% had no formal education. According to [22,34] education raises human capital and would significantly increase farmer's ability to make correct and meaningful choices for farm operations including use of appropriate risk management strategy. Also, 61.8% of the respondents had no extension contact and 51.4% relied on both family and hired labour for labour supply. Poor extension access could lead to high perception of risk.

Table 2. Distribution of cassava farmers according to socio-economic characteristics

Variable	Frequency (N = 518)	Percentage	Mean
Age (years)			**47.8**
< 21	3	0.6	
21-30	104	20.1	
31-40	144	27.8	
41-50	128	24.7	
51-60	96	18.5	
>60	43	8.3	
Sex			
Male	213	41.1	
Female	305	58.9	
Marital Status			
Married	374	72.2	
Single	70	13.5	
Widow (er)	60	11.6	
Divorced	2	0.4	
Separated	12	2.3	
Household size			**7.32**
1-5 persons	240	46.3	
6-10 persons	264	51.0	
11-15 persons	12	2.3	
16-20 persons	2	0.4	
Educational level			
No formal education	72	13.9	
Primary education	186	35.9	
Secondary education	194	37.4	
Tertiary education	66	12.7	
Farm size			**1.2**
≤1	278	53.7	
1.1 – 2.0	166	32.1	
2.1 – 3.0	74	14.3	
Extension contact			
No Contact	320	61.8	
Contact	198	38.2	
Source of farm labour			
Family labour	82	15.8	
Hired labour	170	32.8	
Both family and hired labour	266	51.4	

Source: Field survey data, 2015.

Sources of Risks to the Cassava Farmers

As presented in Table 3, 77.2% of the farmers

identified erratic rainfall, as risk occurring very often within the last five years. Also, 31.3% had experienced flood occurring twice within the last five years. Another risk source identified by the cassava farmers were as pests and diseases(59.1%). [10] noted that the major causes of farm loss were pest and disease outbreak, erratic rainfall pattern, price fluctuation, changes in government policies and theft.

Table 3 further shows that 69.1% and 51.7% of the farmers had experienced low price of output and inadequate market for produce respectively occurring yearly in the last five years. This could be attributed to inconsistencies in agricultural produce marketing, poor road network to standard markets and unstable government policies [26]. [3] revealed that efficient marketing system is a pre-requisite for increased and sustained food production and agricultural development. Furthermore, 57.5% of the respondents had experienced high cost of input. This implies the absence of input price regulatory agencies and institutions to cassava farmers. [4] noted that the potential success to small scale farm enterprise rests on their ability to divide risks and reduce working capital. One way farmers can achieve this is by engaging in crop share lease.

With respect to financial risks, Table 3 shows that 3.9%, 50.6% and 3.9% of the respondents stated lack of adequate insurance coverage, inadequate credit facilities and high interest rate as their source of financial risks respectively. Lack of adequate insurance coverage (3.9%) implies that majority (96.1%) of the farmers do not have formal security against unforeseen circumstances in their farms. This could be attributed to the costs associated with acquiring agricultural insurance coverage. Having crop insurance plays an important role in mitigating risk in small farms [14]. In contrast, having crop insurance negatively influences a farmer's management decision and may lead to the farmer taking unnecessary risks [4]. Majority (70.3%) of the cassava farmers had no access to adequate credit and as such may not be able to purchase productive assets needed to expand their enterprise. This is attributed to absence of formal credit institutions in rural economies [27]. A fair percentage (30.9%) of the cassava farmers experienced very high interest charge. It could be that these farmers obtained their farm credit mainly from informal sources. [8, 11, 37] had posited that one of the principal characteristics of informal credit is the higher interest charge on loans relative to those by the formal banking sector. Most farmers prefer to access informal credit because of numerous bottle necks associated with obtaining credit from formal financial institutions in Nigeria [8].

About 18% and 50% of the cassava farmers stated that lack of microfinance banks and government policy lag respectively, were sources of institutional risks to cassava farming in the study area. This finding could be attributed to unstable agricultural finance policies and implementation strategies, and indicates that government agricultural policies and programmes are not sufficiently structured to suit the needs of small scale cassava farmers. This could also be related to the subsistence level of agriculture practiced by rural farmers which is essentially for family sustenance rather than commercial gains.

Results of human/personal risks show that 38.2 %, 32.4%, 60.2%, 20.5% and 1.5% of the cassava farmers had experienced inadequate family labour, ill health, lack of technical knowhow, adulteration of input and communal conflict, respectively, 1-5 times in the last five years. The shortage in family labour could be attributed to rural-urban migration of young people in search of white collar jobs [13]. About 60% of the respondents lack the technical skills to carry out modern farm operations. Modern farming skills such as agrochemical use and planting specifications for improved cultivars require additional training to be carried out. This could be attributed to certain socio-economic characteristics such as levels of formal education, access to land and extension contact [14,18]. Also about 24% and 4% of the respondents had experienced theft and conflict with Fulani cattle rearers respectively. This implies that the respondents had no formal security measure against threats on

their farms. This may possibly be attributed to the rural settings where farming activities take place at subsistence level in distant farms [31]. Theft in small farms might be as a result of the unemployment and under-employment and the need to sustain living. Job creation is bound to reduce crime rate especially among young farmers in rural areas. The finding with respect to conflict with Fulani cattle rearers is in contrast with [19] assertion that small scale farmers consider Fulani cattle rearers as posing grave danger to their farms.

Table 3. Sources of risks to cassava farmers in Abia State, Nigeria

Risk sources	*Percentage of respondents (N = 518)	Number of times experienced (last 5 years)
Production risk		
Cassava pest and disease	59.1	5
Erratic rainfall	77.2	5
Flood	31.3	2
Destruction by animals	2.1	1
Bush fire	24.3	1
Marketing risk		
Low price of output	69.1	5
Inadequate market for produce	51.7	5
High cost of inputs	57.5	3
Financial risk		
Inadequate insurance coverage	3.9	1
Inadequate credit facilities	70.3	5
High interest rate	30.9	3
Institutional risk		
Inadequate functional MFB/Cooperative societies	18.1	5
Government policy	50.2	2
Human/personal risk		
Farmer's ill health	32.4	2
Inadequate family labour	38.2	2
Theft	23.6	3
Adulteration of inputs	20.5	3
Conflict with Fulani cattle rearers	4.25	2
Communal conflict	1.5	1

Source: Field survey data, 2015; *Multiple responses.

Cassava Farmers' Attitude to Risk

The Likert scale result presented in Table 4 shows that majority (69.5%) of the respondents were risk averse.

Table 4. Distribution of respondents according to risk attitude

Risk attitude	Frequency	Percentage
Risk averse	360	69.5
Risk neutral	70	13.5
Risk takers	88	17.0
Total	518	100.0

Source: Field survey data, 2015.

About 13.5% and 17.0% of the respondents were risk neutral and risk takers respectively. Similar results were obtained by [18] on risk attitude of crop farmers in central part of Nigeria.

Risk Management Strategies Adopted by the Cassava Farmers

Risk management strategies can be grouped into three categories: prevention strategies to reduce the probability of an adverse event occurring, mitigation strategies to reduce the potential impact of an adverse event, and coping strategies to relieve the impact of the risky event once it has occurred [39]. Prevention and mitigation strategies focus on income smoothing, while coping strategies focus on consumption smoothing. As shown in Table 5, Majority (78.8%) of the cassava farmers adopted intercropping as preventive strategy against production risks such as adverse change in weather conditions and crop failure. Also, 79.9% used primary processing techniques to manage spoilage and extend shelf life of produce. Only 39.3% of the respondents had storage facilities. This indicates that majority (60.7%) of the cassava farmers do not have storage facilities for cassava produce [14]. Also, 20.5%, 23.9% and 14.7% of the cassava farmers use extension services, government assistance and resistant varieties respectively as preventive strategies. This means that majority of the farmers did not use the institutions and resistant varieties due to insufficient research information and policy lag associated with agricultural policies. Table 5 also shows that about 22.8% and 34.7% of the cassava farmers used pesticides/herbicides and fertilizer application, respectively. The low percentages could be attributed to inaccessibility and cost of agrochemicals, lack of awareness on the usefulness and method of applying agrochemicals in small farms. It could also imply that farmers practice shifting cultivation and land fallowing to restore the nutrient content of the soil due to the bottlenecks associated with fertilizer acquisition.

With respect to mitigation management strategies, 73.0% and 58.3% of the cassava farmers used gathering of market price

information and spreading sales respectively. This implies that farmers in the study area source information about the prevailing market prices for their produce before making sales. This can help put them in less compromising positions about future prices. One benefit of this is that farmers can actually make better short and long term marketing decisions. Spread of sale can relieve the farmer of seasonal price fluctuations and may even help raise earnings [4]. Few (4.63%) of the respondents adopted cooperative marketing as a mitigation strategy for risk of low price of output. Cooperative marketing is a way of sharing market risks with others and increasing market power to attract more favourable prices. It is shown in Table 5 that 39.8% of the cassava farmers diversified their source of income and engaged in non-farm activities from which they earned non-farm income. Engaging in and earning of non-farm income will lower the variance of income to the farm family by providing a steady income regardless of the success of the agricultural enterprises in a given season [6]. According to [4] farmers often sustain their farm income with earnings from off farm work. All the cassava farmers (100.0%) diversified their enterprises. Diversification of enterprises is the production of two or more crops or livestock enterprises simultaneously by a farmer and all the enterprises in the combination being in agriculture.

The results of coping strategies show that 56.0%, 24.3%, 45.2%, 68.0% and 48.6% of the cassava farmers used working off farm, reduced consumption, borrowing, hiring labour and planning expenditure, respectively, as coping strategies for risks. This confirms that farmers have alternative sources of income due to the unpredictable nature of agricultural activities. Majority (75.7%) do not reduce their food consumption level in order to manage risk. This is because household primary reason for farming is family sustenance. Cassava farmers often borrow from friends/relatives during planting season and customarily payback with crops or animals during harvest periods, as coping strategy against risks. This implies that cassava farmers in the study area rely on borrowing to make contingency financial plans for the farm. The use of hired labour by 68.0% of the farmers as risk management strategy can be attributed to the tedious nature of cassava farming, which necessitates farmers to hire people outside their household to augment household labour [31]. About 56% of the cassava farmers used local (*akawo*) contribution as risk management strategies. This implies that farmers have alternative local means of saving cash and obtaining loans for farming during the season.

Table 5. Risk management strategies used by cassava farmers.

Management Strategies	Frequency (N=518)	% of respondents*	Rank
Prevention strategies			
Intercropping	408	78.8	3rd
Spraying herbicides/pesticides	118	22.8	19th
Use of resistant varieties	76	14.7	21st
Fertilizer application	180	34.7	15th
Extension contact	106	20.5	20th
Government support	124	23.9	18th
Primary processing	414	79.9	2nd
Storage facilities	240	46.3	11th
Record keeping	56	10.8	22nd
Mitigation strategies			
Selling of asset	196	37.8	14th
Price support	160	30.9	16th
Cooperative marketing	24	4.63	23rd
Formal insurance	4	0.77	24th
Forward contracting	1	0.19	25th
Spreading sales/sequential marketing	302	58.3	6th
Gathering market information	378	73.0	4th
Diversification of enterprises	518	100.0	1st
Diversification of income sources	206	39.8	13th
Coping strategies			
Working off farm	290	56.0	8th
Reduced consumption	126	24.3	17th
Borrowing	234	45.2	12th
Change in production technique	264	51.0	9th
Hired labour	352	68.0	5th
Planning expenditure	252	48.6	10th
Akawo (local) contribution	292	56.4	7th

Source: Field survey, 2015.

CONCLUSIONS

From findings of the study it can be concluded that sources of risks to cassava farmers are varied and many. Erratic rainfall and pest and disease infestation were two

main sources of production risks faced by the farmers, While, important source of market risk and financial risk were low price of output and inadequate credit facilities respectively. The farmers' were mostly risk averse and generally employed enterprise diversification as a means of reducing price risk, while very few of them used insurance, cooperative marketing and forward contracting. It is therefore evident that cassava production in the study area is done under a system fraught with numerous risks that necessitate the need for general policy solutions.

Based on findings of this study, the following recommendations are pertinent:

Agricultural policy makers should make policies that will encourage cassava farmers to use formal insurance, cooperative marketing and forward contracting as a means of reducing social and market risks.

Also, the state government in collaboration with private sector should institute a loan scheme specifically targeted towards empowering women in the agricultural subsector, since it has been observed that women are the dominant gender in cassava farming. Also, it is suggested that cassava farmers should organise themselves into cooperative societies to enable them pool resources together and negotiate jointly with input suppliers and produce buyers to manage the market risks in cassava farming.

The study showed that lack of inputs such as fertilizer and herbicides/pesticides are sources of risk to cassava farming. The current agricultural policies targeted at making fertilizer more accessible at subsidized rate under the growth enhancement support scheme should be sustained. Also, the on-going credit liberalization policy of the government aimed at encouraging lending to farmers at single digit interest rate should be continued to enable farmers purchase farm inputs.

The role of crop insurance cannot be over emphasized in risk management. Government should focus on creating a suitable insurance coverage against risks associated with weather conditions. More research should be carried out on the cost implications of this risk management strategy.

Farmers should develop a broad range of strategies through record keeping which take into account the advantages and disadvantages (benefits and costs) of each risk management option individually and in combination with others.

Cassava farmers in the study area should be encouraged by government and non-government organizations to join cooperatives in order to have access to better agrochemicals, financial services, extension services, and information that will help in cassava risk mitigation. Unions or cooperatives will further facilitate positive interactions especially on risk sharing and cooperative marketing. This will present a collective bargaining front, and serve as a conduct for transmitting government extension recommendations to the farmer.

The contact between farmers and extension agents should be strengthened to increase the number of extension contacts to cassava farmers. Farmers can manage risks effectively with technical knowledge got from research institutions through extension agents.

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