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Research Article

Cassava Processing as Driver of Agricultural Enterprises in Kwara State, Nigeria

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Abstract

Food and nutritional insecurity have attracted global recognition, which is a major problem in our society, while small-holder farmers need to adopt agro-processing enterprises in order to increase the productivity of the food crops value chain. This study examined the cassava processing as a driver of agricultural enterprises in Kwara State, Nigeria. A multi-stage sampling technique was used to randomly select 120 farmers from 40 major towns/communities in ten (10) LGAs in the four (4) ADP zones of the State, which covers Kwara-Central, Kwara-North and Kwara-South senatorial districts. Structured interview schedule was used as instrument to collect primary data from respondents on their socio-economic characteristics; determine the level of awareness; adoption of cassava processing and identify the constraints affecting cassava processing enterprises in the study area. Data were subjected to descriptive statistics, profitability and multiple regression analysis. The result revealed that the majority (65.4%) of the processors/farmers were between 30-55 years with a mean age of 42 years; (66.67%) were females, with 85 percent married; while (67.49%) were educated. The majority (45%) had household sizes of between 3-10 members with over 10 years of experience, and engaged in different occupations, while 39.17 percent sourced their funds from cooperative groups for cassava processing enterprises, and more than half (37.5%) were into gari processing enterprises. The cassava processing enterprises in the study area are profitable (₦ 162, 750) with low income. The major constraints faced by the processors were high cost of transportation (18.33%), poor pricing and marketing of cassava information (16.66%), inadequate capital (14.16%), government policies and institutional support (9.16%). The study recommended that Government and development partners need to consider a project or policy that will inspire youths to venture into cassava processing

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enterprises, implements an effective pricing policy; extends the cassava buy-back policy and organizes farmers into virile cooperatives while research institutions like NCAM, NSPRI, etc. should intensify works on mechanical gari fryers, cassava chipping machine and pressurized hydraulic presser for better profit maximization.

Keywords: Cassava, value chain, agricultural processing enterprises, technologies, constraints.

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Introduction

Food and nutritional insecurity have attracted global concern, while their recognition has become a major problem among smallholder farmers in Nigeria. Therefore, adoption of improved agricultural technologies (mechanical gari fryer, mechanical sifter, mechanical peeler machine, etc.) has increased the productivity of staple food crops (Sennuga et al., 2020; Jegede et al., 2021).

Agriculture is the principal driver of the Nigerian economy, employing about 35% of the population (World Bank, 2020), while over 70 percent of Nigerians are engaged in the agriculture sector, mainly at the subsistence level. FAO (2020) states that agriculture remains the foundation of the Nigerian economy and a source of livelihood for most Nigerians and across Sub-Saharan Africa (SSA). With the increasing population, and various supports from all partners and stakeholders in agricultural productivity, estimated to reach 400 million by 2050, enhanced agricultural productivity through adaptation of new technologies and innovations is necessary to ensure food security, adequate nutrition and poverty alleviation. Therefore, the contribution of cassava production and agro-processing enterprises for agricultural development in Nigeria cannot be overemphasized.

Since the 1980s, Nigeria has remained the global leading economy in cassava (*Manihot esculenta* Crantz) production with an annual production of approximately 45 million metric tonnes (ECP, 2010; FAO, 2011); with about 20% of the global market share (Hillocks, 2002; IITA, 2007). While its output per hectare remains one of the lowest in the world, resulting from poor technological development and adoption (Odebode 2008; Dada et al., 2009; Ogundari 2010). Cassava production, like other crops in Nigeria, is mostly driven by land area expansion rather than productivity associated with improved technology (Muanyoung et. al., 2005; IFPRI, 2010). However, about 80% of cassava produced in Nigeria is being consumed as food, such as Lafun, Fufu, Gari, Starch, Tapioca (FAO, 1998; Dada et al, 2010). This is

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In contrast to Latin America and Asia reports, which state that less than half is being utilized for human food.

Over the past two and a half decades, the cassava production trend has been one of the major crops produced by many small-scale farmers in Nigeria, which has been increasing in terms of the area cultivated and yields per hectare. The total world cassava utilization was projected to reach 275 million tonnes by 2020 (IFPRI in Westby, 2010), with some researchers estimating the number to be close to 291 million tons (Scott et al, 2000 in Westby, 2010). Africa is the world's largest cassava-producing region and accounts for nearly 55 percent of the world's cassava. Yet, Africa's yields are the lowest in the world, standing at only 10 tonnes per hectare compared to 26 tonnes per hectare in India. The average yields of cassava in Nigeria are 11.84 metric tonnes per hectare in 2005 (African Agriculture, 2007). The low productivity was a result of limited market opportunities due to low utilization of mechanization production and processing tools, which include mechanical cassava peeler, spaced motorized graters, motorized flakers, mechanical cassava sifters, mechanical gari fryer, cassava chipping machine, etc. Invariably, an increase in farm productivity has increased farmers' income while reducing poverty by adopting these improved technologies (Jegede et al., 2021; NCAM Bulletin, 2015). African Agriculture Technology Foundation states that it takes a farmer in Africa 10 days to uproot or harvest their fields, while a farmer in India requires only six hours (AATF, 2013). Cassava has enormous potential to improve food security and the livelihoods of people in Africa. Therefore, cassava is an industrial crop in emerging countries like Brazil, Indonesia and Thailand.

A dynamic and sustainable approach to cassava development has remained a great concern to the Nigerian government and policy makers (Agwu et al., 2008). Thus, research and adoption of technological improvements are crucial to increasing agricultural productivity and food security (IFAD, 2011). An increase in the production of cassava to sustain the world food security needs improved machinery to allow its continuous cultivation and processing (Kolawole et al., 2010). The use of technology in Agriculture has to do with the application of technological innovations into production, processing, storage and marketing of agricultural products to improve efficiency and effectiveness. Cassava is one of the crops that has to be cultivated extensively for human consumption as well as for industrial use. Its tubers cannot stay for more than two to three days after harvesting without rotting because it is highly perishable and therefore needs to be processed immediately after harvest to avoid spoilage (Anonymous, 2024).

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Moreover, any nation that is not able to preserve its food output until it is needed for consumption is far from achieving sustainable food security and lessens poverty in the hungry world. Globally, there has been a breakthrough in the area of improved food processing technologies, while Nigerian farmers relied on traditional methods of processing, which reduce the level of productivity. Notably, traditional methods of cassava processing are labourious and tedious in nature, but since there is an alternative form of improved processing technologies put in place in order to reduce the drudgery and labour intensity, traditionally, the cassava processing method increases output. Hence, there is a need for all-inclusive adoption of agricultural technology innovation.

The adoption of improved agricultural technologies is found to be generally slow, even though it is a sure way out of poverty in developing countries (Bandiera and Rasul et al., 2010; Simtowe, 2011). Hence, cassava farmers need to be encouraged and supported by providing subsidies for all agro-processing equipment/materials in order to fast-track the adoption rate and use of improved cassava processing enterprises among smallholder farmers in Kwara State. It is more practicable if researchers and extension workers can provide enabling environment for the teeming farmers through organizing of seminars, trainings and workshops such as field trips, exhibitions and farm demonstration to fast-track adoption of innovation technologies in agriculture and to ensure adequate food for all Nigerians, all year round, government should pay more attention to the area of food processing, value chain, nutrition and safety.

Therefore, this study is to examine the socio-economic status of farmers, determine the level of awareness and adoption of cassava processing entrepreneurs and identify the constraints affecting cassava processing enterprises in the study area.

Methodology

The Study Area

The study area is Kwara State of Nigeria, which is located within the North Central geo-political zone, commonly referred to as the Middle Belt. The State has sixteen Local Government Areas (NPC, 2006), where the headquarters is in Ilorin. Agriculture is the main source of the economy. The State shares boundaries with Niger State in the North, Kogi State in the East, Benin Republic in the West and Osun and Oyo in the South (Ellen and Kellogg, 2005). Kwara State has a geographical area spreading between latitude 11 ° 15′ N and longitude 7 ° 23′ E (NBS, 2006). The State has a land area of 36, 825 Km^2 (14, 218 sq. mi) with a total population of about 2, 371, 089 (NPC, 2007; NBS, 2006); this has increased to 2,591,555 million people and land

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mass of 36, 825km^2, while the population density is 42.51km^2 (KWADP, 2014). The State has an estimated figure of 260, 528 farm families, the majority of which live in 36, 380-hectare farmland of the rural area in the state (KWADP, 2014). The people in the State are mainly civil servants, while a minority are farmers, hunters, fishermen, traders, handicraftsmen and women. The major crops grown in the State include rice, maize, millet, sorghum, guinea corn, yams, sweet potatoes, cassava, melon, soybean, groundnut, cocoa, kolanut and vegetables.

Sampling Technique/ Analytical Technique

A multi-stage sampling technique was used to select respondents for this study. The first stage involved the random selection of four (4) ADP zones from 10 LGAs in the State. Then, purposive selection was done due to the prominence of cassava farming, processing and marketing activities in these zones. In the second stage, ten (10) identified communities/ towns/villages were randomly selected, each from the four (4) zones, i.e. zone A: Baruten LGA (Shikage); Kaiama (Okuta); zone B: Pategi LGA (Pategi; Yagba-west); zone C: Ilorin-West LGA (Sabo-Oke); zone D: Ekiti LGA (Osi); Oke-Ero LGA (Ilofa); Irepodun LGA (Esie); Ifelodun LGA (Ganmo and Idofian). The third stage involved a simple random sampling of two cells from each block, and this made a total of twenty-four (24) cells in all. The fourth or final stage involves a random selection of five (5) farmers and processors from each cell, resulting in a total of one hundred and twenty (120) respondents that were used for data collection.

Primary and secondary data were collected using a structured interview schedule as an instrument. Kwara State Agricultural Development Programme (KWADP) provided the sampling frame from the list of registered cassava farmers/processors. The ADP Extension agents were trained on how to administer the instrument. Data captured in the interview schedule covered socio-economic characteristics of cassava farmers/processors, cost of cassava processing, inputs, labour, etc. and the revenue generated from cassava processing enterprises. Ten (10) constraints to cassava processing were identified and captured. The data collected were subjected to simple descriptive statistics such as mean, frequency, tabulation, and percentage, while inferential statistics such as regression analysis, correlation, and ANOVA.

Results and Discussion

Socio-economic Characteristics of the Respondents

Table 1 revealed the age distribution of the respondents to be within the age bracket of less than 40 years to 60 years, which formed 65% of the respondents, with a mean age of 42 years, while 35.0% of the respondents were those above 60 years of age.

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This suggests that the cassava processing enterprises in the study area comprise mainly the young and older generations. This agrees with the statement of Olowosegun-Sanni (2004) and Egbe and Eze (2014), which states that young and middle-aged people are likely to adopt and serve as better agents of innovation transfer at various locations in the State, especially at the economically active age, than the older ones**.** A greater proportion (66.67%) of the respondents, as shown in Table 1, were females, while 33.33% were males. The results revealed that cassava processing activities were being carried out by women who are more predominant in the cassava (gari) processing activity than men in the study area. This study agrees with the findings of Ndubueze-Ogaraku and Edema (2015) in cassava value chain analysis in Ughelli North Local Government Area of Delta State, which reported that processing of agricultural products is generally seen as a female job. Mensah et al. (2020) also corroborated those female farmers and processors carried out hauling of crops in the semi-arid region of Ghana.

The large proportion consisting 85% of the respondents were married while the remaining 6.67% of them were divorced; 5.83% of them were single; and 2.50% of them were widows. This agrees with the findings of Adefalu et al., (2017) who reported that married individuals participated actively in agricultural production enterprises. The household size as shown in Table 1 revealed that respondents with household size of less than 3 to 10 peoples formed 75% of the majority with mean value of 5 people which is relatively large. This indicates that farmers/processors can possibly engage some of their households or family members into cassava processing and marketing activities. This is in line with findings of Adejoh et al., (2017) which stated that an average household size of processors was found to be 5 peoples in Niger State**.** Majority of the respondents representing (81%) of the farmers/processors had access to tertiary, secondary, primary and quranic education, while the remaining (19%) of the respondents had no formal education. This implies that majority of the farmers had access to formal education.

Therefore, educated groups served as focal points in information dissemination to individuals of a lower education level or no education. This finding further corroborates with the research work of Bamidele (2014) on accessing expiratory flow rates of local gari processors in a rural community of South-South. Table 1 further revealed that 43.33% of the respondents were into agricultural produce (cassava farming/processing) which is their major source of income generation, 20.83% were into crop farming; 16.67% engaged in other business activities (trading); 11.66% were artisans, while 7.50% were civil servants, mainly into teaching jobs, which is the lowest. This was corroborated by Tesfaye and Tadele (2013), who stated that some groups provide opportunities for their members to be involved in different income-

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generating activities, such as trading, artisanship (carpentry, building, etc.). Table 1 indicates that the majority, representing 43.33% of respondents, had between 1 to 10 years of experience in cassava processing activities, 25.85% had between 11 and 20 years of experience, 16.66% had between 21 to 30 years of experience, while the remaining ones, representing 14.16%, fall above 31 years of experience with a mean value of 7. It can be deduced that cassava processors in the study area were quite experienced in production and processing activities. This further corroborates the findings of Saleh and Mustafa (2018), who emphasized that the year of farming experience increased agricultural productivity among farming households in Nigeria. The membership of cooperative associations/ groups revealed that the majority (60%) of the farmers belong to cooperative associations with a minimum of 2 years, while (40%) who dominate the cassava processing activities, were not in any cooperative society. This implies that involvement in groups/ association membership is one of the key determinants in the output of production and processing activities, as it allows the farmers/processors to increase their output, which enables selling or marketing of their produce at remunerative prices, making a profit satisfactorily (Adenegan et al. 2013).

Table 1 further revealed that 20% of the respondents had access to credit facilities through local money lenders; 25% got their credit facility from Agricultural credit agencies (bank); 15.83% got their credit facility from friends and relations; while the remaining 39.17% got their credit facilities from cooperative societies/groups. This implies that most processors depended on cooperative groups to finance their processing business, followed by agricultural credit agencies. As a result of this, the production and processing capacity of the farmers is likely to be conditioned by the magnitude of the capital base of the cooperative purse, which may, to some extent, determine their high level of production and processing expansion. Most of these borrowed funds attract interest within the time bounds. Table 1 revealed that majority 56.67% of the respondents earned between ₦101, 000- ₦200, 000 per annum; 20.83% earned between ₦ 201, 000- ₦300, 000 per annum; about 15.83% earned less than ₦ 100, 000 per annum while only 6.67% earned above ₦401, 000 per annum; while average annual income of the respondents was about ₦162, 750. It can be assumed that cassava farmers/ processors in the study area made substantial income from cassava processing enterprises. However, their income level, if judiciously used and managed, is capable of bringing about expansion, thereby increasing their level of farmer's participation. Samuel et al. (2015) opined that with increased income, farmers could save more and acquire assets useful in sustaining their production, while processing and marketing lead to further income.

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Table 1: Socio-economic Characteristics of the Respondents (n=120)

Variables	Frequency	Percentage (n=120)
Gender		
Male	40	33. 33
Female	80	66. 67
Age		
< 40	24	20. 00
41-50	36	30. 00
51-60	18	15. 00
> 60	42	35. 00
Marital Status		
Married	102	85. 00
Divorced	8	6. 67
Widowed	3	2. 50
Single	7	5.83
Household Size		
≤ 3	12	10. 00
4-6	24	20. 00
7-10	54	45. 00
> 10	30	25. 00
Educational Level		
None	20	19. 00
Primary Education	51	51. 00
Secondary Education	21	16. 00
Tertiary Education	15	8 00
Quranic /Arabic Education	13	6. 00
Occupation		
Crop farming	25	20. 83
Trading	20	16. 67
Civil servant (Teaching job)	9	7. 50
Artisan	14	11. 66
Agricultural produce/processing	52	43. 33
Farming/Processing Experience		

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Variables	Frequency	Percentage (n=120)
1-10 years	52	43. 33
11-20years	31	25. 85
21-30 years	20	16. 66
≥ 31 years	17	14. 16
Annual Income		
<₦100, 000	19	15. 83
100, 000- 200, 000	68	56. 67
201, 000- 300, 000	25	20. 83
>₦401, 000	8	6. 67
Cooperative Membership		
Yes	72	60. 00
No	48	40. 00
Credit facility		
Friends and Relatives	19	15. 83
Local money lender	24	20. 00
Agricultural agencies	30	25. 00
Cooperatives societies	47	39. 17

Source: field survey, 2021.

Table 2 revealed that 37.50% of the respondents were into gari processing enterprises, 26.67% processes cassava products into lafun, 16.67% processes cassava products into fufu, 10.83% processes cassava products into cassava pellets, while the remaining of the respondents 8.33% engaged in cassava chips. However, processing of cassava into gari products would likely be high due to the fact that gari is a staple and stable food that is easily and readily available for preparation and consumption. Also, lumps sieved from cassava are sun-dried and processed into lafun. Just about (3%) do not sieve before frying and later grind lumps into lebu, which is then packed for making "eba". Some of the few starch makers keep the cassava effluent gotten from gari to settle for starch or scoop out from fufu and dry. Cassava products are mostly consumed in the study areas. This disagrees with the findings of Ani et al. (2019), who reported that most cassava processors only engaged in gari and fufu production and processing enterprises. Table 2 revealed that the majority (55.0%) of the respondents were into small-scale cassava processing enterprises; (43.33%) are into medium-scale cassava processing enterprises; while only (1.66%) is into large-scale production/processing cassava activities, which implies that getting cassava tubers in the areas will be easier. Those producing in small and medium quantities have cassava farms and may also hire labour for production, while those who do not have cassava farms buy from others.

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Table 2: Frequency/Mode of Cassava Processing Enterprises (n=120)

Variables	Frequency	Percentage
Size of cassava enterprises		
Small scale	66	55. 00
Medium scale	52	43. 33
Large scale	2	1. 66
Various forms of cassava processing enterprises		
Gari	45	37. 50
Lafu	32	26. 67
Fufu	20	16. 67
Cassava pellets	13	10. 83
Cassava chips	10	8. 33
Methods of processing		
Traditional/Modern	102	85. 00
Traditional	12	10. 00
Others	6	5. 00
Mode of Acquiring Cassava Processing Machine		
Outright purchase from NCAM	12	10. 00
Outright purchase from local fabricators	24	20. 00
Inheritance	54	45. 00
Lease-holding	30	25. 00
Cooperative groups/ADPs/Extension agents		
Constraints		
High cost of transportation	23	19. 17
Inadequate capital	17	14. 29
Scarcity of labour	10	8. 40
Poor pricing & marketing information	20	16. 66
Price fluctuation	7	5. 80
High cost of the cassava roots	6	5. 00
Poor road infrastructure	4	3. 33
Poor storage facility	9	7. 50
Poor extension contact	5	4. 16
High cost of machines, spare-parts & servicing	8	6. 66
Government policies/Institutional support	11	9.16

Source: field survey, 2021.

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Table 2 revealed further that the majority of the respondents procured their cassava processing enterprises from various sources, such as (43.33%) through local fabricators; (17.50%) through leasing hold; (15.83%) through inheritance; (13.33%) through ADP/Extension agent and cooperative groups, while (10.0%) through NCAM, respectively. The inadequacy of the extension agents/ADPs and or cooperative groups in procuring cassava processing machinery may be due to a lack of staff, which was observed during our interactions with the extension agents and farmers/processors in the study area.

Furthermore, those available were not equipped or prepared to carry out their responsibilities. Singh and Priya et al. (2011) reported findings that fellow agro-processors' families and neighbours significantly provided agricultural knowledge and information to farmers on farming techniques and practices for sustainable agricultural development. However, the majority of the respondents procured most of their cassava processing technologies from more than one source.

Constraints to Cassava Processing Enterprises

Table 2 shows that the cassava processing enterprises were faced with some constraints such as high cost of transportation of the products to market which accounted for 19.17%; poor pricing and marketing of the products which accounted for 16.66%; inadequate capital which accounted for 14.16%; government policy and institutional policy which accounted for 9.16; scarcity of labour which accounted for 8.33%; poor storage facilities which accounted for 7.50%; high cost of machineries, spare parts and servicing which accounted for 6.66%; price fluctuation of the cassava products which accounted for 6.66%; high cost of cassava products which accounted for 5%; poor extension service which accounted for 4.16; and poor road infrastructure which accounted for 3.33% respectively etc.

Therefore, the results showed that high cost of transportation of the products to the market; poor pricing and marketing of the products; inadequate capital; government policy and institutional policy; scarcity of labour; poor storage facilities; high cost of machineries, spare parts and servicing and price fluctuation of the cassava products forms part of the major constraints faced by the cassava processors in the study area which equally affected their productivity. The response regards impact of extension services in Table 2 poses a surprise as extension farmer's ratio in Nigeria is noted to be as high as 1:2,500 (Ilevbaoje, 2004) and in recent years as 1: 3, 000. Perhaps, the cassava farmers/processors may have underestimated the importance of extension services in increasing production, processing, packaging, grading, marketing and transportation activities. This, however, has negative implications on the quality of

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cassava tubers and their products for marketing and grading, trading and commercialization.

Results of Multiple Regression Analysis

Table 3 revealed the results of the regression analysis affecting cassava processing enterprises in the study area. The model showed that the R-squared ratio was 49%. The estimated coefficients were age, marital status, education level, income, gender and access to credit facilities, which formed the major determinants of cassava processing enterprises in the study area. The estimated R^2 of 0.493 implies that 49% of the variation in the income level of the cassava processors/farmers could be saved and acquire assets useful in sustaining cassava processing enterprises and their family households among other things.

Therefore, age, source of income, and access to credit facility were significant at 1% while marital status, educational level and gender were negatively significant at 10%, 5% and 5%, respectively. This study was in agreement with Adesimi (1985) and Emenyonu et al. (2005).

Table 3: Multiple Regression Result of Cassava Processing Enterprises

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	T	Sig.
(Constant)	4.079	.644		6.332	.000***
Age	-.243	.048	-.371	-5.023	.000
Marital status	-.071	.118	-.050	-.602	.548**
Educational status	-.059	.046	-.166	-1.290	.200*
Occupation	.352	.194	.208	1.814	.072*
Income	-.433	.115	-.387	-3.753	.000
Gender	.248	.222	.167	1.117	.267
Credit	-.654	.117	-.439	-5.610	.000

Source: field survey, 2021.
Significant at 1% and at 5% probability level respectively ***significant
***, **, and * refers to significant at 1%, 5% and 10%, respectively.
R-square=0.493, F=14.7, p<0.01

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Conclusion and Recommendations

The presence of cassava as a driver of agricultural processing enterprises will address food insecurity and poverty, create jobs, and enhance rural income by providing adequate modern processing technology to increase agricultural productivity and income without increasing rural unemployment. However, the findings of this study recommend the following:

i. The cassava processors engaged fairly literate farmers (67.5%) of both genders;
ii. Most cassava processors were in their active productive age bracket of 30 and 55 years;
iii. The cassava processors (55.0%) mostly operated on a small scale, ranging from 2 to 5 persons;
iv. Cassava processing enterprises is profitable in the study area with ₦162, 750 as an average income margin; and
v. Most of the cassava processors were faced with some constraints such as high cost of transportation of the products to market; poor pricing and marketing of the products; government policy and institutional policy; scarcity of labour; inadequate credit facilities; poor storage facilities; high cost of machineries, spare parts and services price fluctuation of the products etc.

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