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Impact Of Adoption of Alternative Energy Supply on Economic Performance of Foodstuffs' Mills in Nigeria

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Research Article

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Abstract

Regular power supply is the prime mover of small and medium scale enterprises. This study provided meaningful insight into the analysis of the impact of adoption of alternative energy supply on the economic performance of foodstuff' mills' in Southwest Nigeria. A multistage sampling technique was used to select 200 respondents for the study. Primary data were obtained from the respondents with the aid of a well-structured questionnaire. The data obtained were analysed using descriptive and inferential statistics. The endogenous switching regression output of the impact of the millers' decision the respondents' income level revealed that; age, year of education, primary occupation, access to credit, frequency of power failure, frequencies of the low voltage, duration of power failure per day of the respondents were found to significantly determined the income level of the respondents in the study area. The study therefore recommends that; the Nigerian government should at all level should address the issues of alternative power supply diversification from petroleum fuels to cleaner energy in form of solar power, that will be more sustainable and affordable to all especially to small and medium scale enterprises.

Keywords: Adoption; Alternative Energy; Endogenous Switching Regression; economic performance; foodstuffs' mills'

Introduction

The primary driver of industrial, economic, technological, and social progress is reliable electricity supply. There is hardly any business or facet of human development that does not require energy in one way or another. Nigeria is blessed with a diverse range of energy resources, including crude oil, natural gas, coal, hydropower, solar energy, and fissionable materials for nuclear energy. Nonetheless, the country is plagued by energy shortages (electricity outages), which are a serious hindrance to industrial and home consumers. (Adenikiju, 2017). The poor state of electricity infrastructure and the significant power deficit have harmed business economic performance and competitiveness in the worldwide market (Adenikiju, 2017). Power outages generally have both direct and indirect effects on firm performance, causing increases in economic costs, decreases in produced quantities, and, eventually, decreases in sales and productivity (Osei-Gyebi et al., 2023)

Generators are the favoured mitigation solution for many power-dependent firms in nations with inadequate electrical reliability (Raj, 2020). Around 33% of SMEs in developing nations utilise a generator, which is the most frequent way for SMEs to deal with power outages (Scott et al., 2014). The share of SMEs utilising a generator is higher in nations with inadequate electrical reliability,

reaching 86% in Nigeria. Firm-owned generators account for approximately 6% of installed generation capacity in Sub-Saharan Africa, and up to 20% in countries with extremely unstable energy (Mertzanis, 2018). Firms that use generators are more likely to be SMEs or sole proprietorships, to be capital-intensive, and to experience more outages than firms that do not use generators (Scott et al., 2014). Generator ownership has been proven to be most efficient for medium-sized businesses and businesses that use a lot of electricity (Scott et al., 2014). Because of the cost of running a generator, electricity consumption is significantly decreased during power outages. Generators are occasionally used only for illumination and communications, rather than for motive power. During outages, firms are rarely able to operate at full capacity, and suspending production is a typical (and often required) option (Scott et al., 2014). This study further advanced the literatures in the field of agricultural production economics by offering this innovation. The study analysed Impact of adoption of alternative electricity power on the economic performance of foodstuffs' mills' in Nigeria. The indicators of economic performance used for this study is income level of the respondents. There is still paucity of information on the Impact of adoption of alternative electricity power on the economic performance of foodstuffs' mills in Nigeria in the literature. Hence, the needs to carry out this study that check how adoption of alternative electricity power impact on the economic performance of foodstuffs' mills' in Nigeria.

Methodology

Study area

The study context was Oyo and Osun States of Nigeria the two States are situated in the southwest geopolitical zone of the country. Nigeria's South West Geopolitical Zone is a geographical region that spans latitudes 60 to the north and 40 to the south. Its longitudes are 40 to the west and 60 to the east. Its land area is approximately 114,271 square kilometres, or 12% of the total land mass of the nation. Yoruba people make up more than 96% of the population (NPC, 2006). Oyo, Osun, Ondo, Ekiti, and Lagos are the six (6) states that make up the South-West zone. The Republic of Benin borders it on the west, the Atlantic Ocean on the south, the Kogi and Kwara states on the north, Edo and Delta states on the east. There is a bimodal rainfall pattern and a tropical climate. The cropping season, sometimes referred to as the wet season, lasts from late March until October. The dry season, which runs from November to early March, comes next, followed by a brief break. In the derived savannah zone, the mean annual temperature ranges from 21.10C, and the mean annual rainfall is between 800mm and 1500mm. The regions vegetation is primarily rainforest, and the soil type is extremely ferruginous tropical red soil. Among the major food crops grown each year are bananas, yam, sorghum, rice, cowpea, cassava, and millet. Many individuals engage in the retail or wholesale trade of different agricultural products. Some people are employed in non-agricultural jobs like carpentry, bricklaying, crafts, and civil service. Seventy-five per cent of Nigeria's mills are located in the southwest area. Nigeria has become the 40th largest milling producing nation in the world, with over 1000 milling enterprises operating on both small and large scale there today, compared to just two (2) in 1957 (NBS, 2018). Notwithstanding this potential, the South West Nigeria, which is home to at least 75% of Nigeria's installed and active mills, continues to dominate the industry's growth.

Sampling techniques and sample size

A multistage sampling procedure was used to select the respondents. At the first stage simple random sampling was employed to select two (2) states out of the six states in South-west namely (Oyo and Osun State). At the second stage, four (4) major/largest cities namely (Ibadan, Ogbomosho, Oyo town and Iseyin) for Oyo State, (Oshogbo, Ilesha, Ife and Ede) for Osun state were purposively selected per state, based on the availability of large markets where the foodstuffs' millers operate. At the third stage, purposive sampling technique was used to select largest market in each of the selected cities based on the presence of large numbers of millers' operations in those markets. At the fourth stage, the use of snow- ball sampling technique was used to select twenty foodstuffs 'millers who adopt any of the mitigation measures against electricity power outages and those millers who depend solely on national grid (IBEDC) for their electricity supply, therefore a total of 200 respondents were used for the study. The sample size was calculated using the Taro Yamane (19673) sample determination method. A total of 200 respondents were used for the study, data collected through the use of structured questionnaire.

Model specification

The Endogenous Switching Regression Model (ESR) was employed for the study. It was used to investigate the effect of foodstuffs' millers' choice to use alternate energy sources on economic performance in the study area. A two-stage estimation approach had to be simultaneously estimated in order to quantify the influence of foodstuffs 'millers' decision to reduce electricity power outages on (Income) and (profitability) as calculated using the ESR framework.

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To ascertain the elements influencing the adoption decision, the mitigation decision is estimated in the first stage. The second step entails estimating the correlation between a collection of explanatory variables and the outcome variables for two regimes: those that implement mitigation methods for power outages and those that do not. The following are the requirements for the two regimes:

Regime 1(Adopters): $Y_{1i} = K_i\beta_1 + \varepsilon_{1i}$ if $M_i = 1$ (1a)

Regime 2 (non-adopters): $Y_{0i} = K_i\beta_2 + \varepsilon_{2i}$ if $M_i = 0$ (1b)

Where Y_{1i} and Y_{0i} are outcome variables for adopters and non-adopters, respectively; K is a vector of respondents' socio-economic characteristics and operational-related characteristics such as;

X_1=Age of the respondents (years)

X_2= Sex (Female =0, Male =1)

X_3= Primary occupation (Yes=1, No =0))

X_4= Education (years)

X_5=Household Size (number)

X_6= Experience (years)

X_7= Income from milling (naira)

X_8= Union Membership (Yes =1, No=0)

X_9= Frequencies of Power Outages per Week

X_{10}= Duration of power outage per day/per week (Hrs.)

X_{11}= Primary Occupation (Yes=1, No=0)

X_{12}= Access to Credit (Yes =1, No=0)

X_{13}= Neighbours Using Alternative Power (Yes =1, No=0)

X_{14}=Frequency of Low Voltage

X_{15}=Electricity Bill

To be estimated, β is a vector of parameters, and the error term is μ. Equation (1)'s X and Equations (1a) and (1b)'s K can overlap due to the structure of the ESR model. For the sake of identification, it is crucial, nevertheless, that at least one variable not exist in K. This suggests that, with the addition of one variable in the former, the same set of variables is utilized to estimate the selection and outcome equations. The utilization of power outage mitigation measures by neighbours is considered a legitimate tool since it is anticipated to impact the decision to employ mitigation rather than the final result. The variables in K in equations 1a and 1b only take into account observable factors.

However, due to unobservable features inside the structure of the missing variable problem, the ESR model may be able to address the selection bias problem. Heckman (1979) clarified that covariance terms σ0ε and σ1ε are included in equations 1a and 1b, which lead to equations 2a and 2b. These selectivity terms are employed in the selection equation and reflect λ1 and λ0 for adopters and non-adopters, respectively.

$Y_{iA} = K_{i1}\beta + \sigma 1\varepsilon\lambda_1 + {}_{\varphi i1}$ if $S_i = 0$ (2a)

$Y_{iN} = K_{i0}\beta + \sigma 0\varepsilon\lambda_0 + {}_{\varphi i0}$ if $S_i = 1$ (2b)

Selectivity terms λ1 and λ0 account for selection bias resulting from unobservable factors, while error terms φi1 and have conditional zero means. The maximum probability strategy, which was advocated by Abdulai (2016) and Lokshin and Sajaia (2004), was employed in this investigation.

By comparing the expected income and profitability of foodstuffs 'millers who implement mitigation strategies with the expected outcomes of the counterfactual hypothetical cases of those fooodstuffs'millers who do not adopt mitigation strategies, the ESR model was utilized to investigate the effect of adopting power outage mitigation strategies on respondents' income and profitability respectively. The following can be used to indicate the expected values of result Y for adopters and non-adopters:

$E(Y_{i1}|S = 1) = K'\beta_{i1} - \sigma 1\varepsilon\lambda 1$ (3a)

$E(Y_{i0}|S = 1) = K'\beta_{i0} - \sigma 0\varepsilon\lambda 1$ (3b)

The difference in the expected outcomes from equations 3a and 3b is how equation 4 expresses the average treatment effect on the treated (ATT), according to Lokshin and Sajaia (2004), as a change in the outcome owing to adoption.

$ATT = E(Y_{iA}|S = 1) - E(Y_{iN}|S = 1)$ (4a)

$ATT = K(\beta_{iA} - \beta_{iN}) + \lambda A(\sigma A\varepsilon - \sigma N\varepsilon)$ (4b)

In the case of the error terms, σ stands for their covariance and λ for the inverse mills ratio or selectivity term.The regression was carried out on the three categories of the respondents namely, the adopters of alternative power sources (Respondents that depend on fuel engines only), non-adopters (Respondents that depend solely on electricity) and the Pool respondents (Respondents that adopt both electricity and alternative to electricity source

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of power) respectively on socio-economic characteristics and operational characteristics respectively.

Results

Socio-economic and demographic characteristics of the respondents

The socio-demographic characteristics of the respondents revealed the majority 71 % to be male with only 9.5 % of having marital status as single. In terms of age, most (31.5 %) of the respondents were between the age of 41-50 years with a mean age of 45 years. The mean household size of the respondents was 6 persons while 11 % had no formal education. The majority (64 %) run their business full time with mean years of experience of 20 years. With respect to power option for running of business, 80.5 % use alternative power supply (Table 1).

Table1: Socio-economic and demographic characteristics of the respondents.

Variable	Frequency	%
Gender		
Female	58	29
Male	142	71
Marital status		
Single	19	9.5
Otherwise	181	90.5
Age		
20-30	26	13
31-40	55	27.5
41-50	63	31.5
51-60	32	16
61-70	13	6.5
>70	11	5.5
Mean age=45.61		
Size of Household		
01-5	96	48
06-10	87	43.5
>10	17	8.5
Mean size-=6persons		
Education		
Non-formal	22	11
Primary	50	25
Secondary	25	12.5
OND/NCE	91	45.5
BSC/HND	12	6
Nature of business		
Part-time	72	36
Full-time	128	64
Experience		
≤10	46	23
11-20	65	32.5
21-30	63	31.5
31-40	20	10
41-50	5	2
>50	1	0.5
Mean=20.3years		
Power Option		
Solely electric	39	19.5
Alternative energy	161	80.5
Total	**200**	**100**

Power supply options and billing system of the respondents

The power supply options of the respondents revealed that only 19.5% of the respondents adopted solely electricity as their source of power for their milling enterprise while 21.5% combined electricity+diesel engine as their power source. A total of 14.4% of the respondents combined electricity+diesel+petrol engines as their power source, 14.5% adopted petrol engine solely and 30% used solely diesel engine (Lister engine) as their power source (Fig. 1). Among the respondents that adopted electricity solely, the larger percentage of 48.7% do not have any metre system while 33.3% had prepaid card/electrical meter installed and are legally connected to the power grid. In the case of the categories of the respondents that adopted electricity+diesel and electricity + diesel engine + petrol, majority (88.4%) and 75.9% were on estimated billing for their milling enterprise, respectively (Fig. 2).

Constraints faced by the respondents in the adoption of different power sources

The constraints faced by the respondents in the use of different power sources are as presented in Table 3. The irregular power supply with percentage 94% ranks 1st among constraints faced by the millers in the research area. The nation national grid is characterised by the epileptic and irregular power supply and therefore it forces SMEs to self-generate electricity to keep their businesses afloat while the least constraint was Poor Customer Service from the electricity officers as the constraint faced in the study area in the adoption of electricity (national grid) as their power source for their foodstuffs' milling businesses. The constraints faced in the adoption of the alternative energy sources namely the diesel and petrol engines respectively. The high cost of fuelling was identified as the major constraints in the adoption of the alternative power sources, with a total percentage of 100%. while the least constraint was Carbon emissions which ranks 6th (Table 3).

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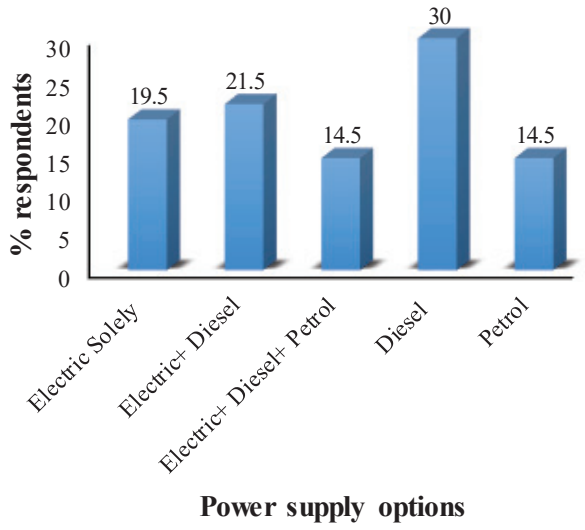

Figure 1: Power supply option the respondents.

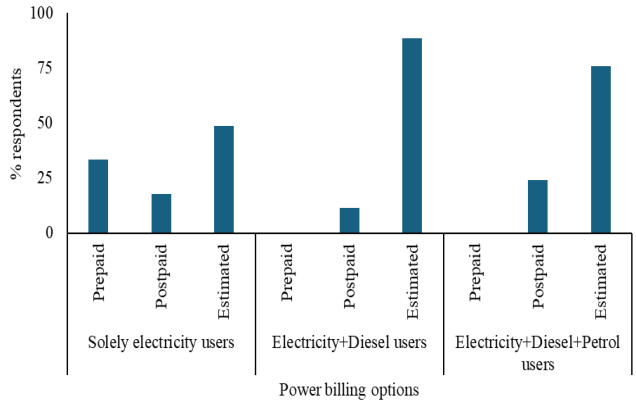

Figure 2: Power billing options of the respondents.

Effect of adoption of electricity power alternative on income level

The endogenous switching regression output of the effects of the miller's decision to adopt electricity power alternatives on the respondents' income level is as shown in Table 2. The Chi-square (X2) coefficient of 49.03, was found to be significant (P<0.0000) according to the endogenous switching regression model's likelihood estimates, suggests that the model has a definite explanatory capacity. According to the log of Pseudo like-lihood of -2754.7254, was significant (P< 0.0000), this suggests that the model demonstrated an exemplary fit to the data. The coefficient of age was found to be statistically significant and positive at 5% level on income of the non-adopters' category, with a t-value of 2.25 and probability value less than 0.005 while family size increased the adoption of mitigation strategies which was found to be significant and positive at 5% level of significance with a t-coefficient of 4.34 and -5.40 and a probability values (p<0.005). Also, years of education favours adoption of power outage mitigation strategies, adoption of mitigation measures and increased the respondents' income level. This was found to be significant and positive at 5% level of significance with t-values of 2.02 and -2.13 respectively (Table 2). The effects of years of experience on income level of the non-adopters were found to be significant and negative at 5% level of significance with a t-statistics of -6.54 while gender of respondents' favours the adoption of electricity power outage mitigation strategies; effect of gender on the income level of the adopters was found to be significant and positive at 5% level of significance with a t-statistics of 3.04. Also, the marital status of the respondents' increased the adoption of power outage mitigation strategies among the respondents in the study area. The effect of coefficient of gender on the income level was found to be positive and significant at 5% level of with a t-statistics of 2.33. The primary occupation of the respondents increased the adoption of power outage mitigation strategies, on their income level was found to be negative and significant at 5% level of significance with a t-statistics of -2.32 and -7.56 respectively (Table 2). Also, credit accessibility favoured the adoption of power outage mitigation option in the study area it was found to be statistically significant and negative at 5% level of significance with a t-statistics of -5.14, 4.81 & 2.37 respectively for all the categories of the respondents. Access to credit was found to have a significant decreasing effect on the income level of the adopters of alternative energy sources. The frequency of power failure increased the adoption of electricity power outage mitigation strategies in the study area. The result found out that, there was a negative and significant relationship between the frequencies of daily power failure experience of the respondents in on their income level at 5% level of significance with a t-value of -2.46 (Table 2). The electricity bill was found to be statistically significant and positively related to the income level of the respondents in the adopters and non-adopters category at 5% level of significance with a t-value of (2.33, 5.43 & -2.39) respectively while frequency of the low voltage on the respondents' income level was found to significantly influence the adoption of power outage mitigation strategies and related with income level of the at 5% level of significance with a t-statistics of -5.12 and 3.87. Low voltage impacts negatively on the income level of the adopters. The effect of duration of power failure was found to be significant and positively related with the income level of the respondents and favours being a non-adopter of power outage mitigation option at 10% level of significance with a t-statistics of (1.97 and -1.88) respectively (Table 2).

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Table 2: Endogenous Switching Regression Model on the Impacts of Millers' Decision to Adopt Alternative Electricity Sources on the Income Level of the Respondents.

	Income	Adopters		Non-adopters			Pool		
	β-value	S-Error	t-value	β-value	S-Error	t-value	β-value	S-error	t-value
Constant	491688.5	161407.5	3.05**	1105946	340548.8	3.25**	0.6960669	-8.59	0
Age	-2123.135	1979.95	-1.07	983.2508	437.01	2.25**	-0.0027405	0.0219147	1.66
Family size	9937.432	2289.731	4.34**	-6816.716	1262.355	-5.40**	-0.0373201	0.0372831	-1
Education	4239.619	39.31903	2.02**	-19382.13	9099.59	-2.13**	0.1117772	0.0672637	1.66
Experience	79.42446	3209.574	1.32	-2791.779	426.878	-6.54**	0.0523357	0.0586261	0.89
Gender	117484.8	38646.32	3.04**	33666.95	95518.26	0.35	0.1943142	0.4526585	0.43
Marital status	7684.658	62985.22	0.12	-104885.7	154954.7	-0.68	1.405769	0.6039292	2.33**
Secondary occupation income	-89687.68	38658.2	-2.32**	-306912.4	255745.4	-1.2	5.025567	0.6649443	-7.56**
Credit	-6358.995	1237.159	-5.14**	94291.87	19603.29	4.81**	0.7171687	0.3021634	2.37**
Power failure	-5407.689	5874.368	-0.92	-79086.8	32149.11	-2.46**	-0.1171894	0.1102488	-1.06
Electricity bill	17.63585	7.582553	2.33**	3.281309	0.604292	5.43**	-8.25E-07	3.45E-07	-2.39**
Low Voltage	3111.43	607.701	5.12**	-51363.72	59871.8	-0.86	0.2827556	0.0730208	3.87**
Duration of Power Failure	1795.007	2781.851	0.65	15608.76	7923.228	1.97*	-0.059105	0.0314111	-1.88
Log pseudo-likelihood	-2738.7195								
Prob> chi2	0.0011								
Wald test of indep. eqns. :chi2(1) = Prob > chi2 =	49.03 0.001								

Note: ***denotes 1%, ** denotes 5% and * denotes 10%
Source: Computed from field data survey, 2023

Constraints faced by the respondents in the adoption of different power sources

The constraints faced by the respondents in the use of different power sources are as presented in Table 3. The irregular power supply with percentage 94% ranked first among constraints faced by the millers in the research area. The nation national grid is characterised by the epileptic and irregular power supply; therefore, it forces SMEs to self-generate electricity to keep their businesses afloat while the least constraint was Poor Customer Service from the electricity officers as the constraint faced in the study area in the adoption of electricity (national grid) as their power source for their foodstuffs' milling businesses. The constraints faced in the adoption of the alternative energy sources namely the diesel and petrol engines respectively. The high cost of fuelling was identified as the major constraints in the adoption of the alternative power sources, with a total percentage of 100%. While the least constraint was Carbon emissions which ranks 6th. (Table 3)

Table 3: Constraints faced by respondents in the adoption of different power options.

	Responses	Frequency	(%)	Rank
Constraints to use of national grid	Irregular Power Supply	188	94	1st
	Poor response time to rectification of fault	180	90	2nd
	Non-availability of prepaid meter	172	86	3rd
	High tariffs	153	76.5	4th
	Voltage fluctuations	123	61.5	5th
	Poor customer service	120	60	6th
Constraints to use of alternative power sources	High cost of fuelling	200	100	1st
	High/ scarce spare parts	195	97.5	2nd
	Ease of operation	122	61	3rd
	Problems of noise pollution	102	51	4th
	Problems of carbon emissions	77	38.5	5th

Discussion

In this study, increase in age of the respondents tends to increase the probability of being non-adopter of power outage mitigation strategies. This observation could be attributed to the tedious nature of operation of alternative engines and the laborious nature of mitigation measures against power outrage, due to old age may limit the tendency to adopt alternative power supply. A similar observation has been reported by Hsieh and Klenow (2014) in a related study. In a study on factors effecting farmers' attitude and risk perceptions in Khyber Pakhtunkhwa, Pakistan, Ullah et al. (2015) also reported that increase in age reduced the adoption of mitigation strategies. This study revealed a negative relationship between family size and adoption of power mitigation strategies. Larger family size is usually attributed to availability of cheap labour, to be able to operate alternative power engines by close family members (Anyanwu et al., 2022). Also, negative relationship between family size and adoption

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of power outage mitigation strategies may be due to the fact that some mitigation strategies are laborious, which require more hands that can be gotten from household members. Saqib et al., (2016) reported that family size increases the probability of adopting mitigation strategies. This study revealed educational level helps in adoption of improved technology that will enhance a better standard of living (Nwokoye et al., 2019). The reason for this could be attributed to the fact that increase in level of education assists foodstuffs' millers in the area of adoption of new technologies in spite of the associated risk, since they know that risk always comes with great benefits, hence the need to adopt power outage mitigation strategies. This is finding is in line with Olawuyi and Olawuyi (2015) report, who reported that number of years spent in school increased adoption of mitigation technologies. As observed in this study, years of experience favours non-adoption of electricity power outage mitigation strategies among the respondents. This result is in tandem with the observation of Takahashi et al., (2019) who in a study on technology adoption, impact, and extension in developing countries' agriculture, indicated reported adequate experience, enable adequate decision-making with respect to input utilization that guarantees maximum output. It is posited that experience makes individuals to be averse to risks, as non- adopters tend to know the trend of the risk involved in not adopting the alternative power sources on their milling enterprise (Adepoju et al., 2019). The study revealed that gender is a factor in adoption of electricity power outage mitigation strategies (Zheng et al., 2022). This affirmation can be attributed to the fact that the alternative energy supplies are laborious in nature and requires high energy to operate. The male tends to be adopters compared to their female folks which are less energetic in handling laborious activities like manual whining of the alternative energy engines (Hargreaves et al., 2010). These findings contradict the assertions of Adisa and Okunade (2005) in their study on factors associated with women farmers' level of control in farmer-groups in Kwara State, Nigeria posited that women constitute the larger proportion of the agricultural labour force. Akinnagbe et al., (2008) and Nsoanya and Nenna (2011) in related studies have indicated that women are the backbone of the agricultural sector and agricultural production. As observed in this study, secondary occupation income of the respondents increased the income level of the adopters. This result can be attributed to the fact that milling enterprise with alternative energy supply has been found in this study to be capital intensive giving room to low profit margin (Ullah and Shivakoti, 2014). It is reported that secondary occupation income is capable of assisting in investing on mitigation options that can reduce other risks associated factors (Ullah and Shivakoti, 2014). Also, access to credit was found to significant affect the income level of adopters of alternative energy sources among the study respondents. This could be attributed to the fact that loans are not the same as grants for their enterprises, as higher interest rates charged on the loans will eventually decreases the adopter's income on both long and short run (Kehinde, 2021). This result is in consistent with Ukoha et al., (2007) in their study on relative price variability and inflation: evidence from the agricultural sector in Nigeria. They opined that, possessing credit is thought to boost a respondent's productivity also Cole et al., (2018) in their study on 2018 standard scenarios report: A US electricity sector outlook, they found out that, access to credit is positively associated with technical efficiency of firms, however, this study found out that access to credit is positively related to adoption of power outage mitigation measures. In this study, the frequency of power failure determines the income level of the adopters of electricity power outage mitigation strategies in the study area. The result found out that, there was a negative and significant relationship between the frequencies of daily power failure experience of respondents on their income (Hensher et al., 2014). The study of (Steinbuks and Foster, 2010) on the willingness to pay for residential electricity supply quality and reliability. They affirm that, Firms are rarely able to function at full capacity during outages, and stopping production is a common (often necessary) solution. The electricity bill was found to favour adoption and increased the income level of adopters and non-adopters of electricity and alternative energy supply in the study area. This result corroborates the already established fact in this study that, the milling enterprise is highly profitable with the electricity from national grid, as it has a low running cost (Alao et al., 2018). The result is agreement with the study (Oseni and Pollitt, 2015), on a firm-level analysis of outage loss differentials and self-generation: Evidence from African business enterprises. They posited that electric power deficiency badly affects the technical efficiency of the production unit in the economy. In a study on electricity connections and firm performance in 183 countries, significant variations of cost and time associated with the electricity connections across the global landscape was reported (Geginat and Ramalho, 2018). Additionally, the study observed that frequency of low voltage influences the income level and adoption of power outage mitigation strategies of the respondents in the study area. Low voltage impacts negatively on the income level of the adopters of alternative energy supply (Doe and Emmanuel, 2014). In this study effect of duration of power failure was found to be significant and positively related with the income

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level of the respondents and favours being a non-adopter of power outage mitigation option. A similar observation has been reported by Bah and Fang, (2015). The electricity supply to their milling business from national grid must be top notch before average millers can really on its supply for his/her business without seeking for mitigation measures to power outage (Doe and Emmanuel, 2014).

Conclusion

The results from this research revealed that, electricity power supply from national grid favours the economic performance of foodstuffs' milling enterprise in the study area by increasing the income level and profitability of the operators compared to alternative source of energy from alternative/fuel engines. The electric engine was found to be the most convenient, safe, efficient, fast and environmentally friendly, by all the categories of respondents. Socio-economic and operational characteristics of the respondents was found to significantly enhances economic performance of foodstuffs' milling enterprise in the study area. The study recommends that governments at different levels should address the issues of epileptic power supply, as electricity is the prime mover of small and medium scale enterprises in Nigerian economy. Also, government should address the issues of alternative power diversification from petroleum fuels to cleaner energy in form of solar power, that will be more affordable to all SMEs especially the foodstuffs' milling enterprise, by providing the battery storage system that can power the milling engines. Also, government should encourage decentralization of power supply from the federal government alone, by giving autonomy to each state for power generation through independent power supply.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Authors' contributions

Author 'F.M.H'. Conceptualize the study, designed the methodology, collected the data, analysed the data, interpreted the data and wrote the paper. Author 'A.O.O'. Designed the methodology, interpreted the data, and wrote part of the paper.

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