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Examining the determinants of loan default among microfinance banks' borrowers in Kano State, Nigeria

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Abstract
Purpose: The study examines how the personal and business characteristics of micro, small and medium enterprise (MSMEs) borrowers of microfinance banks influence loan default, using Kano State as a case study.
Research Methodology: The study employed a survey research method and the sample was drawn through multistage stratified random sampling and comprised 544 beneficiaries of microfinance banks selected from 10 local governments across the state. Data was collected using questionnaires and analyzed using Logit and Probit models with the aid of STATA 13 software.
Results: The findings revealed that family size, gender, and business age are significant determinants of loan default. Borrowers' marital status and age as well as the size and location of business were found to be insignificant in predicting loan default among microfinance MSME borrowers.
Limitations: Part of the limitations of this study is the difficulty involved in getting the required information from the sampled microfinance beneficiaries. This research considered only personal and business characteristics of microfinance banks' borrowers as determinants of loan default in some selected areas of Kano State. Findings in other areas may differ.
Contributions: This study contributes to the area of microfinance research by adding more value to the knowledge and literature existing in this field. Managers of microfinance banks will also find the outcome of this research useful as it will assist them in understanding the appropriate strategies to adopt in minimizing the default rate of their clients.
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1. Introduction

The study examined the influence of personal and business characteristics of beneficiaries of microfinance banks on loan default. The main focus of the study is on the operators of Micro, Small, and Medium Enterprises (MSMEs) who have access to microfinance loans from microfinance banks in Kano State, Nigeria. MSMEs mostly operate mainly in the informal sector. They are unregistered, unregulated, and have little or no access to formal banking services (Wairimu & Mwilaria, 2017).

Microfinance banking provides a credible platform for extending financial services to the unbanked to assist them to contribute to socio-economic development and reduce poverty Central Bank of Nigeria (CBN, 2017). Microfinance is involved in offering financial services to the poor who are traditionally not served by conventional financial institutions (CBN, 2005).

Globally, MSMEs are known for their contribution to poverty reduction through employment generation. However, in Nigeria, the potential of employment generation of small businesses has been seriously constrained by lack of access to finance, either to start, expand or modernize their present scope of economic activities. Delivering on employment generation and poverty alleviation, MSMEs, would require multiple channels of financial services, which an improved Microfinance framework should provide (CBN, 2011).

MSMEs also suffer from poor management skills due to lack of adequate training and low level of education of their operators which often leads to a high rate of business failure and default in loan repayment. While MSMEs constitute an important component of the private sector in devel¬oping countries, they experience higher obstacles to their survival and growth than large businesses. Among these obstacles; lack of access to appropriate financial services, especially lending services, looms large (as reported in Beck & Cull 2014).

Microfinance is the provision of a broad range of financial services such as deposits, loans, payment services, money transfers, and insurance to poor and low-income households, and their microenterprises (Asian Development Bank, ADB, 2000).

A national survey of SMEs jointly conducted by the Small and Medium Enterprise Development Agency of Nigeria (SMEDAN) & National Bureau of Statistics (NBS) in 2017 has shown that the total number of MSMEs in Nigeria has increased from 37.07 million in 2013 to 41.5 million in 2017 (categorized into micro-41,469,947; small – 71,288; and medium – 1,793, but the number of medium enterprises has drastically declined from 4,670 in 2013). These figures account for about 96% of the total businesses in the country and employed about 59,647,954 people (that is 86.3% of the national workforce). The MSME sub-sector has also been noted to contribute about 49.78% to Gross Domestic Product (GDP), as well as 7.64% to exports in 2017, both of which have slightly increased from 48.47% and 7.27% in 2013, respectively. The survey has also revealed a 32.1% financing gap for the MSME sub-sector in the country (SMEDAN & NBS, 2017).

Data from the CBN revealed that only 6.02% of total credit disbursed to the private sector by the Deposit Money Banks (DMBs) was given to SMEs from 2000 to 2005 (Modi et al. 2014)). After identifying the unwillingness of conventional banks to support SMEs by the Central Bank of Nigeria, in 2005, the Federal Government of Nigeria adopted microfinance banking as the main financing window for micro, small and medium enterprises in Nigeria. The Microfinance Policy Regulatory and Supervisory Framework (MPRSF) was launched in 2005 and revised in April 2011 by the Central Bank of Nigeria. The policy among other things addresses the problem of lack of access to credit by small business operators who do not have access to regular bank credits. It is also meant to strengthen the weak capacity of such entrepreneurs and raise the capital base of microfinance institutions (Babajide, 2012).

Kano is the second-largest commercial city in Nigeria besides Lagos. It is the commercial nerve Centre of Northern Nigeria. A joint MSMEs' survey by SMEDAN and NBS in 2017 has shown that the number of micro-enterprises in the Kano state has increased from 1,794,358 in 2013 to 1,824,961 in 2017. However, the number of small enterprises has declined from 7,790 in 2013 to 2,298 in 2017; and that of medium enterprises from 496 in 2013 to 143 in 2017, respectively (SMEDAN & NBS, 2017).

The state was also reported to have the highest number of microfinance banks (MFBs) in Northern Nigeria besides Federal Capital Territory (FCT) and was also ranked fourth in the country following Lagos, Anambra, and FCT (CBN, 2018). A population projection by National Bureau of Statistics in 2017 puts Kano State as the state with the highest population in Nigeria (NBS, 2017).

The MSME sub-sector in Nigeria is characterized by a huge financing gap that hinders the development of Micro, Small, and Medium Enterprises in the country (CBN, 2014). Most of these

enterprises have remained relatively small and seen stunted growth over the years. This is due to the fact that a large percentage of entrepreneurs in the country remain unserved by formal financial institutions (Akpan & Nneji, 2015). Small and medium enterprises (SMEs), which according to SMEDAN & NBS 2017 MSME survey account for 96% of businesses in Nigeria, are often forced to close because they lack access to funds (Watse 2017).

Moreover, the high rate of loan default among microfinance banks' borrowers, especially MSMEs, is posing serious threats to the survival of these banks considering the size of their capital base. Many empirical studies such as Muthoni (2016), Muiruri (2014), Abdulsaleh & Worthington (2013), and Ackah & Vuvor (2011) among others, have revealed loan repayment default as one of the major obstacles affecting the success of microfinance banks, but most of these studies were not able to measure the extent to which MSME borrowers' characteristics, as well as business characteristics, can affect loan repayment default. The study aimed at bridging this gap.

2. Literature review and hypothesis development

Conceptual literature

Concept of Loan Default

Loan default as a concept has different meanings depending on the microfinance policies. Yegon et al. (2013) define loan default as the inability of a person to repay the loan when due. According to Consultative Group to Assist the Poor (CGAP) (as reported in Muthoni, 2016), loan default occurs when a loan payment is late.

According to Moti et al. (2012) loan default (also called credit risk) is a loss incurred as a result of the inability of a borrower to make payments as promised. Besides that, according to Pearson and Greeff (2006) (as reported in Mosha, 2016), loan default is described as a risk where a borrower misses to repay at least 3 installments within a month period. Similarly, Ameyaw-Amankwah (2011) and Murray (2011) describe loan default as the inability of a borrower to pay the interest or principal on a debt when it is due. However, in this research, the definition of a loan given default by Ameyaw-Amankwah (2011) and Murray (2011) would be adopted. This is because this definition is more encompassing as it mentioned the 'inability' to pay either the 'principal' or 'interest' or both as and when due.

Microfinance lending models

Microfinance lending models are methodologies adopted by microfinance institutions in granting loans to their clients. Below are the commonly used models:

a. Individual Lending Model
   In this model, a loan is disbursed directly to the individual borrower subject to satisfaction of the requirements of the bank. In this case, the individual borrower is solely responsible for making full payments of the loan principal and interest without any financial support from a group in case of any defaults (Mosha, 2016).

b. Joint liability or group model
   The joint liability or group model (also known as Peer Lending Group or Solidarity Group Model) normally comprises 4 to 5 individual members coming together as a group with a view to accessing a loan in solidarity for all the members. Under this model, the individual members in this group are self-selected based on their relationship, reputation, and trust in one another. The group has the collective responsibility of ensuring timely repayment for the entire members according to the agreed repayment schedule. In the case of any default from an individual group member, the entire group becomes responsible for settling such due payments (Mosha, 2016).

c. The Grameen Bank Model

Grameen Bank was a pioneer microfinance bank that was initiated by Muhammad Yunus in 1976 in Bangladesh. The famous work of Yunus sets a new pace in the history of modern microfinance banking in the world. The Grameen Bank was established with a view to rendering financial assistance to poor and low-income households, especially women. The bank is managed by a manager and workers who visit villages to source for eligible clients after explaining the purpose, functions, and mode of operation of the bank (Taiwo, 2012).

Under this model, a group of 5 prospective borrowers is formed from the eligible clients, but only two members receive their loan in the first instance, while others take their turns later. The group is then put under monitoring and supervision to see if members are complying with the rules and regulations of the bank. If the two beneficiaries of a loan facility are able to repay their principal and interest over a period of 52 weeks, other members then become eligible. Under this model, there is continuous group pressure to make individual beneficiaries comply with the rules and regulations governing the operations of the bank, and also ensure timely repayment of loans (Taiwo, 2012).

In the Grameen Bank model, group formation is also used for other purposes, such as collective bargaining, educating the group members, and creating awareness among the group members. It is also possible to borrow as an individual. In this model, a loan is backed by moral collateral and the conviction that the group stands as guarantor for each loan granted to the members (Taiwo, 2012).

Concept of Micro, Small and Medium Enterprises (MSMEs)

The concepts of micro, small, medium enterprises are separately discussed below:

a. Micro-enterprise

In developing countries, micro-enterprises are those enterprises that employ less than ten workers Wairimu, Z. and Mwilaria, S.M. (2017). Microfinance Institutions' Social Intermediation and Micro and Small Enterprises Survival in Thika Town, Kenya. Asia Pacific Journal of Multidisciplinary Research, 5(2): 87-93. (Wairimu & Mwilaria, 2017). In Nigeria, the Central Bank of Nigeria (CBN, 2014), defines micro-enterprises as those enterprises with less than 10 employees with a total asset of less than N5 million (excluding land and buildings) and operated by the sole proprietor.

Similarly, Small and Medium Enterprise Development Agency of Nigeria (SMEDAN), defines Micro Enterprises are those enterprises whose total assets (excluding land and buildings) are less than Five Million Naira with a workforce not exceeding ten employees (SMEDAN & NBS, 2013).

b. Small Enterprise

Wairimu and Mwilaria (2017) define small-scale enterprises in developing countries as enterprises that usually employ less than 50 workers. The Small and Medium Enterprise Development Agency of Nigeria (SMEDAN), defines Small Enterprises as those enterprises whose total assets (excluding land and building) are above Five Million Naira but not exceeding Fifty Million Naira with a total workforce of above ten, but not exceeding forty-nine employees (SMEDAN & NBS, 2013).

The European Union (EU) defines a small enterprise as one which has a headcount of fewer than fifty employees and a balance sheet and turnover each of not more than ten million Euros (as reported in Ibor, Offiong, and Mendie, 2017).

In Great Britain, Small Scale industries include those with an annual turnover of two million pounds or less and with less than 200 paid employees with no reference made to capital investment (as reported in Ibor, et al., 2017). In the USA, according to the Small Business Administration (SBA), a firm with less than 500 employees is considered a small business (as reported in Ibor, et al., 2017).

c. Medium Enterprise
Small and Medium Enterprise Development Agency of Nigeria (SMEDAN) defines Medium Enterprises as those enterprises with total assets excluding land and building) are above Fifty Million Naira, but not exceeding Five Hundred Million Naira with a total workforce of between 50 and 199 employees (SMEDAN & NBS, 2013).

According to CBN (2014), small and medium enterprises (SMEs) are those entities with an asset base of N5 million and not more than N500 million (excluding land and buildings) with employees of between 11 and 200.

The European Union (EU) defines a medium-sized enterprise as one which has a headcount of less than two hundred and fifty employees, and a turnover of not more than fifty million Euros or a balance sheet of not more than forty-three million Euros (Ibor, Offiong, and Mendie, 2017). The International Financial Corporation (IFC, 2012), which is a member of the World Bank Group committed to providing financial services to SMEs in developing countries, defines SMEs based on the number of employees, total assets, and total annual sales. IFC defines SMEs as registered businesses with less than 300 employees, a minimum of $100,000, and a maximum of $15 million of total assets and annual sales

Empirical literature

Apiri (2013) examined the default rate and performance of microfinance banks' loans to SMEs in Lagos, Nigeria. The study showed that the causes of loan default by SMEs reflect the risk and vulnerability of SMEs in Nigeria. It results further revealed that the existing high cost of funds from microfinance banks, insincerity, and fund diversion among the borrowers were identified as major factors responsible for the high default rate among SMEs borrowers in Nigeria. Similarly, a study by Muiruri (2014) in Kenya corroborates that of Apiri (2013).

Abdulsaleh & Worthington (2013) conducted a study to assess the effect of SME operators' personal and business characteristics on their financial behaviour and access to external sources of finance. The business characteristics examined include; business size, business age, type of business ownership, business location, as well as industry sector and asset structure of the business. The owners' personal characteristics examined are; owner's gender, age, education, and experience. The findings showed that business characteristics such as; business size, age, ownership type, location, and ability to provide collateral have a direct effect on SME owners' ability to access credit. Moreover, owners' personal characteristics such as gender, age, education, and experience also affect their chances of accessing credit from external sources of finance.

Furthermore, a study carried out by Muthoni (2016) assessed the borrowers' personal and business characteristics associated with loan default in Kenya. A sample size of 106 microfinance institutions and 40 financial intermediaries (FIs) were selected for the study. Questionnaires were used as instruments of data collection, and techniques of data analysis employed were multiple regression & Pearson correlation coefficients. The findings revealed that borrowers' characteristics and business' characteristics have a significant and positive relationship with loan default. It concludes that borrower' and business' characteristics influence loan repayment in both microfinance institutions and financial intermediaries in Kenya and those male borrowers were found to default in loan repayment more than their female counterparts.

Contrary to the above findings, a study by Ackah & Vuvor (2011) revealed that a high rate of default in loan repayment among SME beneficiaries of microfinance services was mostly due to their difficulties in the management of cash receivables. Another study conducted by Madole (2013) on SMEs in Tanzania revealed that collateral, age or experience of SME owners, and size of the firms influence access to credit. The findings also reported high interest rates, Grace period, and moral

hazard as major factors causing a high rate of default among SME borrowers. Kanayo, Jumare & Nancy (2013) in their study to identify the emerging challenges affecting the outreach and sustainability of microfinance institutions in Nigeria revealed that many MFBs have collapsed in Nigeria due to poor quality of the loan and high level of default in loan repayment.

Contract theory

Contract theory analyzes economic phenomena where economic agents are engaged in the contractual agreement. Such a contractual transaction may usually give rise to information asymmetry where one party is more informed than the other. Kenneth Arrow was the first to give the formal treatment of situations with asymmetric information in the field of economics in 1960.

Information asymmetry is a situation where one party engaged in an economic transaction with another party tends to be more informed than the other. That is, the information is skewed to one side, causing the less informed party to make an inappropriate decision. If such a situation occurs in the credit market, adverse selection and moral hazard problems usually ensue. The first problem of information asymmetry, adverse selection occurs as a result of the inability of the creditor (i.e bank) to identify customers that are likely to be riskier than others so that the riskier customers are charged higher than safer ones so as to compensate for the likelihood of loan default. However, the bank does not know who is riskier and who is safer, and setting interest above the average interest rates for every customer often drives safer customers out of the credit market. The second problem, moral hazard arises when banks are unable to ensure proper application and utilization of the investment funds received by customers to make their projects successful. A moral hazard also arises when customers try to abscond with the bank's money (Aghion & Morduch 2005).

Information asymmetry is one of the major reasons SMEs cannot easily to have access external credit. Capital does not always flow to SMEs because of the twin problems of adverse selection and moral hazard, which are known to have a devastating negative impact on SMEs (Stigilitz & Weiss, 1981).

3. Research methodology

This research adopted a cross-sectional survey design using a structured questionnaire. A sample size of 544 MSE beneficiaries of microfinance banks' services out of a population of 12,527 beneficiaries was used. However, to arrive at the sample size needed for this study, a Dillman (2007) sample size determination formula was employed as follows:

$$n = \frac{(\mathrm{Np})(\mathrm{P})(1-\mathrm{P})}{(\mathrm{Np}-1)(\mathrm{B}/\mathrm{C})^2 + (\mathrm{P})(1-\mathrm{P})}$$

n represents a sample size
Np represents the size of the population of the study
P represents percentage of expected responses (at least 50% or 0.5)
B represents accepted level of sampling error (0.05 = ± 5%; 0.03 = ± 3%)
C represents *Z* statistic associated with confidence interval (1.64 = 90% confidence level; 1.960 = 95% confidence level; 2.576 = 99% confidence level)
Therefore, the size of our sample is calculated as:

$$n = \frac{(12{,}527)(0.5)(1-0.5)}{(12{,}527-1)(0.05/1.645)^2 + (0.5)(1-0.5)}$$

$$n = \frac{(12{,}527)(0.5)(0.5)}{(12{,}526)(0.0304)^2 + (0.5)(0.5)}$$

$$n = \frac{(12{,}527)(0.25)}{(12{,}526)(0.0000924) + (0.25)}$$

$n = \frac{3131.75}{11.534} = 271.5$, this is approximately 272.

However, it was reported in Iro (2019) that, "since not every selected respondent will likely respond, there is a need to increase the sample size by the researcher to avoid non-response bias." For this purpose, the sample size is doubled (272 x 2=544), and the sample size used in this is 544 respondents drawn from microfinance banks' beneficiaries

Stratified random sampling was also employed in the research. In the first stage, ten Local Government Areas (LGAs) out of the 44 local governments of Kano State are selected. In selecting the 10 LGAs, 6 LGAs (2 local governments from each of the 3 senatorial zones of the state) outside the Kano metropolis were selected and referred to as 'rural area', while 4 LGAs from within Kano metropolitan area were selected and referred as 'urban area'. At the second stage, ten microfinance banks from the selected ten local government areas (one MFB from each of the 10 LGAs) were chosen. At the third stage, the list of clients of the ten selected MFBs, who are beneficiaries of microfinance services and MSE operators, is collected from these MFBs, and they are categorized based on their economic activities into five strata: Manufacturing, Trading, Agric/Agro-allied, Services, and others. At the fourth stage, 54 respondents from each of the six selected rural MFBs are randomly chosen, whereas, 55 respondents from each of the four selected urban MFBs are chosen, making a total of 544 MSME respondents.

The study employed Logit and Probit regression models as its technique of analysis. Logit and Probit Models were adopted to explore the relationship between loan default and borrowers' personal and business characteristics. Logit and Probit were applied here since the regressand (loan default) is a dichotomous variable. Below is the theoretical model:

$$Y= \beta_0 + \beta_1X_1+\beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5+ \beta_6X_6+ \beta_7X_7+U_t \quad \text{.....1}$$

The empirical model under Logit and Probit models is thus specified as:

LDF = f(MTS, FAS, GEN, EAG, BIS, BLC, BAG) ……..……..2

$$LDF = \beta_o+\beta_1MTS+\beta_2FAS+\beta_3GEN+\beta_4EAG+\beta_5BIS+\beta_6BLC+\beta_7BAG+U_t \text{ ……......3}$$

Table 1. Variables description and measurement

S/N	Variable Name	Variable Description	Variable Measurement
1	MTS	Marital Status	MTS is coded '1' if married and '0' if not married.
2	FAS	Family Size	Number of persons within a household
3	GEN	Gender; Male or Female	GEN is coded '1' for male, and '0' for female
4	EAG	Entrepreneur's Age	Age is categorized as interval scale into 4 categories; 15-30 coded '1', 31-45 coded '2', 46-60 coded '3', and above 60 coded '4'.
5	BI S	Business Size	Business size is coded '1' if an enterprise is micro, '2' if small, and '3' if medium.
6	BLC	Business Location	Location is categorized into 'urban' and 'rural'; where 'urban' refers to any location within Kano metropolitan area and is coded '1', while 'rural' refers to any location outside Kano metropolitan area and is coded '0'.
7	BAG	Business Age	Number of years of the existence of business

Source: Apiri (2013), Muiruri (2014), and Muthoni (2016).

4. Results and discussions

Table 2. Logit and Probit Models for Loan Default (LDF)

Variables	*Logit Model Results*	*Marginal Effects for Logit Model*	*Probit Model Results*	*Marginal Effects for Probit Model*
MTS	-.303	-.072	-.186	-.071
	(.281)	(.067)	(.172)	(.066)
	0.281	0.286	0.279	0.282
FAS	.146***	.034***	.089***	.034***
	(.043)	(.010)	(.026)	(.010)
	0.001	0.001	0.001	0.001
GEN	.809***	.191***	.494***	.188***
	(.219)	(.051)	(.134)	(.050)
	0.000	0.000	0.000	0.000
EAG	-.011	-.003	-.007	-.003
	(.211)	(.049)	(.129)	(.049)
	0.956	0.956	0.956	0.956
BIS	.127	.029	.078	.029
	(.367)	(.086)	(.224)	(.085)
	0.729	0.729	0.726	0.726
BLC	-.076	-.017	-.039	-.015
	(.232)	(.054)	(.141)	(.053)
	0.743	0.742	0.779	0.779
BAG	-.066**	-.015**	-.040**	-.015**
	(.033)	(.007)	(.020)	(.007)
	0.045	0.045	0.043	0.043
Constant	-.002		-.005	
	(.416)		(.254)	
	0.995		0.983	
LR chi2	27.59		27.46	
Prob > chi2	0.0003		0.0003	

Source: Author's Survey 2019 (Computed using STATA 13)

Note: Table 2 contains the coefficients, standard errors in parenthesis, and their respective p-values. "**" and "***" denote the level of statistical significance at 5% and 1% respectively.

Table 2 depicts the estimated results of Logit and Probit models in respect of loan default (LDF) as functions of personal characteristics; marital status, family size, gender, and age, and MSMEs' characteristics; the size of business, location, and business age. The results of Logit and Probit models are interpreted using marginal effects.

From the above results, the p-value (p > chi2) of the likelihood ratio chi^2 (LR chi2) is statistically significant at less than 5% level for both Logit and Probit models, which implies that the models as a whole are statistically significant. This further signifies that the independent variables joined together, that is, personal characteristics (marital status, family size, gender, and age) and business characteristics (business size, business location, and business age) of microfinance borrowers, can reliably predict or explain changes in the dependent variable, that is, loan default.

From the results of marginal effects, the coefficients of marital status (MTS) for Logit and Probit models are -0.072 and -0.072 with respective p-values of 0.286 and 0.282. This implies that the variable MTS is statistically insignificant and negatively related to loan default. This further implies that being a married borrower decreases the probability of loan default by 7.2% and 7.2% respectively. This could be attributed to the fact that borrowers that are married have family responsibility are therefore expected to handle their business with more seriousness and dedication to ensure the business performs sustainably well enough to support the family and repay the loan.

However, this variable is statistically insignificant and not different from zero, hence cannot be used for making any inference.

The variable family-size (FAS) is statistically significant in both Logit and Probit models at 1% level of significance and positively related with loan default. The coefficients of 0.035 and 0.034 in Logit and Probit models indicate that increase in family size increases the probability of defaulting by 3.5% and 3.4% respectively. That is, a microfinance borrower with a larger family size is 3.5% and 3.4% more likely to default than a borrower with smaller family size. This finding concurs with that of Muthoni (2016). The possible reason is that a borrower with a larger family size may usually face larger family responsibilities that increase expenditure, which can affect the financial strength of the business and the borrower's ability to pay the debt as and when due. Moreover, the possibility of diverting loans to settle family-related problems such as buying foodstuffs, paying school fees, or medical bills is higher when a borrower has a larger family size.

Similarly, the variable gender (GEN) is statistically significant at 1% level and positively related to loan default in both Logit and Probit models with respective coefficients of 0.19 and 0.19. This implies that being a male borrower increases the probability of defaulting by 1.9% and 1.9% respectively. This further signifies that male microfinance borrowers have a 1.9% higher probability of default than females. This is corroborated by the findings of Yegon et al. (2013), Wilfred et al. (2015), and Muthoni (2016), who found that male borrowers have a high tendency of defaulting in loans repayment than their female counterparts. This could be related to the high tendency of male borrowers to divert the borrowed funds to other personal uses than the business. Another possible reason is that men tend to spend more out of their business finances than women due to the huge burden of taking care of their family which reduces their savings culture and increases their chances of defaulting.

The findings revealed a negative and insignificant relationship between entrepreneur's age (EAG) and loan default (LDF) in both Logit and Probit models with coefficients of 0.0028 and 0.0027 respectively. This implies that a year increase in the age of a borrower decreases the probability of loan default by approximately 0.3%. This further implies that more mature borrowers are 0.3% more likely to repay their loan without defaulting compared to less mature borrowers. However, the coefficient of EAG is statistically not different from zero, hence cannot be used for making any inference.

The variable business size (BIS) revealed a positive and insignificant relationship with loan default in both Logit and Probit models with coefficients of 0.03 and 0.03 respectively. This signifies that a change in business size (i.e from micro to small enterprise, or from small to medium enterprise) increases the probability of loan default by 3%. The insignificance level of BIS signifies that the size of the borrower's business is not in any way related to the level of loan default, as default can be found among all businesses irrespective of their size. Similarly, business location (BLC) was also found to be statistically insignificant but negatively related to loan default in both Logit and Probit models with coefficients of -0.017 and -0.015 respectively. This implies that SMEs that are located in urban areas have a lower probability of defaulting in loan repayment than SMEs located in rural areas by 1.7% and 1.5% respectively. BLC is statistically insignificant and this signifies that the location of business does not have any meaningful effect in influencing loan default. These findings are contrary to those of Abdulsaleh & Worthington (2013), Madole (2013), and Wilfred et al. (2015) who found that the location and size of business have a positive and significant effect on loan default.

Business age (BAG) also revealed a significant negative related relationship with loan default in both Logit and Probit models with coefficients of 0.016 and 0.015 respectively. This signifies that a year increase in the age of borrower's business decreases the probability of loan default by 1.6% and 1.5% respectively. This further implies that old existing businesses are 1.6% and 1.5% more likely to repay their loan without defaulting than newly established businesses. This finding is supported by

Abdulsaleh & Worthington (2013), Wilfred et al. (2015), and Muthoni (2016). The reason is that, an old existing business is well settled, has accumulated more financial resources, has established good chains of customers, and is managed by a more experienced manager, and therefore stands a better chance to repay its debt than a newly established business.

The findings discussed from Table 2 above indicate that out of 4 borrowers' personal characteristics tested, 2 characteristics (family size and gender) have a positive and significant effect on loan default, while 2 other personal characteristics (marital status and age) have a negative and insignificant effect on loan default. Moreover, out of 3 business characteristics tested, only 1 characteristic (business age) revealed a significant and negative effect on loan default, while 2 business characteristics (business size and business location) revealed an insignificant effect on loan default, with business size having a positive effect and business location having a negative effect. The above findings corroborate the findings of other previous studies, such as the findings of Abdulsaleh & Worthington (2013), Apiri (2013), Kanayo et al. (2013), and Muthoni (2016).

Diagnostic tests for logit and probit models

Table 3. Specification Test for Logit Model of Loan Default (LDF)

MAT	Coefficients	Std. Errors	T	P>|t|
_hat	1.286	.340	3.78	0.000
_hatsq	.345	.317	1.09	0.276
_cons	-.034	.139	-0.25	0.804

Source: Author's Survey 2019 (Computed using STATA 13)

Table 4. Specification Test for Probit Model of Loan Default (LDF)

MAT	Coefficients	Std. Errors	T	P>|t|
_hat	1.274	.327	3.89	0.000
_hatsq	.539	.503	1.07	0.283
_cons	-.022	.086	-0.26	0.796

Source: Author's Survey 2019 (Computed using STATA 13)

Tables 3 and 4 above show the results of the specification test for Logit and Probit models in respect of loan default. The usual 'null hypothesis' states that, "there is no specification error in the model", which is not rejected if the p-value of _hatsq is not statistically significant or rejected if significant (< 0.05). Based on the above results, the p-value of _hatsq in table 4.11 (0.276) and table 4.12 (0.283) is very high and not statistically significant at all levels, hence, the null hypothesis in both models cannot be rejected, and that the models are correctly specified and suitable for estimations

Test of Goodness of Fit for Logit and Probit Models of Loan Default (LDF)

Table 5. Hosmer-Lemeshow Test of Goodness of Fit for Logit Model of Loan Default

	Statistics
Number of observations	421
Number of groups	10
Hosmer-Lemeshow chi2(8)	10.63
Prob > ch2	0.2233

Source: Author's Survey 2019 (Computed using STATA 13)

Table 6. Hosmer-Lemeshow Test of Goodness of Fit for Probit Model of Loan Default

	Statistics
Number of observations	421
Number of groups	10
Hosmer-Lemeshow chi2(8)	11.29
Prob > ch2	0.1859

Source: Author's Survey 2019 (Computed using STATA 13)

The goodness of fit test helps in deciding whether a model fits the data or not. It is usually used to answer the question "how well does my model fit the data?." The decision rule here is that, if the p-value is low (< 0.05) the model is rejected, but if the p-value is high (> 0.05) the model passes the test.

Tables 5 and 6 depict the results of the Hosmer-Lemeshow test of 'goodness of fit' for Logit and Probit models. The p values for Logit and Probit models are 0.2233 and 0.1859 indicating a high p-value greater than 0.05 for both models. Therefore, our models cannot be rejected, and the best fit of the models is well represented by the data generating process.

5. Conclusion

The study concludes that male MSME borrowers are more likely to default than their female counterparts. An increase in borrowers' family size is reported to increase the probability of default. An increase in the age of borrowers' business was found to decrease the probability of loan default. Borrowers' age, as well as the size and location of the business, are not significant factors in determining loan default.

The study recommends that microfinance banks should give more priority to female entrepreneurs when disbursing loans to their beneficiaries as they were found to be more reliable in repaying the loan, this will also minimize the high cases of loan default among their beneficiaries.

Limitations and future research

Part of the limitations of this study is the difficulty involved in getting the required information from the sampled microfinance beneficiaries. This research considered only personal and business characteristics of microfinance banks' borrowers as determinants of loan default in some selected areas of Kano State. Findings in other areas may differ. Further research should investigate other factors causing a high rate of loan default among microfinance banks' borrowers.

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