

ASSESSING MSMEs GROWTH THROUGH ROSCA INVOLVEMENT USING PAIRED *t*-TEST AND ONE SAMPLE PROPORTION TEST

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Abstract

*In this research work, rotating savings and credit association (ROSCA) effect on the growth of micro, small and medium enterprises (MSMEs) and identification of a factor supporting the continuity of ROSCAs is studied. A well-designed questionnaire with a reliability value of 0.957 was distributed to 400 entrepreneurs in Wukari through snowball sampling technique. After validity check, 368 valid questionnaires were used for the research. Firstly, a paired *t*-test was applied to know if entrepreneurs achieve significant positive growth in their business before and after 5 years of joining ROSCAs. At 5% level of significance, entrepreneurs achieved significant positive growth in their businesses 5 years and above of joining ROSCAs. Secondly, a one sample proportion Z-score test was used to identify the major factor responsible for ROSCAs continuity. At 5% significance level, flexibility was identified as the major factor responsible for ROSCAs. It was concluded based on the results obtained that ROSCAs has a significant positive effect on the growth of MSMEs and ROSCAs continuity towards MSMEs growth is due to its flexibility factor in terms of operations, disbursement, seeking loans and interest rate.*

Keywords: Flexibility, Growth, MSME, ROSCA, *t*-test, Z-score

JEL Classification: G23; D72; L26

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1. Introduction

Micro, small and medium enterprise (MSME) sector perform a significant role worldwide (Abiola 2012). It has a potential socioeconomic contribution noticeably in job creation, revenue creation, innovations and serve as a vibrant catalyst for urban and rural growth (Love & Roper, 2015; Memili, Fang, Chrisman, & De Massis, 2015; Regnier, 2017). Most of the industrialized countries, over 98% of all manufacturing sector firms originate from the SMEs sector and they are main employment providers (Chowdhury, Azam & Islam, 2015). The characterizations of SME are typically peculiar in every country, established on the role of SME in the economy, policies and programs considered by agencies or institutions authorized to develop MSME. Illustratively, a small business in developed economies like Japan, United States of America (USA), Germany, etc., may be a medium or large-scaled business in developing economies like Nigeria, Ghana, etc., (Etuk, Etuk, & Michael, 2014). In Nigeria, the adoption of value of fixed capital in determining what a small scale industry (SSI) is, varied from ₦60,000 in 1972, ₦159,000 in 1975, ₦250,000 in 1979, ₦500,000 in 1986, to a fixed investment not greater than ₦2,000,000 in 1992 and ₦5,000,000 in 2003 and above. Business or enterprise below the upper bound of ₦250,000 with annual turnover exceeding that of a cottage industry currently at ₦5,000 per annum is a SSI. While National Directorate of Employment (NDE) concept of an SSI is fixed at a maximum of ₦35,000 (Ene & Inemesit, 2015; Amuchie & Christina, 2018).

It is unarguably true that SME sector hires more than 25% of the productive labour force in the developing countries. In Nigeria, MSMEs are increasingly recognized as the principal means for achieving equitable and sustainable industrial diversification and diffusion. In most countries MSMEs contributes in total above half of the total employment share, sales and value. In terms of employment it contributes on average about fifty percent to employment and industrial output respectively but contributes a meagre one percent to Nigeria GDP (Babatope & Akintunde, 2010; Babagana, 2010; Abdullahi *et al.*, 2015; Aroloye, 2017). Damaševičius (2018) posits that despite SMEs contributions in county's job creation, their continuing growth and strengths has been compromised by the persistent limitations on their access to financing from formal-sector. Financial gap exists in Nigeria MSME sector which deteriorates their growth, productivity, performance and contributions to the country's economy (Aminu & Shariff, 2015). Accessing loans from formal sources, especially the commercial banks, had become a herculean task for MSMEs in Nigeria due to strict conditions attached to these loans. This forces enterprises to look elsewhere for succour, since finances from formal financial institutions are not easy to access, MSMEs resolve to use informal mechanisms instead (Simpasa, Shimeles & Salami, 2015; Biscaye, *et al.*, 2015).

The widespread use of rotating savings and credit association (ROSCAs), and similar informal financial networks is a testament to this (Egboro, 2015; Ksoll, Lilleør, Lønborg, & Rasmussen, 2016; Taiwo, Yewande, Edwin & Benson, 2016). Informal banks are well known globally as Rotating Savings and Credit Associations (ROSCAs) which are systems that provide quick access to savings and credit systems for people, mostly women, who are

excluded from formal micro banking channels. In many parts of the world, informal community micro banks are operating, including in rich countries like the US and Canada with large diaspora populations (Hosseini, 2014). In Nigeria, ROSCAs also exist. ROSCAs derive their rotating pattern based on mutual agreement among the members in the group. Contribution is fixed based on mutual agreement looking at their financial strength so as to avoid delay in contribution or inability to continue because sustainability is one of the setbacks of ROSCAs (Faloye, 2014; Hammawa & Hashim, 2016; Kabuya, 2015).

To efficiently study ROSCAs impact on MSMEs growth theoretically, *information asymmetry theory* is adopted as a framework for this study. The theory is based on the notion that the borrower is likely to have more information than the lender about the perils of the venture for which they collected funds. This leads to the problems of ethical vulnerability and hostile selection (Matthews & Thompson, 2008). These problems reduce the efficiency of the transfer of funds from surplus to deficit units. This is typical of entrepreneurs to their financial institutions which have led to little or no attention from financial institutions to support the growth of MSMEs in most developing countries like Nigeria. However, on the side of the banks, they have not been able to demonstrate any concern for providing commitment to long-term relationships with customers. Adamantly, they refused being part of the information sharing coalitions (economies of scale) and refused to delegate a monitoring team as a means of checkmating borrowers (Gwilym, 2011).

According to Matthews and Thompson (2008), if a bank has a close relationship with its borrowers, then this enables the bank to have good information about future prospects and to take remedial action (other than foreclosure) in the event of the borrower experiencing problems. There is evidence that firms with close banking ties appear to invest more and to perform more efficiently than those without such ties. Under direct financing, it is necessary for a lender to obtain information with effort to recompense the asymmetry of the information. However, information is costly to obtain and is a 'public good'. In absence of a bank, any purchaser of information about a borrower can easily sell or share that information (Gwilym, 2011). Hence, ROSCAs operates on close relationship among members whose information about each member is not far fetch. Most ROSCAs members originate from close friendship, co-worker, family, same business operation, same living environment, etc. The information asymmetry theory supports the formation of any informal financial group like ROSCAs since membership is heavily in reliance to information about members who agree to be part of the contributing and borrowing processes. This research investigates the impact of ROSCAs on MSMEs growth in Nigeria through the application of paired *t*-test and Z-score test. The objectives of the study is to know if entrepreneurs in Wukari, Taraba State, Nigeria recorded significant positive growth in their businesses as a result of joining ROSCA and to determine the factors responsible for ROSCAs sustainability as an informal institution towards MSMEs growth.

2. Methodology

This study employs the cross-sectional survey research design. The choice for cross-sectional survey is because our target respondents differs in their type of ROSCA involvements, that is, in terms of formation, contribution amount, number of participants, selection system of turn to be contributed for and length of rotation cycle. Also, the choice of cross-sectional survey system is to get responses from respondents who are entrepreneurs at different categories, that is, micro, small and medium entrepreneurs who have funded their line of businesses through ROSCAs of different operating platforms. Likewise, through the cross-sectional survey system employed, responses from entrepreneurs that have been into ROSCAs at different length in time can be obtained which will give a cross-sectional view of the impact of ROSCA on the growth of MSMEs. The target population of this study is all registered MSMEs with the revenue office at Wukari local government area (WLGA), Taraba State, Nigeria. According to the WLGA revenue office record, the total number of MSMEs as of 2019 was 8197.

The sampling technique used in selecting the number of members belonging to any ROSCA's group will be obtained through *snowball* sampling technique (Osuala, 2002). The sampling technique is suitable because it helps to locate an entrepreneur who is a member of ROSCA and a next respondent is located from the previous respondent and this goes on until the number of respondents needed is reached. Yomens (2000) formula for sample size determination was adopted. The formula is given as follows.

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

where, SS is the sample size, N is the population size and e is the tolerable error in investigating the population.

$$SS = \frac{8197}{1 + 8197(0.05)^2} = 381.388856577876 \approx 381$$

Hence, 381 questionnaires would be administered to owners of MSMEs in WLGA in Zaria using *snowball* sampling technique. To reduce the proportion of incomplete questionnaires, 400 questionnaires were administered to entrepreneurs that belong to any ROSCA group through the snowball sampling technique.

In order to implement the cross-sectional survey for this research, a well-designed questionnaire is used to obtain the necessary data from the respondents for proper analyses, interpretations and conclusions. The designed questions are both structured and unstructured so as to capture all relevant information necessary for testing the research hypotheses. A three months period was used in collecting the data. This period for collection was feasible because 10 trained enumerators were used for the field data collection in order to make it easy and fast. This system was employed because consideration for number of revisits that might be

encountered due to respondent's absence or a reschedule from the respondent was taken into consideration.

Before any analysis of the collected data, reliability and validity tests were carried out. Cronbach's Alpha test (CAT) was applied for measuring the reliability of the instrument. The estimated Cronbach's Alpha value for the entire instruments distributed is expected to be close to one. In this research the CAT value obtained is 0.957 which implies a very high reliability for the instruments being administered. The instruments were adequately checked to remove wrongly filled questionnaires. Also, for this research work, an instrument shall be termed valid only if it is filled by an entrepreneur who is a member of ROSCA. In the path of validity check, 32 questionnaires were found invalid and as a result 368 instruments were used for further analyses.

2.1 Statistical Methodology

The statistical tests used for this research are the paired t -test statistic applied to ascertain if ROSCAs have a significant positive impact to the growth of MSMEs and a Z-score test for a sample proportion to identify the factors necessitating the continuity of ROSCAs among entrepreneurs in the study area. All data analyses were performed using Minitab version 18.

2.1.1 The Paired t -Test Statistic

The paired t -test arises when two different measurements originates from the same source. In this research data on respondents annual sales turnover before joining and 5 years after joining ROSCAs, number of employee before joining and 5 years after joining ROSCAs and annual savings before joining and 5 years after joining ROSCAs shall be collected.

Let X_i denote before joining ROSCAs and Y_i denote 5 years after joining ROSCAs. The data can be described by the n pairs (X_i, Y_i) , $i = 1, \dots, n$.

Let $W_i = X_i - Y_i$, $i = 1, \dots, n$. Now if there is no difference, it should follow that W_i would have zero mean. Hence, the hypothesis can be tested for no difference by testing

$$H_0 : \mu_w = 0 \quad \text{versus} \quad H_1 : \mu_w \neq 0 \quad (2)$$

where $W_1, \dots, W_n$ are assumed to be a sample from a normal population having unknown mean μ_w and unknown variance σ_w^2 . Hence, this can be tested by (Ross, 2004)

$$\text{Not rejecting } H_0 \text{ if } -t_{\alpha/2, n-1} < \sqrt{n} \frac{\bar{W}}{S_w} < t_{\alpha/2, n-1} \quad (3)$$

Reject H_0 otherwise

where $\alpha = 0.05$ significance level, $n - 1$ is the df , $\bar{W}$ is the sample mean difference and S_w is the sample standard deviation of the difference W . $\bar{W}$ and S_w can be expressed as

$$\bar{W} = \frac{\sum_{i=1}^n W_i}{n} \text{ and } S_w = \sqrt{\frac{\sum_{i=1}^n (W_i - \bar{W})^2}{n-1}} \quad (4)$$

Six variables (X_1, X_2, X_3, Y_1, Y_2 and Y_3) would be compared using the above paired t -test presented in equation (3), that is, (X_1 by Y_1), (X_2 by Y_2) and (X_3 by Y_3) at 5% significance level to test the research hypothesis (H_{01}) as stated in equation (2) of this study. The null hypothesis is retained if the probability value (P-value) is greater than 5% significance level but if the P-value produced is less than 5% significance level the hypothesis will be rejected. Where, X_1, X_2, X_3, Y_1, Y_2 and Y_3 are defined as entrepreneur's annual sales turnover before joining ROSCAs, number of employee before joining ROSCAs, annual savings before joining ROSCAs, entrepreneur's annual sales turnover 5 years after joining ROSCAs, is number of employee 5 years after joining ROSCAs and annual savings 5 years after joining ROSCAs respectively.

2.1.2 One Sample Proportion Test

The proportion estimate P is given as

$$\hat{P} = \frac{x}{n} \quad (5)$$

where, x is the number in the sample that have the outcome of interest and n is the sample size. The hypothesis to be tested is

$$H_0 : P = P_0 \quad \text{versus} \quad H_1 : P \neq P_0 \quad (6)$$

The hypothesis considers if the population proportion is equivalent to some pre-specified value, P_0 . As a rule of thumb nP_0 and $n(1-P_0)$ are greater than 5. In this research we choose a pre-specified value, P_0 to be 0.1 greater than half of 1 which is the maximum proportion size, which is 0.6. Once the proportion estimate P of equation (5) has been obtained, the Z-score statistic which follows approximately a standard normal distribution, that is, $Z \sim N(0, 1)$ is to be estimated. The Z-score is given as follows.

$$Z = \frac{\hat{P} - P_0}{\sqrt{\hat{P}(1 - \hat{P})/n}} \quad (7)$$

where, n is size of the sample, $\hat{P}$ is the proportion estimate and P_0 is the pre-specified value. The null hypothesis H_0 in (6) is rejected at 5% significance level if $|Z| > Z_{\alpha/2}$, where $Z_{\alpha/2}$ is the $1 - \alpha/2$ percentile of the standard normal distribution. The confidence interval for the Z-score is given as follows.

$$\left(\hat{P} - Z_{\alpha/2} \sqrt{\frac{\hat{P}(1 - \hat{P})}{n}}, \hat{P} + Z_{\alpha/2} \sqrt{\frac{\hat{P}(1 - \hat{P})}{n}} \right) \quad (8)$$

3. Results and Discussion

The frequency distribution of the entrepreneurs shows that 269 (73.1%) of the respondents are males while 99 (26.9%) of the respondents are female. Also, 183 (49.7%) are of the age group 20 – 30 years old, 104 (28.3%) of them are of the age group 31 – 40 years, 65 (17.7%) of the respondents are of the age group 41 – 50 years, 12 (3.3%) of them are of the age group 51 – 60 years and only four of the members are above 60 years. Based on educational status, 46 (12.5%) have no formal education, 48 (13%) have first school leaving certificate, 71 (19.3%) have senior secondary school certificate, 112 (30%) have national certificate of education/diploma, 84 (22.8%) have first degree/higher national diploma, 6(1.6%) have master degree and only one (0.3%) of the respondent have other educational qualification. Also, 43 (11.7%) of the respondents are into farming, 87 (23.6%) are into trading, 104 (28.3%) are artisans, 16 (4.3%) have small scale industry, 82 (22.3%) are service providers and 36 (9.8%) are into other type of businesses. Results on the frequency distribution on the factors described are presented in Table no. 1.

Table no. 1: Respondents' Sex, Age, Educational Status and Work Type Frequency

SEX	Frequency	Percent
Male	269	73.1
Female	99	26.9
Total	368	100.0
AGE		
20-30 years	183	49.7
31-40 years	104	28.3
41-50 years	65	17.7
51-60 years	12	3.3
Above 60 years	4	1.1
Total	368	100.0
DUCATIONAL STATUS		
No formal education	46	12.5
FLC	48	13.0
SSSC	71	19.3
NCE/DIPLOMA	112	30.4
First Degree/HND	84	22.8
Master Degree	6	1.6
Others	1	.3
Total	368	100.0
WORK TYPE		
Farming	43	11.7
Trading	87	23.6
Artisans	104	28.3
Small Scale Industry	16	4.3
Services	82	22.3
Others	36	9.8
Total	368	100.0

Field survey (2019)

3.1 Examination of Research Questions and Hypotheses

Research Question One: *Do entrepreneurs achieve significant positive growth in their business before and after 5 years of joining ROSCAs?*

In answering the above stated research question, entrepreneurs responses which corresponds to questions related to the research question stated above was examined through the hypothesis stated below. Note, significant positive growth for this research is defined as entrepreneur's business evolution in terms of increased turnover on sales, savings, customer base, number of branches and number of employees 5 years after joining ROSCAs.

H₀₁: *Entrepreneurs achieved no significant positive growth in their business after 5 years of joining ROSCAs.*

The paired *t*-test analysis was applied to the above stated first research question and hypothesis at 5% significance level on the annual sales turnover before joining ROSCA (ASTOB) and annual sales turnover after joining ROSCA (ASTOA), annual savings before joining ROSCA (ASB) and annual savings after joining ROSCA (ASA), number of employees before joining ROSCA (NEB) and number of employees after joining ROSCA (NEA), number of branches before joining ROSCA (NBB) and number of branches after joining ROSCA (NBA), and number of products producing/selling before joining ROSCA (NPPSB) and number of products producing/selling after joining ROSCA (NPPSA). Table 1 below presents the paired *t*-test results and it can be observed that the p-values for each respective pairs are less than 5% significance level which implies that there is a significant difference between pairs of variables.

Table no. 2: Paired T-test Results

Pairs	Mean Difference	<i>t</i> -Test	DF	P-value
ASTOB – ASTOA	-27733122.20652	-1.047	367	0.296
ASB – ASA	-279668.20652	-3.125	367	0.002
NEB – NEA	-2.44293	-14.706	367	0.0001
NBB – NBA	-0.71196	-12.538	367	0.0001
NPPSB – NPPSA	-4.94293	-7.073	367	0.0001

Field survey (2019)

The results in Table no. 2 shows that there is a positive effect five years and above of joining ROSCAs because the mean difference is negative all through for the five pairs, that is, output as a result of entrepreneurs involvement in ROSCAs increased five years and above of joining ROSCAs. However, the probability value (p-value) of 0.296 from the paired *t*-test for the annual sales turnover before (ASTOB) and five years and above (ASTOA) of joining ROSCAs implies the positive effect observed is not significant at 5% significance level. However, the positive effects observed for annual savings before (ASB) and five years and above (ASA) of joining ROSCAs, number of employees before (NEB) and five years and above (NEA) of joining ROSCAs, number of branches before (NBB) and five years and above (NBA) of joining ROSCAs and number of products producing/selling before (NPPSB) and five years and above (NPPSA) of joining ROSCAs are all significant since their respective p-values in Table no. 2 are all less than 5% significance level.

Therefore, from the results obtained it can be clearly stated that entrepreneurs achieve significant positive growth in their businesses five years and above of joining ROSCAs and

this implies that the stated null hypothesis (H_0) is rejected and it can be concluded that there is a significant positive effect of ROSCAs on the growth of MSMEs in WLGA, Zaria.

Research Question Two: *What is the major factor responsible for the continuity of ROSCAs to the growth of MSMEs?*

In answering the second research question stated above we examined the responses of entrepreneurs on the major factor responsible for ROSCAs continuity despite known constraints associated to ROSCAs through the hypothesis stated below

H₀₂: *there is no significant major factor responsible for ROSCAs continuity for MSMEs growth.*

Based on respondents response frequency on ROSCAs flexibility amidst known constraints that might be associated to ROSCAs and members involved coupled with a test of response proportion, the above stated research question is examined and the hypothesis will be accepted or rejected. First, respondents were asked if they will still continue to be members of any ROSCAs they identified to be okay despite the known associated risks involved. Table no. 3 showed that out of the 368 entrepreneurs that responded, 96.7% of them responded *yes* they will still join to be a member and a benefactor. Only 3.3% responded they will not (*no*) join any ROSCAs they found to be okay. Secondly, to ascertain the level of acceptability of ROSCAs despite identified constraints, the entrepreneurs were asked if saving with a bank is more flexible than ROSCAs. It was found out that out of the 368 entrepreneurs that responded, 64.4% responded that ROSCAs is more flexible than saving with a bank. Also, it was discovered majority of these ROSCAs members which amount to 73.9% have either a savings or current account with existing banks in Wukari while 26.1% of the ROSCAs members do not have savings or current bank accounts.

Table no. 3: Response Frequency and Proportion Test for ROSCAs Continuity

Variable	Frequency (%)		Z-value	P-value	95 % CI
	Yes	No			
Even as there are associated constraints with ROSCAs, will you continue to be a member of any identified good ROSCAs?	356 (96.7)	12 (3.3)	17.93	0.0001	(0.949245, 0.985538)
Do you have a savings or current account with any of the existing banks in Wukari?	272 (73.9)	96 (26.1)	9.17	0.0001	(0.694267, 0.783994)
Saving with a bank is more flexible than saving with ROSCA.	131 (35.6)	237 (64.4)	5.53	0.0001	(0.595102, 0.692942)

Field survey (2019)

These differences identified from the responses of entrepreneurs are clearly captured by the test of response proportion with a p-value of 0.0001 respectively at 5% significance level. This implies that we reject our null hypothesis and conclude that flexibility is a major factor for ROSCAs continuity for MSMEs growth. Flexibility in this context implies ease of setup, agreed cycle time, agreed amount of contribution, no hidden cost and low interest rate for borrowers.

4. Conclusion

In this research work, the effect of ROSCA on the growth of MSMEs and the identification of the factor necessitating the sustenance of ROSCA is studied. A *t*-test and Z-score test were applied for the study. Results obtained from both statistical tests applied showed that entrepreneurs experienced positive business growth five years and above joining ROSCAs in terms of annual sales turnover, annual savings, number of employees, number of branches and number of products producing/selling. While flexibility was found to be the major factor responsible for ROSCAs continuity towards MSMEs growth, that is, flexibility in operations, disbursement, seeking loans and interest rate. As a result of this flexibility trait, 96.7% of the entrepreneurs accepted to join any ROSCA group found to be good. Therefore, it is concluded that ROSCAs as an informal financial institution is a good alternative for generating funds for the growth of MSMEs due to its flexibility in the period of financial contribution amongst members pegged to the ROSCAs model for saving and sourcing funds to grow their businesses. However, this is at the expense of belonging to a ROSCA that is well formulated, designed and guided by agreed rules put together by respective members.

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Appendix: Designed Questionnaire

SECTION A

Biodata / firm size (micro, small or medium)

1. Sex

Male	☐
Female	☐
2. Age

20 – 30 years	☐
31 – 40 years	☐
41 – 50 years	☐
51 – 60 years	☐
Above 60 years	☐
3. Religion

(a) Islam	☐	(b) Christianity	☐	(c) Others	☐
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4. Marital status

(a) married	☐	(b) single	☐	(c) widowed/divorced	☐
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5. Educational qualification

No formal education	☐
First Leaving Certificate	☐
Senior Secondary School Certificate	☐
NCE/DIPLOMA	☐
First Degree/HND	☐
Masters Degree	☐
Others	☐
6. Occupation/Type of Business

Farming	☐
Trading	☐
Artisan	☐
Small Production Industry	☐
Services	☐
Others	☐
7. Do you have a savings/current account with any of the banks in Wukari? (a) Yes ☐ (b) No ☐
8. Saving with a bank is more flexible than saving with ROSCA. (a) Bank ☐ (b) ROSCAs ☐

9. Even as there are associated constraints with ROSCAs will you continue to be a member of any identified good ROSCAs? (a) Yes [] (b) No []

SECTION B

Impact of ROSCAs Credit on the Growth and Development of MSME's in Wukari LGA.

10. How long have you been contributing/ receiving ROSCA credit?
Below 1 year []
Below 2years []
Below 3 years []
Below4 years []
5 years and above []
11. Has ROSCAs helped you grow your line of business? (a) Yes [] (b) No []
12. What was your annual sales turnover before joining ROSCA? _____
13. What is your annual sales turnover after joining ROSCA? _____
14. What was your annual savings before joining ROSCAs group? _____
15. What is your annual savings after joining ROSCAs group? _____
16. How many people you employed before joining ROSCAs? _____
17. How many people you have employed after joining ROSCAs? _____
18. How many branches were you operating before joining ROSCAs? _____
19. How many branches are you operating now after joining ROSCAs? _____
20. How many products were you producing/selling before joining ROSCAs? _____
21. How many products are you producing/selling now after joining ROSCAs? _____