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# Success versus Failure Prediction Model for Small Businesses in Ghana

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## ABSTRACT

This study tests the validity of Lussier model in predicting success or failure of small businesses in Ghana, Africa. The study uses logistic regression to analyze 101 failed and 107 successful small businesses. The results of the study support the model validity in Ghana and three variables (capital, economic timing, and marketing skills) were significant in predicting small businesses success or failure. The model also predicted 86.5% of the businesses accurately with a high *R*-square value. This study is the first to test the Lussier model in Africa and reinforces the validity of the Lussier model as a global success or failure prediction model that contributes to theory and practice. Implications for future and current entrepreneurs; government agencies that train, advice and assist small business owners; public policy makers; educators; suppliers; lenders; and consultants are presented.

## KEYWORDS

Small businesses; Lussier model; success; business failure; Ghana

## 1. Introduction

Small businesses in both developed and developing economies have been recognized by global governments for their contribution to economic growth, job creation, social cohesion and development (Abor & Quartey, 2010; Agwu & Emeti, 2014; Gagoitsepe & Pansiri, 2012; Makanyeza & Dzvuke, 2015; Mead & Liedholm, 1998). Entrepreneurs also contribute significantly to a country's GDP, and the majority of firms in both developed and developing countries consists of small businesses (Domeher, Musah, & Hassan, 2017; Kyereboah-Coleman & Amidu, 2008). For example, there are 28.8 million small businesses in the United States representing 97.8% of the businesses and they employ 56.8 million workers in the private sector (SBA, 2016). In Ghana, small businesses represent 92% of all businesses; they contribute 70% to GDP and employ more than 80% of the workforce (Abor & Quartey, 2010).

These significant roles small businesses play in every economy suggest that government and policy makers must create the necessary enabling environment to create, develop, and sustain them for continuing growth (Al-Saleh, 2016), in order to reduce poverty (Tait, Van Eedeu & Venter, 2001) and create employment opportunities (Guzman & Lussier, 2015).

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Meanwhile, most small businesses fail (Neshamba, 2006), within the first five (Pena, 2004) or six years (Hayward, Shepherd, & Griffin, 2006). Therefore, success and failure prediction of small business has become an important area in research (Davidsson & Klofsten, 2003) to both prospective and well-established entrepreneurs, and other stakeholders (Dennis & Fernald, 2001). Thus, understanding why they failed or succeed is crucial to the stability and health of the economy (Carter, Williams, & Reynolds, 1997; Hyder & Lussier, 2016).

Why do some businesses succeed and others fail? There is great inconsistency in research study findings, as they have failed to clearly identify a list or model of variables that do in fact contribute to the success or failure of small businesses (Lussier & Halabi, 2010; Marom & Lussier, 2014). Currently, there is no empirical or theoretical framework to develop a theory (Hyder & Lussier, 2016). Therefore, there is a need for further research (Marom & Lussier, 2014). Bono and McNamar (2011) stated that replication studies are vastly underutilized in management research and concluded that there is also a need to test the validity of a model in different countries to access its robustness. So, there is also a need for a global success versus failure prediction model (Guzman & Lussier, 2015).

This study makes research contributions in this field as it adds to the existing body of knowledge by testing the Lussier (1995) success versus failure prediction model in Ghana, a country where three out of five businesses fail within the first five years of corporation (Kusi, Opata, & Narh, 2015). Without a theory, this study contributes to developing an empirical framework to predict success versus failure of small businesses. To our knowledge, this is the first success versus failure prediction study conducted in Sub-Saharan Africa, Ghana. Therefore, this study further validates the Lussier model as a global predictor of success or failure.

This study also makes practical contributions and the model can be used in Ghana to increase the chances of success of entrepreneurial new ventures. Ghana is currently making contributions of sustaining the private sector and establishment of businesses in every district of the country and predicting entrepreneurial fate can guide activities of government to continue this development. Also, evidence providing insight for entrepreneurs, policy makers, and other stakeholders could aid in their efforts through the reallocation of resources that may help reduce the rate of poor performance or insolvency (Halabi & Lussier, 2010). Hence, the implications of the study can strengthen the small business sector in Ghana, which can result in more job creation, greater social cohesion, better income distribution, and eventually lead to increased economic growth and development.

## 2. Literature review

### 2.1. Resource-based theory

The study uses resource-based theory (RBT) to explain factors that contribute to success or failure of small businesses. RBT was introduced by Wernerfelt (1984), and it has been widely used as a theoretical base for understanding how firms' resources drive performance (Crook, Ketchen, Combs, & Todd, 2008). Many scholars have argued that it is firm's ability to deploy resources that explain their performance differentials (Newbert, 2007). The theory argues that entrepreneurs need to have specific resources that will help to recognize new opportunities and assemble other resources for their firms to succeed (Alvarez & Busenitz, 2001).

RBT is widely utilized in the field of small businesses. For example, Thornhill and Amit (2003) used the RBT to differentiate between organizations that have experienced failure during their preliminary stages due to their lack of financial resources or knowledge management. Additionally, O’Cass and Sok (2013) used the RBT to examine the extent to which combinations of intellectual resources, product innovation, and marketing knowledge influence the performance of small businesses. Drawing on the resource-based theoretical lens and in the context of success factors of small businesses, the study test Lussier (1995) 15 success versus failure factors to find out the resource-based factors that contribute to success or failure of businesses in Ghana.

## **2.2. Prediction models**

Several failure prediction models (Altman, 1968; Altman, Haldeman, & Harayanan, 1977; Beaver, 1966; Blum, 1974; Deakin, 1977; Ohlson, 1980) are based on financial data, but fewer models include non-financial variables (Lussier & Corman, 1995). These models are based on a number of prediction models used with large firms due to the availability and accessibility of financial data. These models also include financial performance measures, so they are not appropriate for use with start-up new ventures with no prior financial history. As a result, scant literature is available on failure predictions for small businesses (Altman & Sabato, 2007) because it is difficult to access their financial data and many small entrepreneurial businesses are not even in the formal sector in many developing countries such as Ghana.

That is why to date the failure prediction studies in Ghana focused either on qualitative research on large company (Amankwah-Amoah & Debrah, 2010), or quantitative by testing and incorporating a particular tool using financial data on large firms (Amoa-Gyarteng, 2014; Appiah, 2011; Gyimah & Boachie, 2018). Meanwhile, the use of financial data or models for prediction of failure or success of businesses has been questioned (Corman & Lussier, 1991; Gilbert, Menon, & Schwartz, 1990). For instance, Appiah (2011) found multiple discriminant analysis (MDA) model to be poor predictor of failure on the financial data of listed firms in Ghana because the model had 84.62% Type II error rate. Also, financial information can be manipulated using some accounting policies (Eljelly & Mansour, 2001; Rosner, 2003), and that it is unrealistic to use financial information to predict failure or success of a business. These are some of the reasons why Lussier (1995) asserted that non-financial variables can more accurately predict success or failure of small businesses than financial data, especially for new ventures with no financial history.

## **2.3. Lussier model and prior studies**

The Lussier (1995) model is the most extensive model which has been validated for SMEs research (Dennis & Fernald, 2001; Teng, Bhatia, & Anwar, 2011). The Lussier model was created in 1995 by Professor Robert Lussier in the United States to build understanding of why some businesses succeed and others fail. The model considers distinct factors identified from 20 prior studies that contribute to success and failure of small businesses in which other researchers did not consider. The model consists of 15 financial and non-financial variables that were selected from 20 prior studies identified as contributing factors to success and failure of small businesses, and the model is also more appropriate for small businesses since prior financial data are often unavailable.

Although there is no universally accepted theoretical foundation that constitutes the success versus failure prediction variables of small businesses, Lussier (1995) used resource-based theory in research studies, as entrepreneurs make judgments about which resources are more or less important for the development of their venture. The 15 variables of Lussier model are shown in Table A1.

Table A2 summarizes comparison of Lussier (1995) model variables updated in 40 prior studies of the factors contributing to the success or failure of small businesses. (Refer Appendix for Tables A1 and A2).

### 3. Methods

#### 3.1. Study area and small business context

The study is conducted in Ghana, a sub-Saharan Africa region located in western part of Africa. The country occupies a surface area of 239,567 km<sup>2</sup> and has an estimated population of 28,308,301 across its 10 regions. Ghana's nominal GDP per capital is \$2,081 where small business contributes 70%. Small businesses in Ghana include businesses that employ at most 50 workers with a threshold of not more than a cedi equivalent of \$1 million (excluding land and building) that undertake economic activity. Most small businesses in Ghana are sole-proprietorship businesses managed by individuals between the ages of 31 and 40 years.

A report by ITC (2016) found that SMEs in Ghana generate an average annual income between \$26,000 and \$1,022,000 (cedi equivalent) depending on the size of the firm and most revenue comes from domestic sales. Thus, small businesses contribute significantly to economic growth and development (Abor & Quartey, 2010; Kessey, 2014); and are the critical economic drivers in Ghana. However, three out of five businesses fail within the first 5 years of incorporation in Ghana, and henceforth, a study to understand why they failed or succeed can contribute to the stability and health of the Ghanaian economy.

#### 3.2. Research design and sample

Small businesses and entrepreneurship journals favored replication studies (Gamboa & Brouthers, 2008) and Brush, Manolova, and Edelman (2008) suggested research study replication in other countries. Therefore, this study used primary survey research data using the Lussier (1995) model questionnaire that has been previously validated in different countries.

The population includes registered businesses that do not publish their accounting data (IASB, 2015; IFRS for SMEs: Section 1) and employs at most 50 workers with a threshold not more than a cedi equivalent of \$1 million excluding land and building that undertake economic activity. The study used random sampling techniques in the selection of sample of small businesses. This method is commonly used in firm-level studies (Brush et al., 2008; Carrero-Morales, 2015; Lussier & Halabi, 2010).

The questionnaires were administered across the 10 regions of Ghana within a period of 40 days. The questionnaires were collected through four sources using Hyder and Lussier (2016) research methodology: (1) interviewing entrepreneurs and/or managers of businesses; (2) Electronic (by means of email using Google forms) to businesses registered under National Board for Small-Scale Industry (NBSSI) and Small Business Advisory Officers across the Country; (3) Accounting firms and (4) Executive students using

Weekend/Distance studies students. A total of 750 questionnaires were administered and 307 completed the survey resulting in a response rate of 40.9%. However, 83 responses were incomplete and 16 businesses were omitted since they were classified as large firms. Thus, 208 questionnaires were usable for the study, in which 107 were classified successful and 101 as failed firms.

The combined sample of successful and failed firms includes 21% from Greater Accra region, 10% Brong-Ahafo region, 9% Northern region, 18% Ashanti region, 4% Upper East region, 12% Central region, 5% Volta region, 6% Western region, 4% Upper West, and 11% Eastern region.

### 3.3. Model and variable measures

#### 3.3.1. Model and statistical analysis

As in Lussier (1995; Lussier, 2005), Lussier and Pfeifer (2001), Lussier and Halabi (2010), Teng et al. (2011), Lussier, Bandara, and Marom (2016), Hyder and Lussier (2016) studies as well as Reynolds (1987), Cooper, Dunkelberg, Woo, and Dennis (1990), (1991), logistic regression was used to test the model based on a dichotomous dependent variable. The model for the study is:

$$\begin{aligned} \text{Logit (Success)} = & \beta_0 + \beta_1 \text{Capital} + \beta_2 \text{Record Keeping and Financial Control} + \beta_3 \text{Industry} \\ & \text{Experience} + \beta_4 \text{Management Experience} + \beta_5 \text{Planning} + \beta_6 \text{Professional} \\ & \text{Advice} + \beta_7 \text{Education} + \beta_8 \text{Staffing} + \beta_9 \text{Product/Service Timing} + \\ & \beta_{10} \text{Economic Timing} + \beta_{11} \text{Age of Owner} + \beta_{12} \text{Partners} + \beta_{13} \text{Parent} + \\ & \beta_{14} \text{Minority} + \beta_{15} \text{Marketing} \end{aligned} \quad (1)$$

In addition to testing the model, the independent variables were tested for their differences between successful and failed firms. The t-test was run to compare the mean difference between scale and ratio measures, and for nominal measures, chi-square was run to test their significant differences.

#### 3.3.2. Dependent variable

The dependent variable for the model was success or failure, which is a dichotomous variable. Previous studies used bankruptcy as a measure of failure (Lussier, 1995, 1996a, 1996b; Lussier & Corman, 1996; Marom & Lussier, 2014); however, others used profitable and non-profitable criteria for successful and failure businesses (Guzman & Lussier, 2015; Halabi & Lussier, 2010; Hyder & Lussier, 2016; Lussier & Pfeifer, 2001; Teng et al., 2011). This study follows the methodology of measuring profitability as success or failure because at the time of conducting this research, the Republic of Ghana had no bankruptcy court to select failed businesses.

Thus, a business is classified as successful if the level of profits is average or above industry average profit, and a business is classified as failed if the level of profit is less than average profits or the business is currently not profitable. On a Likert scale of 1 to 4, SMEs owners or managers were asked to select their level of profit, 1 – profit is above the industry profit, 2 – industry average profits, 3 – below industry average profits, and 4 – currently not making profits. Those that selected 1 and 2 were coded as 1 to represent success and those responses that chose 3 and 4 were coded as 0 to represent as failure.

### 3.3.3. *Independent variables*

For the 15 independent variables, industry experience, management experience, and age of the owners are ratio measures. Capital, record keeping and financial records, planning, use of professional advice, educational level, staffing, product/service timing, economic timing, and marketing skills are measured on a 7-point scale. Partners, parents, and minority are nominal measures coded as 1 or 2.

### 3.3.4. *Control variables*

The demography of small businesses in terms of number of employees (size), number of years of conducting business (age of the firm), and industry can be used as control variables (Lussier & Halabi, 2010). According to Shane (1996), small businesses are more likely to fail than large businesses; therefore, the size of the business was measured in terms of the number of employees. The mean number of employees for both successful and failed firms was 8; not significantly different at 0.05. Thus, the size of the business should not bias the results of the study.

Also, the age of businesses affects failure or success since new firms have greater chance of failure than established business (Reynolds, 1987). Successful and failed businesses mean ages were 5.6 and 5.1 years, respectively; not significant at 0.05. Thus, the number of years of firms conducting businesses should not bias the result.

Industry can also affect success or failure, as service and retail firms tend to have higher failure rates (Lussier, 1995). However, like Dun & Bradstreet (1995), and Lussier (1995) industry classification, the study includes all industries with more service (47) and retail (40) than manufacturing (37), agriculture (33), wholesale (20), construction (12), transportation and communication (11) and finance (8). The chi-square was run by industries between successful and failed business; there is no significant differences. There were relatively equal numbers of failed and successful businesses by industry, and hence industry should not bias the results.

### 3.4. *Non-response bias*

Although different methods of collecting data were used, non-response bias was minimized. According to Teng et al. (2011), statistical techniques can be used to test the reliability and validity of non-response bias by comparing early and late respondents and different types of data collection.

Approximately 28% of the sample were late-respondent (it took them 40 days to respond to the questionnaires), and 10% were interviewed since they were unwilling to participate in the survey, but consistent follow-up resulted in late respondents. T-test and chi-square test of difference comparing late respondents to early respondent, and interviewed respondents compared to those that filled the questionnaire responses were not significantly different ( $p < .05$ ). Thus, non-response bias was minimized and should not significantly influence the results of the study. In addition, the study has a large sample size helping to represent the population.

## 4. Results and discussion

Table A3 contains the descriptive and inferential statistics of the 15 independent variables for 208 Ghanaian businesses, and the test of difference between the failed and successful

small businesses. [Table A4](#) shows the correlations among the 15 variables and the logistic regression analysis results are shown in [Table A5](#). (Refer Appendix for [Tables A3–A5](#)).

#### 4.1. Test of difference

From [Table A3](#), successful businesses had 13 greater level of resources than failed businesses; however, only five were significantly different. Therefore, if small businesses start with adequate capital ( $p < 0.01$ ), maintain good record keeping and financial control ( $p < 0.05$ ), have a specific plan ( $p < 0.1$ ), start with partners ( $p < 0.1$ ) and have marketing skills of owner's prior starting the business ( $p < 0.01$ ), they will increase their chance of success. The failed businesses had only two greater value of resources, (3) industry experience and (4) management experience; however, the difference was not significant.

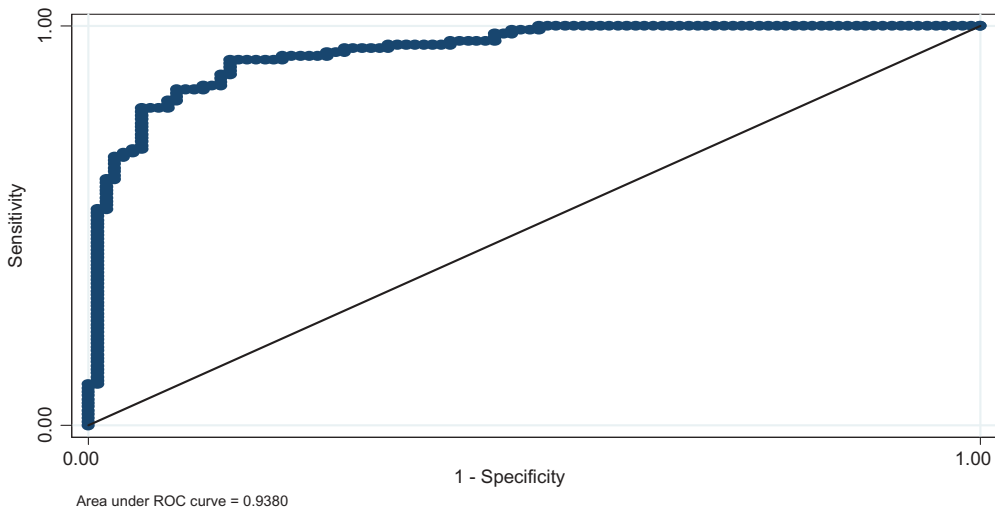
#### 4.2. Test of Lussier model

As shown in [Table A5](#), the model had  $-2$  LL statistics of 131.478, which compares how likely the sample results are given the parameter estimates. The LL implies that the Lussier model does not differ significantly from the “perfect model” in which all cases would be correctly classified; or simply, the model is a good predictor of success or failure. Also, chi-square is used to determine the significant level of model in logistic regression, which is similar to the F test in standard regression (Lussier, 2005). The logistic regression results testing the model chi-square was 74.57 with the model significance level less than 0.01 ( $p = .000$ ). Results support the model's validity as it will identify a group of businesses as successful and failed more accurately than random guessing 99% of the time in Ghana (Sub-Saharan Africa).

Therefore, successful businesses owners (or entrepreneurs) that start with adequate capital, maintain good record keeping and financial control, begin with industrial and managerial experience, have specific plans, make use of the advice from professionals, more educated, have little difficulties recruiting and retaining quality workers, have better product or service and economic timing, have partners, have parents who own businesses and have marketing skills prior starting their businesses can increase their chances of success. The model also has a very high R square value ( $R = .544$ ) indicating that the model does, in fact, include significant variables that do in fact predict success or failure.

#### 4.3. Predictive power of Lussier model

As shown in [Table A5](#), the Lussier model was able to predict an overall accuracy rate of 86.5% of the total sample as successful and failed. The model classified correctly 94 out of 107 successful SMEs representing 87.85%, and 86 out of 101 failed SMEs correctly representing 85.15%. Also, the model had a high value of the area under ROC, 0.9386 indicating that the model fits the data and the model is able to predict high positive value approximately 94% (see [Figure 1](#)) of the time. Again, the results support the model's ability to predict success and failure in Ghana (Sub-Saharan Africa) due to a high predictive value as the model will accurately predict a specific business as successful or failed 86.5% of the time compared to 50% for random guessing.



**FIGURE 1** Receiver-Operating Characteristic (ROC) for Lussier model.

#### 4.4. Reduced model for Ghana

As shown in Table A5, the most significant variables at 95% confidence interval were three that distinguished successful businesses from failed businesses. These variables are (1) capital (t-value,  $p = 0.000$ ), (10) economic timing (t-value,  $p = 0.014$ ) and (15) marketing (t-value,  $p = 0.000$ ). Therefore, the reduced model function for Ghana is:

$$S = f(\text{capital, economic timing, and marketing})$$

The odds of (1) capital ( $\beta = -0.942$ ) is  $-0.61$ ; because,  $[e^{(-0.942)} - 1] = -0.61$ . This implies that there is 61% less likelihood that successful businesses (which is coded 1) are undercapitalized in Ghana. In terms of (10) economic timing, the result shows that businesses that start during the expansion period can increase their success by 81%. Or firms started during a recession have a greater chance of failing than firms that start during expansion periods. For “Marketing”, the explanation could be; For each additional score towards skilled marketing, the odds of “success” (which is coded 1) will increase by 67%. Because,  $e^{(0.514)} - 1 = 0.67$ .

The implication is that of the 15 variables of the full model, the most important for success in Ghana, is for the business owners to start with adequate capital, start in a growing economy, and have marketing skills prior to starting their businesses.

#### 4.5. Near multicollinearity and collinearity

The main reason why some of the 15 variables lack significance is because of near multicollinearity or just or faced multicollinearity. This exist when one independent variable is linearly dependent on one or more other independent variables, without the variable(s), the estimate would not exist. For instance, age of the business owner, years of management, and industrial experience are expected to be highly correlated.

The correlations in Table A4 have several significance p-values. However, to be problematic of collinearity the r-values need to be above  $r = .500$  and some say as high

as  $r = .700$  to be considered highly collinear (Lussier, 2005). The contributing factor of significance comes primarily from the fact that using a large sample size finds significant differences even when the correlation is low. Only three of the correlation were greater than  $r = .700$ . Industry experience and management experience ( $r = .766$ ), industry experience and age ( $r = .802$ ), and management experience and age ( $r = .746$ ). As stated, they are expected to be highly correlated, as you cannot be young and have several years of experience. Hence, multicollinearity and collinearity should not be problematic.

#### 4.6. Prior research and results

It is difficult to compare results of this study using the Lussier (1995) model to prior studies not using the same model. The research by Cooper et al. (1990, 1991), Reynolds and Miller (1989), and Reynolds (1987) used logistic regression to analyze their data as used in this study. However, although their models included non-financial variables, they also included prior sales as predictor variables. Thus, their models are not appropriate for use by start-up ventures. Other prior studies used different models and without logistic regression to determine businesses performance. For instance, Gaskill, Van Auken, and Manning (1993) used a factor-analysis method of predicting small business failure, which is a less robust test than logistic regression for predicting business failure.

The model is significance ( $p = .000$ ) supporting the following findings. In terms of the most significant variables for Ghana ( $t$ -values  $< .05$ ), capital (note that capital is a reverse item scale, so a negative sign indicates that the successful firms mean = 2.37 vs failed mean = 4.77 did in fact start with great capital – see Table A3) was a contributing factor in predicting business success in recent studies including Marom and Lussier (2014), Hyder and Lussier (2016); as well as earlier studies of Cooper et al. (1990, 1991), Reynolds and Miller (1989), and Reynolds (1987). The economic timing which is also one of the most significant variables in Ghana was not a contributing factor for predicting business success or failure with countries that have tested Lussier model; however, the variable was deem relevant in the study of Cooper et al. (1990). In terms of marketing skills, studies by Houben, Bakker, and Vergauwem (2005), Teng et al. (2011), and Lussier et al. (2016) also found that owners with marketing skills prior to starting their business contribute significantly to the success of their business.

## 5. Implications

### 5.1 Theoretical implications

As shown in Table A2, there is great inconsistency in 40 research study findings, as they have failed to clearly identify a list or model of variables that do in fact contribute to the success or failure of small businesses. There is also no universally accepted model to predict small business success vs failure. Thus, there currently is no empirical or theoretical framework to develop a theory (Hyder & Lussier, 2016; Lussier & Halabi, 2010; Marom & Lussier, 2014). This study makes research contributions in this field as it adds to the existing body of knowledge. Without a theory, this study contributes to developing an empirical framework to predict success versus failure of small businesses. This study can serve as foundational research to build upon, such as to conduct a longitudinal study as future research.

The Lussier (1995) model makes a research contribution to the literatures as it is significant and accurately predicted 86.5% of the sample as being successful or failed. Thus, the Lussier model is valid for use in Ghana (Saharan Africa). A business that starts with adequate capital; good recordkeeping and financial control; is older with management, industry, and marketing experience; a business plan; professional advice; education; proper staffing; good product and economic timing; partners; parents who owned a business; and is not a minority has a greater chance of business success versus failure. Three of the 15 variables (capital, economic timing, and marketing skills) are more relevant in predicting small businesses success or failure in Ghana. Therefore, if Ghanaian businesses owners/entrepreneurs start with adequate capital, start their business in better or good economic times, and have marketing skills prior starting their business, they have a greater chance of success than those that do not.

## **5.2 Practical implications**

In addition to making practical contributions to aspiring entrepreneurs that can use the model, other stakeholders can benefit from the results of this study. Consultants can use the model when giving advice to aspiring entrepreneurs and small business owner clients.

The National Board for Small Scale Industry (NBSSI) can use the model to train aspiring entrepreneurs and current small business owner clients. The NBSSI is a source of professional advice. It can educate clients to understand that being older with years of management and industry experience, and that having good product and economic timing can help them succeed. The NBSSI can educate clients of the need for adequate capital, help estimate the needed capital, and make loans. The NBSSI can also advise them of how to get capital including having partners. The NBSSI can also train clients to keep good records and financial control, make a business plan, and develop marketing skills to help their business succeed.

Advocacy organizations, such as Ghana National Chamber of Commerce and Industry (GNCCI), Business Advisory Service (BSA) of State Enterprise Commission, Microfinance and Small Loans Centre (MASLOC), and other regulators in Ghana should support programs that offer low interest credit or loans to business owners in order to start with a reasonable level of capital. During times of economic decline, policy makers should continue to stimulate entrepreneurship.

“The one district one factory” initiative that is yet to start by the current government of Ghana and other public institutions should utilize the research findings of the study. Prospective managers of future factories can use the model to plan, organize, lead, and control performance. Society can benefit in direct and indirect ways through allocation of scarce resources, such as government credit and aids.

Potential investors and lenders can use the model to better assess the probability of the new or growing ventures’ success at providing a return on the investment or payment of the loan plus interest. Also, suppliers that sell products and services on credit to the new or growing venture can better assess the probability of being paid in full within the credit terms, late or only partial payment, or insolvency.

## 6. Limitations and future research

Although this research has used rigorous methodology and the Lussier (1995) model with 15 variables to explore success versus failure, it has limitations. The first limitation is that Ghana does not have an established record of bankrupt small businesses, so the level of profitability of firms was used to classify firms as successful or failed. Although it is extremely difficult to locate failed business owners, and to get them to honestly complete the questionnaire, future research would be more robust by collecting data from firms that have actually failed, and match them with existing successful firms.

Cross-sectional data collection is another limitation and needs for further research, as survey data were collected at a single point in time rather than a longitudinal study. One of the significant t-values was economic timing. There could be variations in the variables over time during a recession or expanding economy. Economic timing to start a business may be more critical during a recession than a growing economy. Future research should adopt longitudinal methodology to affirm the model validity across economic fluctuations, and changes related to several of the other variables.

The research also included different sectors of industries and the study did not discuss the characteristics of any of the industries. Future research should consider each sector in predicting business success or failure to find out the sector that is more prone to failure in that country. This study was based on collecting data from businesses in the formal economy in Africa. But in several developing countries globally, there is an informal economy. Entrepreneurs walk the streets selling products without any type of registration with the government, making a living without being counted in local or national GDP. Thus, an area for future research is the informal economy.

Although the R-square was high (.544) and the predictive power strong (86.5%), there are other variables contributing to the success or failure of small businesses. Thus, additional variables can be added to the Lussier model to improve its statistical predictive powers.

Also, some of the model independent variables were measured on a 7-point scale (See Table A3) that are subjective self-reported perception of business owners. Thus, the model as a predictor of business success versus failure should be used with other existing predictions methods by entrepreneurs, investors, suppliers, consultants, policy makers, and other stakeholders to improve decision-making. Further research should integrate more objective measures of the model variables.

Another limitation is that the model does not provide specific numerical guidelines to distinguish success from failure, such as the percentage probability of success. Thus, judgment is needed to assign a probability of performance of the business. When the business is strong on some variables and weak on others, the judgmental assignment of a probability of success is more subjective. With mixed strengths and weaknesses among the variables, the other decision criteria previously used by entrepreneurs and other stakeholders become increasingly important when they assign a probability of success or failure to a business. Future research should incorporate more objective probability measures to improve the ability of variables in predicting performance.

There is no unified theory for success versus failure of small businesses, and therefore the Lussier model should be tested in different countries especially in African countries and other developing economies to assess its robustness for its universal acceptance and theory.

Although the full 15 variable Lussier model has been significant in different countries and parts of the world, the reduced model based on the significant t-values does vary by country. Thus, a comparison of the reduced model between countries is an area for further research.

Although the Lussier model has been tested in different countries, there has not been any comparison and discussion of differences between the cultures of the countries and how culture affects performance. Thus, culture is an area in need for future research to develop a global success versus failure prediction model.

## 7. Conclusion

Despite the limitations, the Lussier (1995) success versus failure prediction model is statistically significant in Ghana; thus, it provides theoretical and practical implications. It will more reliably predict a group of businesses as successful or fail than random guessing 99% of the time. The model will accurately predict a specific business as successful or failed 86% of the time, and the model variables explain a high 54% of the variance distinguishing success from failure in Ghana. Thus, our research using the Lussier model can be used to help improve business success rate in Ghana, as it can make a contribution to the economy. The study also supports the validity of the Lussier model being a global success versus failure prediction model.

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## APPENDIX

**TABLE A1** Lussier (1995) model 15 variables.

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Success versus failure variables

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*Capital (capt)*. Businesses that start undercapitalized have a greater chance of failure than firms that start with adequate capital.

*Record keeping and financial control (rkfc)*. Businesses that do not keep updated and accurate records and do not use adequate financial controls have a greater chance of failure than firms that do.

*Industry Experience (inex)*. Businesses managed by people without prior industry experience have a greater chance of failure than firms managed by people with prior industry experience.

*Management Experience (maex)*. Businesses managed by people without prior management experience have a greater chance of failure than firms managed by people with prior management experience.

*Planning (plan)*. Businesses that do not develop specific business plans have a greater chance of failure than firms that do.

*Professional Advisors (prad)*. Businesses that do not use professional advisors have a greater chance of failure than firms using professional advisors. A more recent source of professional advisors is venture capitalists.

*Education (educ)*. People without any college education who start a business have a greater chance of failing than people with one or more years of college education.

*Staffing (staff)*. Businesses that cannot attract and retain quality employees have a greater chance of failure than firms that can.

*Product/Service Timing (psti)*. Businesses that select products/services that are too new or too old have a greater chance of failure than firms that select products/services that are in the growth stage.

*Economic Timing (ecti)*. Businesses that start during a recession have a greater chance of failing than firms that start during expansion periods.

*Age (age)*. Younger people who start a business have a greater chance of failing than older people starting a business.

*Partners (part)*. A business started by one person has a greater chance of failure than a firm started by more than one person.

*Parents (pent)*. Business owners whose parents did not own a business have a greater chance of failure than owners whose parents did own a business.

*Minority (mior)*. Minorities have a greater chance of failure than non-minorities.

*Marketing (mrkt)*. Business owners without marketing skills have a greater chance of failure than owners with marketing skills.

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**TABLE A2** Comparison variables identified in 40 articles as contributing factors to success and failure of business.

Author	capt	rkfc	inex	maex	Plan	prad	educ	staff	psti	ecti	age	part	pent	minor	mrkt
Barsley and Kleiner (1990)	C	-	C	C	C	C	-	-	-	-	-	-	-	-	-
Bosma, Van Praag, and De Wit, (2000)	-	-	C	-	-	-	-	-	-	-	C	-	-	-	-
Bruins, Op de Coul, Stigter, and van Uxem, (2000)	C	-	C	N	-	-	N	-	-	-	C	-	-	-	-
Bruno, Leidecker, and Harder, (1987)	C	C	-	C	C	-	-	C	C	C	-	-	-	-	C
Carrero-Morales (2015)	N	N	N	N	N	N	N	C	C	N	N	N	N	C	N
Cooper et al. (1990)	C	-	N	N	C	C	N	-	C	C	C	C	-	C	-
Cooper, Gascon, and Woo, (1991)	C	-	C	N	-	C	C	-	N	N	N	N	C	C	-
Crawford (1974)	-	-	C	-	-	C	C	-	-	N	N	-	-	-	-
Cressy (1996)	C	-	-	C	-	-	-	-	-	-	-	-	-	-	-
Dun and Bradstreet (1995)	C	C	C	C	-	-	-	-	-	C	-	-	-	-	-
Flahvin (1985)	C	C	C	C	-	C	-	C	-	-	-	-	-	-	-
Gaskill et al. (1993)	N	C	C	C	C	C	N	-	-	N	-	-	-	-	C
Guzman and Lussier (2015)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Hoad and Rosko (1964)	-	-	C	N	N	C	C	-	-	-	-	-	-	-	-
Houben et al. (2005)	N	N	N	C	C	C	N	N	C	C	N	C	N	N	C
Hyder and Lussier (2016)	C	N	N	N	C	N	N	C	N	N	N	C	N	N	N
Kennedy (1985)	C	-	-	C	C	-	-	-	-	C	-	-	-	-	-
Lauzen (1985)	C	C	-	C	C	-	-	C	-	-	-	-	-	-	-
Lussier and Corman (1996)	C	C	C	N	C	C	C	C	N	C	N	N	C	C	N
Lussier and Halabi (2010)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Lussier and Pfeifer (2001)	N	N	N	N	C	C	C	C	N	N	N	N	N	N	N
Lussier (1995)	N	N	N	N	C	C	C	N	N	N	N	C	N	N	N
Lussier (1996a)	N	C	N	C	C	C	N	C	N	C	N	C	C	N	C
Lussier (1996b)	N	C	N	N	C	C	N	N	C	C	C	N	N	N	N
Lussier et al. (2016)	N	C	N	N	C	-	N	C	C	-	-	N	-	-	C
Marom and Lussier (2014)	C	C	N	N	C	C	N	N	N	N	C	N	N	N	N
McQueen (1989)	C	-	C	C	-	-	-	-	-	-	-	-	-	-	C
Rauch, Frese, and Utsch (2005)	-	-	C	C	-	-	C	-	-	-	-	-	-	-	-
Reynolds and Miller (1989)	C	C	-	-	C	-	N	N	C	-	N	C	-	-	-
Reynolds (1987)	C	C	-	-	C	-	-	N	C	-	-	-	-	-	N
Sage (1993)	C	-	-	C	-	-	C	-	-	-	-	-	-	-	-
Santarelli (1998)			-	-			-	C	-	-	C	-	-	-	-
Schutjens and Wever (2000)					C	-	-	-	-	-	-	C	-	-	-
Sommers and Koc (1987)				C	C	-	-	C	-	-	-	-	-	-	-
Teng et al. (2011)	N	N	N	N	N	N	N	N	C	N	N	N	N	N	C
Thompson (1988)	N			C	C	-	-	C	C	-	-	-	-	-	-
Vesper (1990)	C	C	C	C	N	C	C	-	C	C	-	C	-	-	C
Wight (1985)	C	C		C		C	-	-	-	-	-	-	-	-	-
Wiklund and Shepherd (2003)	C			C		-	-	-	-	-	-	-	-	-	-
Wood (1989)		C	C	C	C	-	C	-	-	-	C	-	-	-	-
Total C	20	15	14	19	21	16	11	11	11	10	6	8	3	4	8
Total N	12	8	13	15	6	5	14	9	9	11	13	10	10	10	10
Total -	8	17	13	6	13	19	15	20	20	19	21	22	27	26	22

C supports variable as a contributing factor.  
 N does not support variable as a contributing factor.  
 - does not mention variable as a contributing factor.

**TABLE A3** Ghana descriptive statistics and test of difference.

Model variables	Failed mean (n= 101)	Failed S.D.	Success mean (n= 107)	Success S.D.
1. Capital (1 adequate – 7 inadequate) <sup>a</sup>	4.77	1.78	2.37	1.50***
2. Record keeping and financial control (1 poor – 7 good)	3.19	2.91	4.52	3.00**
3. Industry experience (number of years)	4.86	3.50	4.77	3.32
4. Management experience (number of years)	4.61	3.06	4.55	3.36
5. Planning (1 specific – 7 no plan) <sup>a</sup>	4.05	1.95	3.64	1.75*
6. Professional advice (1 used – 7 not used) <sup>a</sup>	2.55	2.64	2.40	2.55
7. Education (1 none – 7 doctorate)	2.63	1.33	2.89	4.46
8. Staffing (1 difficult – 7 easy)	3.26	2.30	3.27	2.25
9. Product/service timing (1 introduction – 7 decline) <sup>a</sup>	2.51	1.34	2.35	1.22
10. Economic timing (1 expansion – 7 recession) <sup>a</sup>	3.55	2.98	3.02	2.85
11. Age of wwner (number of years)	33.97	8.61	34.51	8.35
12. Partners (1 owner 49.5% 2 Partners 50.5%)	1.49	0.50	1.51	0.50*
13. Parents (1 yes parent owned business 45.7% – 2 no 54.3%)	1.60	0.49	1.49	0.50
14. Minority (foreigners) (1 yes 15.9% – 2 no 84.1%)	1.83	0.38	1.85	0.36
15. Marketing (1 unskilled – 7 skilled)	2.19	2.40	6.05	2.20***

<sup>a</sup>Note that these are reverse scale items. Therefore, a lower number is preferred/expected.

Significant levels: \*\*\*  $p < 0.01$ .

\*\*  $p < 0.05$ .

\*  $p < 0.1$ .

**TABLE A4** Correlation matrix among the 15 variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.00														
2	-.063	1.00													
3	.006	-.006	1.00												
4	-.010	.030	.766*	1.00											
5	.095	-.133	.031	.062	1.00										
6	-.019	-.051	.035	-.021	-.004	1.00									
7	-.054	.017	.020	-.012	.002	.056	1.00								
8	.058	-.009	.042	-.028	-.012	-.067	.036	1.00							
9	-.014	-.070	.015	-.010	.033	.030	.096	-.007	1.00						
10	-.027	.118	.146*	.135*	.149*	.061	.082	-.074	.012	1.00					
11	-.063	-.021	.802*	.746*	-.029	.000	.144*	.053	.092	.072	1.00				
12	.016	-.076	-.035	-.070	.084	-.106	.060	.073	.125	.042	.048	1.00			
13	.006	-.031	.060	.027	.049	-.083	-.051	.022	.115	.002	.071	.112	1.00		
14	.115	.108	-.071	-.037	-.045	.003	.172*	.159*	-.073	.123	-.028	-.062	1.00		
15	-.414*	.169*	-.041	-.047	-.166*	.001	.186*	-.000	-.080	.004	-.034	.009	-.092	1.00	

\* Correlation is significant at 0.05 level.

**TABLE A5** Logistic regression model test results Ghana.

Model parameter estimates <i>Variables name</i>	Model $\beta$	Model <i>t-Sig.</i>
1. Capital	-0.942	<b>0.000</b>
2. Record Keeping and Financial Control	0.138	0.056
3. Industry Experience	0.022	0.869
4. Management Experience	0.011	0.945
5. Planning	0.124	0.329
6. Professional Advice	-0.074	0.432
7. Education	-0.079	0.638
8. Staffing	0.027	0.797
9. Product/Service Timing	0.001	0.997
10. Economic Timing	-0.208	<b>0.014</b>
11. Age of Owner	0.019	0.709
12. Partners	0.301	0.537
13. Parents owned a business	-0.567	0.263
14. Minority	0.997	0.161
15. Marketing	0.514	<b>0.000</b>
Constant	-0.977	0.636
<i>Model Test Results</i>		
-2 Log Likelihood	131.478	
Model Chi-square	74.57	
Model Significance	<b>0.000</b>	
R Square	<b>0.544</b>	
<i>Classification Results</i>		
Correctly Classified Cases		
Success	87.85%	
Failed	85.15%	
Overall	<b>86.50%</b>	