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African Journal of Business Management

Full Length Research Paper

Survival of Uganda's small and medium businesses in a cox model

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The government of Uganda came up with the micro, small and medium enterprise policy in 2015 in an effort to support SMEs for sustainable wealth creation and social economic transformation. However, the SMEs sector has grappled with wide ranging challenges and these challenges therefore threaten the survival of SMEs. This study thus investigated factors responsible for the survival of Uganda's small and medium businesses and was based on the records of the businesses from the survey done by the Uganda Bureau of Statistics. Business survival was measured from the year when the business started operations to the survey year, 2010. A time-to-event approach in a Cox Proportional Hazard Model was adopted in the analysis. There is a minimum of 1 enterprise and a maximum of 23 enterprises that can survive which were considered to exit operation with business survival was 4.85 years. It indicates a low survival rate of Uganda's businesses. The rate of exit of businesses was significantly higher for businesses located in the central region, those employing a larger number of employees, those owned by non-Ugandans, those not operating as sole proprietorship and those considered not to be innovative. The findings point to a recommendation of scaling up measures aimed at ensuring that the survival levels of businesses in the country improve.

Key words: Survival of SMEs, Uganda, business, Cox hazard model.

INTRODUCTION

According to the World Bank (2016), a healthy and enabling business sector contributes to the economic development of any country mainly through creating employment opportunities, triggering higher production volumes and thus increasing exports, as well as developing the country's entrepreneurial skills. Recent studies have elucidated that "the small, micro and medium businesses are increasingly becoming more important since they dominant the force impacting the growth of national economies…" by Kira (2013).

Due to the contribution played by the business sector to a vibrant and growing of industrial sector, it takes a noticeable position in development programs of many countries and thus most countries create institutions which recognizes SMEs to enjoy the benefits associated with them among of which include employment creation, poverty alleviation in addition to facilitating economic growth. Previous studies argue that the business sector on average contributes 60% of manufacturing sector's formal employment globally and around three in every

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four jobs created in Africa is attributed to business enterprises (Ayyagari et al., 2007).

With the creation of the East African Community, the volume of business transactions have increased resulting into massive expenditure on research and development and innovation aimed at meeting the high demand for goods and services across the Countries in the East African region (Mungiru and Njeru, 2015). This in turn has not only led to the increase in trade volumes but as well the national GDP of the East African Community., A case in point, "…it is estimated that t 20% of the labor force in Tanzania are employed in small businesses" (Kira, 2013).

In Kenya, the business sector employs 74% of the total employment and its 88% of job creation is attributed to businesses which results to the contribution of about 24.5% to the "Gross Domestic Product (GDP)" and in Rwanda over 90% of its workforce is employed in private sector businesses while in Uganda the private sector represents a significant part of the economy in stimulating the economic growth of the Country (Kira, 2013). Thus small, micro and medium enterprises development has been identified as a key strategy for generating industrialization which is coupled with generation of employment thus leading to eradication of poverty (Atieno, 2009).

More still in Uganda, about 75% of GDP is contributed by the (Small and Medium Enterprises (SMEs)" in addition to employing approximately about 2.5 million people as alluded by African Development Bank, 2011. The actions of SMEs are thus seen as vital for economic growth promotion and their importance is recognized by many researchers (Cant et al., 2014; Smit and Watkins, 2012; among others).

In relation to SMEs survival, a number of studies have been carried out in Uganda mainly on business growth and development with Turyahikayo (2013) carrying out a study to identify the challenges faced by SMEs in raising finances, Uwonda et al. (2013) did investigate Cash flow management utilization by SMEs in Northern Uganda while Eton et al (2017) did study Cash flow management and survival of SMEs. All these have revealed that SMEs are a key important factor for the growth and development of the economy.

Despite the substantial significance of the SMEs, many of the businesses that are started fail within their first year of operation (Uwonda et al., 2013). This could be attributed to barriers and challenges that exist for SMEs in Africa. A number of factors have advanced to explain the survival of firms categorized as owner's characteristics, business characteristics and type of business (Lussier, 1995). Individual firm characteristics that have been suggested as influencing firm survival are their origin and ownership. Firms from abroad are likely to live longer, as they may benefit from local policies designed to encourage foreign investor, have better access to advanced technology and financial resources Asrat and Shirefaw, 2009) Business characteristics have

been revealed by many researchers (Lopez-Garcia and Puente, 2006) to be key determinants in the survival of firms and such factors may include competitiveness, capital requirement, innovation activity and barriers to entry. To capture this, Lopez-Garcia and Puente (2006) used concentration measures.

Survival is found to be positively related to size and age (Spaliara and Tsoukas, 2013). Harding et al. (2004) and Frazer (2005) found out that larger firms are less vulnerable to failure than smaller firms. In contrast, others, such as McPherson (1995) were using surveys for Swaziland, Botswana, Malawi and Zimbabwe in the early 1990s. Nkurunziza (2012) using surveys for Kenya, found firm size to be insignificant and considered the effect of credit on firm survival in Kenya and found a significant positive impact. Frazer (2005) reported significant but weak age effects while Soderbom et al. (2006) found no significant age effect.

In the context of this study, the government of Uganda came up with the micro, small and medium enterprise policy in 2015 in an effort to support SMEs for sustainable wealth creation and social economic transformation (MTIC, 2015). However the SMEs sector has grappled with wide ranging challenges some legal, institutional and others attitudinal and these challenges therefore threaten the survival of SMEs (Uwonda et al., 2013). This study thus investigated factors responsible for the survival of Uganda's small and medium businesses.

LITERATURE REVIEW

From the theoretical perspective, Business Survival is defined as the longer a business can survive and prevent and prevent involuntary exit (Praag, 2003). Business survival is thus defined in a sense that it remains in operation and continues to exist mainly during tough times like recessions and this explains why it is known that starting a business in itself is a challenge while having it survive and grow is problematic. Economically, the survival of a business is defined as its ability to continue in operation over a certain period of time in a market of competition. In this study, business survival is looked at from the time (year) when the business started to when the survey was done by "Uganda Bureau of Statistics (UBOS, 2003)" in 2010.

The study was based on Wernerfelt's Resource-Based Theory which was introduced in 1984 (Wernerfelt, 1984). In accordance with this theory, business enterprises with good skills and diverse capacities are able to compete favorably and increasing its survival. It was thus believed that a business starting with well-trained directors having distinct capacities will adapt to the environmental competitiveness and thus improve its stay in operation. In this study, it was hypothesized that male operated/owned businesses survive longer than those

operated by their female counterparts on assumption that males have more time to devote to the businesses. This assumption was in agreement with Fairlie and Robb (2009) who revealed that business which are owned by females have lower survival rate that those owned by males and the study seeks to find out whether the case is similar in the Ugandan case.

Empirically, a review of literature shows that many businesses don't live even for a year (Rooks et al., 2009) and that the probability of survival of businesses is associated with the socioeconomic environments in which they operate. Rooks et al. (2009) revelation seem to be in agreement with Cook et al. (2012), who in their study to examine the survival patterns of new firms that were created during difficult economic times, revealed that the odds of a firm surviving from first year of operation to the second year appear to be no better than the odds of them surviving from inception to year one (Ron, 2014).

It is shown that "… different locations seem to provide better conditions and higher life expectancy, mainly due to positive network effects occurring at a local level" (Cabras et al., 2017). Recent studies, (Strotmann, 2007) argue that business enterprises operating in rural areas have lower risks of failure compared to their counterparts and De Silva and McComb (2012) revealed that business enterprises of the same industry concentrated in a given area stressing within a mile, tend increase their survival rates.

It is believed that Firms originating from abroad tend to survive longer since they benefit from local policies designed to encourage and promote foreign investors as reported by Helmers and Rogers (2010) and Coleman et al. (2013).

Esteve-Perez et al. (2004) and Gorg and Strobl (2003) however argued that there is a high exit risk for business enterprises whose capital originates from foreign sources.

In relation to experience, it was concluded that firms whose owners are experienced and have high education levels survive longer compared to their counterpart (Coleman et al., 2013). This augment agreed with Kangasharju (2000) who found out that educated self-employed have lower failure rates and thus the argument that for any organization to thrive, staff are considered a valuable asset in an organization (Harting, 2008) is supported. This reasoning supports the resource based view which forecasts an increased firm survival probability.

Firm size of the business is an important factor that affects its survival. Survival is found to be positively related to size and age (Spaliara and Tsoukas, 2013). Harding et al. (2004) and Frazer (2005) found out that larger firms are less vulnerable to failure than smaller firms. Contrary to this, McPherson (1995) using surveys for Swaziland, Botswana, Malawi and Zimbabwe and Nkurunziza (2012) using surveys for Kenya found out that

firm size is insignificant to their survival. It is however reported by Nkurunziza (2012) and Frazer (2005) that there is significant but weak age effects to survival which disagreed with Soderbom et al (2006) who found no significant age effect to firm's survival.

Based on these studies, it was hypothesized and believed that firms incrementally introduce product innovations increases its survival. It was revealed that innovation increases the survival of business enterprises (Cefis and Marsili, 2005) and this was attributed to gaining a larger market share (Coleman et al., 2013).

DATA AND METHODS

The study was carried out among the businesses from the survey done by Uganda Bureau of Statistics. Data were obtained on business characteristics like region, country of origin of owners, number of employees, firm size in terms of turnover, ownership type and whether the business was innovative or not (own and use computer and use of internet). The data/information was got on businesses that operated Uganda as per the survey (2010) but those started before 1987 were excluded from the study due to the fact that their exit could have been influenced by political instabilities of early 1980s. Businesses with a turnover of 5 million and above were taken as censored observations.

The independent variables as used in the study were based on the survey done by the Uganda Bureau of Statistics are explained as follows; the variable location as studied by Cabras et al. (2017); De Silva and McComb (2012) was considered very important in the survival of the business; the researcher believed that firms operating in the same locality tend to survival longer than those in far different locations mainly because of economies scales resulting from common use of resources which may be less expensive compared to when they are located in far different areas.

Secondly, it is believed that the Country of origin of owners/directors was vital for the business to survive in that most foreign tend to survive mainly because they invest with more funds and/or have access to finance which enables them to beat off competitors (Gorg and Strobl, 2003). This was however not agreement with Helmers and Rogers (2010). Praag (2003) noted that an educated business owner will study the business very well in addition to making projections and investment portfolios and thus the education level is taken to be more important to the survival of the business which agrees with Kangasharju (2000) who argues that "… more educated self-employed tend to have lower failure rates recessions and thus the better business ideas should be able to survive longer". As regards to competitiveness and innovativeness, Carroll and Hannan (2018) stresses that innovative businesses are less likely to fail when compared to their counterparts. This was supported by Cader and Leatherman (2011) and thus the researcher seeks to find out if it is the same case for Uganda. In regard to firm size, firms' survival is found to be positively related to size by Harding et al. (2004) and Frazer (2005) as was supported by Spaliara and Tsoukas (2013). It was though reported otherwise by Nkurunziza (2012) and Frazer (2005) that there are significant but weak age effects to survival and the thus the researcher seeks to find out why there was a disagreement using the Ugandan case. The dependent variable was taken as duration of stay in business by the businesses up to the time when the survey of businesses was done. This variable was measured from the year when the business started operating up to when the survey of businesses was done. Observations for businesses with a turnover of 5 million and above were taken as censored observations.

Table 1. Specification errors of link function.

Log hazard function	Coefficient	Std. error	P-value
_hat	1.0126	0.0152	0.000
_hatsq	-0.0053	0.0057	0.352

Exponential form of the dependence of the hazard function on the predictors
Source: Specification Errors of Cox model in Table 4
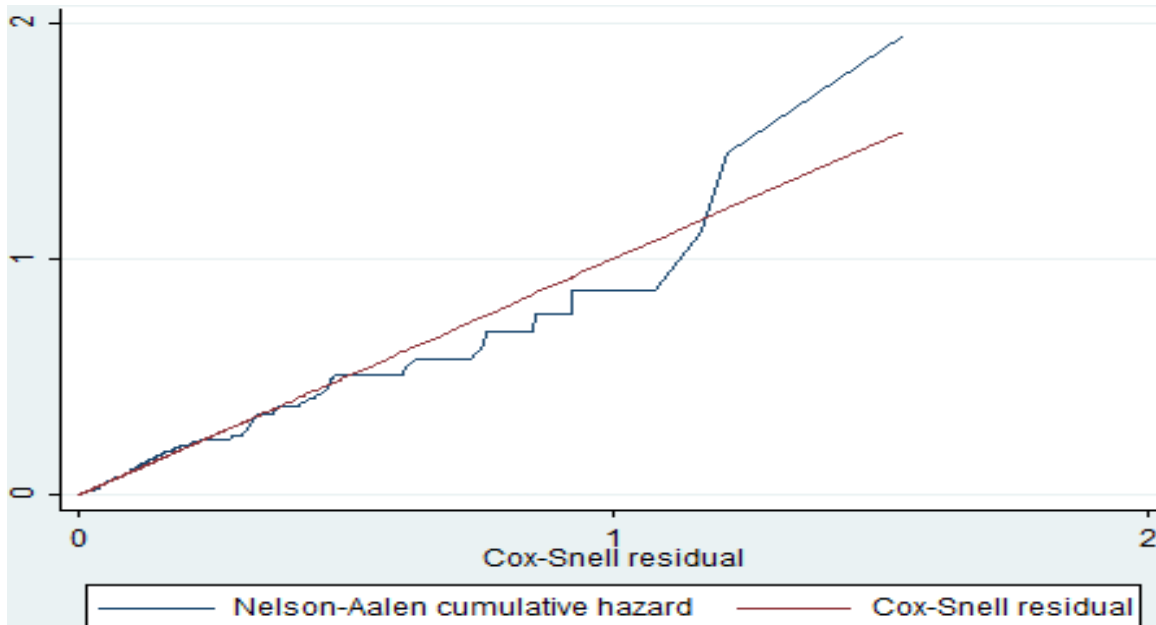
Figure 1. Goodness of fit of the final model.
Source" The cumulative hazard function based on the Cox Model in Table 4.

Data analysis was done in three stages: first, each variable in the data set was explored separately. Frequency tables and summary statistics were obtained to show the distribution of each potential predictor of survival of business. Duration of stay in business was subjected to the Shapiro-Wilk test for non-normality (Shapiro and Wilk, 1965). At the second stage, the log-rank was used to test for equality across different categories of potential predictor's duration of stay in operation by a business enterprise. A probability value of 0.25 or less was used as a criterion for inclusion of the variable in the final model. Finally, at the third stage since the duration of stay in business was not normally distributed and some observations were censored, the Cox Proportional Hazards Regression Model was employed to study the rate of exit of businesses (Cleves et al, 2008) as used by (Muhwezi et al., 2017; Pereira, 2014; Lee, 2014). The indicator of censoring, δ was defined as below;

$$\delta = \begin{cases} 1 \text{ if Business has ceased operation} \\ 0 \ otherwise \end{cases}$$

The model employed in studying the rate of exit of businesses in Uganda was written as;

$$h(t) = h_0(t) \exp(\beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p)$$ (1)

Where; $x_{i \ for} \ i$=1, 2, ……, p are covariates and their coefficients are β_i' s, $h_0(t)$ baseline hazard depending on time the business enterprises stays in operation only and $h(t)$ is defined as hazard function.

Three diagnostic tests were done. First, the proportionality tests of the hazards using the Schoenfeld and Scaled Schoenfeld residuals and log-log plots were satisfied; the parallel line of the log-log plots suggested that the variables did not violate the proportionality assumption of the Cox model. Second, the specification errors of the link function indicate that the log hazard function was well specified which is predicted by the Hat-statistic (_hat: $p < 0.05$) and the Hat-square statistic (_hatsq) reveals that no additional variables were significant ($p > 0.05$) as shown in Table 1; Third, the goodness of fit was evaluated using the Cox-Snell residuals. The cumulative hazard function followed the 45 degrees line as seen from Figure 1 which indicates that the final model fitted the data very well.

RESULTS

Survival of business, estimated from survey records of businesses, was estimated from the time when a business started operating to the time when the survey was conducted (2010) and the characteristics of

Table 2. Summary statistics on business survival (years).

N	Min	Max	Median
212.511	1	23	4.850996

Summary statistics related to business that were considered to exit operation by the survey time (2010).

Table 3. Pattern of business survival.

Interval (years)		Total[a]	Exiting[b]	Censored[c]	Survival function	Std. error
0	1	317.850	46.703	15.790	0.8493	0.0006
1	2	255.357	38.910	15.905	0.7157	0.0008
2	3	200.542	27.356	27.356	0.6149	0.0009
3	4	160.344	18.612	9.320	0.5414	0.0009
4	5	132.412	17.486	9.461	0.4672	0.0010
5	6	105.465	9.180	5.518	0.4255	0.0010
6	7	90.767	7.217	4.690	0.3907	0.0010
7	8	78.860	5.966	4.020	0.3604	0.0010
8	9	68.874	5.172	2.937	0.3328	0.0010
9	10	60.765	17.137	10.093	0.2304	0.0009
10	11	33.535	2.181	1.775	0.2150	0.0009
11	12	29.579	2.800	2.332	0.1938	0.0009
12	13	24.447	1.536	1.315	0.1813	0.0009
13	14	21.596	1.758	1.268	0.1661	0.0009
14	15	18.570	2.868	2.230	0.1388	0.0009
15	16	13.472	924	883	0.1290	0.0009
16	17	11.665	781	654	0.1201	0.0009
17	18	10.230	990	793	0.1080	0.0009
18	19	8.447	654	451	0.0994	0.0009
19	20	7.342	3.206	2.130	0.0486	0.0oo8
20	21	2.006	444	378	0.0368	0.0008
21	22	1.184	256	244	0.0279	0.0007
22	23	684	374	310	0. 0082	0.0006

[a]Donates all the number of businesses; [b]donates the number of business considered to exit operation and [c] donates the number of business not considered to exit operation.

businesses in Uganda employed in the study can be summarised as follows: mainly of Ugandans (98.65%) with sole proprietorship (93.40%) from Central region (59.44%), employing one staff (56.68%) and are predominantly not innovative (97.86%).

Survival of business was subjected to the Shapiro-Wilk test for non-normality (Shapiro and Wilk, 1965). Test results excluding those lost to follow up provided evidence for the existence of non-normality (N = 212,511; p < 0.01). A similar test on the entire dataset also supported the test (N = 317,850; p < 0.01). The median rather than mean was thus adopted as the measure of central tendency. Table 2 presents a descriptive summary of business survival.

Based on the business enterprises which were considered to exit operation by the survey time (N=212,511), the median business survival was 4.85

years (range, 1 – 23). This figure certainly indicates a high turnover rate among businesses in the Uganda. Further analysis on the survival of businesses was done by grouping them in the intervals of one year. Table 3 presents this pattern and the summary of the findings is made thereafter.

Of the 317,850 businesses started during the period of 1987–2010, a total of 212, 511 were considered to exit operation by the survey time, representing a 66.86% survival rate. According to Table 2, the business exiting rate in the first one year, two years, five years and ten years of starting is 14.69%, 26.94%, 46.9% and 60.95%, respectively. Details about the rates of other years can be got from Table 2 however, as Rao and Schoenfeld (2007) revealed, the median exiting rate can only be estimated ifthe survival curve drops to or below 0.5 and thus the median survival of businesses lies between 4 and 5 that

is, 4.85 as indicated from Table 1. Survival of businesses was investigated by characteristics of businesses to ascertain whether they were differentials by the variables included in the model and the next section presents an assessment of the same.

The rate of business survival was evaluated using a Cox Model. Table 4 presents cox regression estimates of the rate of business survival in Uganda. In this study, the hazard ratio (HR) is defined as the measure of how often a business exits operation in one group compared to how often a business exits operation in another group over time.

According to the results in Table 3, the model fitted the data well since the Chi-square probability of the log likelihood ($p < 0.001$) was significant. Hazard Ratio is interpreted as follow; a hazard ratio of one compared to the reference category of a variable means no difference in levels of survival between the two categories. A hazard ratio of more than one means a high survival rate compared to the reference category while hazard ratio of less than one means a lower survival rate compared to the reference category.

DISCUSSION

In this study as seen, business survival was observed to be right skewed thus, the normality assumption to fit the regression model in ordinary least squares was violated which supported the time-to-event approach in a Cox-regression that was employed in the study. The normality assumption could certainly distort relationships and significance tests, resulting in questionable results (Osborne and Elaine, 2002).

The exiting rate of (60.95%) as indicated from Table 4 points to low survival of businesses in Uganda and it is in agreement with other recent research carried out (Rooks et al., 2009; Cook et al., 2012). Looking at the businesses considered to have exited, a similar conclusion is reached with a median survival of 4.85 years (range, 1 – 23) and this value reveals that more than 60% of the businesses in Uganda do not see their 5th birth day.

Looking at the multivariate assessment shown from Table 4, the rate of exit of businesses was significantly higher for businesses located in the Central, those employing more number of employees, owned by non-Ugandans, not of sole proprietorship and those considered not to be innovative (owning a computer, using a computer and using internet). In light of the low survival rates of businesses (4.85 years) estimated, it is a clear indication that more of existing business enterprises are mainly those considered not to be innovative.

For this study, innovativeness was defined as owning a computer, using a computer and using internet. Being innovative is found to be having a significant ($p < 0.05$) relationship which its survival and the findings are in line with recent studies (Cefis and Marsili, 2005). The increased survival of businesses due innovation was attributed to gaining a larger market share (Buddelmeyer et al., 2010). This however disagrees with Cader and Leatherman (2011) who revealed that business enterprises operating within a highly innovative business environment tend to damage their chances of survival.

Relating to region, the results of this study revealed a significant variation by the rate of exit of businesses in the Country. The results agree with recent studies (Cabras et al., 2017) though the revelation by this study that businesses located in other regions other than central had a lower rate of survival. In a similar relation, the study results reveal that an industry in which the business enterprise operates has an influence over its survival.

Prior to the study, the researcher believed that firms owned by foreigners were more likely to survive since they benefit from local policies which are mainly designed to encourage foreign investors. The findings of the study revealed otherwise; businesses owned and operated by non-Ugandans had a lower rate of survival. This revelation was in agreement with (Esteve-Perez et al., 2004; Gorg and Strobl, 2003) who argued that there is a high exit risk for business enterprises whose capital originates from foreign sources. This disagrees with Helmers and Rogers (2010) who found out that business enterprise which are foreign owned have reduced rates of exit as compared to their counter parts.

Related to this, the study found out that sole proprietorship businesses have a high survival rates compared to others.

Pertaining to number of employees a business employed, Harting (2008) noted that for any organization to thrive, staff is considered a valuable asset. The study however revealed that the increase in the number of employees by any business enterprises does not increase its survival chances but however declines which indicates that staff number should not just be increased but skilled or experienced staff should be employed as recent studies (Coleman et al., 2013) have argued. This greatly improves the output and resulting into a longer survival time.

All in all, study findings point to a need to scale up measures aimed at ensuring the business enterprise's survival like encouraging the use ICT and reduce ICT related costs, creation and gazzetting of areas mainly for businesses like creation of industrial parks and organizing similar businesses in the same locality for easy movement of factors of production; training the citizens mainly in skills development which are business oriented other than theoretical academic programmes. This will result into generation of employment to the citizens and improving the tax base of the country. In other words an increased number of the business enterprises surviving, and eventually growing lead to economic growth and subsequently development.

In summary, the rate of business survival varied significantly by region, number of employees, country of origin, business industry, type of ownership and

Table 4. Rate of business survival.

Variable	Coefficient	HR	Std. error	P-Value
Region				
Central[+]	.	1	.	.
Western	-0.0444	0.9566	0.0055	0.000
Eastern	-0.1285	0.8794	0.0056	0.000
Northern	-0.0529	0.9485	0.0074	0.000
Number of employees				
Employs one[+]	.	1	.	.
Employs 2- 10	-0.5042	0.6040	0.0030	0.000
Employs above 10	-2.284	0.1019	0.0037	0.000
Country of origin				
Uganda[+]	.	1	.	.
Others	-0.4520	0.6364	0.0231	0.000
Business industry				
Trading Services	.	1	.	.
Manufacturing	-0.0955	0.9089	0.0079	0.000
Other Services	0.2927	1.3401	0.0066	0.000
Type of ownership				
Sole proprietorship[+]	.	1	.	.
Partnership	-0.2035	0.8159	0.0146	0.000
Others	-0.9794	0.3755	0.0086	0.000
Being innovative				
Innovative[+]	.	1	.	.
Not Innovative	1.7566	5.7928	0.3116	0.000

Likelihood Ratio Chi-square (14) = 36646.24; $p < 0.001$; n = 317,748 and [+] is Reference category.

innovativeness ($p < 0.05$). Particularly, businesses located in the central region were less likely to survive compared to those in the regions of western, eastern and northern, businesses with more number of employees were less likely to stay in operation, businesses owned by Ugandans had a higher rate of survival compared to the ones owned by non-Ugandans, businesses dealing in trading services were less likely to survive compared to others that is, manufacturing among others, businesses in the category of sole proprietorship were found to stay longer in operation compared to others and finally businesses owning a computer, using a computer and using internet that is, innovativeness for purposes of this study were more likely to survive as compared to their counterparts. In other words, business survival did vary significantly by all the variables considered in the study.

The study thus identifies the factors responsible for business survival in Uganda to be region, number of employees, country of origin, business industry, type of ownership and innovativeness. Thus, the hypotheses supported were: Country of origin of directors has a significant effect on duration of stay in business, location of the business has a significant effect on its duration of stay in business, being innovative has a significant effect on duration of stay in business, type of business has a significant effect on duration of stay in business. And also number of employees and type of ownership significantly affect business survival.

The results of the study point to a need to scale up measures aimed to ensure the survival of businesses in the Country. The following should be done in the country; significantly encourage the use ICT and reduce ICT related costs, creation and gazzetting of areas mainly for businesses like creation of industrial parks and organizing similar businesses in the same locality for easy movement of factors of production; training the citizens mainly in skills development which are business oriented other than theoretical programmes among others. This is mainly due to the fact that survival of businesses in the country means more employment to the citizens and improving the tax base of the country and hence growth and development of the economy.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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