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Survival Analysis of Small Scale Manufacturing Enterprises in Eastern Ethiopia

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

Small manufacturing enterprises (SMEs) are important because they provide the majority of new jobs created especially in developing counties like Ethiopia. In Ethiopia, despite the enormous potential of vibrant small manufacturing enterprises to contribute to job creation, income generation and poverty alleviation, the high failure rate of small enterprises is a subject of much concern. The main purpose of conducting this study was to critically analyse likelihood of SMEs long survival in a competitive market. Descriptive and survival analysis methods were employed to analyze panel data between the period 2001 and 2006 E.C in the eastern part of Ethiopia. About 86.4% of total failed firms ceased operation during the first two years of operation, and only 9.1% of all failed firms ceased operation after their fifth birth day. Hazard function showed that probability of failure decreases as the age of the enterprise increase. Kaplan-Meier survival probability plots were used to compare the survival probabilities of SMEs with regard to manufacturing type showed that leather product and textile manufacturing enterprises have higher probability of survival whereas wood and metal work and food item producing enterprises have the least survival probabilities. This study has policy implications for Government and other stakeholders to understand that newly emerging manufacturing enterprises face difficulty in their first three years of establishment. Therefore, since the creation of new jobs depends on the new entry rates and growth of enterprises, a concerted attention should be given to support them financially as well as technically to reduce the failure rate.

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Keywords: Small manufacturing enterprises; survival rate; failure rate; Eastern Ethiopia.

ACRONYMS

SMEs : Small Manufacturing Enterprises
E.C : Ethiopian Calendar
OECD : Organization for Economic Cooperation and Development
MoFED : Ministry of Finance and Economic Development
CSA : Central Statistical Authority

1. INTRODUCTION

Small manufacturing enterprises (SMEs) are important because they provide the majority of new jobs created. Besides, they are of special significance for larger agrarian countries like Ethiopia because of their role in the foundation of strong and sustainable economic development path. The sector is claimed to be a breeding ground for development of industrial skill and entrepreneurships. In addition, it upgrades indigenous technologies, including exploitation of locally available raw materials with lower capital, flexible to local market conditions and with fewer requirements of infrastructure development and utilities [1].

Micro & Small Enterprise development program in Ethiopia meaningfully has been given due attention by government since 2004/2005. Of course, in 1996/97 National Micro and Small Enterprise Strategy was developed by the government of Ethiopia. However, the degree of recognition to the sector with regards to job creation and the alleviation of abject poverty among impoverished youth & women were not sufficient. Until 2004/2005, the national strategy was implemented by Federal MSMEs Development Agency organized only at national level. Because of this, it was very difficult to make the strategy practical specially in delivering business development service for SME operators [2].

In Ethiopia, the size of the labor force continues to grow more rapidly than the ability of the economy to offer new employment opportunities. Unemployment, particularly urban unemployment is one of the critical problems in the country. According to the National Labor Force Survey conducted in 2004, the rate of urban unemployment in the country was 26.4 %. According to the most recent census result, the urban unemployment stands at 22%. The overall unemployment rate for literate person is higher than that of illiterate. 19.7 percent against 10.8 percent among the literate group, the rate of unemployment were relatively higher among those who did not complete Diploma and Degree (34.1 and 37.1 percent, respectively) [2].

To this effect, the government of Ethiopia has taken a number of specific policy measures aimed at the creation of enabling environment for the revival and expansion of the private sector. The recently issued strategies of the Small Enterprise Development Strategy and the Industrial Development Strategy underscore the role and relevance of private sector for income and employment generation [3].

In Ethiopia, despite the enormous potential of vibrant small manufacturing enterprises to contribute to job creation, income generation and poverty alleviation, the high failure rate of small firms and enterprises is a subject of much concern.

In this research, the author presents survival analysis of small scale manufacturing enterprises found in eastern part of Ethiopia to show failure and survival status of the enterprises with their age of establishment, location and manufacturing type in the study area.

2. REVIEW OF LITERATURE

According to OECD [4], the share of the industrial sector of Ethiopia to overall GDP was only 11.2% or one-fifth of the share of agriculture. The Ethiopian manufacturing sector is one of the least industrialized sectors in the world in terms of its structure, employment and technological content [5]. The sector is characterized by features that are peculiar to least developed economies of the world. Firstly, the sector produces non-durable consumer goods that have limited potential for competing in the global economy and for realizing export earnings, due to the poor quality and quantity of outputs. Secondly, the sector is highly dependent on imported inputs, which means that the manufacturing sector has weak linkages with the rest of the economy. The majority (70%) of manufacturing firms produce non-metallic goods such as food and beverages, furniture, mineral products, leather and textiles [6].

In economic literatures, the survival of a business firm is defined as the ability of the firm to

continue its operation and remain in business over a certain period of time in a competitive market. A review of empirical literature shows that only one in three small businesses survive to their third anniversary, and that the probability of survival of firms is associated with the socioeconomic circumstances in which these firms operate [7]. This is even more remarkable in the context of the long-standing theoretical pessimism embodied in the dominant schools of economic thought in which firm size and scale of operation are believed to determine the future of small firms [8].

In the context of this paper, survival is measure of a firm's competitiveness in terms of the efficient utilization of its scarce resources in comparison with other players in the market [5]. In the Eastern part of Ethiopia, survival analysis of the small scale enterprises has not been adequately studied. It is also clear that the larger the number of the small enterprises especially those engaged in manufacturing are the more likely to produce new jobs.

Therefore, this paper makes a critical analysis of SMEs that have managed to survive from the year 2001-2006 E.C (6 years) and remain competitive in challenging environment as well as the key reasons to failure of those businesses ceased from the market. Frazer [9] studied the survival of Ghanaian manufacturing firms using the RPED (Regional Program on Enterprise Development) dataset for the early 1990s while Harding et al. [8] carried out a similar study for Ghana, Kenya and Tanzania. These recent papers on African firms provide strong evidence that the risk of exit declines in firm size and productivity. These findings are consistent with the predictions of market selection models as well as some of the evidence for industrialized countries. Hopenhayn [10] showed that high entry barriers, due to government policy or collusion among large firms, could reduce the minimum level of productivity needed to stay in the market thereby protecting incumbents. Similarly, costs associated with firm exit such as employee compensation or difficulty to recover fixed assets may delay firm closure although they may not prevent it indefinitely [11].

Ericson and Pakes [12] predicted that small firms die more often than their large counterparts in the same industry. On the other hand, as time goes by, firms would acquire competitive skills and the risk of failure begins to decline. From these models we understand that initial size and age are important predictors of firm survival. On the other hand, the business strategy literature suggests that small firms do not need to grow in size in order to survive [13]. The argument is that small firms have the advantage of being flexible and the ability to specialize in niche markets giving them strategic advantages to overcome business failure. Most empirical studies however find significantly positive age and size effects on firm survival supporting the view of market selection [14,15].

According to Mengiste [16], Ethiopian manufacturing in the mid 1990s, there is a positive effect of firm size on survival. He shows further that the risk of exit declines in the human capital of entrepreneurs while it increases in the degree of competition both from imports and rival domestic firms. Using census based panel data of Ethiopian manufacturing firms, [17] follows a non-parametric analysis that uncovers a high degree of persistence at the top of the productivity ranking while the majority of establishments at the bottom of the distribution (about 60%) exited the market in a period of six years, revealing the existence of competitive markets.

Such studies were based on descriptive and cross-sectional study designs, and were not suitable for assessing the long-term survival of small businesses and enterprises. The main supremacy of survival analysis is to better characterize surviving firms and assess the nature of market selection.

This paper investigates small manufacturing enterprises survival and failure status in Eastern Ethiopian manufacturing sector and new contribution to this literature draws from a data advantage.

3. MATERIALS AND METHODS

The study was conducted in ten geographically representative regions of Eastern Ethiopia (Dire Dawa, Harar, Jigijga, Chiro, Babile, Badhesa, Gelemso, Deder, Haramaya and Chelenko). The sampling frame included all the registered small manufacturing enterprises until August/2006 E.C by the micro and small enterprises development offices which included a total of 257 enterprises were used in the study area. A stratified sampling procedure was employed. In stratified random sampling, the procedure calls for categorizing the heterogeneous population into groups that are homogeneous in themselves. Hence, from the

list of small manufacturing enterprises in Eastern Ethiopia, 92 manufacturing enterprises were selected from each stratum (Manufacturing type) under proportional allocation and availability based on the total number of enterprises in each study area.

3.1 Empirical Models

3.1.1 Survival analysis

Survival analysis is analogous to logistic regression analysis but follows a longitudinal or follow-up study design. Survival data analysis is performed by using the duration of operation of SMEs as survival time (T) and the variable δ as an indicator of censoring for each of the SMEs in the study. The value of δ is 1 for all SMEs that failed (businesses that ceased operation on or before the end of the study period). The value of δ is 0 for all SMEs that are economically viable at the end of the study period. For each of the SMEs in this study, the exact date when operation started is known. However, measurement of survival time was stopped at the end of 2006 E.C/ August 2013 as the study was finally completed.

The indicator of censoring, δ is defined as follows:

$$\delta = \begin{cases} 1 & \text{if SME is out of the business} \\ 0 & \text{if SME is still operating the business} \end{cases}$$

Survival analysis is suitable for comparing survivors and non-survivors as some of the SMEs still operational at the end of 2006 E.C (the date when the data collection procedure was completed). SMEs that are still functional at the end of 2006 E.C are called "censored" observations. Censored observations are analyzed using the Cox proportional hazards model Cleves [2,8]. Using hazard ratios, failure and survival rates will be obtained for several predictor variables that affect survival of business. The two groups of SMEs in this study (those that are financially viable and those that are not) will be compared using Kaplan-Meier survival probabilities.

The analysis of survival time has a long tradition in biometrics and material sciences. Its application for firm demographics is rather recent starting with the works of [18] and [19]. The subject of analysis is the population distribution of time under risk-enterprises exit in this case. The cumulative density function F(t) of time under risk or survival time (T) is expressed as:

$$F(t) = P(T \le t), \quad t \ge 0$$

Where t is a specific value of T.

The survivor function (S) is defined as the probability of surviving past time t:

$$S(t) = 1 - F(t) = P(T > t)$$

Because of the right-censoring of survival time, inmost applications the prime interest is in the hazard function which is the probability of failure in a short time interval Δt conditional on survival until *t*. The hazard function λ(*t*) is expressed as:

$$\lambda(t) = \lim_{\Delta t \to 0} \frac{P(t \le T < t + \Delta t \mid T \ge t)}{\Delta t} = \frac{f(t)}{S(t)}$$

Where $f(t)$ is the density of T.

The shape of the hazard function conveys an important message about the underlying distribution of survival time.

3.1.1.1 Kaplan-Meier survival probabilities

Kaplan-Meier survival probability is a method of estimating the duration before the occurrence of an event such as failure. It is possible to distinguish businesses that survive long from businesses that survive briefly on the basis of Kaplan-Meier survival probabilities, hazard probability curves, survival probability curves, life tables and hazard ratios. The Kaplan-Meier survival probability curve is often illustrated graphically and compares the survival probability curves of two or more groups. In this study, Kaplan-Meier survival probability curves was used to compare the duration of survival of firms that has operated for long period with firms that are infant. For firms that failed, survival time was measured from the date of establishment of the business up to the date of the business' ultimate collapse. For firms that are still operational at the end of 2006 E.C (censored observations), survival time was measured as the difference between their date of establishment and the end of 2006 E.C.

Suppose that the survival times after entry to the study (ordered by increasing duration) of a group of n SMEs denoted by $t_1, t_2, \ldots, t_n$ are given. The

proportion, p, of SMEs surviving beyond any follow up time (t) is estimated by the Kaplan-Meier technique as:

$$\hat{p} = \prod_{i=1}^{n} \frac{r_i - d_i}{r_i}$$

Where

$\hat{p}$ is the proportion of SMEs surviving

r_i is the number of viable SMEs just before t_i

d_i is the number of SMEs that failed at time t_i

3.1.1.2 The log-rank test

Different categories of SMEs have different probabilities of survival. The log-rank test is used to compare successful and unsuccessful businesses with regard to important variables of study [8]. The null hypothesis states that successful businesses are similar to unsuccessful businesses with regard to the variable of comparison. The alternative hypothesis states that successful and unsuccessful businesses differ from each other with regard to the variable of comparison. At the 5% level of significance, the null hypothesis is rejected if the P-value falls below 0.05. Otherwise, it is accepted at the same level of significance.

For example, it is possible to compare the chances of survival of businesses that have larger size with businesses that are not by using the log-rank test. The null hypothesis states that businesses that have larger size have the same probability of survival as businesses that are not larger. The alternative hypothesis states that businesses that have larger size have the same probability of survival as businesses that are not larger.

4. RESULTS AND DISCUSSION

Stratified random sampling was used for gathering data from a random sample of 92 small manufacturing enterprises. Data were gathered on variables that are known to affect the long-term survival of small businesses and enterprises in Eastern Ethiopia. The enterprises were selected from ten geographically representative regions of Eastern Ethiopia. The study areas account for a diverse range of SMEs activities conducted over a long period of time sum up the typical socioeconomic environment within which small manufacturing enterprises operate in the Eastern Ethiopia. Hence, the 92 small businesses and enterprises selected for the study constitute representative sample in terms of characteristics and problems experienced by SMEs in Eastern part of the country. Some of the selected SMEs were excluded mainly because of the problem of obtaining reliable longitudinal data for the study.

4.1 Demographic and Socio-economic Characteristics of SMEs Heads / Owners

Table 1 gives an overview of the respondents included in the analysis, 53(76.8%) of enterprises heads/owners were males and 16(23.2.4%) were females. Hence it can be realized that the sector is male dominated. 14(20.3%) & 50(72.5%) of the business owners' marital status were single and married, the rest 5(7.2%) of them were divorced, widowed and separated at the time of the study. Regarding their literacy, 3(4.3%) were illiterate who were unable to read and write and 67(95.7%) were literate who can read and write. The level of education attained by the heads/owners of enterprises at the time of the study shows that about 54(80.6%) attained below secondary school level and the other 13(19.4%) were above certificate graduate level. Majority of the respondents, about 40(58%) acquired formal technical training related to their engaged activities and 28(40.6%) never acquired formal technical training. This descriptive statistics table illustrates that most of the respondents who operate the enterprises were males in terms of sex, literate but completed below secondary school and above half acquired formal technical training.

4.2 Profile of SMEs in the Sample

In this study, a closer going over the sector indicates that small manufacturing enterprises in Eastern Ethiopia cover a wide range of business activities that are generally classified into six major categories (food items, wood & metal works, construction materials, textile & garment, ornamental articles, leather products) of production. Table 2 reveals that wood and metal works represents the majority of small manufacturing enterprises 46(50.0%), followed by the food items (19.6%) and the textile & garment producing enterprises (17.4%). but all the other three (ornamental articles, construction materials and leather products) accounted for

cumulatively about (13.0%) in the selected sample.

The distribution of small and manufacturing enterprises across the geographical regions of Eastern Ethiopia was assessed. Most of the SMEs located at Dire Dawa administration 30(32.6%) followed by Harar 12(13%) and Jigjiga 8(8.7%). about 9(9.8%) of sampled enterprises each selected from Badeesa, Chiro and Gelemso whereas the other (14%) of the included sample was from Haramaya, Babile and Chelenko.

Table 1. Basic demographic characteristics of the head/owners of the enterprises

Variable	Categories	Count	Percents
Sex	Male	53	76.8
	Female	16	23.2
Marital status	Single	14	20.3
	Married	50	72.5
	Divorced	2	2.9
	Widowed	1	1.4
	Separated	2	2.9
Literacy	Yes	67	95.7
	No	3	4.3
Educational level	Below secondary school	54	80.6
	Certificate level	1	1.5
	Diploma	5	7.5
	Bachelor degree and above	7	10.4
Technical training	Yes	40	58.0
	No	28	40.6

Table 2. Distribution of SMEs across geographical areas

Home town of the enterprise		Manufacturing type of the enterprise						Total
		Food items production	Ornamental articles	Wood & metal products	Textile & garment	Construction materials	Leather products	
Dire Dawa	N	7	3	7	10	1	2	30
	%	23.3	10.0	23.3	33.3	3.3	6.7	100.0
Harar	N	1	0	7	2	2	0	12
	%	8.3	0.0	58.3	16.7	16.7	0.0	100.0
Jigjiga	N	1	1	5	1	0	0	8
	%	12.5	12.5	62.5	12.5	0.0	0.0	100.0
Chelenko	N	0	0	2	0	0	0	2
	%	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Babile	N	0	0	4	0	0	0	4
	%	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Bedesa	N	3	0	5	0	1	0	9
	%	33.3	0.0	55.6	0.0	11.1	0.0	100.0
Chiro	N	2	0	4	1	2	0	9
	%	22.2	0.0	44.4	11.1	22.2	0.0	100.0
Deder	N	0	0	5	0	0	0	5
	%	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Gelemso	N	3	0	4	2	0	0	9
	%	33.3	0.0	44.4	22.2	0.0	0.0	100.0
Haramaya	N	1	0	3	0	0	0	4
	%	25.0	0.0	75.0	0.0	0.0	0.0	100.0
Total	N	18	4	46	16	6	2	92
	%	19.6	4.3	50.0	17.4	6.5	2.2	100.0

As Table 3 presents, 19(86.4%) of failed businesses cease to operate before their second birthday and 100% of failed businesses ceasing operations before their fifth birthday. The majority of failed firms in this study were in the early stages of their establishment. Therefore, it can be realized that they lacked the ability to successfully compete against well established enterprises during their early stages of operation. Various factors contribute to the failure of newly established firms, but the key factor responsible for the demise of such firms is lack of access to finance [20,21]. This study tried to get data via interviewing heads of some enterprises that small firms that went out of business started operation with insufficient working capital, and failed to gain access to finance from formal money lending institutions such as cooperative bank of Oromia.

The same table shows that enterprises in wood and metal work and construction material production have the highest infant failure rate compared to other businesses. Enterprises in the leather products and textile and garment businesses have survived better in comparison with the other businesses, with 4.8% of enterprises in leather products, 4.8% of textile and garments, and 14.3% of enterprises in construction and food production each. But 61.9% of enterprises failure rate exhibited in wood and metal works having failed during the six-year-long period of study is the highest. It was found that the rate of failure decreases with the age of the firm and duration of operation. For instance, 86.4% of total failed firms ceased operation during the first two years of operation, and only 9.1% of all failed firms ceased operation after five years of operation.

According to Chemeda [20], Ethiopia has no solid entrepreneurial culture due to the deprived educational system of the country and other constraints. Lack of proper support in terms of policy and marketing, inefficient production systems and poor quality of outputs, and ineffective business management reflect a low level of entrepreneurial practice, and this limitation is responsible for the high infant failure rate in Ethiopian MSMEs. For the open ended questions attached to the main questionnaire of the study, majority of the respondents replied that the three most constraining factors in their respective seriousness faced by operators during the time of startup include lack of sufficient capital, access to working premise, and market problems.

Survival analysis was employed to compare survivors and non-survivors as some of the SMEs still operational at the end of 2006 E.C (the date when the data collection procedure completed). SMEs that are still functional at the end of 2006 E.C are called “censored” observations.

4.3 Kaplan-Meier Survival Probabilities

$\bar{T}$ and $\bar{h}$ measure the average survival time and the average hazard/failure rate of the businesses in the study respectively. Total survival time (person years) was the sum total of the durations of survival of the enterprises in the study. The total duration of survival of all the businesses in the study was equal to 3162 months. Number of failures is the number of businesses that failed during the study period.

Kaplan-Meier survival probability plots were used to compare the survival probabilities of SMEs with regard to some variables of interest such as geographical region, level of education, gender of owner and type of manufacturing. The plot in Fig. 1, is a Kaplan-Meier survival probability curve that shows that SMEs in Babile

Table 3. Proportion of failed firms by sector and duration of operation

		Manufacturing type of the enterprise					Total failed firms
		Food production	Wood and metal products	Textile & garments	Construction materials	Leather products	
Under 2 years	N	2	12	1	3	1	19
	%	10.5	63.2	5.3	15.8	5.3	100.0
3-5 years	N	1	1	0	0	0	2
	%	50.0	50.0	0.0	0.0	0.0	100.0
Above 6 years	N	0	0	0	0	0	0
	%	0.0	0.0	0.0	0.0	0.0	0.0
Total	N	3	13	1	3	1	21
	%	14.3	61.9	4.8	14.3	4.8	100.0

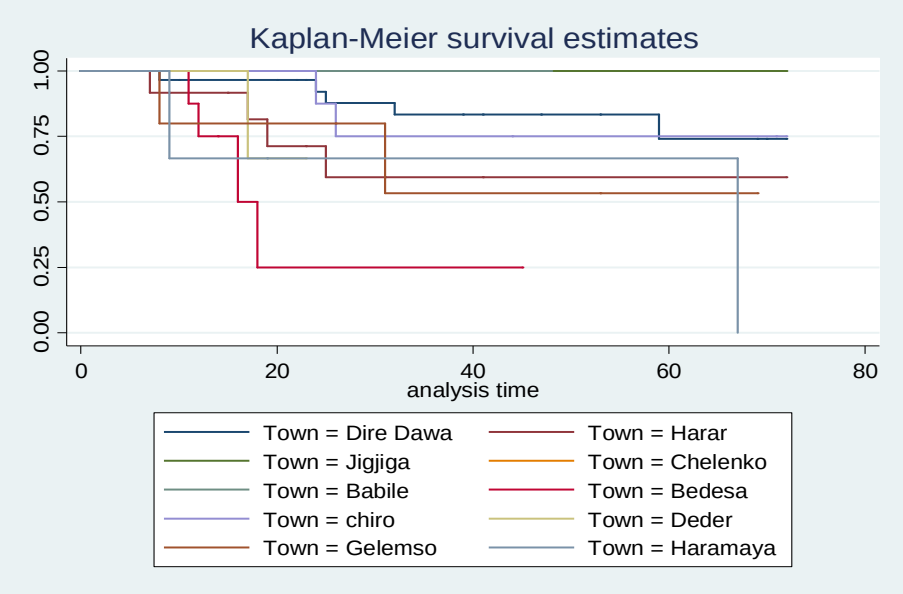

Fig. 1. Kaplan-Meier survival probability curves by geographical region

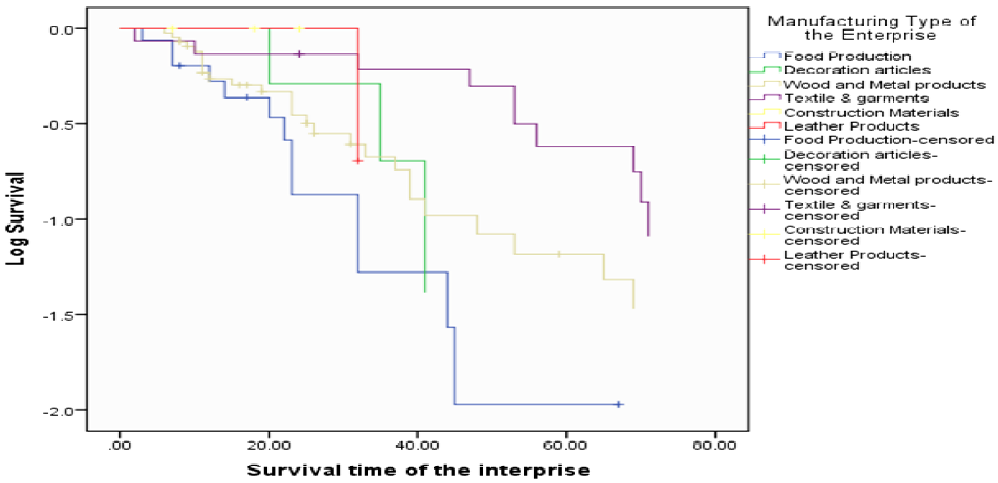

Fig. 2. Kaplan-Meier survival probability curves by manufacturing type of enterprises

and Dire Dawa had the highest survival probabilities in comparison to the other geographical regions in the study. The plot also shows that SMEs in Badessa had the smallest survival probabilities relative to the other geographical regions. From this we can recognize that location may be a reason to failure of enterprises. Fig. 2, shows the Kaplan-Meier survival estimates by type of small manufacturing enterprises. The Kaplan-Meier survival probability curve shows that leather products and textile and garment producing enterprises have the higher probability of survival in comparison to others. The next higher survival probability was that of ornamental articles producing enterprises. The least survival probability was that of wood and metal work and food item manufacturing enterprises.

The log-rank test is used to compare survival probabilities of different categories of SMEs with each other. At the α level of significance, a P-value smaller than α shows that the survival probabilities of the categories being compared differ significantly from one another.

From Table 4 the P-value from the above log-rank test is 0.1947 > 0.05. We fail to reject that the survival functions for SMEs in all categories are identical. The larger P-value shows that the survival probabilities of the all categories of the variable manufacturing type do not significantly differ at the 5% level of significance.

In survival analysis, life tables are a commonly used method for comparing various categories with regard to survival and hazard probabilities. Survival probabilities are used to measure the likelihood of survival [22]. By contrast, hazard probabilities are used to measure the likelihood of failure. Survival probabilities and hazard probabilities are inversely related with one another. A decrease in one implies an increase in the other, and vice versa. SMEs that do well have relatively higher survival probabilities and smaller hazard probabilities, whereas SMEs that struggle have relatively smaller survival probabilities and larger hazard probabilities.

Table 5 shows a life table that illustrated probabilities of survival for each of the five regions in the study at intervals of five months. The life table shows that business in food and textiles manufacturing have high probability of surviving (.941) & (.937) and respectively when they enter in to the market. And at the end of the study period, food production showed least probability of surviving, .138 (and the largest hazard probabilities) along with that of wood and metal production enterprises, with probability of surviving was 0.23 at the last time interval of study period.

This study mainly focused on measuring long term survival of small manufacturing enterprises in the competitive market in eastern Ethiopia. Survival probabilities and the time to retain in the market were estimated using Kaplan Meier probabilities and survival function of the enterprises.

The results from survival analysis, the Kaplan-Meier survival estimates by type of small manufacturing enterprises were examined and found that leather products and textile have the higher probability of survival. The least survival probability was that of wood and metal work and food item producing enterprises.

Table 4. Log-rank test for equality of survival estimates

Manufacturing type	Events observed	Events expected	Sun of ranks
Food production	3	2.93	-14
Decoration articles	0	1.05	-65
Wood and metal products	12	9.02	169
Textile & garments	1	4.88	-215
Construction materials	3	1.52	118
Leather products	1	.60	7
Total	20	20	0

$chi^2(5) = 7.37$; $Pr>chi^2 = 0.1947$

Table 5. Life table of the SMEs

Interval	Beg. total	Deaths	Lost	Survival	Std. error	[95% confidence interval]	
0-5	90	2	0	.9778	.01555	.9141	.9944
5-10	88	6	4	.9096	.0305	.8273	.9537
10-15	78	9	2	.8032	.0428	.7026	.8729
15-20	67	2	5	.7783	.0450	.6745	.8526
20-25	60	8	2	.6728	.0521	.5592	.7632
25-30	50	2	3	.6451	.0535	.5298	.7389
30-35	45	6	2	.5571	.0570	.4386	.6602
35-40	37	4	0	.4969	.0583	.3785	.6044
40-45	33	3	0	.4517	.0585	.3349	.5614
45-50	30	4	0	.3915	.0579	.2786	.5024
50-55	26	3	0	.3463	.0568	.2378	.4570
55-60	23	1	1	.3309	.0563	.2241	.4414
65-70	21	3	1	.2825	.0546	.1816	.3919
70-75	17	17	0	.0000			

The total percentage of failure of small manufacturing enterprises was 23.9 while 76% of the included SMEs were surviving in the market.

The developed life table shows that enterprises engaged in food and textile manufacturing have high probability of surviving (.941) & (.937) and respectively when they enter in to the market. But food production showed least probability of surviving and the largest hazard probabilities along with that of wood and metal production enterprises at the last time interval of study period. Especially the survival time of food producing enterprises fall fast from largest to least probability. This implies this sector require high attention to save from failure. Most SMEs operators are struggling because of a low level of education, poor technical training and inability to acquire on-the-job training [17]. The low levels of investment in research and development and failure to adapt to new technology have contributed to the poor performance of the sector [1].

This study shows that enterprises in the wood and metal work and construction material production have the highest infant failure rate compared to other businesses. Enterprises in the leather products and textile and garment businesses have survived better in comparison with the other businesses, with 4.8% of enterprises in leather products, 4.8% of textile and garments, and 14.3% of enterprises in construction and food production each. This result is consistent with Eshetu [1] pointed out that irrespective of differences in sector, new entrant firms in all sectors find it difficult to compete and survive through the first three years of operation.

5. CONCLUSION

A number of studies have been conducted in recent years to investigate the survival of small enterprises. Although a little has been learnt, still much need to be explored in the literature. Based on the survival analysis, the study has shown that there was a relationship between firm age and firm survival. In other words, majority of failed firms in this study were in the early stages of establishment and probability of failure decreases as the age increases. Older establishments are more likely to survive than new businesses. The fact that surviving establishments face hazard rates that decline over time reveals that firms learn survival skills by staying in the market.

Kaplan-Meier survival probability plots were used to compare the survival probabilities of SMEs with regard to geographical region, and shows that SMEs in Babile town and Dire Dawa city administration had the highest survival probabilities in comparison to the other geographical regions in the study. Survival estimates by type of small manufacturing enterprises shows that leather product manufacturing and textile manufacturing enterprises have the higher probability of survival. The next higher survival probability was that of ornamental articles producing enterprises. The least survival probabilities were that of wood and metal work and food item producing enterprises.

The life table has shown that business in food and textiles manufacturing enterprises have high probability of surviving (.941) and (.937) respectively when they enter in to the market. And at the end of the study period, food production showed least probability of surviving, .138 (and the largest hazard probabilities) along with that of wood and metal production enterprises, with probability of surviving was 0.23 at the last time interval of study period. Survival probabilities and hazard probabilities are inversely related with one another. A decrease in one implies an increase in the other, and vice versa. Enterprises that do well have relatively higher survival probabilities and smaller hazard probabilities, whereas enterprises that struggle have relatively smaller survival probabilities and larger hazard probabilities.

Findings from this study have a policy implication that can be applied to several economies similar to that of Ethiopia. In countries where the SMEs sector faces technical problems and needed support to survive, there is no option other than to pay special attention to newly established manufacturing enterprises especially the manufacturing segments who are more hazardous than others.

6. RECOMMENDATION

The findings of this study have important implications for interventions designing to enhance the start up, growth and expansion of SMEs in the study area. The finding that relates to business experience is associated with new start-ups calls for the promotion of the culture of consulting and intern experience sharing for the young as a possible area of intervention in employment generation. These include group

lending approaches, small and (contingent on success) increasing credit, link of credit savings or micro financing institutions through NGOs. Lack of sufficient capital partly emanates from a knowledge gap and appropriate business promotion that can be supported with reliable and supportive credit scheme. Ethiopian Ministry of Industry should give emphasis and special support to those sectors with high probability of failure in their infant stage of establishment.

7. LIMITATIONS AND FUTURE RESEARCH

Concerning the closed enterprises, it was initially planned to approach about 30 small manufacturing enterprises which are listed as closed in the registry to consider them in the survival models. However, many have left their premises, others have gone to abroad, and for some others, the owner is dead. Very few found after much effort, but not adequate to include in the study. Hence, incorporating demographic and socio-economic variables of closed enterprises' operators was difficult during the study period. This may be due to the poor recording system of the offices to keep important information of each enterprise operators. Therefore, Cox proportional hazards model was not possible to be employed. The result will be more convincing if such a survival models are fitted.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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