Determinants of Firm Survival in Manufacturing Industry: A Research on Lake Region in Turkey

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Abstract: This paper gives an empirical analysis of determinants of firm survival in the manufacturing sector of Lakes Region (Turkey) from 2003 to 2009. The survival activities of the firms are measured through a four-dimensional, namely firm based, industry/environment based, innovation based and human capital based, questionnaire consisting of 49 questions. For the application logistic regression method is used for the evaluation of survival probability and the findings are compared with the basics of the related literature. According to the results of the empirical work, the effects of the "Firm Based" factors on the survivals and growth performances of the firms located in the region are found to be more significant and positive than the remaining dimensions.

Introduction

Studies, depending on market entry and exit dynamics, have emphasized on the importance of the the high turbulence level in the industry in recent years. Applies to all sectors and all the economies, most of the new companies stop their activities a few years after entering to the markets. Chance of firms' survival and improving their performance for growth depend on following successful strategies which can be adaptable to changing environmental conditions.

The difference in survival rate of firms till to the 1980s has not been got attention in the literature as deserved. However, after 80s, there has been an increasing interest in performance of the firms to survive and the studies have focused on the determinants of survival. The relationship between scale and growth rate were investigated in the studies, related to the performance levels of firms in the 1950s and 1960s by using firm-level data. However, nowadays, the studies gives particular importance to firm-level factors which effect the survival rate. Economists have started to use the market selection models which affect the survival of firms to explain the empirical findings. Based on previous studies of the factors, affecting the survival of companies, can be classified under three categories :

1-) Firm-based factors
2-) Industry-based factors
3-) Local factors

At a level in firm-based , the most important and best-known variables that affect the chance of firms' survival are firm's age and its scale. The changes in the scale of the firms occuring in the course of time also reflect the interactions between entry and exit. The most important determinants of the survival chance at a level in the industry are market scale and growth rates, technology properties and product life cycles.

Among these three categories, human capital and local factors are evaluated with different measurement in the literature of survival. Human capital is generally a variable related to individual characteristics of the the owner's of the company, entrepreneur's, manager's and employee's (Van Praag 2002). Therefore, in the analysis of

survival of the firms, human capital variables is not used whether in local or regional level (Acs and Armington 2006). Human capital is evaluated in the firm-based level because of reflecting its own specific effects.

In addition to these three categories, especially at the end of the 90s, the impact of the innovative efforts of companies to survive has started to take over. Innovation in a changing environment will provide a competitive position to the company and this will increase the firm's potential for being successful in the market. This effect is important for both the firms that are operating in the industry and the firms being freshly established and enter to the market. Innovation can not only increase the chance of survival of new firms by means of enabling them to enter suitable niche markets but also reduce the negative effects of tecnologies which are new and devoloping or desructive upon the avaliable firms.

Determinant Features of Survival of Firms

Classifying of the factors affecting survival in the industry-based and firm-based would be appropriate to form a starting point. Industrial attributions include both time-based factors and external variables which show the effects amidst the markets. This scope is a result of the form and rate of technical changes and different demand attributions. Therefore, affecting the survival of firms, owned properties are regarded as internal factors (Agarwal and Gort 1997). The other important point should also be noted that the survival of the firms is seen as a function of the variables of the firm and variables of the industry.

The entering to the market and existing of the firms from the markets are important process which affects the degree of competition / efficiency and evolution of the industry. These two cases have important impacts on the distribution of resources, increasement of productivity with innovation rate and renewal of the industry. Although, existing of firms from markets have both social and economical effects, the number of studies is very low regarding factors which determine the risk of exist. Factors which increase the effectiveness of the company are the important determinants of survival as well (Perez et al.2004). Most of the recommended practices which increase the probability of survival are expanding export rates and increasing R & D activities (providing information about foreign markets, guiding in entrance to the market and providing export structure, support policies into investment R & D)

Determinants of survival of the firms which newly enter are avaliable in industrial organization literature. According to Geroski (Geroski 1995), one of the important points related to market entry are age and scale which are directly related with the chance of firm' s survival. As first put forward by Stinchcombe (Stinchcombe 1965), new firms are faced with " barrier to being new" and this is a risk of failure compared with large firms. During the period of starting, the firms are faced with the problem of completion in efficieny levels and organizational effectiveness to maintain their speed in the same level with competitors. In order to overcome this case, obtaining of capital and labour force, establishment of business connections with suppliers and finding of customers for products are essential points.

The studies related to entry and exit of the firms, performance after entry and evolution of industry do not fully deal with the location, especially the role of region at the time of entry. The problems of the countries in which the risk ratio is different in local center and out of city center and where the economic activities are intensive in only a few local center can be eliminated by application of the development policies. Location selection is the most important strategic decisions of the company at the begining. A large part of the new firms which start operations are located in clusters where the firms have particular relations between each other and where the institutions are geographically concentrated (Pe'er and Vertinsky 2006).

Scale and scope not only allow the creation of organizational capital, but also provide different benefits. Scope provides diversity in the organizational capital while scale gives the depth to the organizational capital. A larger scale and scope of the firm can increase chance of survival when faced with problems of money, connections and provide benefits such as work Schedule (Bercovitz and Mitchell 2007).

There are some structural factors such as firm's age and its scale which play important role in the industrial economy. Differences among the chance of survival among the firms are seen the results of the selection process. Experience will increase the chance of firm's survival and therefore, life curves of the firm has extended with the scale of the firm.

Innovation may increase chances of the firms' survival by contributing to the development of appropriate strategies. The existing firms in the market is also under risk because of recession/ fluctuation in the industry that are results of tecnological changes occurring in its nature. Innovation activities increase their abilities to being alive permanently.

Level of competition, demand predictability, the rate of tecnical change and its structure vary among different industries and these affect the chance of survival. The industry characteristics affecting the survival can be analyzed in two groups (Agarwal and Gort 1997):

- Specifications for all products in this group vary in course of time or more distinctly, in the period of consecutive product life cycle.

- In the second group, industrial properties change between industries thanks to all stages of the life cycle or a large part of life cycle.

The conditions of industry at the time of entry have two significant reasons for firms which newly enter to the industry. Firstly, the firms must make large irremeable investments in order to compete with the firms which are already exist in the industry. If the firms flunk out from the industry, these investments would be appraised as sunk costs and it is considered that these investments affect dynamics and profitabilitiy of the company. Therefore, identification of industry's conditions that reflect the nature of cost at the time of entry enable to understand how this kind of structural barrier effect the performance after entry.

Having a high human capital attributes of entrepreneur will decrease the ambiguities about the efficiency level and also enable to firm to adapt market condition and enable faster at the time of arranging the capacity so this will reduce the probability of exit. The entrepreneurial human's impact on the success of new firm may start before establishment. The entrepreneurs, who have opportunity to capture lucrative market and have ability to access relevant information, get the advantages because of past experience.

High level of previous experience is not only increasing economic performance, but also opportunity of obtaining of entrepreneurs and the expected income level of entrepreneurs in alternative business sectors. Therefore, a skilled entrepreneur performs better when he works for himself, also he will have high performance that he needs to go on his business life (Gimeno et al. 1997). Has previously worked in similar industries or individuals who set up a new company in the same region, command the organization of firm associated with business environment, relational features of sector and contex of sector (Santarelli and Vivarelli 2007).

One of the factors that increase the survival of institution which is related to founder, owner and employees level of education can be found in lots of studies. The founder of firm can be accepted as the first builder of organization's both structure and strategy. The role of the founder is inevitably an important position in capitalist economy. When viewed from this aspect, the level of education of the founder should be considered as one of the important determinant affecting the performance of the firm (Nelson 2003).

Research

Research Sample

The universe of firms located in Lake District region are in manufacturing industry. The number of firms in the sample set is 60. This sample was used in Dr.Bekir Sami Oğuztürk dissertation thesis titled " The Role of Innovation in Regional Development and a research in Lake District". The firms which were applicated in survey in the sample set are compared after 5 years with a new survey which was prepared by us to investigate the cases whether they are survive or not.

39 of 60 firms are located in Isparta, 21 of them are located in Burdur. The survey of the study was applicated by meeting individually with each firms owner, partner, manager, department manager of the firms including active or not active at that time. 12 of the firms (20% of the sample) in the sample ended their activity in 2008.

	ISPARTA	**BURDUR**
Construction	3	3
Timber	6	8
Textile	13	8
Cosmetic	4	-
Food	8	-
Bait	1	-
Machine	4	-
Gun	-	1
Tarımsal Sulama	-	1
Total	39	21

Table 1. The Sectoral Distribution of Sample Firms

Sample included firms in other sectors of the provincial distribution are included in Table 1. Looking at the sectoral distribution of firms, in both provinces is seen as a condensation on the timber industry. Wood products industry is identiy of the region. The industry has a long history in the region and this industry which has provided value added to the region for many years and has also included a large portion of employment. Naturally, in the set of sample, most of companies are performing in timber industry in both cities. Looking at the city-level, after timber sector, 2nd intensive industry is textile in Isparta. The reason is city's past experience

in carpet and yarn, and also having infrastructure. In Burdur, most of firms are performing in timber industry and in machine industry. Considering high agricultural production level in Burdur, it has a considerable potential in the production of agricultural equipment and machines.

Research Data

The source of data for study is a survey, consisting of 39 questions about firms' survival and growth performance, was applied to the firms between June-July 2008. This survey consists of four main headings: firm information, product and sales information, staff information working in branch, firm's innovation performance. Moreover, the data belongs to 2003 was obtained from survey which was used in dissertation thesis of Dr.Bekir Sami Oğuztürk.

Influential factors on the growth performance of firms for survival analysis will be collected under four main headings to be used for the growth analysis by making totalitarian evaluation. The headings under which analysis of growth are categorized as firm characteristics, industry / environmental characteristics, innovation activities and human capital (for entrepreneurs and workers).

Variables, grouped under four headings, have detailed explanations above. The symbols and the use of variable are presented in Table-2

VARIABLES	DEFINITION
Exit (EXT)	For the survived firms 1 Otherwise 0
Firm Age (AGE)	For the survived firms difference between founding date and year 2008, for the exit firms difference between founding date and exit date.
Firm Size (SIZE)	Number of employees in 2003 at the firm
Export (EXPRT)	For the exporter firms 1 Fort he non-exporter firms 0
Diversification (DVSF)	Number of plant, branch office and bussiness concerns ecept headquarter
Minimum Efficient Scale (MES)	Proportion number of emplyees at the firm to number of employees in own sector.
Industrial Growth (IGRWT)	Mean of sectoral growth rates fort he last four years
Location (LCT)	Isparta ilinde faaliyet gösteren firmalar için 1, Burdur ilinde faaliyet gösteren firmalar için 0.
Innovation Activities (INNO)	İf the firm has bought/developed; a-) A new product , b-) A new production system and/or technology 1 Otherwise 0
Patents/Industrial Design (PTNT)	Number of patents and/or industrial design certificate
Research and Development (RD)	For the regular R&D activities 1 Otherwise 0
Educational Level of Employees (ELE)	(Graduate employment)/(Total employment)

Table 2. Variables Used In The Analysis

Logistic regression model (logit) will be used to distinguish the survival firms and failed firms in 5 years period after 2003. Logit model is explained as below with estimation of a specific event / fact with β probality parameters.

$$P(Y = 1/X) = \frac{e^{\beta_0 + x_{i1}\beta_1 + x_{i2}\beta_2 + \dots + x_{ip}\beta_p}}{1 + e^{\beta_0 + x_{i1}\beta_1 + x_{i2}\beta_2 + \dots + x_{ip}\beta_p}} \quad (1)$$

In logit model, β coefficient is calculated by maximum probabilty method. Thus, taking into consediration of the firm' s situation within a specific period, it is possible to calculate the probability of firms' survival.

Results

The main features of firms being inclusive of sample are shown in Table 3. Accordingly, in the region, the firms' average age was 26 and this age level shows that most of the firms were founded in the early 80s and 90s while the industrialization was accelerated in Turkey. The firms in the region have an avarage level of foreign sales opportunity. 57% of firms are exporting. In terms of employees or scale, firms are in middle sizes (average number of employees is 73). Although there is no setted innovative structure and culture, 42% of the firms are engaged in informal R&D activities. Although the structure of firms are generally limited liability and joint-stock company, the most prominent characteristic for all the firms is family business. Finally, it is observed that 83% of the firms' founders in the sample have experience in the same or different sectors as an entrepreneurial.

	NUMBER OF OBSERVATIONS	MEAN	STANDART DEVIATION	MINIMUM	MAXIMUM
COMPANY STRUCTURE	60	1.13	0.34	1 (Corporate)	2 (Individual)
EXT	60	0.8	0.40	0	1
AGE	60	26.03	22.25	3	153
SIZE	60	72.78	103.2	7	431
EXPRT	60	0.56	0.49	0	1
DVSF	60	1.88	1.7	1	11
MES	60	47.84	15.4	10	100
IGRWTH	60	7.35	7.46	-3.07	19.17
LCT	60	1.35	0.48	1	2
INNO	60	0.53	0.50	0	1
PTNT	60	0.45	2.65	0	20
RD	60	0.41	0.49	0	2
ELE	60	9.27	8.64	0	38.71

Table 3. Descriptive Statistics

The correlation analysis will be made in order to see whether there is a directly relationship amidst explanatory variables which cause an increasement in the estimate values' of standart errors of parameters before making econometric analysis. Table 4 contains the results of correlation analysis.

When we examine the values of co-efficient resulted from correlation analysis, it can be seen that there is no highly relationship which can cause multicolinearity problem between independent variables. Table 2 will also help us to see the direction of relationship between firms growth rate and survival chances with independent variables

The Stata 1.9 statistical program was used for all models while the researh findings are being obtained. In the findings section, the determinants which affect the firms' survival including firm-based, industry and environment-based, human capital and innovation-based, growth perfomance factors will be examined with an order.

	EXT	AGE	SIZE	EXPRT	DVSF	MES	IGRWTH	LCT	INNO	PTNT	RD	ELE
EXT	1											
AGE	0.32	1										
SIZE	0.05	0.18	1									
EXPRT	0.25	0.18	0.44	1								
DVSF	0.28	0.13	0.04	0.29	1							
MES	-0.02	-0.12	0.29	0.23	-0.01	1						
IGRWTH	0.09	0.14	-0.46	-0.35	-0.12	-0.54	1					
LCT	-0.15	-0.14	-0.33	-0.12	0.01	-0.24	0.46	1				
INNO	0.08	-0.01	-0.01	-0.13	-0.03	0.07	-0.07	0.01	1			
PTNT	0.05	0.20	0.16	0.32	0.33	-0.21	-0.08	0.10	0.18	1		
RD	0.28	0.38	0.12	0.29	0.05	-0.20	0.22	-0.16	0.18	0.29	1	
ELE	0.26	0.41	0.13	0.11	0.43	-0.13	0.01	-0.19	0.15	0.37	0.28	1

Table 4. Correlation Analysis

EXT	**Coefficient**	**Std.Dev.**	**z**	**P>|z|**
AGE	0.08	0.05	1.59	0.11
SIZE	0.00	0.01	-0.68	0.50
DVSF	3.49	1.64	2.14	*0.03***
EXPRT	2.36	1.45	1.63	0.10
MES	0.00	0.05	-0.03	0.98
IGRWTH	0.26	0.12	2.08	*0.04****
LCT	-3.84	2.05	-1.87	*0.06***
RD	-0.73	1.42	-0.52	0.61
PTNT	-1.15	0.60	-1.93	*0.05***
INNO	1.23	1.22	1.01	0.31
ELE	0.06	0.10	0.64	0.52
Constant	-2.46	3.69	-0.67	0.51

Significance Level: *=%10, **=%5, ***=%1

Number of obs = 60 Pseudo R2 = 0.4877

LR chi2(11) = 29.29 Log likelihood = -15.381425

Prob > chi2 = 0.0020

Table 5. Factors Affecting Firms' Survival

Effects of variables on sırvival probabilities of firms are respresented in Table 5. Accordingly, DVSF, IGRWTH, LCT and PTNT variables has significant effects. The mos striking result is that PTNT variable has significant and negative effect. But, only four firms has patent application and even more these firms has exited. ThereforePTNT is not a robust variable with which we could observe the concrete effects of the patent ectivities of the firms on their survival opportunities.

Conclusion

There are a lot of factors which affect the performance of the companies. The majority of factors are stochastic such as war, natural disasters, change of government, fluctuations in the stock market etc. In this study, the systematic factors which are thought as having an impact in the process of firms survival and the direction of these affects are investigated. The factors including firm, industry, innovation and human capital that affect the performance of firms operating in Lake District are identified by econometric analysis.

The results obtaining from emprical analysis clearly demonstrate that new and small-scale firms' importance. The results show that generally firms in the region continue their activities, and grow under the

traditional factors. Survival results related to literature do not show very large differences. Source of the differences is the variables which do not show significance in the Lake District sample set. Generally, opening branches for going to path differentiation are usually carried out by large firms. However, a large part of the firms going to path differentiation in Lake Region are consisting of small and medium sized firms. This case is one of the important difference that shows small and junior firms in the region perform better.

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