# CHAPTER IV

# MORTALITY AND SURVIVAL OF FIRMS AND GROWTH OF ENTERPRISES
# A TIME SERIES ANALYSIS

## 4.1 GROWTH OF FIRM : A BRIEF SURVERY

In the real world situation, small firms face competition not only from within the same sector but also from large scale industries and from imports. Therefore, if the small scale units have to survive in the market, they have to be cost- conscious. Most of the large firms that we see around were small when they were established, in the course of time they grew continuously and attained their present status. A firm at a point of time has certain objectives, so as to enable it to survive and attain growth in the market. In actual practice a firm is constantly adapting itself to rapidly changing world. Hence its objectives too change depending upon the situation it faces.

Traditionally, the theory of firm emphasizes the objective of profit maximization of a firm. Therefore, firms would grow till they reached equilibrium i.e. would have achieved maximum profits. Having reached this stage, there would be left no incentive for the firms to grow, and, the relationship between profitability and growth would vanish. However, the character, strength and nature of relationship is, in general indeterminate depending as it does, on the causes of disequilibrium and the speed of adjustment. However since the last four decades, some important developments in the functioning of the business

activities have altered this view. Criticisms of the traditionally postulated objective of the firm emphasizes that firms may have objectives other than profit maximization such as steadiness of profit, or a certain rate of profit or a certain share in the market or good labour and public relations. Finally survival or growth may be the dominant objective of the firm rather than profit maximization. Not that profits do not matter but other objectives may be regarded by management as a better criterion of progress of a firm.

For firms with different growth objectives the desire to make profits is inherent in the objective itself.[1] This is because profits are necessary in order to finance growth internally or to obtain additional outside finance. It applies whether the objective is to maximize the growth rate of profits, sales revenue, net assets or other indicators.

Firms are motivated by desire for growth. The firms try to grow in size but size can be defined in many ways. The size of a firm is a multidimensional concept including both stock and flow magnitudes. Dimensions of size include for example sales revenue, value added (Net output) capital assets, number of employees and other aspects of firms operations. It is only under perfect competition and in the case of single product firm that growth can be unambiguously interpreted to mean the rate of increase of output over time and in this case growth and profit would become

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1. Needhan, Douglas, "Economic Analysis and Industrial Structure", Holt, Rinehart and Winston, Inc. 1969.

identical as objectives assuming that profits are reinvested in the same business. In all other cases growth may mean, Growth of capital invested,[2] Growth of sales revenue,[3] Growth in the proportionate share of an expanding market. Of these, Boumal's interpretation of growth of size in terms of sales revenue seems to be the most widely followed criteria. In this interpretation profit is regarded not as a constraint but as instrument variable- "a means where by management works towards its goals ---- profits are a means for obtaining, capital needed to finance expansion plans". Though profits are necessary for growth the two are not identical as a criteria for decision making. According to this interpretation profits and growth in sales revenue cannot be treated identically as larger sales may be achieved only with lower profits and higher profits may restrict sales. Growth in invested capital as suggested by Penrose seems to exaggerate the importance of fixed capital for the purpose of growth of firm. The technological changes may alter the capital - output ratio for the firm or changes in relative prices may lead to change in the methods of production employed. A firm may be operating well below capacity but for the purpose of expansion, current operating expenses, including expenditure for sales promotion, may be more important than investment in fixed capital. The third interpretation of growth of firms in terms of share of the market is also not appropriate. This is open to the objection that if

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2. Penrose, E.T., "The Theory of Growth of Firm", Oxford, 1959.

3. Boumal, W.J., "Business Behvaiour, Value and Growth", New York, 1959.

the firms proportionate share in an expanding market remains steady, it would be right to concede that the firm has been growing.

Any firm in a position to reap further economies of scale will find it profitable to grow in size. However the growth in case of a firm is an organic rather than mechanical phenomenon. The growth of a firm depends not only on its rate of investment but also on the capacity of human and organizational resources, its adaption and adjustment to changes in scale of operation and to new environment. The managerial constraints in expansion of a firm are implicit in Marshall's analysis. Even in case of increasing returns to scale the firm cannot expand very rapidly because entrepreneur cannot go in for too rapid an expansion of his firm because his enterprise is a delicate organization with complicated labour and managerial relations. Survival and growth of firms in competitive market speak of their over all performance.

An industry attains growth, when the firms in the industry are growing. A strait forward reference to growth is found in Marshall's analysis of `representative firm'. Marshall compared the life of a firm with that of a living organism as such it was supposed to pass through the various stages of the life-cycle till it declined and disappeared all together from he scene. However in modern times one comes across large joint stock companies which often stagnate but seldom die but small firms exhibit high mortality. Marshall's analysis of representative

firm was suitably modified to fit the conditions of modern business. In a dynamic setting,the primary concern of the firm, it is claimed, is to grow or, at least to survive. Its behaviour at any time cannot be explained simply in terms of the motive of maximizing profit, though profits play crucial role.

Even when there are ample sources of funds available, firms will not invest if they do not foresee a profitable out come to the venture.[4] But this does not mean that an expanding level of profits is likely to be associated with an increase in investment and vice-versa. The level of investment under taken by any firm depends on two basic factors, viz., the ability of firm to grow and its willingness to grow. If the chief objective of firm is to increase its sales beyond a limit it becomes inevitable for the firm to expand its productive capacity. Thus arises the need for investing in fixed assets and inventories. The generally accepted hypothesis is that, the higher the profitability, higher will be the capacity to reinvest. However, companies in a particular industry may be involved in more than one activity and therefore they may create other small companies for their convenience. In such situation high profits earned by parent company by its one activity may reflect high retained earnings, but may not, and necessarily be reinvested in the activity.

The law of proportionate effect[5] states that the probability

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4. Schultz, C.L., "National Income Analysis", Prentice Hall of India Pvt. Ltd., New Delhi, 1976.

5. Gibrat discovered the 'Law of Proportionate Growth', and is also termed as Gibrats Law.

distribution of growth rates is independent of firm size. The modern writers[6], viz., Penrose, Marris, Gardon and Steindl postulate the theory of independence of growth in relation to size and thus support the Gibrats hypothesis. While Baumoul argues that the rate of profit increases with size of firm and growth of firm is positively correlated with its rate of profits and thus refutes Gibrats Law. Empirical evidence suggests that there is no difference between the average growth rates of different sized firms and that an inverse relation existed between the size of the firm and the standard deviation of firm growth rates. However, if diseconomies of scale are in operation, expansion of firms beyond a certain size will lead to higher cost and lower profit. This leads us to the conclusion that larger firms grow more slowly than small firms. On the other hand if there exists economies of scale, the average cost of larger firm is low and also their profit margin is high. In this situation if small firms have to survive in the market, expansion is a must, as with expansion firms realize economies of scale leading to lower costs and higher profits. When the unit costs are constant, there would then be no reason to expect large firms to grow, slower or faster on average than small firms i.e. the law of proportionate effect holds good.

The small firms are expected to exhibit high standard

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6. (i) Penrose,E.T. op.cit. (ii) Gordon,M., "The Investment, Financing and Valuation of Corporations", Illinois, 1962. (iii) Marris,R.L., "Economic Theory of Mangerial Capitalism", London, 1964. (Iv) Steindl,J., "Random Process and the Growth of Firm", London, 1962. (v) Boumal,W.J., op.cit.

deviations. Because of higher unit costs, the small firms would have lower profits. Their survival value would be lower. There would be a tendency for them to be driven out of the industry. However small firms with high unit costs will have an incentive to expand and realize further economies of scale, that is to become one of the large, low cost firms. This implies that a small firm has a greater probability of decline than does the larger firm and at the same time a greater probability of faster growth. Therefore, the dispersion of growth rates should be higher for the small firms than that of large ones, but there is no reason to expect that average growth rates would differ.

There are number of empirical studies attempted in India and abroad to study these aspects. The results arrived at are of varied nature. We shall look at some of the important studies.

According to Adelman,[7] Industrial concentration changes "at the pace of a glacial drift." Since there are usually few changes among the ranks of large firms and since concentration ratio's are stable, it is implied that there is an overall equality of growth rates of large and small firms. Sidney Alexander[8] in his study of the effects of size of manufacturing corporation on the distribution of the 'Rate of Return' found no relation between mean rate of return and size of firm and an inverse relation

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7. Adelman,M.A., "The Measurement of Industrial Concentraion", Review of Economics and Statistics, XVIII, Nov. 1951, p. 295.

8. Sidney Alexander "The Effect of Size of Manufacturing Corporation on Distribution of the Rate of Return", Review of Economics and Statistics, XXXI, Aug. 1949, pp. 229 - 35.

between variability of rate of return and size of firm. Hymer and Pashigian[9] in their study on firm size and Rate of Growth conclude that either there are continual economies of scale with increasing size; or larger firms are able to secure temporary or permanent monopoly returns but small firms are not. The study suggests that no relation existed between size of firm and mean growth rates and that an inverse relation existed between the size of firm and the standard deviation of firm growth rates. Simon and Bonini[10] found no relation between the size of firm and the mean rate of growth or between the size of firm and the standard deviation of firm growth rates.

The study by Hart and Prais[11] on the analysis of business concentration found no relation between size of firm and mean rate of growth or between the size of firm and the standard deviation of firm growth rates. This study takes the growth rates for the period 1885 to 1950 of sample firms listed in London stock exchange. Mc Connell[12] also found no relation between mean rate of return and size of firm and an inverse relation between

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9. Stephen Hymer and Peter Pashigian "Firm and Rate of Growth", in Readings in Economics of Industrial Organization (ed.) Needham,D., pp. 142-159.

10. H.A.Simon and C.P.Bonini, "The Size Distribution of Business Firms", American Economic Review, XLVIII, Sept. 1958, pp. 607-17.

11. P.E.Hart and S.J. Prais, "The Analysis of Business Corporation", Journal of Royal Statistical Society Part 2, 1956, pp. 150 - 91.

12. Joseph Mc Connell, "1942-Corporate Profits by Size of Firms", Summary of Current Business, Jan. 1946, pp. 10 - 16.

the variability of rate of return and size of firm was observed. However, the study was for one year only. The growth of manufacturing firms in British economy have been analysed by Lydall.[13] He observes that substantial growth in output took place primarily through expansion of existing firms. He also observes that there is no tendency for larger firms growing rapidly than smaller firms. Majority of the firms exhibited growth by indicators of employment and installed capacity. Around one third of firms remained as they were and hardly 10 percent exhibited decline. Samuel[14] examined the relation between the rate of growth and size of firms, with the help of 400 firms. He found that larger firms were growing significantly faster than smaller firms, but the degree of variability of growth with in a given class did not differ significantly between larger and smaller firms.

The study by Singh and Whitinagton[15] did not support the existence of a systematic relation between average growth rates and size of firms, although they noted a tendency for the largest firms to grow faster. Further, firms above a certain minimum size were found by them having a lower variance of growth rates

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13. Lydall,H.F., "The Growth of Manufacturing Firms", Bulletin of The Oxford University Institute of Economics and Statistics, May 1959, Vol. 21, No.2. pp. 85 - 111.

14. Samuels, J. "Size and Growth of Firms", Review of Economic Studies, 32(1965), pp. 105 - 12.

15. A.Singh and G.whittington, "Growth, Profitability and Valuation", University of Cambridge, Department of Applied Economics, occational paper No. 7, Cambridge, CUP; 1968.

than smaller firms in different industries. Radice[16] examined 86 firms from food, electrical engineering and Textile industries. He found that on an average the owner- controlled firms had higher profit rates and higher growth rates than managerially controlled firms. Monsen[17] and other in a study of U.S. firms found that owner controlled firms had higher profit rates than managerially controlled firms. Larver[18] and Kamerschen[19] using the American data found almost no difference in the growth and profit rates of the firms. There are a number of other studies which examined the profitability and growth rates of owner-controlled and managerially controlled firms but these studies gave conflicting results. Pandey[20] in his study on 'Growth of firms in India' analyses 201 continuing basic chemical companies during 1956-71. According to this study, inspite of the large variations in growth rates of individual firms in the Indian basic chemical industry, the three size-groups of firms Large, Medium and small are found to have similar growth on an average.

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16. Radice,M, "Control Type, Profitability and Growth in Large Firms", Economic Journal, 81; 1971, pp. 542 - 62.

17. R.Monsan, J.Chill and D.Cooley, "The Effect of Separation of Ownership and Control on the Performance of the Large Firms", Quarterly Journal of Economics, 82; 1968, pp. 435 - 51.

18. R. Larner, "Management Control and Large Corporation", Dunellan, N.Y., 1970.

19. D.Kamerschen, "Influence of Onwership and Control on Profit Rates", American Economic Review, 58; 1968, pp. 432 - 47.

20. D.D.Pandey, "The Indian Basic Chemical Industry Gibrats Law and Mobility of Firms", Economical and Political Weekly, Vol.22, May 29, 1976, pp. M 26 - 34.

The dispersion of growth rates about the mean is, however, found to be significantly different between the small to higher sized firms. This implies that the small, medium and larger firms in Indian Basic Chemical industry have an equal chance of growing.

The profitability and growth of chemical firms by size in India have been studied by Subrahmaniam and Papola.[21] The study found no bias of size in rates of growth and profitability of firms. They observed independence of profitability and growth and relation to the size of firms and found a strong relationship between average profitability on growth of firms. The validity of Gibrats law for corporations in Gujarat have been tested by George.[22] The study observes that the size discrimination in asset growth is not found to be compatible with that in sales growth. The study of small enterprises in Columbia by Mililuz Cortes and others[23] reveals that the high growth rates correspond to firms that have started very small and the entrepreneurs age is negatively related to growth rates. Little and others[24] in their study on small manufacturing enterprises in India observe

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21. Subrahmanyan,K.K. and Papola, T.S., "Profitability and Growth of firms — The Case of Indian Chemicl Industry", Anvesak, Ahmedabad, Vol.I, No.I, June 1971.

22. George, P.V. "Gibrats Law andGrowth of Corporations in Gujarat", Anvesak,Ahmedabad, Vol. II, No.2 June 1972.

23. Miliuz Cortez, Albert Berry and Ashfuq Ishaq, "Success in Small and Medium Scale Enterprises. (The evidence from Coloumbia); World Bank Publication, 1987, pp. 158 - 177.

24. Ian,M.D., Little, Dipak Majmudar, John.M. Page. Jr., "Small Manufacturing Enterprises - A Comparatiave Analysis of Indian and other Economies", Oxford, pp. 203 - 223.

that small and the young firms that survive grow fast, faster than larger firms. The study also observes that most of the enterprises started in a small way.

Berna[25] in his study of entrepreneurs in South India observes that the enterprises established are generally found less than optimum scale and they have scope for achieving economies of scale through growth. Two major patterns of growth are ascertainable among the firms under study. In the first growth pattern, a clearly defined break or discontinuity is evident in the development of enterprises, in the second growth pattern this clear discontinuity is absent. Growth takes place more or less steadily with no clearly marked turning point in the firms development. It can be said that entrepreneurs have in general been quite active in developing their enterprises into larger units.

James Mc Crory[26] in his study of small machine industries in North India come out with a contradictory result to that of Berna. Mc Crory conclusion was that, although the small industrialists he studied are good industrialists by most of all standards, they do not grow and prosper, but subsist, or frequently fail and start over again. The chief cause of this

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25. Berna, James J. "Industrial Entrepreneurship in Madras State", Asia Publishing House, Bombay, 1956. pp. 144 - 158.

26. Mc Crory, James, T. "Small Industry in a North Indian Town; case studies in latest Industrial Potential", New Delhi; Govt. of India, Ministry of Commerce and Industry, 1956. pp. 19 - 27.

pattern of frustrated growth is attributed to the financial vulnerability of the small enterprises. One must note that these two studies are biased samples and therefore are uncomparable. Berna studies the growth patterns of successful enterprises, which have grown over time and Mc Crory studies the growth pattern of non successful units. Therefore, the results arrived at cannot be compared with one another. At a point of time an industry consists of firms with different sizes, varied performance and of varied age structure.

Rao[27] in his study of Industrial estates in districts of Andhra Pradesh, reveals that majority of small enterprises have achieved growth. The study observes that the growth of firms when measured by investment criteria is greater than by employment criteria. The old units, the ancillaries and the self employed or technocrat units exhibited the qualities of better entrepreneurship as their performance in terms of growth is higher. Shiva Ramu[28] in his study measures the growth of enterprises in terms of different criteria such as capital invested, power installed, number of employees, capacity expansion and sales turn over. The smallest firms are observed to exhibit higher growth rates than larger firms by all the criteria. With this background, an attempt is made to estimate the growth rates of different categories of chemical enterprises.

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27. Gangadhar Rao, N., "Entrepreneurial andGrowth of Enterprise in Industrial Estates", Deep and Deep P lications, 1986, pp. 199 - 256.

28. S. Shiva Ramu, "Entrepreneurship and Enterprise Growth", Seema Publications, 1985, pp. 137 -144.

Estimates of growth by size of enterprises have been attempted. Mortality and survival rates for small scale enterprises have been estimated for the period from 1961 to 1984. It may be noted that earlier no attempt has been made to estimate the mortality rates. The survival and mortality rates for all industrial categories and chemical industry groups have been estimated separately so as to observe the differences in these patterns.

## 4.2 **Measurement of Growth** :

### 4.2.1 Problems Encountered :

Entrepreneurs have a special role to play in the growth of firms. Their contribution does not end with the establishment of the firms. They contribute to economic development by expanding their firms, improving the technology, there by creating additional employment opportunities and raising industrial output. A good entrepreneur would be equally interested in technological advancement and in improving the quality of products. The performance of enterprise is said to be dependent upon the entrepreneurs propensity to take risks, strong desire for achievement, capacity to mobilize resources, ability to perceive avenues for employing these resources and capacity to utilize them efficiently. Expansion of firm, the effective interest in the technological improvement and product diversification are some of the facets of the growth of enterprises.[29] The increase in productive capacities of goods and

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29. Berna, James,J. op.cit. pp. 11 - 13.

services in an economy may be made either by establishing new factories owned by new entrepreneurs or by expanding the existing factories in an industry. Therefore, the performance of enterprises must be judged by the contribution they make to the development of the nation. Increased number of enterprises alone does not automatically bring rapid industrialization of underdeveloped countries, therefore, economists are equally concerned with the growth of the firms; technological advancement and improvement in quality of products, as they are concerned with starting of new units. The problems that encounter the evaluation of the growth of a firms are many. Firstly, there are difficulties in defining the growth, secondly evolution of criteria to measure the growth and its quantification poses certain problems. Lastly evaluating the growth of the firms is not altogether different from evaluating the entrepreneurial performance.

Expansion usually means enhancement of the installed capacity of the enterprise and thus expansion may be taken as an index of the growth of industrial units. One of the arguments put forward by Berna[30] in support of the need for expansion of industrial units in underdeveloped countries is that they are generally established on less than optimum scale. So expansion in the Indian context may imply growth of units from below the

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30. Ibid. pp. 11.

optimum level towards the optimum level.[31] As such growth has no meaning with out expansion or technological improvement or product diversification. The problem of small scale units is not only that they are started on less than optimum scale but also their production capacity has remained underutilized for long years.[32] The reasons for starting industrial enterprises on less than optimum scale and the reasons leading to underutilization are varied limited amount of initial capital at the disposal of entrepreneurs, their caution due to inexperience in industry and the restricted markets for industrial products are some of the reasons attributed by Berna, for starting the industrial units on less than optimum scale in under developed countries.[33] Rao in his study on industrial estates in Andhra Pradesh agrees with Berna's views. He observes accordingly as pointed out by Berna, that for sometime after establishment there is scope for achieving economies of scale through growth of enterprises.

If the growth is considered as nearly an additional capacity created over and above the initial installed capacity, it may not lead to a meaningful assessment of the growth of enterprises. As such for assessing the growth in a situation as this, in addition to taking into account the expansion beyond the initial size,

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31. Robinson defines the optimum firm as "a firm operating at that scale at which in existing conditions of technique and organizinag ability it has at the lowest average cost of production per unit, when all these costs which must be covered in the long run are included. EAG. Robinson - "The Structure of Competative Indsutry", Cambridge, 1958, p.11.

32. Berna, James J. op.cit., pp. 144 - 148.

33. Gangadhara Rao, N. op.cit., 199 - 256.

the efforts to utilise the existing production capacity fully should be taken account of. Then the problem in quantification of the growth arises. Finding out the differences between the initial capacity and the existing capacity or the initial utilization and the present utilization appear to be a simple way of measuring growth. But the method presents several problems in the case of undertaking rendering services and making hetrogenuous products. Even if it is possible to measure the production and utilization capacities they may not provide a useful basis for comparison in view of the varied nature of the enterprises and their products.

Growth may also be measured in terms of the increased employment, fixed capital investment, production, horse power connected, profits, market share etc. Each of these measures has its own merits and demerits. In the real world firms may grow, stagnate or decline over a period of time. A genuine study of performance and growth of firms should take into consideration all these aspects. The existing firms in the economy at a point of time may have either grown, stagnated or declined over a period of time. In the economy at every moment new firms are added as a result of fresh entrepreneurial activity in the market and reduced as a result of certain proportion of old firms moving out of the market. The phenomenon of firms moving out of the market could be as a result of number of factors. Therefore, the growth of firms in the economy should be looked in terms of net growth. It is generally expected that the smaller firms have

higher mortality than larger firms, this is to say that lower proportion of small firms survive in the market than that of large firms.

In this chapter an attempt has been made to study the growth performance of enterprises. The performance of the existing units have been analysed using the primary survey data. As the dead units have not been covered in the sample, other sources of information are used. For this purpose the data from electricity divisions of Gujarat state and Baroda municipal corporation have been used. With the help of this data one can estimate the mortality rates for different Industrial categories by their size and age. The results pertaining to mortality and survival of enterprises is presented in the last section of this chapter. The growth performance of the existing firms have been estimated for the sample. The indicators of growth used are the employment, investment and sales. Even in case of variables with reference to which the information could be gathered, it was not found possible to do so for all years. The data relating to the employment, investment and sales with reference to the initial years and the latest year were collected from all enterprises. The initial year refers to the first year of the functioning of the enterprise and the latest year refers to the year of survery, i.e., accounting year 1984-85. With respect to the variable investment the additions in the subsequent years were collected. This data have been used for analysing the growth of enterprises. Judging the growth of an enterprise on the basis of

initial year and final year is not without limitations. Employment and sales in case of firms are subject to wide fluctuations between years, either way. Though the Investment is not subjected to such wide fluctuations as in the case of sales and employment, the elements of inflation makes the investment and sales between two points of time non-comparable, unless the investment figures and sales figures are suitably deflated. With these limitations the assesment of growth with these indicators have been estimated.

4.2.2 Methodology Adopted :

In this section the growth performance of the sample units is presented. As the sample consists of the surviving units at a point of time the estimates of growth by this method would be neglecting the dead units and as a result give higher estimates. It is widely believed that the mortality rates are greater for the smallest size firms and for the younger firms. Many enquiries bear witness to the high death rate of young firms and firms in the smallest size classes.

For analysing the growth of the sample units three indicators have been used. These are employment, sales and investment. It has not been possible to gather information of other indicators of growth. An attempt has been made to collect information pertaining to the value added by the firms, as the data was not forthcoming and due to doubts about genunity of the information, it has not been used for the analysis of growth of

firms. Even in case of variables with reference to which the information could be collected, it is not found possible to do so for all the years. However, the data relating to the employment, sales and investment, with reference to the initial year and the latest year were collected for all the enterprises. In case of one criteria i.e., investment, the information for all the years, were collected. Firms were able to give the subsequent additions to the initial investment at different points of time. This information has been used for analysing the growth of enterprises.

The year of inception varies from firm to firm. As all the firms have not come into existence in a particular year, the estimation of growth using this data posess certain problems. The mean value of growth rates have been estimated (that is the sum of growth rates of individual firms divided by the number of firms in the group). The average growth estimated by this method usually is above the overall growth rate (i.e. the growth rate of the sum of the value of an indicator) of all firms in a given category. The average growth rate estimated using the first method would be neglecting the size of the firm as all sized firms are treated equally. Therefore, small firms with a high growth rate swing the overall average growth in a category upwards. However, in the absence of continuous data this method has been used, despite its limitations. This approach for estimating growth of firms has been used both in Indian and abroad, by a number of studies. Miriluz cortes in his study of

small and medium scale enterprises in Columbia; Little and others in their study on small manufacturing enterprises in India and other economies and many other studies have followed this procedure.

In the present study an attempt has been made to over come the limitation of mean growth rates. As the information pertaining to one criteria i.e. investment is available for all the years, this data has been used for estimating the overall growth rate of the group of firms. It was found that 38 of the 95 small scale firms surveyed, have come into existence before 1975. The growth rate for these firms have been estimated for the period 1975 to 1984. However one basic limitation of this method should also be mentioned here. That is the growth estimated by this procedure will be neglecting the growth performance of some of the firms in their early stages of life. Going by the general observation that the mean growth rate of the youngest of the surviving firms is much higher than older firms, the estimate of growth of the firms during 1975-84 this method would be an under estimate.

The criteria for measurement of growth have been defined as follows. investment has been defined as capital invented which is a produced means of production. Hence capital invested consists only of physical assets which are produced in the economy and are used for further production. Hence at any point of time capital consists of fixed assets like machines and building etc. and circulating assets such as consumable stores. The gross value

(i.e. undepreciated) of capital at 1970-71 prices has been used for estimating the growth off firms in terms of investment.

Employment is measured by the average number of workers employed. This figure does not include the self employed persons and proprietors. The employees consists of skilled and unskilled workers, permanent and nonpermanent workers. However all types of labour have been treated equally for estimating the growth in employment of the enterprises.

Total sales by an enterprise during an accounting year has been used to estimate the growth of the enterprises. Sales during an accounting year can at times be less than or greater than actual production. In such cases there would be an addition or subtraction to the stock of finished goods. However on an average the sales could be equal to the production in an enterprise during an accounting year. The sales at 1970-71 prices have been used for estimating the growth of firms.

4.2.3 Overall Growth Performance of Enterprises :

Turning to the data bearing on the growth of the enterprises under study, it can be said that entrepreneurs have in general been quite active in developing their enterprises. The available evidence suggests that typical plant or enterprise that survives will grow over time. Three indicators of growth analysed here are employment, sales and investment for each industrial unit. A firm showing better performance in one aspect need not reveal similar performance in the other aspect. The intensity, nature and period of growth can only tell about the relative performance of a unit.

Overall growth performance of the chemical enterprises from inception has been analysed. The data is presented in Table 4.1. It has been observed that 52 firms have shown positive growth by all the three criteria. These 52 firms are found to be of various sizes and from different industrial groups and it can be said that these have achieved over all growth. For various reasons the firm performing well by one criteria may not be found doing well by other criteria. Three units have been found fairing badly by all criteria i.e. these three units have exhibited negative growth rates by all the criteria. If one goes by the criteria that a firm exhibiting positive growth by any two criteria is doing well in the market, then we have a minimum of 66 firms doing well in the market and these form 69 percent of the sample. The information in Table 4.1 indicates that majority of the firms have exhibited growth by each of the indicators. The growth in case of sales and investment are estimated by the growth in their values expressed at 1970-71 = 100 prices. Therefore, the estimates of growth by these indicators show real growth. Growth in employment is estimated by the actual increase or decrease in employment. Firms are defined stagnant if they exhibit zero or very little growth (-0.5% to + 0.5%). It is observed that 84 percent of the firms exhibited positive growth in sales and 73 percent in terms of invested capital, 64 percent exhibited position growth in terms of employment. 20 percent of the firms when measured by employment and 18 percent when measured by invested capital exhibit stagnation. That is, these firms have remained as they were at the time of their inception.

Table 4.1 Growth Performance Of Chemical Enterprises From Inception.

| Criteria | Number of Enterprises Showing | | |
|---|---|---|---|
| | Positive Growth | Stagnation | Negative Growth |
| Employment | 61 | 19 | 15 |
| Sales | 80 | 5 | 10 |
| Investment | 69 | 17 | 9 |
| All three criteria | 52 | - | 3 |

Largest number of firms i.e. 15 ( 16%) have had negative growth in employment and 9 firms had negative growth in invested capital.

All the firms which had negative growth in capital invested reported a fall in the employment. The main reasons given by the enterprises for fall in the invested capital has been the breakup of partnerships. Some firms which were incurring continual losses too have reduced invested capital. Only two firms have reported that they have reduced employment even with better performance. All other firms have reduced employees for reasons such as break up of partnerships or reduced activity of the enterprise. Bad management and improper planning by some of the enterprises explain their poor performance. Firms which have started with over staff, have reduced their employees, so as to economise on their expenditure. The negative growth in sales has also been reported by few firms. Fall in demand for the products, fall in production as a result of other factors are the main reasons attributed. In addition firms which were dependent on single customers were found to be facing great problems. Any decision by the purchaser or purchasing company will have an adverse effect on the manufacturing enterprise. Even the firms with very limited number of purchasers have to face more problems. In two cases we have found that the manufacturing enterprises are virtually in the cluthes of the sole purchasers. The irregular payments by the purchasers have many a times lead to shortage of working capital which has effected the production schedule. Few firms have

reported stagnation i.e. they are as they were at the time of inception. Economists are of the opinion that stability is the first required step before achieving growth. Unless a firm is well settled and doing well it can not achieve growth. Overall it has been observed that a greater proportion of firms have exhibited growth.

The performance of various industrial groups in chemical industry is presented in Table 4.2. The data reveal that in all the industrial groups, the firms on an average have attained growth in the market. A minimum of 50 percent firms have positive growth in employment, 66 percent firms in sales and 43 percent firms in capital invested. However the actual growth achieved differ from one firm to another. The average growth of firms in each industrial group has been estimated. These results are presented in Table 4.3.

The results presented in Table 4.3 reveal that on an average firm exhibit high growth rates. It could be because these are average of rates of growth. The growth rates, when estimated by mean, would give a lower estimate. The growth rate of each firms has been estimated using the formula $y = ae^{bt}$ where `Y' is the current years value, `a' is the initial years value and `t' is the time period or age denoted by number of years. The average of the firms growths in a group or Industry is estimated by simple average. One observes that in general for majority of the firms, the growth in sales are higher than growth when measured by other two indicators. In 5 out of 7 industrial groups the growth in

Table 4.2 Chemical enterprises showing Positive growth by different criteria.

| Industry | Employment | Sales | Investment |
|---|---|---|---|
| Inorganic Chemicals | 12 (70.59) | 13 (76.47) | 10 (58.83) |
| Organic Chemicals | 8 (66.66) | 8 (66.66) | 9 (75.00) |
| Fertilizers and Pesticides | 7 (63.64) | 11 (100.00) | 8 (72.72) |
| Dyes and Paints | 13 (86.67) | 12 (80.00) | 8 (53.33) |
| Drugs and Pharmaceuticals | 12 (85.72) | 12 (85.72) | 6 (42.86) |
| Soap and Cosmetics | 5 (50.00) | 10 (100.00) | 8 (80.00) |
| Other Chemicals | 12 (75.00) | 15 (93.75) | 12 (75.00) |

Note : Figures in brackets are percentage of firms in each Industry.

Table 4.3 Average annual Growth Rate of Firms By Industry.

| Industry | Growth Per Annum (%) | | |
|---|---|---|---|
| | Employment | Sales | Investment |
| Inorganic Chemicals | 13.70 | 24.07 | 4.90 |
| Organic Chemicals | 16.10 | 12.26 | 2.10 |
| Fertilizers and Pesticides | 13.98 | 13.42 | 9.60 |
| Dyes,Paints and Lacquers | 9.40 | 12.20 | 4.61 |
| Drugs and Pharmaceuticals | 20.93 | 13.13 | 7.46 |
| Soap and Cosmetics | 3.51 | 33.51 | 22.19 |
| Other Chemicals | 6.40 | 18.00 | 5.74 |
| All Groups | 12.27 | 17.48 | 7.43 |

Note : Formula used $Y = ae^{bt}$, Where Y = final years value, 't' is the number of years. Average growth is calulated by averaging b's of all firms.

sales are greater. During the life time of the enterprises, the capacity utilization for a large number of firms raise. The growth in sales come largely from increased production by better capacity utilization.

Not that firms, do not expand capacity and diversify, but largely in the initial stages of life the firms grow by better capacity utilization. In under developed countries it is possible for small enterprises to expand considerably with little change in investment and firms tend to establish themselves with excess capacity. As a result firms may grow by increasing production, working for longer number of hours in a day by introducing shifts or by additional employment generation. Berna was of the opinion that the capacity remains under utilized for some time in the early stages of life. The employment growth has taken place in fewer firms. The firms which have reported employment expansion have grown rapidly. If sales could be taken as proxy to the gross output of firms the implication of these growth rates of employment and sales taken together, that labour productivity was on the increase over life time of the enterprises. Capital invested has grown at a lower rate in general than sales and employment growth rates. In case of soap and cosmetics industry the growth in capital invested is reported very high. This is largely due to the growth attained by one firm of recent origin. Excluding this observation the growth rate is only 6.7 percent. Few firms have gone in for expansion, some have introduced new products. 6 firms reported to have introduced new products and 8

have reported changes the product line itself. As many as 24 firms have reported expansion in the H.P. connected which have direct bearing on the capacity of the plant.

The increase in H.P. connected is mainly related to expansion of firms. Higher HP is required to run larger machines, when a firm is undergoing diversification it requires additional power as the processes are not the same as earlier. The reasons given for change of products by various firms are different. Few firms had to change products as their previous activities (products) were not profitable. Few firms reported raw material shortages and demand deficiency, responsible for change in product line. All these activities by the firm have had their impact on the employment and output generations.

4.2.4 Age and Growth of Firms :

Many studies bear witness to the observation that age is strongly related to growth rates. It must also be emphasized that the death rates for the younger firms would have been higher also. Thus declining average growth rates with ages might be less pronounced if those that declined to nothing (dead units) could have been included. For survivors only, there is a clear probability that older the firm the slower its growth. In the present study an attempt has been made to examine this relation. The results presented in table - 4.4 gives the annual percentage growth rates of firms by three indicators, employment, sales and investment by the years of establishment of the units. The information reveal that, in general the growth rates are higher

Table 4.4 Average annual growth rate of firms by age of firms.

| Year of Establishment | Number of firms | Growth per Annum (%) Employment | Sales | Investment |
|---|---|---|---|---|
| 1960 and before | 6 | 0.93 | 10.13 | 4.44 |
| 1961-65 | 2 | 5.90 | 3.40 | 3.70 |
| 1966-70 | 4 | 5.60 | 8.50 | 5.18 |
| 1971-75 | 26 | 4.28 | 10.74 | 4.47 |
| 1976-80 | 29 | 10.02 | 14.02 | 10.78 |
| After 1980 | 28 | 27.18 | 32.57 | 10.05 |
| All Units | 95 | 12.27 | 17.48 | 7.43 |

Note : For the formula used see Table 4.3 note.

Break-up these monster paragraphs



for enterprises established in the latter years. The growth rate by all the three indicators show an inverse relation with the age of the firms. The growth rates are highest for firms established after 1980. However growth in sales for firms established before 1960 is found to be as high as 10 percent per annum. This is largely due to substantial growth of two firms one in pharmaceutical industry and another in organic chemical industry, which was initially very small. These figures give us the average growth. When we observe the firm wise data the results are much more pronounced. Correlation coefficients have been estimated to check the over all relation. The correlation coefficients are negative for all the three indicators, showing an inverse relation. The correlation coefficient for age and growth in sales ( - 0.2692); age and growth in employment ( - 0.3618); age and growth in invested capital (-0.3567). These coefficients are significant at 1% level. However wide variations in growth rates are observed in the initial years. it is only after the first few years of life firms tend to stabilize. In the early years the firms are in search of clients and are entering new markets. Though one notices firms expanding sales and employment, this is done largely by better capacity utilization. Only small fraction of firms are found to expand the installed capacity. Most of the firms had initial technical difficulties many of them had problems in obtaining raw materials, hiring responsible workers, working capital was another major problem of these firms. New firms typically face variety of hurdles that are at times reflected in their performance. Some of these

initial problems appear to have slowed the growth, but usually only for few years. In the early years the firms are cautions of expansion in installed capacity. Even when the firm is doing well in the market, it has to be cautious. The need to pay debts was cited as an initial difficulty by more than 25 percent of the firms. Many firms with initial difficulties probably went into liquidation and were not caught by this study.

4.2.5 Size and Growth of Firms :

The effect of size on growth of firms have been widely studied in various countries. However, no definite conclusion is arrived at. Studies in India too have come out with different results, one of the studies conducted recently[34] on small scale industries concluded that those of the small and the young that survive grow fast, faster than larger firms. The law of proportionate effect states that the probability distribution of growth rates is independent of size of firms and the probability distribution of small firms are expected to exhibit high standard deviations than larger firms. Here an attempt has been made to examine the effect of size on growth rates of firms. However, the results can not be generalized as the sample is very small, ~~hence discussed in the context only.~~

The average annual growth rates of firms by size are presented in Table - 4.5. Horse power connected has been used to denote the size of the firms. The data reveals that for units

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34. I.M.D. Little and others - op.cit.

Table 4.5 Average annual growth rate (%) of firms by their size (H.P. connected) and the variation in growth rates.

| Horse power Connected | Employment | | Sales | | Investment | |
|---|---|---|---|---|---|---|
| | Mean | C.V. | Mean | C.V. | Mean | C.V. |
| 0-10 | 5.07 | 5.31 | 22.80 | 1.32 | 12.57 | 2.45 |
| 11-20 | 7.41 | 2.32 | 24.54 | 0.96 | 2.53 | 5.89 |
| 21-30 | 14.45 | 1.17 | 15.10 | 0.84 | 6.85 | 1.99 |
| 31-50 | 11.54 | 1.94 | 8.89 | 1.24 | 3.03 | 2.82 |
| 51-75 | 16.76 | 1.31 | 16.23 | 1.11 | 6.36 | 1.35 |
| 76-100 | 15.60 | 1.48 | 19.57 | 1.15 | 10.13 | 1.23 |
| All | 12.27 | 1.54 | 17.48 | 1.33 | 7.43 | 2.26 |
| Above 100 | 10.98 | 0.65 | 28.02 | 0.50 | 8.54 | 1.42 |

Note : For the formula used in estimating growth rate - see table 4.3 (Foot Note).

below 10 H.P. the growth rates are the highest when measured by sales and investments criteria. However the growth rates in employment are found to increase with size. No such conclusion can be drawn about growth in sales and growth in investment. Growth in sales reduced with size up to 50 H.P. and raise later on. Growth in investment does not show any regular pattern. Correlation coefficients have been estimated to check the overall relation. The corelation coefficient for size and growth in emplolyment (+ 0.1738); size and growth in sales (- 0.1042); and size and growth in investment (- 0.0643). The results do not given any definite relation but sales and investment growth show a negative relation to size, though not significant. The firms above 100 HP show reasonably high growth rates by all indicators. It may also be noted that the S.D. growth rates is low for units above 100 HP and also exhibit low coefficient of variation (c.v.). The smallest sized firms exhibit high coefficient of variations in comparison with larger groups. However the over all results are erratic and no definite conclusion could be drawn. Units above 100 HP exhibit higher growth rates than units below 100 HP by indicators of sales and investment and also exhibit comparatively lower coefficient of variation.

4.2.6 Growth of Firms Established Before 1975 :

In the earlier two sections we have analysed the impact of age and size on the growth of firms. We have observed that the younger and smaller firms are growing at a faster rate in comparision with that of older and larger firms. The firms

established before 1975 have exhibited substantially lower growth rates in comparison with firms established after 1975 for all the three criteria used. The results can be seen from Table below :

Table 4.6 **Growth Of Firms Since Inception**
(By year of establishment)

| Period of establishment | Sales | Employment | Investment. |
|---|---|---|---|
| | (Growth per annum) | | |
| Up to 1975 | 10.21 | 3.98 | 4.51 |
| After 1975 | 23.13 | 18.45 | 10.42 |

The lower rates of growth of firms established before 1975 (older firms) exhibit, the traditional techniques being used in the process of production. These firms might not have taken up the programme of modernization and change in the technique of production. Productivity could be the main factor behind the low rate of growth. Another factor could be the age factor itself. The older firms cannot expand and diversify as the new firms because of inherent technology in old firms, which is not compatable with new technologies. Therefore, only the firms which have been updating their technology can keep up with the pace of industrial growth in general. The younger firms can also grow in the market making use of the excess capacity or by working for more number of shifts.

In this section an attempt is also made to analyse the growth performance of 38 old firms (established before 1975) for the period 1975-84. Among the three criteria used for estimating

growth since inception; information pertaining to the capital invested could be obtained for all the years. The firms could reveal the information pertaining to the latter day additions to the initial capital and this data have been used for this exercise. Similar data pertaining to sales would have been of greater use. However, such data could not be obtained and even when available was not found to be reliable. With these limitations, an attempt is made to examine the growth performance of old firms during the period 1975 to 1984. The results are discussed below.

The average growth in investment of 38 firms established before 1975 is found to be 4.17 percent for the period 1975-84. This indicates that these firms have grown at slightly faster rate before 1975. The growth rate of these firms is much lower than the growth of new firms i.e firms established after 1975 for the same period (1975-84).

To study the effect of size on growth of firms, the growth rates have been analysed for different sized groups. Out of 38 old firms 13 had invested capital upto ₹5 lakhs, 14 in the range of ₹5 to 10 lakhs of investment and 11 above ₹10 lakhs, when we look at the growth rates of firms (presented in table - 4.7) we notice that the growth reduces with size of firm. Enterprises with invested capital upto ₹5 lakhs exhibit growth of 6 percent and the larger firms exhibit lower growth rates. The coefficient of variations of rates of growth are greater for bigger firms.

Table 4.7 Rate of growth of investment of the firms established before 1975.

| Capital Invested (lakhs) | Number of firms | Mean Growth | C.V. |
|---|---|---|---|
| 0 - 5 | 13 | 5.98 | 1.0809 |
| 5 - 10 | 14 | 3.50 | 1.6633 |
| 10 and above | 11 | 3.44 | 1.6657 |

The growth performance of firms established before 1975 have been analysed industry wise, with respect to size of firms. The results are presented in table - 4.8. Some of the firms have exhibited negative growth rates. These form a small fraction, 4 out of 38 firms have exhibited negative growth by investment criteria. On the whole the results indicate that majority of firms exhibit positive growth and the growth in smallest size in higher. In organic chemicals, Fertilizers and pesticides; Dyes and paints; Drugs and pharmaceuticals, the growth rates are higher in smallest of the old firms. Fertilizer and pesticides industry exhibit high growth in capital invested in comparison with other industrial groups.

In the above analysis we have analysed the growth of surviving firms. The growth of firms by their age; size and industrial category. However not all firms that come into existence survive and grow in the market. Substantial number of firms die out. Therefore, any analysis of growth of firms could not be complete with out analysing the mortality and survival patterns of the firms. The following section will present the mortality and survival of firms.

## 4.3 **Mortality and Survival of Firms** :

A certain proportion of firms would always move out of the market as a part of the natural process of industrial growth and transformation. The market process either follows the principle

Table 4.8 Rate of Growth of Investment of the Firms Established Before 1975 by size and industrial group.

| Industry | Capital Invested (value in 1975; Rs. Lakhs) | | | |
|---|---|---|---|---|
| | Upto 5 | 5-10 | 10 and above | All sizes |
| Inorganic Chemicals | 12.21 | - | -9.12 | 3.46 |
| Organic Chemicals | 5.12 | - | 5.86 | 5.77 |
| Fertilizers and Pesticides | 19.51 | 6.50 | - | 10.47 |
| Dyes, Paints | 4.89 | 2.92 | 1.58 | 2.65 |
| Drugs and Pharmaceuticals | - | 6.76 | 6.47 | 6.58 |
| Soap and Cosmetics | -3.72 | 2.90 | - | 2.65 |
| Other Chemicals | 3.75 | 4.34 | 3.20 | 3.52 |

Break up these paragraphs



of "The survival of the fittest"[35] or the process of "The creative destruction".[36] Among the firms in the economy it is the smallest that are prone to high risks of mortality. It is particularly belived that the group of small scale units has higher rates of mortality than larger industrial units. The reasons attributed for this phenomenon are varied such as bad management, financial vulnerability, in experience, lack of caution, improper planning etc. Small scale enterprises have special incentives and inducements from government and liberal financing from the financial institutions as these are considered employment oriented and are considered as training ground for new entrepreneurs. Large number of items are reserved for manufacture in this sector. Various financial incentives are given for this sector and special provision for infrastructure is made at great social cost. Despite these benefits, the mortality in the sector is reported to be high. In any economy mortality of industrial units is looked upon as a great social waste, more so in a devoloping country like India. Various aspects of small scale enterprises have been studied in detail but the economists have not given due importance to the problems of mortality and survival of firms. Lack of systematic data particularly in India could be the cause. Data collected (either on census or on sample

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35. Various approaches to the Biological growth of firms are well discussed by Penrose, E.T., "Biological Analogies in the Theory of Firm", American Economic Review, Vol. XLII, No.5, Sec. 1952; pp. 804 - 819.

36. Schumpeter, J., Capitalism and Socialism and Democracy, New york, HarPer and Row, 1950.

basis) at any particular time pertains to the firms in existence at any time. Unless one traces the life cycle of each and every firm which has come into existence at any time, study of mortality and survival is difficult. Dadi and Hashim[37] in their study on Vadodara and Kheda districts of Gujarat observe that the incidence of mortality is highest in smaller size and the rate of closing down declines as size of unit increases. The study compares the mortality rate in two adjacent districts and concludes that a good agricultural base provides stronger base for the development of small scale industries, perhaps by ensuring a more stable market. One of the surveys[38] in U.S.A. gives that more than 90 percent of failures in industrial enterprises are due to bad management. The study classifies the major causes for failures broadly into (a) poor financial planning (b) poor coordination between manufacturing and selling and (c) poor general management. Most of the industrial enterprises facing failures are found to start with improper planning. The study by Mc Crory[39] in North India concludes that the entrepreneurs he surveyed had all the qualities of good entrepreneurs.

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37. Dadi, M.M. and Hashim, S.R., "Mortality and Survival of Small Scale Industries", National Seminar Workshop on Sick Industries : Syndrome in India, Gandhi Labour Institute, 27 - 28, May 1988.

38. Nicholas, C. Siropolis, "Small Business Management - A Guide to Entrepreneurship", 1977, Houghton Mifflin Co., Boston, p. 10.

39. Mc Crory, James, T., op.cit. pp. 19 - 28.

Berry and Privell Siles[40] studying the small scale enterprises in columbia suggests a disappearance rate of at least 3-4 percent a year for plants of 10-99 workers and likely rate of 10 percent of more for the smallest plants of roughly 5-14 workers. Thus this study indicates higher mortality for smaller firms. Another study in Columbia by Lee[41] estimates the death rates of firms. Disappearance (death) rates were 4.9 percent annually in Bougta and cali cities of this country. These estimates are almost equal to the estimates of U.S. cities such as Boston, New York, Phoemix and Los Angeles. However, these statistics seldom distiguish between change of location, change of ownership and true disappearance. Therefore, here again the true mortality and survival rates are not properly estimated and mearly act as broad indicators. In what follows an attempt has been made to estimate the morality and survival rate of firms in Baroda region, consisting of Baroda city and the industrial estates surrounding the city.

For estimating the mortality and survival of small scale industrial units, the data from electricity divisions of Baroda municipal corporation (BMC) and Gujarat state; Gujarat Electricity Board (GEB) were used. The data was collected for all

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40. Albert Berry and Armando Pinell - Siles, "Small Scale Enterprises in Coloumbia : A Case Study, Studies on Employment and Rural Development", No. 5; world Bank, Development Economics Department, Washington, D.C., 1979.

41. Kyu Sik Lee, "Intra - urbanization of manufacturing Employment in Coloumbia", Journal of Urban Economics, Vol. 9 (1984), pp. 224.

5161 electrified units in the city and around by the end of 1984, out of these 5161 units information pertaining to 4487 units were collected from Baroda Municipal Corporation and for 674 units were collected from Gujarat Electricity Board. Gujarat Electricity Board supplies electricity to all the regions out side Baroda city. Baroda municipal corporation supplying electricity to all the users in the city limits. The Baroda Municipal Corporation purchases electricity in bulk from Gujarat Electricity Baroda and supplied it to the consumers in the city. For this reason we have collected the information of industrial units both from Baroda Municipal Corporation and Gujarat Electricity Board to cover the entire area of the city and industrial estates around the city. It ~~may be noted that~~ Hashim and Dadi's study refereed to earlier does not take into account the units electrified with in the Baroda city, where the electricity is supplied by the municipal corporation. The organization maintain year to year account of all its costumers. In the case of Industrial customers record of data or connection (electrification) load connected, month by month consumption of electricity, date of permanent disconnection etc., are maintained, customers are classified as under industrial category. When the connection taken in for industrial activity i.e. the units which use power as basic source of energy for the industrial activity. For the purpose of this study the date of connection is taken as the date of birth of Industrial unit. When the unit is permanently disconnected; it ceases to exist. If the industrial unit is tempareriły disconnected for any reason of if

the unit enhances or reduces the load connected it is specified in the records. The period in which an industrial unit stops consuming power or consumes certain minimum may be regarded as period of temporary inactivity of the firm. If the period of inactivity is long enough it may be hanging between mortality and survival. It has been observed that 18.54 percent of electrified units have been permanently disconnected. This indicates that 81.46% percent of electrified units are surviving.

The distribution of electrified and permanently disconnected (PDC) units by load (H.P.) connected and the nature of industrial category is given in Table 4.9 out of 5161 total electrified industrial units upto 1984 end in Baroda region, 957 have been permanently disconnected. Out of 628 electrified chemical units, 116 have been permanently disconnected. The industrial categories exhibiting high mortality are Tobacco manufacturing (50 percent); Beverages (29.2 percent); Textile products (23.7 percent); nonmetalic mineral products (23.8%). The data reveal that in general the mortality rates are highest for the smallest size groups. In 0.5 H.P. group, 23.32 percent of units are permanently disconnected, in 5 - 10 H.P. group 16.3 percent are PDC units. The higher H.P. groups exhibit lower mortality rates. Among smallest group of 0 - 5 H.P. range, chemical industry, nonmetallic mineral products, Tobacco, manufacturing, Textile products, wood and cork, miscellaneous industries exhibit highest mortality rates.

Table 4.9 Distribution of Electrified and permanently disconnected (PDC) Industrial units by load connected and nature of industrial activity located in Baroda region, (1984)

| Industrial Activity / Load Connected | 0 - 5 | | 5 - 10 | | 10 - 20 | | 20 - 30 | | 30 - 50 | | 50 - 75 | | 75 - 100 | | Total | | Net Work |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | connected | pdc | connected | pdc | connected | pdc | connected | pdc | connected | pdc | connected | pdc | connected | pdc | connected | pdc | |
| Food Processing (except beverages) | 407 | 91 | 471 | 84 | 60 | 7 | 16 | 4 | 11 | 2 | 1 | - | 5 | 2 | 971 | 190 | 781 |
| Beverage Industries | 65 | 20 | 3 | - | 3 | - | 1 | 1 | - | - | - | - | - | - | 72 | 21 | 51 |
| Tabaco and Products | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - | 4 | 2 | 2 |
| Textile Products | 53 | 15 | 9 | 2 | 5 | 1 | 4 | - | 1 | - | 3 | - | 1 | - | 76 | 18 | 58 |
| Other Wearing apparel | 32 | 6 | 3 | - | 7 | 1 | - | - | - | - | - | - | 1 | - | 44 | 7 | 37 |
| Wood and Cork | 87 | 21 | 27 | 6 | 47 | 5 | 27 | 2 | 9 | - | 1 | - | - | - | 198 | 34 | 164 |
| Paper and products | 32 | 9 | 13 | 3 | 9 | 2 | 8 | - | 9 | - | 5 | - | 6 | 1 | 82 | 15 | 67 |
| Printing and Publishing | 247 | 46 | 41 | 7 | 15 | - | 5 | 1 | 4 | - | 3 | 2 | 2 | - | 317 | 56 | 261 |
| Rubber products | 17 | 3 | 11 | 2 | 5 | 2 | 5 | - | 11 | 3 | 10 | - | 4 | 1 | 63 | 11 | 52 |
| Chemical and Products | 152 | 58 | 79 | 9 | 82 | 16 | 97 | 13 | 85 | 8 | 69 | 7 | 64 | 5 | 628 | 116 | 512 |
| Non-Metallic Mineral Products | 156 | 42 | 31 | 6 | 24 | 3 | 16 | 1 | 21 | 7 | 1 | 1 | 3 | - | 252 | 60 | 192 |
| Basic Metals | 11 | 2 | 8 | - | 7 | 3 | 11 | - | 5 | - | 5 | - | 5 | 2 | 52 | 7 | 45 |
| Metal Products | 201 | 47 | 73 | 8 | 65 | 8 | 27 | 7 | 20 | 7 | 9 | 2 | 12 | 1 | 407 | 76 | 331 |

With the help of year by year account of all electrified industrial units the age structure of permanently disconnected units have been prepared. A unit may face mortality in the year of installation itself or in any subsequent year. For some of the units established before 1960 the date of connection could not be traced. Therefore we have analysed the data from 1961 to 1984. 736 units were found to be electrified before 1961 of which 126 have been permanently disconnected by 1984 end. 22 chemical units were electrified before 1961 of which 7 have been permanently disconnected by 1984 end. For the present analysis 4425 units electrified in all industrial categories during 1961-84 have been analysed. Out of these 831 have been permanently disconnected at different points of time. A similar excercise has been done for chemical industry. 606 chemical units have come up during 1961-84 of which 109 have been permanently disconnected. As the industrial units existing at a point of time have different age structures so would be the permanently disconnected units. In what follows the analysis of permanently disconnected units is presented.

The age structure of permanently disconnected units is presented in Table 4.10. The age profile is presented in four broad groups of survival, viz., units which survived up to 4 years, those which survived for five to nine years. Ten to fourteen years and 15 years and above. Some of the units were found to be disconnected in the very first year i.e. before completing the first year or during the `0 th' year. However

Table 4.10 : Age profile of permenently disconnected units (PDC units), 1961-84. (Baroda Region)

| Industry | Number of PDC units survived for different ages | | | | Total PDC units | Total Electrified |
|---|---|---|---|---|---|---|
| | 0-4 years | 5-9 years | 10-14 years | 15 years & above | | |
| All Industrial Category | 345 (7.80) | 256 (5.79) | 155 (3.50) | 75 (1.69) | 831 (18.76) | 4425 |
| Chemical Industry | 55 (9.08) | 31 (5.12) | 15 (2.47) | 8 (1.32) | 109 (17.99) | 606 |

Figures in the brackets are PDC units as percentage of total units electrified.

these are found to be a small fraction i.e. approximately 0.5 percent. The data in table - 4.10 reveal that the mortality rates are higher at younger age and that the probability of survival is greater for older firms. However, to test this hypothesis one has to take a closer look at the mortality rates. At the first sight, one finds that the greater proportion of permanently disconnected units have survived for lesser number of years. This holds good for chemical Industry and for all Industrial category in Baroda region. This can be taken as a crude indicator of mortality. For estimating the age specific mortality rates one must have the age profile of the permanently disconnected units and the age profile of total electrified industrial units.

A complete age profile of permanently disconnected units is available for the period 1961 to 1984. This enabled us to estimate the mortality rate and probability of survival for different age groups. Table 4.11 presents the age - profile and the estimates for `All Industries' category. Table - 4.12 presents similar data for chemical Industry. The method of estimation of both these table is same and is presented below.

The upper portion of tables give the distribution of permanently disconnected units by year of connected and year of disconnection in the form of matrix. The row gives the units disconnected in a particular year by their year of connection. The column gives the units electrified in a particular year by their year of disconnection. The distribution is only in lower half of the matrix because a unit can not be disconnected before

Table 4.11: Distribution of permanently disconnected units and probability of survival of small scale units; Baroda region, 1961-1984.



(Year of connection)

| Year of Disconnection | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1961 | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| 1962 | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| 1963 | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| 1964 | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| 1965 | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| 1966 | 2 | - | - | 4 | - | 1 | | | | | | | | | | | | | | | | | | |
| 1967 | 1 | 2 | 1 | - | 3 | 2 | 1 | | | | | | | | | | | | | | | | | |
| 1968 | - | - | - | 1 | | | | | | | | | | | | | | | | | | | | |
| 1969 | 9 | 2 | 4 | - | 1 | 5 | 1 | | | | | | | | | | | | | | | | | |
| 1970 | 6 | - | - | - | 1 | 2 | 3 | 2 | 4 | | | | | | | | | | | | | | | |
| 1971 | 4 | 1 | 5 | 2 | 5 | 5 | 7 | 4 | 2 | 5 | 1 | | | | | | | | | | | | | |
| 1972 | 4 | 2 | 1 | 2 | 5 | 3 | 1 | 5 | 5 | 2 | 3 | | | | | | | | | | | | | |
| 1973 | 2 | - | - | - | 5 | 7 | 2 | 4 | 5 | 4 | 7 | 6 | 1 | | | | | | | | | | | |
| 1974 | 1 | 4 | - | 4 | 1 | 2 | 3 | 2 | 1 | 2 | 7 | 8 | 6 | | | | | | | | | | | |
| 1975 | 2 | - | 4 | 1 | 7 | 3 | 1 | 1 | 1 | 4 | 5 | - | 8 | 5 | 1 | | | | | | | | | |

Table 4.12: Distribution of Permanently Disconnected Units and Probability of Survival of Small Scale Chemical Units; Baroda region,1961-1984.



(Year of connection)

| Years of Disconnection | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1961 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| 1962 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1963 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1964 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1965 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1966 | 1 | | 1 | | | | | | | | | | | | | | | | | | | | | |
| 1967 | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 1968 | | | | | | 1 | | | | | | | | | | | | | | | | | | |
| 1969 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1970 | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| 1971 | 1 | | | | 1 | | | | | | | | | | | | | | | | | | | |
| 1972 | | 1 | | | | | 1 | | | | 1 | 1 | | | | | | | | | | | | |
| 1973 | | | 1 | | | | | 2 | | | 3 | | 1 | | | | | | | | | | | |
| 1974 | | | | 1 | | | | | | | | 1 | | 1 | 2 | | | | | | | | | |
| 1975 | | | | | 1 | - | 1 | 1 | - | 1 | - | 1 | 1 | 1 | | | | | | | | | | |

it gets an electric connection. The diagonal additions of units of a particular age gives the mortality of units at that particular age. For example, the addition of units in the top most diagonal gives the number of units that have died during the zero th year or before entering the first year (20 in table 4.11 and sin table 4.12). The addition of units on second diagonal gives the number of units that have entered first year but died before entering second year (61 in table 4.11 and 12 in table 4.12). Like wise each diagonal is added and presented in the first row below the matrix. The mortality rates (Pi) is estimated by ratio of the units disconnected at a particular age to that of total units at that age i.e.

$$Pi = \frac{\text{Number of permanently disconnected units between ages } i \text{ and } i+1 \text{ years}}{\text{Number of industrial units that have attained } i \text{ years of age}}$$

The probability of survival is denoted by qi and is represented as (1 - Pi). By this method one can estimate the age specific mortality and survival rates. What is the probability that a firm which has survived for (i - 1) years will survive for the i the year and enter ( i + 1) th year. This also gives an indication of age at which firms have greater mortality and low survival rates.

A first sight, at table 4.11 and 4.12 one notices fluctuations in mortality and survival rates from year to year. A

closer look would reveal that the mortality rates are higher in general for younger firms and lower for older firms. This pattern can be observed in case of chemical industry as well as All Industries category. The correlation coefficient between the age of the firm and mortality rates is found to be -0.4721 for all Industries and - 0.2752 for chemical industry indicating an inverse relation between age and mortality. The correlation coefficient is found significant at 5 percent for All Industries. Therefore the data indicates that the survival rate for older firms in general is greater than for the younger firms.

From the above analysis the following conclusions can be drawn. The incidence of mortality is found to vary from one industry to another. The mortality rates are found to be highest in the smallest size and the rate of closing down declines as the size of unit increases. The probability of mortality is relatively high in the younger age groups. On an average 75 percent of the deaths occur before the firms attain 10 years of age. Even among the small scale enterprises it is the smallest and youngest that are found to face greater risk in the market.