An Analysis of the Determinants of Investment, Profitability and Capacity Utilisation of Chettinad Cement Factory from 1970-71 to 1984-85

BY

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A Dissertation submitted to the Bharathiar University, Coimbatore, in Partial Fulfilment of the Requirements for the Degree of Master of Arts

MAY 1987

Acknowledgement

ACKNOWLEDGEMENT

The investigator express her deep sense of gratitude and sincere thanks to Mrs. Geetha Hariharan, M.A.,Dip.Ed., (Madras) Asst Professor of Economics, Sri Avinashilingam Home Science college For Women, Coimbatore for her constant guidance and help in the design of the study.

She Express her deep sense of gratitude to Dr.(Selvi) Saraswathi Bhaji, M.A., Ph.D., (Madras) Professor of Economics, Sri Avinashilingam Home Science College for Women, Coimbatore for her continuous guidance and suggestions given throughout the study.

She expresses her thanks to Dr. (Tmt) Lakshmi Santha Rajagopal, M.S.(Tennessee) Ph.D., (Madras) Principal, Sri Avinashilingam Home Science College for Women, Coimbatore for providing facilities to conduct the study.

She express her deep sense of gratitude to Mr.C.Kuppusamy for his help rendered at all stages, during the course of her work.

She acknowledge her sincere thanks to Dr,L.P. Swaminathan M.Sc, (Agri) Ph.D., Associate Professor, Tamil Nadu Agriculture University, for his help to complete this task.

She express her thanks to the officials of Chettinad Cement Corporation those who provided the Balance sheets for the completion of the thesis work.

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Introduction

INTRODUCTION

India is often described as a major industrialized economy. This description is based on the absolute values of certain indicators of industrial growth. Thus, for example in terms of value added in manufacturing with its value of U.S$15,068 million in 1978, India ranked 14th in the list of 92 countries (J.C. Sandesara, 1978). In terms of employment in manufacturing, with the number of 5.8 million in 1979, it was 6th in the list of 92 countries. And in terms of the scientific and technical manpower, with the number of 1.17 million it stood 11th in the list of 72 countries (J.C.Sandesara, 1978).

Industrial production during the pre-independence period took place without a proper frame work of policy and planning. Industrial production during the period 1900-46 is estimated to have grown at the poor rate of 2 percent per annum. At independence, we had a slender industrial base. Industrial production grow at the trend growth rate of 6.1 per cent per annum during 1950-79 as against 2.0 per cent during 1900-46. Industry's importance in the gross

domestic product (1970-71 prices) increased from 15 percent in 1950-51 to 23 percent in 1978-79. The registered manufacturing units increased their share from 55 percent of gross domestic product in manufacturing units increased their share from 55 percent of gross domestic product in manufacturing (1970-71 prices) in 1950-51 to 65 percent in 1978-79. The percentage of the unregistered manufacturing units declined from 45 to 35 percent over the same period (J.C. Sanderasara, 1978).

Indian planning, since 1956 has relied heavily on industrialisation of the Indian economy as the king-pin in its strategy for economic growth.

Cement constitutes an important segment of modern industrial economy of India. Cement manufacturing is a well established industry, accounting for about 1 - 2 percent of industrial production and employing over 85,000 persons. Although the first cement plant of 30,000 tonnes per annum capacity in India was set up in 1919, it was only in the mid thirties that this industry registered significant growth (A.P. Maheswary, 1984).

India ranked tenth in the world amongest the cement manufacturing countbies in 1981, with the USSR being the leader with 127 million tonnes production. The operational afficiencies achieved the past inIndia are comparable with those of the most developed countries. Indian eement industry has worked at more than 90 percent capacity utilisation in the past, when infra-structure constraints were not there. Even the developed countries such as the USA and Japan are today operating at around 70 percent capacity utilisation and their best performance how only been comparable to India's best (A.P. Maheswary, 1984).

With a population of 700 million people, India's production of cement is 23 million tonnes, while Japan with a population of 110 million, produced 85 million tonnes in the year 1981. China's production in the same year was 84 million tonnes leading to a percapita consumption of 84 kgs, more than double of India's. The figures are revealing, in as much as they indicate the tremendous growth potentiality of the cement industry in the country (A.P. Maheswary, 1984).

Cement Industry is one of the important basic industries of a developing country. The economic vitality of developing country is always identified by the percapita consumption of such important products as cement, steel and power. It is beieved in certain quarters that the percapita consumption of cement in India is as low as 32 kg where the per-capita consumption is 670 kg in Japan, 544 kg. in Germany, 341 kg in USA, 540 kg in Singapore and so on, but India's percapita consumption has been steadily raising for over a decade. It rose from 23.4 kg in 1968 to 25.1 kg in 1973 and 30.8 kg in 1978 before touching 32 kg mark in 1980 (K.S.Ram, 1981).

In the financial year 1982-83, the production of cement in India was little over 23 million tonnes, with an installed capacity of about 82 million tonnes at the end of the year with 1.7 million tonnes of imported cement, the total consumption of cement in the country in the year was 24.7 million tonnes. This works out to a percapita consumption of 35 kg.

The following table shows that there has been a steady increase in the percapita consumption of cement in this country. In 1974 percapita consumption was 23.68 kg while it increased percapita consumption a sortfall during 1979 and1980 has casued considerably discdntentment and the government has to continue its efforts to raise the level of output as fast as possible. (Hardev Singh 1981).

TABLE 1.1

PERCAPITA CONSUMPTION (kgs)

Year	Consumption
1970	24.61
1971	26.43
1972	27.00
1973	25.10
1974	23.68
1975	24.98
1976	29.08
1977	28.77
1978	31.94
1979	30.07

(Hardev Singh, 1981).

The industry's export performance is quite creditable. During the current financial year the country has an export commitment of ten lakh tonnes of cement. In 1974-75 the country exported 2.84 lakh tonnes of cement and earned foreign exchange worth Rs.95 crores (M.N. Gurjar, 1975).

The performance of the Cement Industry during the post Independence are as a whole has not been poor. Starting on a modest scale at the turn of the century, the Cement Industry has taken great leaps. As a major input for development projects in various sectors, cement is considered crucial for the success of our five year plans (Zia Uddin Khairoowala, 1984). Starting with a capacity of 3.28 million tonnes and production of 2.95 million tonnes in 1950-51, it expanded to a capacity o f 9.30 million tonnes in 1950-51 and a production of 7.75 million tonnes within ten years by 1960-61. The 1970-71 figures are: capacity 19.39 million tonnes and production 14.93 million tonnes (Arya, 1979). In fact, the exapnsion rate during the fourth plan period has been most disappointing. As it happens, this is also the period during which the industry has had little if any encouragement to expand since April, 1969, the retention prices of cement had been frozen at Rs.100 a tonne, on the basis of cost increases which took place between January 1966 and October 1968 (Arya, 1979).

Table 1.2 reveals the performance of Cement Industry in India from 1951 to 1974.

TABLE 1.2

PERFORMANCE OF CEMENT INDUSTRY

(in lakh)

Year	Related capacity	Production	Capacity Utilisation
1951	35.60	32.60	89.90
1955	47.30	44.90	94.90
1960	87.10	78.40	90.00
1961	88.71	83.24	93.83
1962	95.52	86.79	93.80
1963	95.05	95.66	96.43
1964	104.25	97.24	93.27
1965	110.40	105.92	95.94
1966	116.91	110.20	94.26
1967	122.77	112.64	91.74
1968	138.64	119.47	86.17
1969	153.33	136.28	88,88
1970	167.58	139.51	83.24
1971	182.85	149.40	81.70
1972	190.04	157.00	83.60
1973	192.13	149.63	77.90
1974	194.52	142.74	73.30

(M.N. Gursar, 1975).

Out of the total of 64 cement factories functioning in the country during 1981, Tamil Nadu had 8 factories with the installed capacity of 43.17 lakh tonnes, Total installed capacity at the state level amounted to 14.9 per cent of total capacity in all India at 290.50 lakh tonnes. In total cement production for the country during 1980 and 1981, Tamil Nadu contributed 18.3 per cent and 16.9 percent respectively. In capacity utilisation, the state achieved to pevent in 1981 whereas it was 70 per cent at the all-India level (S. Perumalswamy, 1928).

Four of the 8 factories viz. Dalmiapuram, Thalaiyuthu, Sankaridurg, and Thulukkappatti, which accounted for 61 percent of the total installed capacity covered 63.5 percent of total production during 1981. The factories at Thalaiyuthu, Thulukkapatti and Ariyalur had notably contributed to increase the production. The Madukkarai and Alagulam factories registered a fall in production to the extent of 90 thousand tonnes and 73 thousand tonnes peppectively. At Alangulam, the constraint was chiefly the workers strike for over two months from 9-10-81 to 10-12-81. At Madukkarai, the major obstacle to increased production was frequent breakdown of machinery coupled with short supply of coal (S.Perumalswamy, 1928).

All India total cement production was 204.39 million tonnes during 1980-81 of which Tamil Nadu contributes 34.64 which is 16.9 per cent. Tamil Nadu has 8 cement factories. Out of 8 cement factories puliur, Chettinad Cement factory is one located in Trichy District. Puliur Cement factory alone contributed 328.249 tonnes during that year.

The details regarding productivity and capacity utilisation of cement industries in Tamil Nadu, Compared to all India details is given below.

TABLE 1.3

PRODUCTIVITY & CAPACITY UTILISATION

OF CEMENT INDUSTRY

(lakh tonnes)

Particulars	1981		1982	
	Tamil Nadu	All India	Tamil Nadu	All India
(1)	(2)	(3)	(4)	(5)
1. Number of factories	8	64	8	68
2. Installed capacity	43.17	290.50	42.19	313.40
3. Cement production	34.64	204.39	35.14	224.70
4. Capacity utilisation	80.20	70.36	83.29	71.7

(Tamil Nadu Economic Appraisal- 1973-74).

Beyond 1980, no new cement factory had been established in the state and the total number of factories remained at 8 as at the end of 1982, against 68 in the country as a whole. In no other industry of India is there greater centralization of ownnership and control than in the cement industry. Out of 68 cement factories, 20 are in the public sector, 13 belong to the A.C.C group, 6 to the Dalmia joint group. The industry is well diversified over all theStates of India. Since the manufacture of cement requires weight losing materials like limestone or chalk, clays and gypsm, the industry has a tendency to be attracted at the point of minimum transportational costs in relation to raw-materials.

Cement is a key factory in economic development, and due to drastic power cuts, shortage of coal, oil etc, the supply could not cope up with demand. So as a measure of revitalising the cement industry which has been operating on low margins and to encourage establishing new capacity in addition to the better use of existing capacity, the union Government introduced the Dual pricing policy for cement, effective from 28th February 1982 based on the recommendations of the Ghosh panel. With an eye on preventing an unwarrented rise in prices of cement sold in the open market, the government also proposed to permit liberal imports.

The prevailing phenomenal trend in cement is highly eratic due to short supply, hike in price, power and fuel shortage, and government policies. The investigator wishes to analyse the possible exogenous supply constraints of production, which casues such erratic fluctuations in cement supply. To analyse this factor investigator had taken Chettinad Cement Corporation Ltd., as her study area for a period of 15 years, with the following objectives:

1. To analyse the capital structure and growth rate of capital.
2. To find the determinents of investment by using acceleration model.
3. To find Return on capital.
4. To analyse the profitability and capacity utilisation and
5. To review the financial strength by using various financial ratios.

The findings of the study would throw light on disproving the classicial and neo classical models of determination of investment and supply on the basis of profitability and liquidity, and would approve acceleration model which takes into consideration, other factors like capacity utilisation, Government policies, etc. The investigator hopes that the study would reveal cretain guide lines for corporate units in decding their investments especially for Cement units.

Review of Literature

II REVIEW OF LITERATURE

The review of literature of "An analysis of the determinents of Investment, profitability and capacity utilisation of Chettinad cement Factory from 1970-71 to 1984-85" is discussed under the following heads:

Related studies on,

A. Capacity utilisation;

B. Acceleration Model; and

C. Performance of Cement Industrial units and other studies.

A. Related studies on Capacity Utilisation:

A.1, Hardev Singh (1981) has studied the problems of capacity utilisation in Cement Industries in his study, 'Low capacity utilisation' published in Eastern Economist May 1981. The study aims in substantiating the argument that,

i. While the government has been trying hand to create more and more capacity, the utilisation of existing capacity has sharply declined.

ii. the government is trying hand to encourage expansion and the setting up of new units it has to pay sufficinet attention to the price structure of this industry.

This study concludes that the price structure of the industry is based upon the promise that the industry will achieve a minimum capacity utilisation of 85 percent. This is no longer a valid assumption, because the government ~~which~~ has full control over the supply of coal and electricity.

A.2. K.S.Ram (1981) has studied the problems of capacity utilisation in Cement Industries in his study published in Yojana May 1981, The study aims in substantiating the argument that, capacity utilisation made a steady progress not only in establishing factories, but also in encouraging machinery of the licenced Indian Cement machinery manufacturing companies to bring up their new units.

ii. The study revealed that the existing capacity of the Cement Industry should be doubled in the next 10 years by adding nearly 3 million tonnes per year on average through the large sized plants to meet the growing domestic demand.

ii. The study pointed out that only large sized plants would bring in economies of scale and keeps the cost of production lower.

This study concludes that it is imperative need of the hour to have proper needful exchange of information among the various experienced organisations and research bodies to study many aspects of the research and development of the industry.

A. 3. M.N. Gurjar (1975) has studied the problems of capacity utilisation in Cement Industries in his study "On to better capacity utilisation" published in commerce July 1975. The study aims in substantiating the argument that,

1. The government now seems to be in a mood to make changes in the pricing policy that will ensure higher production by industry.

ii. With the measures organised by the Ministry of Industry and Civil Supplies, the shortage of coal and wagons has become a thing of the past.

This study concludes that the government has allowed 14 percent return on capital employed in the existing units asalso to those units in the latter of intent stage which are likely to go into production from 1978 onwards.

A.4. Syntax (1985) has studied the problems of capacity utilisation in Cement Industries in his study "Cement Capacity utilisation touches a low" published in the Journal of Industry and Finance January 1985. The study aims in substantiating the argument that,

i. Cement production may reach around 30million tonnes as against the target of 32.5 million tonnes and an installed capacity over 44 million tonnes.

ii. This provokes the query whether the balance is to be laid on the industry or on the impediments over which the Cement Industry has little control such as irregular, inadequate and quality of coal supplies, and the dismal power supply situation.

iii. The "Infrastructural constraints" have raised the cost of production and inevitably contributed to the decline in capacity utilisation.

This study concludes that the working group on cement industry of the planning commission for the Seventh plan has envisaged cement production to be 51

million tonnes by the end of the Seventh plan. According to a review undertaken by the Department of Industrial Development of the Ministry of Industry, the Cement Industry made investments estimated at Rs. 237 Crores in 1982-83 and committed Rs. 490 crores and Rs. 588 crores for 1983-84 and 1984-85 respectively.

B. Related studies on Acceleration Model:

B.1. Yogesh. K. Tunwar (1980) has studied the investment problem of the Cement Industry in his study "Acceleration Principle and fixed investment in Industries" published in quarterly Journal 1980. The study aims in substantiating the argument that,

i. To investigate the time series of investment expenditures for individual industries. Investment here represents the flow of expanditures on acquisition and maintenance of real capital stock over a specified interval of time.

ii. The beheviour of investment has been important subject area for applied economistrics over the past two decades and several models and hypothesis have been tested both for the developed and developing economics.

iii. According to theory of Capital accumulation the demand for factors of production is responsive to changes in relative factor prices or the ratio of factor prices relative to the price of output.

iv. Cost of capital is an important ingredient of this theory, because the change in cost of capital induce changes in investment behaviour by changing the implicit rental price of capital services, and further the changes in the implicit rental price of capital services lead to changes in the desired stock of capital.

Emprical Findings:

The regression results of investment behaviour of selected industries are presented. Contrary to the hypotheses that leg of four years in change in sales variable effect the investment decision, the regression results show that only the change in sale of the preceding year can be considered as significant. Besides change in sales variables, the depresiation progision external borrowings are significant determinents of investment behavour. Regression results for each of the industry studied in this paper is presented in the following peras.

Edible vegetable and hydrogenated oils:

The estimated regression is found to be statistically good fit. Of the four years lag considered, the first and third year lag of the change in sale variables come out to be statistically significant at 5 percent level. This indicates that acceleration principle is operative in case of edible, vegetable and hydrogenated oil industries. In the Indian context, external finance plays a dominent role in encouraging investment. The results also reveal that external finance is a significant factor in determining investment. Depreciation provision is also significant in determining investment behaviour. Only profit or lag in profit variables have not come out to be statisfically significant factor in influencing investment decision.

Transport Equipment:

In case of transport equipment, the second and fourth year lag of the change in sale variables are found to be significant, indicating that the acceleration principle can be considered to be operative in

this industry. Depreciation provision and external borrowings variables are significant in determing investment behaviour. Profit and change in profit variables are insignificant in transport equipment industries, also.

Electrical machinery, Apparatus, Appliances, etc:

The estimated regression equation is found to be statistically good fit. Among the sale variables, the first year lag of change in sales is significant in effecting the investment decision. Depreciation provision and external borrowings variables have come out to be significant determinant of investment behaviour.

Basic Industrial Chemicals:

First and second year lag of the change in sales variables are significant in the statistically good fitted regression equation, implying that acceleration hypotheses has effect on investment behaviour. External borrowings are significant in this case also though depreciation provision and profit variables do not turn out to be significant in determining investment behaviour.

Medicines and pharmaceuticals:

The accelerator principle can be considered to the operative in case of medicines and pharamaceuticals because the first year change in sales variable is statistically significant at 5 percent level. In this case non of the other variables including external borrowings and depreciation provision have come out to be statistically significant.

This study concludes that based on the available data of five selected industries, it can be inferred that accelerator hypotheses have validity in explaining the investment behaviour. Among the other variables considered, external borrowings and depreciation provision also determine investment behaviour. Contrary to the general belief, the profit variables do not show significant effect on investment in any of the industries studied here.

B.2. Y.K.Tanwar (1978) has studied "Determinants of investment in selected Industries" published in Margin July 1978. The study aims in substantiating the argument that,

1. To examine the investment behaviour of selected industries in India. Important theories of investment behaviour are also reviewed to identify the appropriate variables that influence the investment behaviour. He used acceleration principle to note the investment behaviour of certain industries.

Emprical Findings:

As anticipated, the accelerator principle, i.e, change in sales is operating in certain industries and turned out to be statistically significant determinent of investment in the following industries:

- Cement
- Tea plantation
- Iron and steel
- Engineering

Flow of internal funds (depreciation provision) is significant in effecting investment in,

- Shipping
- Cement
- Tea plantation
- Rubber and rubber products.

Current year sale has been found to be significant in the case of:

- Tea plantation
- Iron and steel

Net assets has significant effect on investment in explaining aggregate investment behaviour of all the nine industries selected for the present study.

This study conclude that, based on the available data on the relevant explanatory variables that influenced the level and / or changes in investment of nine selected industries, the economitric analysis presented in this study reveals that acceleration principles and flow of internal funds are important in determinant of investment in the Indian context.

B.3. Anil Rai (1981) has studied the 'Investment Behaviour in the Indian Jute Textile Industries " published in margin October 1981, The study attempts to analyse private investment behaviour in the Indian Jute Textile industry over the period 1950-1975 and the major economic determinants affecting it.

The time series results is suggestive of following.

i. The impact of accelerator is absent on fixed investment.

ii. None of the co efficients of sales change and lagged capital spock is significant.

iii. Retained earnings play a significant role in influencing fixed investment.

iv External finance in the total flow of funds is important in the industry.

v Negative impact of preventory investment on fixed fixed investment is observed from the time series results.

C. Related studies on Performance of Cement Industrial Units and other studies:

Zia Uddin Khairoowala (1984) has studied the performance of Cement Industries in his study "Indian Cement Industry is heading towards self sufficienty". published in Southern Economist June 1984.

i. More investment is coming in and additional capacity creation has been on a significant scale.

ii. The declining trend may be attributed to the stain on the availability of power and good quality coal and the imposition of price controls.

iii, Technological obsolescence is considered the most of the important constraint on the productivity of the Indian Cement Industry.

iv. The industry came under price control as far back as 1942. The Industry has always been subjected to regulation of distribution and price resulting in far-reaching repercussions.

v. The price control, the resultant profiteering and black marketing ~~the~~ have curtailed the growth in many end use sectors and as a results, the percapita consumption of cement has exhibited a static trend.

vi. Supply is expected to improve considerable and the demand for cement is expected to register a growth rate of 8 percent per annum in the next few years.

vii. Infrastructural deficiencies and unimaginative policies of pricing and distribution are responsible for the turbulence in the industry.

viii. In the wake of large capacity that has been approved availability of cement is expected to outstrip the demand gradually and a surplus of the order of 4 million tonnes in the next three or four years can be expected.

ix. The price controls can be made effective only by way of improving the public distribution system.

This study concludes that the coordination between the coal industry, the railways and the cement units to ensure timely availability of coal would go a long way in elevating the cement industry to the place it deserves in the national economy.

C.S. A.P. Maheswary (184) has studied the performance of the cement industry in this study "perspective of cement industry in India", published in Facts for you January 1984. The study aims in substantiating the argument that,

i. If the present trends are any indication, it is expected that the country should have around 100 million tonnes of installed capacity by the turn of present century.

ii. In India, however the demand for cement has remained suppressed for a very long time owing to the cement industry being under distribution control for more than four decades.

iii. In the long run, India should be atleast self sufficient in cement. There is substantial scope for export also and the country has the necessary were withdrawals to achieve this.

This study concludes that the cement industry in India is very bright and CCI has dedicated itself to contribute its mite to the figure growth of this industry is consonance with the national plans.

C. 3. Kumar Bar Das and Sarojini Mishra (1984) has studied the performance of the Cement industry in their study "Spatial spread of Indian Cement Industry" Published in Southern Economist October 1984. The study aims in substantiating the argument that,

i. It is capital, energy and transport incentive however, this industry is characterised by a considerable degree of regional imbalance.

ii. Since cement is a bulky commodity and the transport net work of the country is not adequate it is necessary that the cement plants should be located in such a way t hat the cost of production as well as the cost of transport is optimised.

This study concludes that while setting up a cement manufacturing unit in the country in future in order to avoid bottlenecks on the olerational and scarcity of the product. The cement manufacturing has

spatially concentrated and regional inequality in terms of Cement production has persisted and rather become highly pronounced during the decade. This geographical concentration of the industry is due to the fact that most of the cement units have clustered round the source of raw-material only. Therefore, the locational imbalance puts a very heavy burden on the final consumers, as the coal cost.

C.4. Sudodchandra (1984) has studied the performance of the private corporate sector of the cement industry in his study "The performance of the private corporate sector" published in Southern Economist 1985, The study aims in substantiating the argument that,

i. The performance has a special significance to understand the impact of the expenditure of foreign exchange for mddernisation.

This study concludes that assisted units are found to fall sick that would point to some inherit defect in the system of evaluation of the industry perfects by the all Indian Financial Institutions. Above all the sorry plight of an increasingly large

number of industrial units would also call for a closer look at the management structure of these sick companise in order to ascertain it any change is called for in this regard.

C.5. K.C. Arya (1979) has studied the performance of the industries in his study "Cement Industry in India Its progress towards self sufficiendy" published in Southern Economist 1979. The study aims in substantiating the argument.

i. A standard size Cement project would require an incestment of Rs. 26 crores which cannot be raised by a middleman entrepreneur.

This study concludes that the government therefore, encouraged large industrial houses to enter the field. In this context it is a moot point to consider whether industrial licencing is at all necessary. Should registration be necessary, government can lay down certain guidelines based on which an entrepreneur can be registered for a particular project. The cement industry needs very small portion of its entire equipment

to be imported with a large foreign exchange reserve and the imperative need for speeding up installation of additional capacities, these imports are justified.

C.6. Syntax (1984) h as studied the problems of decontrol in cement industry in his study "Case for total decontrol" published in Industrial Economist 1984. The study aims in substantiating the argument that, though the government scrutinised an increase in the retention prices of levy cement payable to the manufacturers for unpacked cement by Rs. 2 per bag or Rs. 40 per tonne and allowed a marginal reduction in the levy guota.

This study includes that these problems are sought to be overcome by split location and the utilisation of slag available at the steel plants.

C.7. V.S. Ramaswamy (1980) has studied the problems of inventry Control in his study "Importance of Inventory Control" published in Southern Economist 1980. The study aims in substantiating the argument that,

i. The more economical the cost of materials, greater is cost reeuction and more the staying power of an industry in the market.

This study concludes that Inventry Management is an essential for the subsistance, growth and expansion of our industry as the management of finance. In othemwords, Inventory properly managed, leads to proper management of cash.

Methodology

METHODOLOGY

The Methodology adopted in the study "An analysis of the profitability, value added, determinants of Investment and capacity utilisation of Chittinad Cement Corporation Limited from 1970-71 to 1984-85", is discussed under the following headings:

A. Selection of the problem
B. Sources of data
C. Tools of analysis; and
D. Definition of the terms

(A). Selection of the problem

As one of the heavy industries cement industry occupies a major part in nations industrial development. There are 64 cement factories functioning in the country and 8 factories are there in Tamilnadu. Chettinad Cement Corporation Limited located in Puliur, Trichy District was started in the year 1966 and commenced producing from 1968 onwards. As one of the late starter among the 8 cement factories existing in Tamilnadu, the investigator has selected Chettinad Cement Corporation for her study. The study covers 15 years period from 1970-71 to 1984-85.

(B). Sources of data:

Data required for the study are taken from the balance sheets of the industry collected from Chettinad Cement Corporation for a period of 15 years from 1970-71 to 1984-85.

(C). Tools of Analysis:

The investigator applies the following statistical tools:

1. Simple and multiple linear Regression Models.
2. Compound growth Rate
3. Annual Growth Rate
4. Auto correlation - Durbin watson test
5. Ratios and percentages.

1. Simple and Multiple linear Regression:

To find out the effect of various independent various on dependent variables linear Regression equations are fitted. The method is discussed below.

$Y = a + bx$

Y = Independent Variable

x = Dependent Variable

The estimated equations is;

$Y = a^n + b^{nx}$

$$bn = \frac{(x - \bar{x})\ (Y_o - \bar{Y})}{(x - \bar{x})^2}$$

$$a^n = \bar{Y} - b^n \bar{x}$$

$$\leq ei^2 = (Y - \bar{Y})^2\ b^n \leq (Y - \bar{Y})\ \leq (x - \bar{x})$$

$$\hat{\sigma u}^2 = \frac{\leq ei^2}{n-2}$$

$$\text{standard error of } b^n = \frac{\hat{\sigma u}^2}{(x - \bar{x})^2}$$

$$R = \frac{\leq (x - \bar{x})\ \leq (Y - \bar{Y})}{\sqrt{\leq (x - \bar{x})\ \leq (Y - \bar{Y})}}$$

$$t = \frac{b^n}{\text{Standard error of } b^n}$$

If $t > 2\ b^n$ is statistically significant.

If $t < 2\ b^n$ is not statistically significant.

In general Y the equation to be filled is

$$Y = a_1 + a_x x_1 + a_3 x_2 + \ldots\ldots\ldots anxn$$

Then the estimated equation is

$$Y = a_o^n + a_1 x_1 + a_2^n x_2 + \ldots\ldots\ldots anxn$$

Let (β)

$$\begin{vmatrix} \leq x_1^2 & \leq x_1 x_2 & \leq x2\ x_n & \ldots\ldots \leq x_1 x_n \\ \leq x_1 x_2 & \leq x_2 x_2^2 & \leq x_2 x_n & \ldots\ldots \leq x_2 x_n \\ \leq x_1 x_n & \leq x_2 x_n & \leq x_3 x_n & \ldots\ldots \leq x_n^2 \end{vmatrix}$$

where $x_1 = \bar{x}_1$; $x_2 - \bar{x}_2$; $\ldots\ldots x_n = y_n - x_n$

$$a_1^n = \frac{\begin{vmatrix} \Sigma x_1 y & \Sigma x_1 x_2 & \cdots & \Sigma x_1 x_2 \\ \Sigma x_2 y & \Sigma x_2^2 & \cdots & \Sigma x_2 x_n \\ \Sigma x_n y & \Sigma x_2 x_n & \cdots & \Sigma x_n^2 \end{vmatrix}}{(B)}$$

$$a_1^n = \frac{\begin{vmatrix} \Sigma x_1^2 & \Sigma x_1 x_2 & \Sigma x_1 y & \cdots & \Sigma x_1 x_n \\ \Sigma x_1 x_1 & \Sigma x_1 x_2 & \Sigma x_1 y & \cdots & \Sigma x_1 x_n \\ \Sigma x_1 x_n & \Sigma x_2 x_n & \Sigma x_n y & \cdots & \Sigma x n^2 \end{vmatrix}}{(B)}$$

$$R^2 = \frac{a_1^n \Sigma Y x_1 + a_2^n \Sigma Y_{x2} + \cdots a n^n \Sigma Y x n}{Y^2}$$

$$a_o^n = a_1 n - a_2^n \bar{x}_1 - a_3^n - a_4^n x_3^- - a^n 5\, \bar{x}_4 \ldots a^n n \bar{x}_n$$

$$\Sigma ei^2 = \Sigma Y^2 - a_1^n \Sigma Y x_1 - a^n 2 \Sigma Y_{x2} - a^n 3\, \Sigma Y Y_3 - a_4^n \Sigma Y x_4 \ldots a^n n \Sigma Y x$$

$$\hat{\sigma u}^2 = \frac{\Sigma ei^2}{N-n}$$

N = Number of ite ms

n = Number of parameters

Variance of $a_1 = \hat{\sigma u}^2$

$$\frac{\begin{vmatrix} \Sigma x_1^2 & \Sigma x_1 x_2 \ldots \Sigma x_1 x_{1-1} \Sigma x_1 \Sigma x_{1+1} \ldots \Sigma x_1 x_n \\ \Sigma x_i x_i - 1 & \ldots \Sigma x_2 x_i - 1 \Sigma x_1 - 1^2 \; x_1 - 1 \Sigma x_i + 1 \ldots \Sigma x_i - 1^{x_n} \\ \Sigma x_i x_i + 1 & \Sigma x_2 x_i + 1 \ldots \Sigma x_i + 1^2 \ldots \Sigma x_i + 1 \; x_n \\ \Sigma x_i x_n & \Sigma x_2 x_n \quad \Sigma x_1 x_n \; \Sigma x_i + 1 \; x_n \ldots \Sigma x_n^2 \end{vmatrix}}{(B)}$$

Standard error of a_i^n $= \sqrt{\text{Variance } a_1^n}$

t - Value for a_i^n $= \dfrac{a_1^n}{\text{Standard error of } a_1^n}$

If calculated t is greater than 2 the perameter estimate a_i^n is statistically significant.

If $t < 2$ perameter estimate a_i^n is not statistically significant.

Compound Growth Rate:

To find the compound growth rate; the overall percental growth of the particular foactor; the following equation is used

$$\left(\frac{x^n}{x_1}\right)^{1/t} = b$$

$$b - 1 \times 100 = C.G.R$$

Annual Growth Rate:

Annual Growth rate is measured by using the following formula:

$$\frac{x_t - x_{t-1}}{x_t - 1} \times 100 = A\ G\ R$$

To see whether any auto corrleation exist in determinants of investment of the form

Durbin Watson test is applied.

Auto correlation: Durbin Watson Test

$$d = \frac{(e_t - e_t - 1)}{e_t^2}$$

e_t = regression residual

If $d \approx 2$, no auto correlation. $0 < d < 2$, there is some degree of positive auto correlation $d = 4$, perfect negative auto correlation. $2 < d < 4$ there is some degree of negative auto correlation.

The test itself compares the emprical d^* value calculated from the regression residuals with the d_L and d_u in the Durbin - Watson tables and with then transorms $(4 - d_L)$ & $(4 - d_u)$. The comparision with $(4 - d_L)$ and $(4 - d_u)$ investigates the possibility of negative auto correlation.

(1) If $d^* \leq d_L$ we reject the null hypothesis of no auto correlation and accept that there is the auto correlation of the first order.

(2) If $d^* > (4 - dL)$ we reject the null hypothesis of no auto-correlation and accept that there is negative auto correlation of the first order.

(3) If $d_u < d^* < (4 - d_u)$ we accept the null hypothesis of no auto correlation.

(4) If d_L c $d^* < d_u$ or if
$(4 - d_u) < d^* < (4 - d_L)$ the test is inconclusive.

RATIOS:

The following ratios are calculated for the study.

(1) Debt equity ratio:

$$\text{Debt equity ratio} = \frac{\text{Borrowings}}{\text{Net Worth}}$$

(2) Net worth Ratio:

$$\text{Net worth Ratio} = \frac{\text{Net worth}}{\text{Net asset}}$$

(3) Net Profit margin

$$\text{Net Profit Margin} = \frac{\text{Net Profit}}{\text{Gross Sales}}$$

(4) Rate of Return on Net Assets:

$$\text{Rate of Return on Net Assets} = \frac{\text{Net Profit}}{\text{Net Assets}}$$

(5) Liquidity Ratio:

$$\text{Liquidity Ratio} = \frac{\text{Current Assets - Inventories}}{\text{Current Liabilities}}$$

(6) Current Ratio:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

7. Net Worth Ratio:

$$\text{Net Worth Ratio} = \frac{\text{Net Worth}}{\text{Net Asset}}$$

8. Net Worth:

$$\text{Net Worth} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

9. $\frac{S}{W}$ Ratio:

$$\frac{S}{W} \text{ Ratio} \rightleftharpoons \frac{\text{Gross Sales}}{\text{Net Worth}}$$

D. Designation of the Terms:

1. Current Assets
2. Current Liabilities
3. Depreciation
4. Value added
5. Capacity utilisation

1. Current Assets:

Current assets are defined by the American Institute of Certified public Accountants as "cash and other assets or resources" commonly identified as those which are realised in cash or sold or consumed during the normal operating cycle of the business.

2. Current Liabilities:

Current Liabilities are defined as 'Obligations whose

liquidation is reasonable expected to require the use of existing resources properly classifiable as current assets or the creation of other current asssts, on the creation of ther current liabilities".

3. Depreciation:

"Depreciation may be defined as the reduction in the value of fixed assets occasioned either by physical wear and tear, obsolescnece the passage of time".

4. Value added:

When all the factors of production combine to add fresh or additional utility or f value to existing materials the incremental generation of value is know n as value added.

VA = Gross ex-factory value of output - gross value of input.

5. Capacity Utilisation:

Capacity utilisation is the ratio of exhaution or usage of a machine to its installed capacity. It is calculated by finding the ratio of production to installed capacity.

Results and Discussion

IV RESULTS AND DISCUSSION

The results and discussion of the study "An analysis of the determinants of investment, profitability, and capacity utilisation of Chettinad Cement factory from 1970-71 to 1984-85 is discussed under the following heads.

A. Capital Structure

B. Determinants of Investment - Acceleration Hypothesis

C. R eturns of Capital

D. Profitability

E. Capacity Utilisation and

F. Major Financial Ratios

A. Capital Structure:

Capital is the life blood of any organisation. There may be different interpretations of the term capital in different heads. To an individual capital is synonymons with cash in hand and at Bank. Economists interpret the term on functional basis, that is it is the stock of goods that are used for further production of goods and services. A businessman takes capital as his total investment for a return in physical properties and valuable intangibles. When used in accounting sense, it generally means net work or share-holders.

There are two possible approaches the concepts of capital. One of them is the 'fund concept' and the other the 'asset concept' of capital" (Bhabatosh Banerjee (1984).

According to the fund concept the capital of a firm is the sum total of funds that have been employed for its running. It corresponds to the idea of total capital and may also be described as financial capital. According to asset concept capital means capital invested in fixed assets and Current assets.

The word structure is a term of the science of Engineering. It cannotes the arrangements of the various parts of a building or some other construction. It is common knowledge that a corporate enterprise raise its capital from diverse sources such as issue of shares, debentures, long term loans, ploughing back and short term ~~loans~~ loans This arrangement of capital goes by the name of capital structure. It means that capital structures refer more to the quality aspects of capital".

Capital with its entirety can be resolved into two categories: Fixed Capital and Working Capital. The term fixed capital refers to the long term financing of the firm, such as capital requirements for land, building, plant and machinery etc. The term working capital refers to short term funds required for financing the duration of the operating cycle in a business often known as accounting vear. These funds are used for carrying out the routing or regular business operations consiting of purchase of raw-materials, payment of direct and indirect expenses, carrying out production

investment in stocks and stores, credit granted to customers and to be maintained in the form of cash.

In order to study the capital structure of Chettinad Cement Corporation the investigator has chosen gross fixed and gross working capital. Since, depreciation, as expiry cost is in the form of non-cash expense, gross values of assets are being taken instead of net. Depreciation like capital to often defined in many ways. "The day to-day expiration in the cost of fixed asset is called depreciation".

William N.Pyle Depreciation is the measure of the exhaustion of the effective life of fixed asset owing to use or absolescience during a given period". To spicer & Pegel, While other business expenses are as cash consuming depreciation, as an expense is a non cash variety since there is no outflow of cash or other liquid assets in respect of the imputed expense for depreciation. To avoid problems due to imputation of depreciation cost, gross fixed and gross working capital is used to analyse the capital structure.

Gross fixed capital is composed of by the capital invested in land, building, plant and machinery office equipments etc., are of long term, capital investment nature. Table-4Ishows the composition of Gross ffixed Capital in Chettinad Cement Corporation from 1970-71 to 1984-85.

TABLE 4.1

COMPOSITION OF GROSS FIXED CAPITAL (in Rs lakh)

GFC/ Year	Land	Buildings	Plant of Machinery	Office experiments	Other	Total
1970-71	786.46 (1.3497)	12457.46 (21.3775)	33664.33 (57.7749)	425.10 (0.7295)	10934.66 (18.7661)	58268.07 -
1971-72	788.47 (0.1337)	12463.26 (21.1345)	33979.49 (57.6206)	447.63 (0.7590)	11292.14 (19.1486)	58970.99 -
1972-73	78 .85 (0.1331)	12539.13 (21.1721)	34167.93 (57.6920)	469.91 (0.7934)	11259.20 (19.2415)	58515.02 -
1973-74	778.05 (1.2118)	12993.21 (20.2367)	37559.85 (5856.13)	474.79 (0.7994)	12259.99 (19.0948)	64205.90 -
1974-75	781.97 (1.0885)	13506.38 (18.8022)	39244.70 (54.6326)	477.78 (0.6651)	17822.93 (24.8113)	71833.76 -
1975-76	7.85 (0.9209)	139.04 (16.3127)	414.16 (48.5909)	5.09 (0.5971)	286,20 (33.5781)	852.34 -

1976-77	7.84 (1.0013)	139.89 (17.8672)	429.79 (54,8943)	5.55 (0.7088)	199.88 (25.5294)	782.94 -
1977-78	9.34 (1.0331)	142.04 (15.7122)	539.91 (59.7238)	5.89 (0.6515)	208.85 (22.8813)	904. 01 -
1978-79	9.88 (1.0363)	144.32 (15.1375)	559.21 (58.6549)	6.35 (0.6660)	233.63 (24.5051)	953.39 -
1979-80	11.08 (1.1280)	147.83 (15.0505)	562.17 (57.2346)	7.53 (0.7666)	253.62 (25.8210)	982.22 -
1980-81	13.26 (1.2493)	152.49 (14.9672)	568.11 (53.5261)	7.97 (0.7509)	319.53 (30.1054)	1060.37 -
1981-82	19.38 (1.6026)	163.31 (13.5051)	591.54 (48.9183)	9.54 (0.7889)	425.48 (35.1857)	12 09.24 -
1982-83	28.18 (1.7672)	178 .72 (11.2080)	829.30 (52.0080)	11.39 (0.7143)	546.97 (34.3022)	1594.56 -
1983-84	32.57 (1.5632)	195.79 (9.3492)	1142.82 (54.8514)	15.37 (0.7377)	697.97 (33.5002)	2083.48 -
1984-85	33.84 (1.5148)	237 .40 (10.6291)	1198.88 (53.6714)	22.57 (1.0104)	741.08 (33.1766)	2233.74 -

Figures in the paranthesis show percentage to the total.

Table 4.1 reveals that nearly half of Gross Fixed capital is diverted towards plant and machinary , followed by other expenses such as labouratbry equpiments, vehicles, wagons, libraby and railday tracks and fridings. Landand building on an avenage constitutes 22 per cent to total in 1970-71 decline continusouly nearly to 12 per cent in 1984-85. Increased investment on plant and machinary and other equpiment is a healthy sign since it revealslong term 'business' investment.

Depreciation, 'expired capital outlay' is shown in the following table 4.2.

TABLE 4.2

GROSS FIXED CAPITAL AND DEPRECIATION (In Rs lakh)

Year	Gross Fixed Capital	Depreciation
1970-71	582.68	29.41
1971-72	589.71	29.74
1972-73	592.25	29.80
1973-74	642.06	32.67
1974-75	718.34	38.71
1975-76	761.51	41.38
1976-77	782.94	42.59
1977-78	904.01	48.96
1978-79	953.39	52.95
1979-80	982.22	64.37
1980-81	1061.37	81.07
1981-82	1209.24	74.97
1982-83	1594.56	88.61
1983-84	2083.48	159.66
1984-85	2233.74	172.11

By way of charging depreciation, as a process of accounting current assets of the same value are secured to remain locked up in the business. Therefore the overall result is that there is a change in the proportion of fixed asset that the firm indirectly 'builds asset' to the depreciated value. Thus Depreciation is one important determinant of investment as contributor of funds for buildings 'assets'.

Gross working capital constitutes the other segment of capital structure which is shown in Table 4.3.

TABLE 4.3

COMPOSITION OF GROSS WORKING CAPITAL OF CHETTINAD CEMENT CORPORATION. (Rs in lakh)

Year	~~Investments~~ Inventories	Loan and advances	Investment	Cash Balance	Total
1970-71	26.43	19.34	-	2.16	47.93
1971-72	25.25	10.95	-	4.27	40.47
1972-73	33.16	18.76	-	5.37	56.29
1973-74	55.28	18.93	-	1.75	75.96
1974-75	23.82	17.22	-	1.37	42.41
1975-76	63.21	32.82	-	4.39	100.42
1976-77	47-21	43.67	3.40	5.30	97.58
1977-78	22.01	46.28	6.33	6.99	81.61
1978-79	48.15	54.48	17.33	2.03	122.01
1979-80	63.48	47.83	20.13	2.18	133.62
1980-81	51.09	49.30	29.42	3.57	133.38
1981-82	141.49	66.26	45.20	82.43	335.38
1982-83	110.21	77.28	99.50	6.31	293.30
1983-84	71.44	144.13	229.50	19.78	464.95
1984-85	109.26	327.74	248.50	182.54	868.04

~~(Figures in paranthesis denote percentages to total.~~

Inventories and loans and advances kept as buffer constitutes major short term investments, and cash balance is kept at very low level just to meet immediate expenses if any.

Gross fixed and working capital together constitutes Gross productive capital of the firm. Proportion of GFC to GPC is more in Chettinad Cement Corporation for all the years. One healthy sign is that the proportion of GWC to GPC is constantly increasing from 7.60 per cent to 27.99 per cent between 1970-71 to 1984-85, indicating increased requirement for short term funds. The table 4.4 reveals the proportion of GFC and GWC to GPC.

TABLE 4.4

PROPORTION OF GFC AND GWC TO GPC

Rs in lakh

Year	Gross fixed capital		gross working capital		gorss productive capital
	Amount Rs.	Percentage to GPC %	Amount	Percentage to GPC %	GPC
1970-71	582.68	92.40	47.93	7.60	630.61
1971-72	589.71	93.58	40.47	6.42	630.18
1972-73	592.25	91.32	56.29	8.68	648.54
1973-74	642.06	89.42	75.96	10.58	718.02
1974-75	781.34	94.43	42.41	5.57	760.75
1975-76	761.51	88.35	100.42	11.65	861.93
1976-77	782.94	88.92	97.58	11.08	880.52
1977-78	904.01	91.72	81.61	8.28	985.62
1978-79	953.39	88.65	122.01	11.36	1075.40
1979-80	982.22	88.03	133.62	11.97	1115.84
1980-81	1061.37	88.84	133.38	11.16	1194.75
1981-82	1209.24	78.29	335.38	21.71	1544.52
1982-83	1594.56	84.47	293.30	15.54	1887.86
1983-84	2083.48	81.76	464.85	18.24	2548.33
1984-85	2233.74	72.01	868.04	27.99	3101.78

Growth of capital both fixed and working capital is one economic indicator of a firms growth The following table 4.5 reveals the annual and compound (overall) capital growth rates of Chettinad Cement Corporation during the last 15 years.

TABLE 4.5

ANNUAL AND COMPOUND GROWTH RATES OF GROSS FIXED CAPITAL GROSS WORKING CAPITAL AND GROSS PRODUCTIVE CAPITAL. (Rs in lakh)

Years	Gross fixed Capital	Gross working Capital	Gross productive Capital
1970-71 to 1971-72	1.21	15.56	-007
1971-72 to 1972-73	0.43	30.09	2.9
1972-73 to 1973-74	7.75	34.94	10.71
1973-74 to 1974-75	11.79	-44.17	5.95
1974-75 to 1975-76	6.00	136.78	13.30
1975-76 to			

TABLE 4.5

ANNUAL AND COMPOUND GROWTH RATES OF GROSS FIXED CAPITAL GROSS WORKING CAPITAL AND GROSS PRODUCTIVE CAPITAL. (Rs in lakh)

Years	Gross fixed Capital	Gross working Capital	Gross productive Capital
1970-71 to 1971-72	1.21	15.56	-007
1971-72 to 1972-73	0.43	30.09	2.9
1972-73 to 1973-74	7.75	34.94	10.71
1973-74 to 1974-75	11.79	-44.17	5.95
1974-75 to 1975-76	6.00	136.78	13.30
1975-76 to			

The overall growth of Gross working capital is very significant (50 percent) compare to Gross fixed capital which has grown by 22 per cent. The annual growth rates are very phenomenonel during the years 75-76, 83-84 and 84-85, over its corresponding previous years. The over all growth of capital is 25 percent over 15 year which is significant.

In addition to capital, there are other indicators of growth of a corporate unit, such as gorss sales, inventoreis, profit and net worth. Gross sales has grown overall by 44 percent during the past 15 years. The following table 4.6 clearly shown the sales, inventories, profit and net worth of Chettinad Cement Corporation between 1970-71 to 1984-85.

TABLE 4.6

GROSS SALES, INVENTORIES. (Rs in lakh)

Year	SALES Amount	Annual growth rate	INVENTORIES Annual Amount	Annual Growth rate	Profit	Net profit.
1970-71	271.53	-	26.43	-	-4.74	94.92
1971-72	337.38	24.25	25.25	- 4.46	-27.46	85.13
1972-73	227.03	-32.71	33.16	31.33	83.28	50.47
1973-74	258.27	13.76	55.28	66.71	-107.48	-52.11
1974-75	574.07	122.28	23.82	-56.91	-	-49.84
1975-76	628.44	9.47	63.21	165,36	9 .24	74.87
1976-77	711.92	13.28	47.21	-25.31	-24.68	-56.89
1977-78	815.17	14.50	22.01	-53.38	16.93	-100.88
1978-79	808.41	-0.83	48.15	118.76	2 6.57	-119.29
1979-80	921.13	13.94	63.48	31.84	44.46	-29.19
1980-81	1450.15	57.43	51.09	-19.52	79.86	-66.62
1981-82	1601.93	10.47	141.49	176.94	287.52	55.87
1982-83	1415.02	-11.67	110.21	-22.11	234.95	-31.58
1983-84	2828.96	99.92	71.44	-35.18	556.81	16.16
1984-85	3074.47	8.68	109.26	52.94	289.39	-136.78
Compound growth rate		43.91		23.72	285.29	

The compound growth rate of profit is 285.29 which is phenominal to role. The firm has made a remarkable turn from a loss of 4.74 to a profit of 289.39 lakhs.

Net worth remains to be negative in most of the year indicating current liabilities to be in excess of current assets. This is due to the firms dependency on outside capital specially for short term requirements.

TABLE 4.7

NET WORTH OF CHETTINAD CEMENT CORPORATION (Rs in lakh)

(1970-71 to 1984-85)

Year	Current Assets	Current Liabilities	Net worth
1970-71	133.76	38.84	94.92
1971-72	121.36	36.23	85.13
1972-73	111.13	60.66	50.47
1973-74	121.26	163.37	-42.11
1974-75	193.13	212.97	-19.84
1975-76	227.83	152.96	74.87
1976-77	171.68	228.57	-56.89
1977-78	180.78	281.66	-100.88
1978-79	193.18	322.47	-119.29
1979-80	323.83	353.02	-29.19
1980-81	355.21	421.83	-66.62
1981-82	536.58	480.71	55.87
1982-83	457.37	488.95	-31.58
1983-84	476.94	460.78	16.16
1984-85	706.17	842.95	-136.78

Sales and net worth remains to be two major determinents of capital. Sales, wealth ratio influence seems to be significant when tested by using simple linear regression technique.

Model 1 & 2:

The result of the simple linear regression model of the form

$$GFC = \hat{\alpha} + \beta \left(\frac{S}{W}\right) \quad .....(1)$$

$$GPC = \hat{\alpha} + \beta \left(\frac{S}{W}\right) \quad ..... \quad (2)$$

reveals a significant influence of $\frac{S}{W}$ on Gross fixed capital and gross productive capital.

The following table 4.8 shows gross fixed capital, Gross productive capital and $\frac{S}{W}$ Which is used to analyse the influence of $\frac{S}{W}$ on Gross Fixed Capital and Gross Productive Capital.

TABLE 4.8

GROSS FIXED CAPITAL GROSS PRODUCTIVE CAPITAL $\frac{S}{W}$ RATIO

(Rs in lakh)

Year	Gross fixed capital	Gross produvtive capital	$\frac{S}{W}$ Ratio
1970-71	582.68	630.61	2.86
1971-72	589.71	630.18	3.96
1972-73	592.25	648.54	4.50
1973-74	642.06	718.02	-6.13
1974-75	718.34	760.75	-28.93
1975-76	761.51	861.93	8.39
1976-77	782.94	880.52	12.51
1977-78	904.01	985.62	-8.08
1978-79	953.39	1075.40	-6.78
1979-80	982.22	1115.84	-31.66
1980-81	1061.37	1194.75	-21.77
1981-82	1209.24	1544.62	28.67
1982-83	1594.56	1887.86	-44.81
1983-84	2083.48	2548.33	175.06
1984-85	2233.74	3101.78	-22.48

The results of the simple linear model is tabulated below: in table 4.9.

TABLE 4.9

Gross Fixed Capital $= \alpha + \beta(\frac{S}{W})$	Gross productive Capital $= \alpha + \beta(\frac{S}{W})$
$R^2 = 0.506$	$R^2 = 0.45$
$\beta_1 = 5.29$	$\beta_1 = 6.6011$
bo = 1023.04	bo = 1210.20
$Sb_1 = 2.0389$	$Sb_1 = 3.0165$
$Sb_o = 99.41$	Sbo = 465.10
$tb_1 = 2.59$	$tb_1 = 2.19$
$tb_o = 10.29$	$tb_o = 2.60$
$Y = 1023.04 + 5.29\ X_1$	$Y = 1210.20 + 6.6\ X_1$

Nearly 50 percent of Gross Fixed and 45 per cent of Gross Productive Capital is determined by $\frac{S}{W}$ ratio. The corresponding 'T' value indicates that the parameter of $\frac{S}{W}$ is statistically significant at 95 percent level in both the models.

By using multiple linear regression the influ ences of Gross sales, inventories, net worth depreciation and ehanges in sales are being tested. However, only two models reveal significant influences on Gross fixed capital.

Models:

$$GFC = \alpha + \beta_1 \ (P) \ + \beta_2 \left(\frac{S}{W}\right) \ \ldots\ldots \ (3)$$

$$GFC = \alpha + \beta_1 \ (D) + \beta_2 \ (N.W) \ \ldots\ldots \ (4)$$

where,

GFC = Gross Fixed Capital

P = Profit

$\frac{S}{W}$ = Sales by net work ratio

D = Depreciation

N.W = Net worth.

The results of the two models are tabulated below, in table 4. 10.

TABLE 4.10

RESULT OF THE MODEL

$GFC = \alpha + \beta_1(P) + \beta_2(\frac{S}{W})$	$GFC = \alpha + \beta_1(D) + \beta_2(N.W)$
R^2 = .7869183	R^2 = 0.9205248
A = 768.584	α = .9594398
SE(A) = 32.0701	Sα = 57.70656
T(A) = 23.96575	T = 5.272979
β_1 = 1.927743	β_1 = 10.79321
β_2 = -3.269803	β_2 = -.1719403
Sβ_1 = .334417	Sβ_1 = 1.170097
Sβ_2 = 1.885453	Sβ_2 = .2780704
Tβ_1 = 5.764488	Tβ_1 Sβ_2 = 9.224203
Tβ_2 = -1.734227	Tβ_2 = -.6183338
'F' value =16.61865	'F' value= 5212141
$Y = 768.58 + 1.93X_1 - 3.27X_2$	$Y = 0,959 + 10.79X_1 - 0.17X_2$

Model I show that nearly 79 percent of variations in Gross Fixed Capital is explained by profit and $(\frac{S}{W})$ ratio. The independent factor pfofit influences the dependent factor Gross fixed Capital at 95 per cent statistically significant level, since its 'F' value is greater than the table value, calcualted R^2 is also statistically significant because calculated 'F' value is greater than the table value of 'F'.

Model specifies that for one per cent increase in profit these is corresponding 1.9 percent increase in Gross Fixed Capital and similarly for one percent increase in $\frac{S}{W}$ ratio these is 3.27 percent decrease in gross Fixed Capital since $\frac{S}{W}$ and Gross fixed Capital are negatvely related because the value of B2 is -3.2698 The model is nutshell denotes a statistically significant high R^2 indicating profit and $\frac{S}{W}$ ratio as the two major determinants of investment.

B. Determinants of Investments: Acceleration Hypothesis:

Investment behaviour of this unit, is reviewed by identifying appropriate variables that influence the investment behaviour number of theories and hypothesis attempt to discuss the investment behaviour of a corporate unit.

The central theme of the neo classical theory is capital accumulation. That investment behaviour is influenced by changes in capital accumulation.

Profit theory of investment behaviour states "Greater the gross profits greater will be the level of internally generated funds and in turn greater will be the rate of investment" (Y.K.Tanwar, 1980). In the liquidity theory of investment behaviour, desired capital is proportional to liquidity.

Clark (1976) expounded the acceleration principle which explains a direct positive relationship between rate of change in the flow of output or sales and addition to the score of capital. This acceleration principles assumes a technical relationship between output and capital stock. Krishnamoorthy and Sastry inferred that the accelerator hypothesis has come validity in some India Industries for the explanation of investment behaviour. Acceleration model specified that capacity utilisation should be full".

In this study the investment behaviour is analysed by considering the acceleration principle since capacity utilisation of Chettinad Cement Corporation is nearly full (Table 4.15).

Model:

$$It = f(St, Pt, Dt, Ct, \triangle St) \ldots\ldots (5)$$

where,

It = Gross Fixed Investment during year t

St = Gross sales in year (t)

Pt = Profits in year t.

Dt = Depreciation in year t

Ct = Net worth (current assets- current liabilities) in year t.

$\triangle St$ = Changes in sales (St - St-1)

Model is specifi ed in linear form and statistical significance of the explanatory variables are tested.

$$It = \alpha + \beta_1 St + \beta_2 Pt + \beta_3 Dt + \beta_4 Ct + \beta_5 \triangle St$$

Ordinary least squate (OLS) method of estimation is used to solve multiple linear regressions equation specified.

This result of the model is tabulated in the table given below.

TABLE 4.11

DETERMINANTS OF INVESTMENT (Rs in lakh)

Year	It	St	Pt	Dt	Ct	ΔSt*
1970-71	582.68	271.53	-4.74	29.41	94.92	271.53
1971-72	589.71	337.38	-27.46	29.74	85.13	271.53
1972-73	592.25	227.03	-83.28	29.60	50.47	116.68
1973-74	642.06	258.27	-107.48	32.67	-42.11	227.03
1974-75	718.34	574.07	-	38.71	-19.94	258.27
1975-76	761.51	628.44	9.25	41.38	74.87	574.07
1976-77	782.94	711.92	-24.68	42.59	-56.89	628.44
1977-78	904.01	815.17	16.93	48.96	-100.88	711.92
1978-79	953.39	808.41	26.57	52.95	-119.29	801.65
1979-80	982.22	921.13	44 .46	64.37	-29.19	808.41
1980-81	1061.37	1450.15	79.86	81.07	-66.62	979.17
1981-82	1209.24	1601.93	287.52	74.97	55.87	1450.15
1982-83	1594.56	1415.02	234.95	88.61	-31.58	1228.11
1983-84	2083.48	2828.96	556.81	159.66	16.16	1415.02
1984-85	2233.74	3974.47	289.89	172.11	-136.78	2828.96

TABLE 4.12

RESULTS OF THE MODEL V.

Perameter	Estimate β_1	Standard Error	Compound 'T' value
β_o	496.9398	102.9804	4.8256
β_1 (St)	- .1614	.1226	-1.3163
β_2 (Pt)	.6890	.3576	1.9265
β_3 (Dt)	8.2851	1.5725	5.2687
β_4 (Ct)	-1.0133	.4940	-2.0511
β_5 (St)	.1945	.1226	1.5871

'R' Square = .98226213 Adjusted .97240772

'T' value 99.6773

Durbin Watson 'D' = 2.7612

$d_1 \neq 0.56$

$D_n = 2.21$ } (Negative auto correlation which falls in inconclusive region.

The estimated investment function is of the form

$$Y = 496.94 - 0.1614\ X_1 + 0.6890\ X_2 + 8.2851\ X_3 - 1.0133\ X_4 + 0.1945\ X_5$$

Results reveal that depreciation and net work influences Investment decision more that other factor considered. For 1 Percent increase in Depreciation the firm's Investment Capital increases by 8.28 percent similarly, For 1 percent increase in net worth corresponding 1 percent decline in Investment is there, since net worth is current assets minus current liabilities, 1 per cent increase in current asset means 1 per cent decline in Investment captial.

Profit is one determinant of Investment according to profit theorists. In this model profit influences Investment at 90 per cent statistical significance. That is 1 per cent increase in profit influences Investments to go up by 0.69 per cent.

High R^2 (0.98) is indicating that major explanatory factors are being considered in the model and F test reveals that the calculated R^2 is statistically significant.

Sales and changes in sales do not yield a significant result meaning Sales is not the Investment criteria as most the classical and neoclassical models stress. Model reveals that it is the "Asset Creating" factors like Depreciation and Net worth, more influencing the investment decision of a firm followed by Profit and not sales or sales related factors.

To substantiate this argument the investigator wide regression model of the form.

$GFC = \alpha + B_1 (D) + \beta_2 (C_t)$ - Table (4.10).

tested the influence of Depreciation & net worth alone on investment and the results reveal that nearly 92 per cent of the variations in Gross Fixed Capital is influenced by Depreciation andnet worth alone. Of these two factors 'Depreciation' is more influencial which could be spelled as 1 per cent change in Depriciation causes nearly 10 per cent change in Gross Fixed Capital. 'F' test proves that the calculated R^2 is statistically significant.

To test whether there is any serial correlation presents in the model, Durbin Watsons Auto correlation is tested and found the existence of negative Autocorrelation which falls in inconclusive region Since D = 2.7613.

Depriciation serves to be a source of fund for asset creation. Atleast Depriciation stands as revenue to fall back upon, and acts as one major determinant of investment decision. Thus it is the asset building factors and not either sales or profit, which is responsible for Investment decisions, Classical and neo classical theories of the firms' investment behaviour based on profit and liquidity is being disproved and the investigator approves with acceleration hypothesis which have validity in explaining Investment behaviour of Chettinad Cement Corporation.

Similar conclusion is drawn by Yogesh, K. Tanwar (1980) where he concludes "it can eb inferred that acceleration hypothesis have validity in expalining the Investment behaviour: "Among the other variables considered external borrowings and depriciation provision determine Investment behaviour contrary to general belief the profit variables do not show significant effect on percentage in any of the industries studied".

Tanwar(1978) found that acceleration principle was a statistically significant determinant of Investment in certain industries in India.

Limitation of the Model:

1. One of the limitations of this model is that the assumptions generally associated with accelerator hypotheses, such as full utilisation of capacity, constant returns to scale, sales changes being permanent in character, a constant ratio between sales to output, firms not on declining phase of their life and elastic supply of funds, may not be always simultaneously and fully valid and, therefore, lessening, explanatory power of the accelerator hypotheses.

2. Monetary plicy and fiscal policy measure effects are not considered.

3. Technical changes has been ignored in the model specification.

C. III. Return on Capitals:

The net rate of return on prospective capital is analysed by finding its incremental output capital ratio since capital intensity and capital productivity, being basically the two determinants of rate of return on capital. The following table shows the incremental output capital ratio of Chettinad Cement Corporation between 1970-71 and 1984-85.

TABLE 4.13

RETURN ON CAPITAL (Rs in lakh)

Year	Fixed Capital	Average output Capital Ratio	Incremental Outpur	Incremental Capital	Incremental output Capital Ratio.
1970-71	582.68	0.469	-	-	-
1971-72	589.71	0.557	55.07	7,03	0.093
1972-73	592.25	0.408	-86.68	2.54	-0146
1973-74	642.06	0.399	14.47	49.81	0.023
1974-75	718.34	0.800	318.51	76.28	0.443
1975-76	761.51	0.787	24.54	43.17	0.032
1976-77	782.94	0.926	126.21	21.43	0.061
1977-78	904.01	0.932	117.19	121.07	0.130
1978-79	953.39	0.833	-48.80	49.38	-0.051
1979-80	982-22	0.926	115.10	28.83	0.117
1980-81	1061.37	0.158	-741.15	79.15	-0.698
1981-82	1209.24	0.667	638.12	147.87	0.528
1982-83	1594.56	0.114	-623.62	385.52	-0.391
1983-84	2083.48	0.159	148.42	488.92	0.071
1984-85	2233.74	0.136	-27.30	150.26	-0.12

where,

FC = Fixed Capital

IO = Incremental output

IK = Incremental Capital

IOKR = Incremental output Capital Ratio

$$IOKR = \frac{Qt}{Kt}$$

Qt = Output at t period

Kt = Capital at t period

$$IOKR = \frac{Q}{\bar{K}} = \frac{Qt - Qt - 1}{I\ nt}$$ where

Int = Fct - Fct - 1

Fct = Fixed cost at t period

Fct = Fixed cost at t-1 period

The table shows that the maximum incremental capital output ratio was during 1980-81 followed by 1981-82, accounting for 69.8 percentage change in output for 1 percentage increase in fixed capital. The reason attributable for this may be, the fullcapacity utilisation, that is when cpapacity utilisation was maximum to the extent of 120 percent during that period. Negative sign shows that one percent increase in Fixed capital decreases production by 14.6 percent (1971-72). The reason may be excess capacity utilisation in the previous period or prevalent of excess capacity because of existance of unused capacity of the plant.

Rate of return on capital reveals that on an average, the capital return ranges from 11.4 percent to 93.2 percent depending on capacity utilisation and depreciation.

D. Profitability:

Profitability is a simple and widely used index of assessing business efficiency of a firm. The term profitability in abstract sense may be defined as the quality of being profitable, i.e. yielding profit or advantage. Profit is usually interpreted as the difference between the total expenses involved in making or buying of a commodity and the total revenue accuring from its sales. This difference, when expressed as a proportion of invested capital or current outlay expressed or sales, shows the profitability of a business. Profitability may also be expressed as the proportion by which the price per unit soldwould be gr ater than the average or marginal cost. Among economist also, there is no consensus about the definition and conditions for occurence of profit. Some economists treat profit as an implicit return to any service(s) and/or resource(s) supplied by the owner(s) himself. For his personal services in his own business an entrepreneur is supposed to get implicit rent, wage for the money he puts in he gets implicit interest and for his own property used in his own business he gets implicit rent. All such payments the accountants put under the fabric of profit but economists treat them as elements of cost in business.

FB.Hawley treat profit as a reward for risks and responsibilities that the entrepreneur puts himself Frank Knight links the occurence of profit as a reward for such uncertainities rather than the risks which are known in advance and therefore, are insurable. J.B.Clark, in his 'dynamic theory of profit' also propounded similar views on profits. Schumpeter sees the origin of profit as a reward to the entreprenuer for the services of innovation. Joel Dean and Peter Drucker are the two other leading supporters of the innovational theory of profit.

Whatever be the sources of profit whether the implicit earnings of the entrepreneur and/or reward for risks, uncertainities, and innovations, or a return due to monopoly power of the firm, it is essential from the business point of view. In fact, as Dean Joel remarked, "as a business firm is an organisation, designed to make profit, profit is the primary measure of its resources (Barath Wall 1984).

It is phenomenal to observe that in Chettinad Cement Corporation for the first four years, the firm is running in loss and by 1975-76 it picked up and started functioning in profit. Since, 1970-71 to 1974-75 being initial years, one reason attributable for continuous loss during that time may be the initial pains and incapability to compete with other competetors

on the line. The following table 4.14 shows the profit and net profit margin of Ghettinad Cement Corporation for the past 15 years.

TABLE 4.14

PROFIT AND PROFIT MARGIN OF CHETTINAD CEMENT CORPORATION FOR THE PAST 15 YEARS. (Rs in lakh)

Years	Profit margin	Profit margin-profit- Sales.
1970-71	- 4.74	-57.28
1971-72	-27.46	-12.29
1972-73	-83.28	- 2.73
1973-74	-107.48	- 2.40
1974-75	-	-
1975-76	9.24	68.01
1976-77	-24.68	-28.85
1977-78	16.93	48.15
1978-79	26.57	30.43
1979-80	44.46	20.72
1980-81	79.86	18.16
1981-82	287.52	5.57
1982-83	234.95	6.02
1983-84	556.81	5.08
1984-85	289.39	10.62

Profit shows a steady increase after 1976-77 and net profit remains high during 1975-76 and 1977-78. The reason attributable for this hike in net profit margin may be due to increased per capita consumption of cement which has increased from 24.98 kg. in 1975 to 29.08 kg in 1976 and to 31.94 kg in 1978". Hardeo Singh (1981) Table 1.1. Added to this reason capacity utilisation; which was 46 percent in 1973-74 increased to 75.69 percent in 1975-76 and further to 100 percent in 1977 - 78, is another reason for increased net profit margin. To quote Hardev Singh (1981) "In the incase of Cement Industry every 5 percent decrease in capacity utilisation means a loss of Rs. 5/- per tonne".

E. Capacity Utilisation:

Capacity utilisation remains to be one major determinent of profit and to test its significant relationship the Investigator has analysed the influence of value added and capacity utilisation by applying linear multiple regression model of the form

$$P = x + \beta_1 (V.A) + \beta_2 (C.U.) - (6)$$

Where

P = Profit

V.A. = Value added

C.U. = Capacity utilisation

The following table 4.15 shows the profit, value added and capacity utilisation of the Chettinad Cement Corporation from 1970-71 to 1984-85.

TABLE 4.15

PROFIT VALUE ADDED AND CAPACITY UTILISATION OF CHETTINAD CEMENT CORPORATION FROM 1973-74 TO 1984-85. (Rs in lakh)

Year	Profit	Value added	Capacity Utilisation		
			Production	Installed capacity	Capacity Utilisation
1973-74	-107.48	77.37	184696.960	4,00,000	46.174
1974-75	-	110.84	266673.750	4,00,000	66.668
1975-76	9.24	59.01	302791.650	4,00,000	75.697
1976-77	- 24.68	61.84	347824.642	4,00,000	86.956
1977-78	16.93	69.96	400842.854	4,00,000	100.210
1978-79	26.57	80. 57	362201.180	4,00,000	90.550
1979-80	44.46	79.85	328246.504	4,00,000	82.061
1980-81	79.86	120.34	480424.134	4,00,000	120.106
1981-82	287.52	124.43	386528.035	4,00,000	96 .632
1982-83	234 .95	158.14	247007.873	4,00,000	61 .751
1983-84	556. 81	185.26	467500.687	4,00,000	116.875
1984-85	289. 89	280.09	440257.318	4,00,000	110.064

TABLE 4.16

THE RESULT OF THE MODEL IS GIVEN BELOW

R^2	= .620035
F Ratio	= 7.343149
α	= -307.7596
S α	= 153.846
Tα	= -2.00044
β_1	= 1.781982
S_{β}	= .6569721
T_{β}	= 2.712417
β_2	= 2.466134
S_{β_2}	= 1.871415
T_{β_2}	= 1.317791

The calculated R^2 is 0.62 which shows 6.2 percent of the profit to be determined by capacity utilisation and value added. $C_a$lculated 'P' ratio shows the calculation R^2 is statistically significant. Among these two; capacity utilisation is more influenced that is 1 percent change in capacity utilisation brings 2.46 percent change in profit.

Capacity utilisation being one of the major determinant of profit, is determined by power and fuel and capital invested. Energy fluctuations do affect capacity utilisation of an industry since functioning of a machine in modern days mostly depends on electricity. Capacity utilisation is thus an effective factor caused by fluctuations in power and fuel and profit determined by capacity utilisation (62 percent) determinants Investment (vide model 5) at 90 percent levels of significance.

The following models (VII and VIII) shows the determinants of capacity utilisation.

Capacity utilisation = $x + \beta_1$ CPC, $+ \beta_2$ (power & Fuel) -VII

Capacity utilisation = $x + \beta$ (P&F) $= \beta_2$ (Value of production) VIII

T A B L E V.17

Model VII		Model VIII	
R^2	= .7363	R^2	= .5381133
'F' Ratio	= 12.56559	'F' Ratio	= 5.242648
α	= 80.3598	α	= 49.90257
S α	= 8.774745	S α	= 16.05093
T α	= 9.158078	T α	= 3.109014
β_1	= 0.0535	β_1	= -0.06559647
S β	= 0.0180	S β	= 0.02026058
T β	= -2.9748	T β	= 3.23764
β_2	= ,2034734	β_2	= -0.0231925
S_{β_2}	= -0.05084	S_{β_2}	= -0.1954079
$T\beta_2$	= 4.001944	$T\beta_2$	= 1.091013

The results shows that nearly 74 percent of the changes in capacity utilisation is determined by Gross Productive Capital and power and fuel calculated R^2 is statistically significant, since the calculated 'F' ratio is more than the Table value of 'F'. Both Gross Productive Capital and power and fuel influences capacity utilisation at 95 percent statistically significant level. The second model refeals than; R^2 being 0.54 which is statistically significant; capacity utilising is a function of power and fuel value of production from these two models the investigator inferred that power and fuel is the major determinent of capacity utilisation and a simple linear regression model of the form.

Capacity utilisation = $x + \beta$ (P & F) - VIII is reworked and the results reveal a perfect correlation ($R^2 = 1$). That is capacity utilisation is determined by power and fuel to the extent of 100 percent.

The following table 4.18 shows the capacity utilisation and power fuel relationship of Chettinad Cement Factory from 1971-72 to 1984-85.

TABLE 4.18

CAPACITY UTILISATION (Rs in lakh)

1973-74	Production (in tonnes)	Capacity Utilisation	Power and fuel
1973-74	1,84,696.960	46.174	116.66
1974-75	2,66,673.750	66.668	175.00
1975-76	3,02,791.650	75.697	231.29
1976-77	3,47,824,642	86.956	247.29
1977-78	4,00,842.854	100.210	277.41
1978-79	3,62,201.180	90.550	287.48
1979-80	3,28,246.504	82.061	295.15
1980-81	4,80,424.134	120.106	436.73
1981-82	3,86,528.035	96.632	559.02
1982-83	2,47,007.873	61.751	376.88
1983-84	4,67,500.697	116.875	807.90
1984-85	4,40,257.318	110.064	1012.41

Since power and fuel is an exogenous factor determined by the supply of electricity and coal, capacity utilisation is a function of this exogenous factor which determines profit.

Investment decision is thus a function of profit whereas profit depends on capaicity utilisation where capacity utilisation is determined by exogenous factor namely the supply of power and fuel. Investment behaviour of a firm thus depends caomplexities of factors endogenous and exogenous.

Vi. Major Fiancial Ratios:

The basic purposes of financial analysis is to assess objectivity the performance of a firm on a number of aspects such as its resourcefulness and ability to earn a fair return on its investment, its ability to meet its current obligations, effectively; the true worth of its various assets; and the extent and character of its liabilities; its ability to raise new funds and to withstand possible setbacks from internal and external souces;

and so on. The analysis examines all such aspects in terms of interpretation of certain financial ratios and the relationships among themselves. The ratios are derived from the balance-sheet and the profit and loss account of the firm. A ratio is a statistical index that provides a measure of the relationship between the two variables or figures. The values of different variable s shown in the balance sheet and the profit-loss account when linked together through appropriate ratios provide us a simple, pragmatic and operational way to assess the performance of the firm.

The Debt - Equity Ratio:

The debt equity ratio is taken as a proportion of debt to the next worth (current assets - current liabilities) of the firm.

The following table 4.19 the debt equity ratio of Chettinad Cement Corporation from 1970-71 to 1984-85.

TABLE 4.19

DEBT EQUITY RATIOS

(Rs in lakh)

Year	Borrowings	Net worth	Ratio
1970-71	68.73	94.92	0.724
1971-72	78.29	85.13	0.919
1972-73	77.46	50.37	1.534
1973-74	64.84	-42.11	-1.539
1974-75	59.10	-19.84	-2.979
1975-76	106.50	74.87	1.422
1976-77	35.12	-56.89	-0.617
1977-78	27.45	-100.88	-0.272
1978-79	29.10	-119.29	-0.243
1979-80	97.06	-29.19	-3.326
1980-81	104.80	-66 .62	-1.573
1981-82	209.00	55.87	3.741
1982-83	291.57	-31.58	-9.233
1983-84	306.78	16.16	18.984
1984-85	153.78	-136.78	-1.124

Debt equity ratio reflects the extent of owners own money in the total capital of the firm. This is an important index of the credit worthiness of a firm. This ratio varies where current liabilities and current assets changes. The financial position of Chettinad Cement Corporation is not that good because net worth figures in most of the years are negative meaning borrowings are more than owner's share in capital. The firm had its birth only in 1968 and it has in its infancy stage till 1980 may be that is one reason why debt-equity ratio is not that attractive in the case of Chettinad Cement Corporation. The ratio reveals a good positive return in 1983-84 which suddenly again went back to negative in 1984-85.

The net worth ratio is another financial ratio to understand the financial soundness of the firm.

Net Worth Ratio:

The ratio expresses the net worth of a company at a proportion of its total net assets. The following table 4.20 shows the net worth of the Chettinad Cement Corporation.

TABLE 4.20

NET WORTH RATIO FROM 1970-71 to 1984-85 (Rs in lakh)

Years	Net worth	Fixed Assets	Ratio
1970-71	94.92	491.34	0.1932
1971-72	83.13	468.63	0.1817
1972-73	50.47	441.922	0.1142
1973-74	-42.11	459.06	-0.0917
1974-75	-19.84	496.63	-0.0399
1975-76	74.87	498.51	0.1502
1976-77	-56.89	477.95	-0.1190
1977-78	-100.88	550.22	-0.1833
1978-79	-119.29	546.91	-0.2181
1979-80	-29.19	511.48	-0.0571
1980-81	-66.62	510.15	-0.1306
1981-82	55.87	557.62	0.1002
1982-83	-31.58	855.35	-0.0370
1983-84	16.16	1201.20	-0.0135
1984-85	136.78	1200.90	-0.1139

This ratio indicates the extent to which the equity capital including reserves has been used to finance fixed capital formation. The firm will be in a better position if the ratio is high enough. Maximum ratio is achieved during 1970-71 followed by 1971-72 and 1972-73. This means that part of net worth is being used for current assets. Negative sign indicates that part of fixed assets to be financed through borrowed capital. This ratio is also an other indicator, indicating the firms current liabilities to be in excess of current assets which shows that the financial position of Chettinad Cement is not sound.

Rate of Return on Net Assets:

This ratio reflects the long term profitability of a firm. This ratio is negative till 1977-78 since the firm was running in loss till such time and steadily started to work on profits from 1978-79. Maximum ratio was during 1981-82 followed by 1983-84. The following table 4.21 reveals the rate of return in net assets from 1970-71 to 1984-85 of Chettinad Cement Corporation.

TABLE 4.21

RATE OF RETURN ON NET ASSETS. (Rs in lakh)

Year	Net profit	Net Assets	Ratio
1970-71	-24.93	491.34	-0.0507
1971-72	-27.46	468.63	-0.0586
1972-73	-83.28	441.92	-0.1885
1973-74	-107.48	459.06	-0.2341
1974-75	-	496.63	-
1975-76	9.24	498.55	-0.0185
1976-77	-24.68	477.95	-0.0516
1977-78	16.93	550.22	0.0308
1978-79	26.57	546.91	0.0486
1979-80	44.46	511.48	0.0869
1980-81	79.86	510.15	0.1565
1981-82	287.82	557.62	0.5162
1982-83	234.95	855.35	00.2747
1983-84	556.81	1201.20	0.4635
1984-85	289.39	1200.90	0.2412

From the table it is observable that rate of return on net assets is steadily increasing which is a clear indicative of the possibility of a positive long term profitability.

Liquidity Ratio:

The ability of a firm to meet its current obligations with a margin of safety is judged on the basis of two ratios, namely, the current ratio and the quick assets (or 'Acid Test') ratio. The current ratio shows the proportion of current assets to current liabilities. The assets which constitutes current assets are: a) Inventories b) Marketable securities c) accounts receivables and d) Cash in Hand and at the Banks. All these assets are liquid in the sense that they are easily convertible into cash to meet current liabilities such as accounts payable, current provisions, etc. Higher the ratio the better from the point of view of crediters but from the point of view of management it may be quite unwise to build up excessive building up of inventories out of proportion to the needs of the business.

Quick Assets Ratio:

The quick assets or 'Acid test' ratio is a much more stronger test for liquidity of a firm. It gives an answer to the question. If the business firm was to stop working today what is its ability to meet its current obligations immediately with the readily convertible funds on hand".

The following table 4 - 23 shows the asset ratio of Chettinad Cement Corporation in the year 1970-71 to 1984-85.

TABLE 4.22

QUICK ASSETS RATIO / LIQUIDITY RATIO

(Rs in Lakh)

Year	Current Assets	Inventories	Current Liabilities	Ratio
1970-71	133.76	26.43	38.84	2.7634
1971-72	121.36	25.25	36.23	2.6528
1972-73	111.13	33.16	60.66	1.2854
1973-74	121.26	55.28	163.37	0.4039
1974-75	193.13	23.82	212.97	0.7950
1975-76	227.83	63.21	152.96	1.0762
1976-77	171.68	47.21	228.57	0.5446
1977-78	180.78	22.01	281.66	0.5637
1978-79	193.18	48.15	312.47	0.4641
1979-80	323.83	63.48	353.02	0.7375
1980-81	355.21	51.09	421.83	0.7210
1981-82	536.58	141.49	480.71	0.8219
1982-83	457.37	110.21	488.95	0.7100
1983-84	476.94	71.44	460.78	0.8800
1984-85	706.17	109.26	842.95	0.7081

The table reveals that Chettinad Cement Corporation has a quick asset Ratio to the extent of even 82 percent (1981-82). In otherwords, this firm gives more weightage for liquidity than for profitability.

Current Ratio:

Current Ratio indicates the proportion of current assets to current liabilities. This ratio shows the financial strength of the firm. Theminimum ratio is during 1978-79 being 61.82 percent. This means that 61.82 percent of current liabilities is covered by current assets however ratio more than unity (1) is indicative of good financial position.

The following table 4-23. shows the current ratio of Chettinad Cment Factory in the year 1970-71 to 1984-85.

TABLE 4.23

CURRENT RATIO

(Rs in lakhs)

Year	Current Assets	Current Liabilities	Ratio
1970-71	133.76	38.84	3.4439
1971-72	121.36	36.23	3.3497
1972-73	111.13	60.66	1.8230
1973-74	121.26	163.37	0.7422
1974-75	193.13	212.97	0.9068
1975-76	227.83	152.96	1.4895
1976-77	171.68	228.57	0.7511
1977-78	180.78	281.66	0.6418
1978-79	193.18	312.47	0.6182
1979-80	323.83	353.02	0.9173
1980-81	355.21	421.53	0.8421
1981-82	536.58	480.71	1.1162
1982-83	467.37	488.95	0.9354
1983-84	476.94	460.78	1.0351
1984-85	706.17	842.95	0.8377

1970-71 and 1971-72 are the years where the firms is being enjoying a good financial status. 1972-73 and 1983-84 are moderate years. In all other years the current liabilties are more compared to current assets.

Net Worth Ratio

This ratio indicates the proportion of net worth on fixed assets.

The following table 4.25 that show the current ratio of Chettinad Cement Factory in the year 1970-71 to 1984-85.

TABLE 4.24

NET WORTH RATIO

(Rs in lakhs)

Years	Networth	Net Assets	Ratio
1970-71	94.92	491.34	0.1932
1971-72	84.13	468.63	0.1817
1972-73	50.47	441.92	0.1142
1973-74	-42.11	459.06	-0.0917
1974-75	-19.84	496.63	-0.0399
1975-76	74.87	498.53	0.1502
1976-77	-56.89	477.95	-0.1190
1977-78	-100.88	550.22	-0.1833
1978-79	-119.29	546.91	-0.2181
1979-80	-29.19	511.48	-0.0571
1980-81	-66.62	510.15	-0.1306
1981-82	55.87	557.62	0.1002
1982-83	-31.58	855.35	-0.0370
1983-84	16.16	1201.20	0.0135
1984-85	-136.78	1200.90	-0.1139

From the table it is observable that except for 1970-71, 71-72, 72-73, 75-76 and 83-84 the net worth ratio remains to be poorly maintained.

Leverage or Debt Ratio:

This ratio shows the proportion of value of debts to total assets in Chettinad Cement Corporation. This ratio shows a positive decline indicating a decline in the proportion of debt total assets.

The following table 4-25 shows the leverage or debt ratio of Chettinad Cement Corporation in the year 1970-71 to 1984-85.

TABLE 4.25

LEVERAGE OF DEBT RATIO (Rs in lakhs)

Years	Value of debts	Total assets	Debt Ratio
1970-71	391.80	582.68	0.672
1971-72	377.59	589.71	0.640
1972-73	405.65	592.25	0.685
1973-74	431.40	642.06	0.672
1974-75	449.10	718.34	0.625
1975-76	446.25	761.51	0.586
1976-77	375.86	782.94	0.479
1977-78	443.21	904.01	0.490
1978-79	400.64	953.39	0.420
1979-80	402.03	982.22	0.409
1980-81	287.87	1061.37	0.271
1981-82	209.00	1209.24	0.173
1982-83	291.57	1594.56	0.183
1983-84	306.78	2083.48	0.147
1984-85	153.78	2233.74	0.069

From the table it is observable that the debt ratio has declined from 67.2 to 6.9 percent which is a remarkable growth. During 1970-71, 67.2 percent of the total assets to buy borrowing and in 1984-85 only 6.9 percent of the total assets is covered through debt means quite a reasonable proportion of assets the industry has been build up. This is one proof of good financial position of the firm. This ratio also proves that the motive of the firm is asset building while deciding any of its investment.

Conclusion:

Financial ratios and relationships play a crucial role in business decision-making in the realm of procurement and effective utilisation of financial resources.

Summary and Conclusion

V SUMMARY AND CONCLUSION

The benaviour of investment has been an important subject area for applied econom&trics over the past two decades and several models and hypotheses have been tested both for the developed and developing countries. Still the concerns regarding the determinants of investment behaviour is in a fluid state having the problem of localising the relevant variables to empirical results. Modern behaviour of the firms clearly approves with acceleration principle by localising relevant variables and its influences and disproves with classical and neoclassical theories.

The present study "an analysis of the determinants of investment, profitability, and capacity utilisation of Chettnad Cement Factory form 1970-71 to 1984-85" is undertaken with the objectives:

1. To analyse the capital structure and growth rate of capital.
2. To find the determinents of investment by using acceleration model.
3. To find Return on capital.
4. To analyse the profitability and capacity utilisation.

5. and to review the financial strength by using various financial ratios.

The major findings of the study are:

1. Major (nearly 50%) proportion of Gross Fixed Capital is directed towards plant and machinery which is a healthy sign of long term8business' investment in Chettinad Cement Corporation.

2. Depreciation "Expired capital outlay" remains looked up in the business as one important determinant of investment as contributors of funds for building assets.

3. Another healthy sign which could be observed from Chettinad Cement Corporation's Capital Sturcture is that the proportion of Gross Working Capital to Gross productive Capital is constantly increasing from 7.60 percent to 27.99 percent between 70-71 to 1984-85 indicating increased 'business' requirement for short term funds.

4. There is a significant overall growth of 50 percent in the case of working capital and 25 percent compound growth of Gross prodictive capital in Chettinad Cement Corporation for the past 15 years.

5. The firm has made a remarkable turn from a loss of 4.74 lakhs to a profit of 289.39 lakhs.

6. The simple regression results of the influence of (S/W) ratio of Gross Fixed Capital and Gross Productive Capital is significant at 95 percent level of significance.

7. Multiple regresson models reveal that the Gross Fixed Capital is influenced by profit, (S/W) ratio, depreciation and networth significantlv.

8. Acceleration hypothesis model is fitted and found the asset building factors, Depreciation and networth influences investment decision of the firm more significatly compared to other factors like sales, changes in sales and profits However, profit influences, at 90 percent significant level.

9. 'Deprectiation' seems to be a more influencial factor that is for one percent change in depreciation t there is 10 percent change in Gross Fixed Capital, It is the asset building factors and not either sales or profit which is resonsible for Investment decisions classical and neoclassical theories of the firm's investment behaviour based on profit and liquidity

is being disproved and the investigator approves with acceleration hypothesis in the case of Chettinad Cement Corporation.

10. Major determinants of profit are value added and capacity utilization. Capacity utilisation is influenced by amount spent on power and fuel which is an exogeneous factor.

11. Return on capital on an average ranges from 11.4 percent to 93.2 percent depending on capacity utilisation and depreciation.

12. Investment criteria of chettinad cement Corporation is capacity utilisation which depends on power and fuel supply, which is an exogeneous factor; capacity utilisation determines profit and profit along with depreciation determines investment of the firm.

13. The firms financial position is not that sound that its net worth ratio and debt equility ratios are not up to normal standard of appreciation.

14. Rate of return on net assets is steadily increasing which is a clear indicate of the possibility of a positive long term profitability.

15. The Analysis of the qiuck Assets ratio reveals that Chettinad Cement Corporation gives more weigntage for liquidity than for profitability.

16. Being the initial decade for Chettinad Cement Corporation its current liabilities are more compared to its current assets, so its net worth ratio removes to be poorly maintained.

17. It is phenomenal to observe that the debt ratio has declined from 67.2 to 6.9 percent which is clearly indicating that the motive of the firm is 'Asset building' and not either sales for profit.

In conclusion asset creation is the major motive of modern industries and their investment decisions are not guided or motivated sales, or profit Thus in most of the modern corporate units the acceleration principle of investment decision, remains to be identified and valid.

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