

CHAPTER V

METHODOLOGY

The first section of this chapter lays out the criteria describing the universe of firms to which this study restricts itself. The second section deals with the procedure followed for selecting a sample from the universe and justifying the mode and size of the same. The third section presents a defense for the selection of the time frame for the analysis conducted. The fourth section offers a disclosure of the sources from which data was procured. The fifth section describes how variables have been operationally defined and a justification for the same is offered. The sixth section spells out the model and explicates the functional form of the same, and finally the statistical technique deployed for testing the model is presented.

1.0 Universe Definition

The universe for this study has been taken to be large pharmaceutical firms, alternatively also representing the organised sector of the Industry, mainly manufacturing allopathic formulations and whose scrips have been traded on the Bombay Stock Exchange for the year 1994-95. The criteria for the universe, identified at approximately 80 firms, has been listed in detail below and the sampling procedure, resulting in a sample size of 26 firms representing a combined market share of 52.1 %, is subsequently taken up

in the succeeding section 2.0. The objective of this study is to establish that it is the proactivity of firms, resulting in competitive domains getting destabilised, which is responsible for differential performance among firms. Given this aim, it is apparent that only large firms would be in a position to influence their industrial structures, costs, and demand conditions. Alternatively, the passive approach would be more appropriate to the study of small firms. It certainly seems plausible to assert that, relatively speaking, the larger firms owe their current status to a proactive policy strategy vis-a-vis extant medium or small scale firms. Although this does not rule out small firms possessing above par financial performance. However, this may be the exception rather than the rule (Hay & Morris, 1991, p 22)

The goal of the empirical component of the research is to test the proposed model on a sample of large pharmaceutical manufacturing firms. The universe from which the sample was selected was defined as per the following criteria

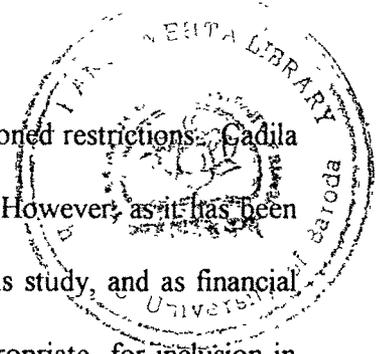
- (1) The study addresses itself only to those manufacturing firms whose turnover is predominantly represented by allopathic finished formulations. A minimum of 60% of a firm's turnover would be required to be represented by allopathic finished formulations, in order for the firm to qualify for being included in the universe. The universe excludes firms predominantly manufacturing semi-finished formulations, bulk drugs, intravenous fluids, Ayurveda based medicines, Unani based medicines, veterinary medicines or running health management polyclinic hospitals. Thus, the results of this study apply only to that sector of the Indian

pharmaceutical industry which consists of large firms predominantly manufacturing allopathic finished formulations only Also refer section 1 0, chapter II

- (2) The universe consists of only those firms, as per No 1 of this section, which were registered with the Bombay Stock Exchange (BSE) as on March 31, 1995
- (3) The universe consists of only those firms, as per No 1 of this section, whose equity share capital, taking into account fully paidup equity shares only, was in excess of rupees three crores as on March 31, 1995 This criteria determines whether the firm is large or not, and was arbitrarily fixed
- (4) The universe consists of only those firms, as per No 1 of this section, whose scrip was traded at least once on the Bombay Stock Exchange between April 1, 1994 and March 31, 1995.
- (5) The universe consists of only those firms, as per No 1 of this section, which had published their financial results for the year 1994-95 by December 31, 1995
- (6) Although, the universe consists only of those firms, as per Nos 1,2,3,4 and 5 it was thought desirable that they also be listed in ORG's Retail Audit report for the month of March, 1995, as well

Criteria 1 to 5 were made mandatory and binding However, the final criterion was essential for having access to market related data It should be noted that firms which fulfilled criteria 1 to 5 but not No. 6 do make-up the universe for which the results of this study stand valid, but those firms listed in ORG's Retail Audit that did not fulfil criteria 1 to 5 are not a part of this study's universe

Only one firm was made an exception to the above mentioned restrictions, Cadila - as until March 31, 1995, it was not a publicly held company. However, as it has been among the top 5 pharmaceutical companies for the period of this study, and as financial and market related data were made available it was thought appropriate for inclusion in the study. Further, and more importantly, given the strategic research objectives of this study the firm was too important to be excluded from the universe.



2.0 Sample Selection

As this study is majorly concerned with examining the role of proactive strategies deployed by large pharmaceutical firms as described in section 1.0, it is the contention of this researcher that the sample should ideally consist of those firms who are market leaders, and perhaps price makers. The analysis of such firms arguably appropriate, would reveal the winning formula that operates in the concerned industry. Given this line of reasoning, a purposive sampling technique was adopted. This led to the selection of the 'top 26' companies existing in the industry on March 31, 1995.

March 31, 1995, was taken as the sample selection juncture, as it is the culmination point of the efficacy of strategies that were presumably initiated at the start of the study's period i.e., April 1988. The criteria considered for the selection of the time frame, dealt with in detail in section 3.0, elaborate on this issue.

The top twenty-six firms ranked by the size of their market shares, were selected from ORG's retail audit report of March, 1995. As market share represents the

proportion of a firm's sales relative to that of the entire industry's output, the criterion of ranking is essentially sales. Although the firm may alternatively be also ranked by profits, assets, or market capitalisation, sales and thereby market share is a well accepted standard in strategy and marketing literature for ranking firms.

Further, the top twenty six firms in order of their contribution to the industry's total output, per se, qualifies them as inherently 'large' firms. The feature supplements the third criteria mentioned in section 1.0 stipulating the parameters of the universe from which sampling was to be done. For the period under study, it has been observed that while firms slipped or climbed in rankings, depending on market share gained or lost, they had managed to retain their position in the bracket of the top twenty-six firms for the period of the study i.e., from 1988-89 upto 1994-95. Thus it may be claimed that this purposive sample is also representative of the band of market leaders for the Indian pharmaceutical industry.

The alphabetical listing of the top twenty-six firms for the year 1994-95, as per the ORG retail audit of market share rankings are Alembic Chemicals, Ambalal Sarabhai Enterprises (ASE), Boots, Burroughs Wellcome, Cipla, Cadila, E Merck, Fulford, German Remedies, Glaxo, Hindustan Ciba-Geigy, Hoechst, Ipca Labs, Lupin Labs, Nicholas Piramal, Parke-Davis, Pfizer, Piramal Healthcare, Ranbaxy, Rhone Poulenc, Smithkline Beecham Pharma (SKB), Sun Pharmaceuticals, Torrent Pharmaceuticals, Unichem Labs, Workhardt, and Wyeth Labs.

All the above mentioned firms comply with the universe restrictions laid down in section 1.0, which has also dealt with the exception of Cadila. As per the criteria of the

said section, the number of firms making up the universe was identified to be eighty approximately to ^{the} best knowledge of this researcher. This information is reliably based on the data made available in the official Bombay Stock Exchange directory, 1995, and the issues of Express Pharma Pulse for the months of March and April, 1995. Thus, the percentage representation of this study's sample size for the universe in question is 32.5%. By standard statistical sampling theory this study's sample size stands validated.

The combined market share of the sample selected as per the ORG retail audit report for the year 1994-95 (the final year for the period of analysis in question) was 52.1%. It would be reasonable to claim that the sample of firms selected contributed to more than half of the allopathic finished formulations market in the year 1994-95, and therefore by this criteria is also representative of the universe concerned.

The ORG rankings as per its market share estimates were also cross checked with CMIE's data for India's Industrial Sector Report (vol. January, 1996) covering the entire Drugs & Pharmaceutical industry. The number of companies surveyed by the said agency was seventy-five. The following companies of this study's sample in order of their market share rankings, featured in the CMIE 1994-95 list of 'top - 18' drugs and pharmaceutical companies : Ranbaxy, Glaxo, Lupin Labs, Cipla, Hoechst, Pfizer, ASE, Torrent Pharma, Alembic, Boots, Ipca Labs, SKB Pharma, Burroughs Wellcome, and Parke-Davis. The combined market share of these companies, for the entire drugs and pharmaceutical sector, for the year 1994-95 was 34.9%.

Moreover, the ORG rankings as per its market share estimates were also tallied with the top ten ranked pharma companies in India as per market share appearing in a

special analytical report of the industry in the Express Investment Week (June 10-16, 1996). The following was the list as per the said report in order of their rankings Glaxo, Ranbaxy, Cipla, Hoechst, Pfizer, Boots, Alembic, Lupin Labs, Torrent Pharma and ASE

Lastly, the Business Today's (Aug 22-Sep 6, 1995) list of India's most valuable companies for 1995 was also referred to Business Today commissioned CMIE to identify the 500 most valuable companies in the country in terms of their market capitalisation on March 31, 1995. In the process, CMIE also generated for the first time - a list of the country's 500 biggest companies ranked by their 1994-95 net sales. For this purpose, CMIE covered a universe of 3,890 companies that were listed on at least one of the country's major stock exchanges - excluding the NSE. The market capitalisation of each company was calculated by multiplying the number of its outstanding shares by the last traded price of the share in 1994-95. In the case of the top 500 companies by sales, CMIE had restricted its analysis to companies that had published their financial results for 1994-95 by August 3, 1995

With the exception of Cadila and Fulford, all the firms of this study's sample found a place in the BT-500. Cadila not being a publicly held company could not be included in the 500. But given the data with this researcher it is very well above the 500th firm of BT-500 in terms of both, capital base and sales

While arguably the above presented evidences are overwhelming, this sampling design takes care of the following three types of errors which sum up to the total error

- (1) Nonsampling bias - was eliminated by rigorously and accurately defining the population and the subsequent identification of its members

- (2) Sampling bias - considering the nature of the objective of this study, examination of a specific strata of firms i.e., only large firms, helped reduce selection bias, while, the large sample size employed helped reduce estimation bias. Central limit theorem should operate.
- (3) Sampling variability - As statistics will vary from one sample to the next, this error is normally difficult to eliminate

2.1 Details of Samples

As this study had opted for a Cross sectional analysis and finally a combined pooled data analysis for capturing the behaviour of variables over time, and considering that the time frame spanned seven years, i.e., 1988-89 to 1994-95 firm-wise data resulted for each year. The data for each year may be considered to be a single sample, per se. The details for data made available for the respective years is provided below.

For the year 1988-89, financial data for Fulford, Ipca labs, Piramal Healthcare, Wockhardt, and Wyeth Labs was not made available and Sun Pharma and Torrent Pharma had not gone public. Thus, the sample for 1988-89 consisted of the remaining nineteen firms. For the year 1989-90 onwards financial data on Piramal Healthcare and Wockhardt was procured while the status for the others remained the same. The sample size for 1989-90 and onwards therefore, went upto twenty-one. For the year 1990-91 onwards financial data on Fulford, Ipca Labs, and Wyeth Labs was also procured. The sample size for 1990-91 and onwards, therefore, went upto twenty-four. In 1992, Torrent Pharma, and in 1994, Sun Pharma went public and therefore financial data for the two firms was made available from the respective years onward. The sample size thus for 1992 and

onwards, and for 1994 was twenty-five and twenty-six respectively. In the year 1994-95, Cadila was split, and financial data for the firm was not available, however market related data was nevertheless procured.

The financial and other information pertaining to the firms is collected for the time period 1988-89 to 1994-95. For the purpose of analysis initially, the cross section of firms is studied on a year to year basis. Finally the data for various years is pooled to capture the dynamics of firm behaviour overtime.

3.0 Time Frame Selection

The time frame for this study is ranging from 1988-89 upto 1994-95. At best, long-term strategic plans versus short-term operational plans are situation-specific (Glueck & Jauch 1984, p.20-21). Short-range and long-range merely express relative periods of time. While in the oil industry or electric utilities plans may extend 20 to 30 years into the future, for a manufacturer of toys or personal computers plans may be for no more than 6 months or a year. Contingent upon the industry to which a firm belongs, Glueck & Jauch suggest the following prescriptive criteria for setting a time frame for strategic planning to be based on: How far into the future do the firm's fixed commitments extend? How much uncertainty is associated with the future? What is the lead time required to ready a product or service for sale?

Given these considerations, it is not uncommon to find that planning is often done on a 'rolling' basis. Under this system, they (Gluck & Jauch 1984) claim that an

organisation may develop a 5-year plan of future operations and update it on an annual basis. As the current year of a 5-year plan closes, the plan is extended, or rolled forward, to include a new fifth year. Moreover, in most financial analysis conducted in the domain of financial management or market analysis conducted in extant marketing literature the time frame normally taken is 5 years. Hax & Majluf (1991, p 32) have also recommended a minimum time horizon of three to five years for framing the overall statement of business direction, alternatively called the business mission, elementary in formulating strategy. McNamee (1985, p 218) too has recommended that the time span for strategic scenario planning may vary from the fairly near future - three years up to and beyond twenty years. However, given the high level of unpredictability of today's turbulent environment any planning time span beyond five years could prove unrealistic. Lastly, availability of historical data also restricts a study's time frame to five years normally.

As the Indian Patents Act, 1970, recognises only process patents, not product patents (refer Chp II, sec 9 0, for a detailed account of the same), the normal time frame of researching, developing, and clinically testing a new drug spanning 10-12 years thus does not apply to this study. However, conducting manufacturing-process R&D, setting up infrastructure, achieving quality standards, production yields, providing for capital investments, and clearing legal restrictions in the pharmaceutical industry can take anywhere between two to six years (Pisano & Wheelwright, 1995). Mastering a manufacturing process; one that is cost effective, capable of high yields, and rapid throughput, would imply acquiring a cumulative work experience of 12 years. Given the nature of this study's objective, the selected time frame of 7 years appears appropriate.

Further, India signed the Uruguay Final Act in April 1994 signalling its consent of the GATT accord. While India stands to amend its patent laws by 1 January, 1995, it is entitled to adopt a transitional moratorium period of 10 years before having to adopt a product cover for drugs. This gives Indian patent infringing manufacturers a shelter till 2004 (refer Chp II, sec 9.0, for details). Thus the cut off period of this study March, 1995, too stands justified as any strategies for negotiating a post-GATT environment, presumably would be initiated only after 1995.

The Drug (Price Control) Order (DPCO), which plays a major role in influencing the strategic options facing a pharmaceutical firm in India (refer Chp II, sec 10.0), of 1979 was replaced by a new DPCO in 1987. This DPCO of 1987 remained unchanged till January, 1995. The strategic posture adopted by a firm keeping in focus the DPCO of 1987, would remain unaltered till March, 1995. Thus the period of this study incorporates the crucial DPCO dimension as well.

Lastly, the period of five years from 1990-91 to 1994-95, also represents the years of India's commitment to liberalising its economy. A period where government completed its full term in office, with no political uncertainty and a committed public policy making team providing firms with the ideal environment for pursuing long-term strategic investments.

Considering all the issues presented in this section, the selected time period safely encapsulates the start-up of a firm's strategy, its implementation, and the subsequent manifestation of the concerned strategy's results in its 7 year frame, devoid of any major environmental discontinuities.

The accounting period for required computations, was standardised as the 12 months that began on April 1st and ended on March 31st. Where a company's accounting period spanned 12 months, for example a calendar year, the mentioned dates were not made binding. However, if a given company's accounting period was more than or less than 12 months, figures were annualised for the same.

4.0 Sources Of Data

This section furnishes a report on the sources from which data for each variable was acquired. The sources of data on the variables are presented in the order in which they appear in the relationships built in section 5.1 thru 5.6.

(1) *Return on Investment (ROI)* The information required for this profitability ratio is primarily of a financial nature and thus, was procured from sources which contained data on the profit and loss account and the balance sheet of joint stock companies that made up the sample. Letters of request for annual reports, followed by reminders, were written to the company secretaries of the concerned companies. Many of the companies responded. However, annual reports for all the seven years (1989-95) were not made available and this necessitated the tapping of other sources publishing the required financial information of the relevant companies. Majorly, the Bombay Stock Exchange (BSE) Official Directory (1995), the Centre for Monitoring Indian Economy (CMIE) and the Capital Market's 'Capitaline Ole' financial data base 1995 were primarily used to secure data for the profitability ratio in question.

(2) *Choice of Market segments* Data pertaining to the Indian Pharmaceutical Market, like in other well-developed nations, is well organized and is scientifically collected. The apex body monitoring the development and growth of the therapeutic segments (of central importance in this study) and the overall pharmaceutical market in general is the Operations Research Group (ORG), Baroda. For over three decades ORG's market research services have been a source of reliable information to facilitate scientific and effective decision making. Almost all major pharmaceutical firms in India have today come to rely on the formulations data base of ORG for making their strategic decisions. The ORG Retail Store Audit is enjoying, on an average, a validity of around 80 % accuracy level. Not only is the report accepted internationally but ministry level policy decisions are also based upon the ORG audit. The statistical analysis for this variable was based upon the market segment growth rates made available by the ORG data base, whose 'Anatomical' classifications (alternatively called therapeutic segments in this study) are done on the guidelines of W.H.O. in the same manner as it is done internationally. Totally there are 13 major anatomical therapeutic groupings, 82 sub-classifications, and approximately 360 resulting product categories which may be treated as individual served markets (ORG Index of Pharma Products, April, 1995). The claims of the statements are substantiated vide ORG's letter dated 9th September, 1995, ^{which} is attached as appendix I.

(3) *Retention Ratio* Data for this ratio was again taken from the financial statements viz. the profit and loss account and the balance sheets, appearing in the annual reports of companies, the CMIE, the BSE Directory, and the Capitaline Ole financial data base. Also refer no 1 of this section.

(4) *Vertical Integration* As in No 1 and 3 data for this ratio, too, was collected from, annual reports, CMIE, BSE Directory, and the Capitaline Ole financial data base

(5) *Marketing Intensity* Data for this variable, like for No 1,3 and 4, was taken from annual reports, CMIE, BSE Directory, and the Capitaline Ole financial database

It may be noted that for the financial values random cross checks were done to ascertain the authenticity of the information given in the financial data bases Values from them were compared with those given in the annual reports received from the companies

(6) *Market Share* Data for this variable was sourced from the ORG Retail Audit Data Base Also refer No 2 of this section It may be noted that these values for their authenticity, were cross checked with the CMIE Industry survey (January 1996) reports and other available industrial handbooks While absolute figures marginally differed, the relative rankings of the respective companies in the sample remained unaffected Also refer appendix I

Lastly, the references which form the basis for Chp II, were also used to validate data procured on the financial and market related parameters and were found to be satisfactory

5.0 Operational Definition Of Variables

This section deals with presenting a description of how collected data was organised to represent qualitative dimensions of the variables specified in the model This section further also specifies the procedure employed to construct the required ratios,

illustrations of how calculations were executed, and defences for formats adopted. This section also explicates the requisite sub-functions, equational forms, and expected signs, of the relevant variables to examine their individual explanatory power. Also the inter-relationships between some of them as a means for capturing the play of these variables in the proactivity of firms, is offered. The complete model finally, is taken up in the succeeding section 6.0.

5.1 Return On Investment

In the field of strategy, financial performance of a firm is a well accepted robust parameter, representative of firm performance. While growth, cash flow, value creation and enhancement, stock price and profitability ratios have been employed, over the years profitability ratios have dominated the dependent variable component in almost all studies. Irrespective of the schools of thought, profitability ratios have figured unquestionably in all researches pertaining to firm behaviour. The basis for the study's proposed model - the Hunt & Morgan Resource - Advantage model and Hay & Morris' holistic model of firm behaviour, have also specified financial performance as the signaller providing feedback for an assessment of progress made. Thus, keeping in mind the objective of this study viz. the role of firm proactivity in explaining variance in firm performance, financial performance, specifically profitability, has been taken as a measure of firm performance.

The problem lies in measuring a firm's profitability. As ROI is a ratio, profits are taken as a proportion of some parameter eg sales, assets, equity, etc. Again, the interpretation of profits and its related parameters also differs from study to study. Depending on the nature of the study, profitability has been mostly measured contingent

upon the concept being employed Hay & Morris (1991, p.217-222) have explicated the following measures of profitability Accounting Rate of Profit (ARP), Economic Rate of Return (ERR), Internal Rate of Return (IRR), Return on Equity (ROE) and Return on Sales (ROS). Studies in the field of financial management, too, have accepted profitability ratios as a standard component in the analysis of financial performance of joint stock companies (Schall & Haley, 1986, p 394). What has been presented is that while financial performance, and the inherently involved profitability ratios, are well accepted, the question remains as to 'which' profitability ratio should be employed

The most accepted profitability ratio has been the Return on Investment ratio (ROI). This study has interpreted this ratio as the proportion of operating profits to the total capital employed which represents the investments made in the business by the firm Hay & Morris (1991, p 428) have defined the return on capital employed (used interchangeably with ROI in this study) thus

$$P = \Pi / K$$

where, P = Return on Capital Employed (ROCE)

Π = Gross trading profit net of depreciation

K = Capital Employed.

Given the above interpretation, it would be reasonable to accept gross profits as the numerator and funds (Investments or capital) employed as the denominator. Profitability studies on the Indian Pharma Industry (N. Ramachandran 1980 and Nagarajan & Barthwal 1990) have also used Return on (Net) Assets as a measure of profitability. Going by the definitions followed by PIMS*, ROCE & ROA are interchangeably used where, 'Return

* The U.K. Office was contacted on 18/04/96 by FAX by this researcher for the same. Owing to the poor quality of the transmission the same is not attached with this thesis

is trading profit after Depreciation but before Interest and Taxes, and Investment is net value of fixed assets plus trading working capital' Also is in line with standard accounting practice, this study defines operating margins as the profit before interest and taxes and capital employed as the sum total of owned and loaned funds deployed in the business (representative of the concept of investment or assets) i e , the net worth plus the long-term borrowings of the firm

Return on capital employed in this study is thus expressed as

$$\text{ROCE} = \frac{\text{Profit before interest and taxes (PBIT)}}{\text{Net worth + Longterm borrowings}}$$

where, Net Worth includes paid up Equity share capital, reserves and surplus, and

Longterm Borrowings includes secured and unsecured loans from Banks,

Financial Institutions and issue of Debentures

For purposes of convenience the term Return on Investment (ROI) is used instead of the term Return on Capital Employed

5.2 Choice Of High Growth Market Segments

As has been earlier mentioned in chapter IV, sec 4 0, the typical pharma firm is not a one product firm but a multiproduct multi-market segment firm As was also mentioned in the same chapter the manufacturing process may differ from product to product, however, the manufacturing plant and equipment remains the same Of course, this stands valid for a given set of pharmaceutical formulations that require more or less similar manufacturing drug intermediaries The very nature of the pharma market necessitates the practice of multi-product multi-segment diversification The total pharma

market consists of many therapeutic segments. These are divisions in the market created on the basis of 'Anatomical' classifications of the human physiology. Also refer sec 7.1 of chapter IV.

The decision of a firm to select a high growth segment, representing a facet of proactivity, is a qualitative dimension of strategy essentially. To operationalize this variable, and make it statistically compatible with other data, a construct which resulted into a percentage value was designed. This was necessary in order to make it compatible with other variables for data analysis. Following was the methodology employed.

First, the compounded annual growth rate at which the industry had grown for the concerned period i.e., 1989 to 1995 was calculated.

Second, the compounded annual growth rate at which the various therapeutic segments had grown for the concerned period was calculated. The number of such segments wherein the sample firms participated totalled 88.

Third, the segments which had grown at a rate above the industry growth rate were classified as 'high growth segments' and those which grew below it were classified as 'low growth segments'. Half a percent above and half a percent below the industry rate was demarcated as the zone where a segment would not be chosen.

Fourth, the top ten products which contributed to a firm's turnover was calculated. These products represent the therapeutic segments where the firm has chosen to participate. On an average the top ten segments represented 86% of a firm's turnover.

Fifth, the contribution of those products which represented high growth therapeutic segments (ref step number three) to the firm's turnover was calculated. This

proportion of high growth market segment products to the total sales turnover of the firm is taken as the value representing the firm's strategic choice of high growth market segments. This is also consistent with measures used for capturing firm-specific diversification (Nagarajan & Barthwal 1990) which though relevant is not a central objective in this study. Refer Fig 5.1 for complete procedure.

This procedure was followed for each firm, for all the seven years. To the best knowledge of this researcher no studies have tried to quantify this decision variable and thus has formulated the mentioned procedure which is presumed to be a robust and justified method of capturing the concerned dimension, i.e. the impact of industry structure on firm conduct.

These resulting percentages of high growth market segment products in a firm's turnover was then regressed on the firm's Return on Investment. The functional form is expressed thus:

$$ROI = f(CMS) \text{ ----- (1)}$$

The specific equational form of the above mentioned function in this section, is expressed alongwith the disturbance term (u) thus:

$$ROI = \alpha + \beta_1 CMS + u \text{ ---- (1)}$$

where, the expected sign of beta was hypothesised to be greater than zero and the justification for the same was presented in chapter IV, sec 7.1, on model and hypothesis

Fig 5.1 : Hypothetical illustration of the operational construct for the variable 'Choice of High Growth Market Segments'

Top ten product/therapeutic segments, alongwith their respective compounded annual growth rates (CAGR) for a specific firm	% representation in the firm's turnover
1 Anti-peptic ulcerants (23 %)	10 %
2 Cephalosporins (18 %)	10 %
3. Quinolones (25 %)	10 %
4. Anti-Histamines (17 %)	10 %
5 Insulins (17 %)	10 %
6 Antifungal, Dermatologic (21 %)	10 %
7 Hypotensives (16 %)	05 %
8 Corticosteroids combination (18 75 %)	05 %
9 Top anti-Rheumatics (19 %)	05 %
10 Anti-Epileptics (15 %)	05 %

	80 %

* Given that the CAGR for the industry is 19 %, then;

-> segments 7,2,10,4 and 5 are low growth segments

-> segments 8 and 9 fall in the band of rejection (18 6-19 4)

-> segments 1,3 and 6 are high growth segments and their respective total contribution to the firm's turnover is 30 % (10 + 10 + 10)

5.3 Retention Ratio

As mentioned and explicated in chp IV, sec 7.2, 'Investments' are representative of a decisive dimension of the firm's proactive stance. In this study, to reiterate, profits are not taken as an output, but as an opportunity for thwarting the bottleneck of market forces characteristic of a perfectly competitive market. It was thought reasonable to employ retained earnings as a representative factor to incorporate the dimension of the power of discretion that these profits offered for assuming a strategic posture.

The retained earnings in standard accounting practice may be defined as the amount of undistributed profits that are left after payments are made to the owners of the firm. In this case, it is the profit that remains after the dividends are paid to shareholders from the net profits. This also then is reflective of the dividend policy of the firm and alternatively is also called the 'Retention Ratio'. It would be reasonable to argue that a firm adopting a conservative dividend payout ratio, resulting in an improved reserves position, is basically one that has plans of securing its future through strategic investments. The retention ratio is the proportion of net profits, less the amount of dividends paid out, to the total amount of net profits. Hay & Morris (1991, p.428) have defined the retention ratio (r) thus,

$$r = \frac{\Pi - iD - d}{\Pi - iD}$$

where,

$\Pi - iD$ = Net profit, and d = Dividend.

Schall & Haley's (1986, pg 299) definition of retained earnings, i.e., the earnings in a given period that have been retained rather than paid out as dividends, is also consistent with the mentioned formula. Further, the balance sheets and annual reports of eight multinational companies were also examined for their interpretation of the same. It should be noted that accounting treatment of resulting reserves accumulated is not the objective of this study.

By its very nature, reserves and the following investments made operate with a time lag. The ultimate payoff of a conservative dividend policy may not materialise in the current financial year but would have an impact in the following financial years. To accommodate this feature the retention ratios were taken with a lag of one year. The ratio to be compatible for statistical analysis with other data had been represented in percentage terms. These values were then regressed on Return on Investment. The functional form is expressed thus

$$ROI_t = f(RR_{t-1})$$

The specific equational form of the above mentioned function, in this section, is expressed along with the disturbance term (u) thus

$$ROI_t = \alpha + \beta_1 RR_{t-1} + u$$

where, the expected sign of Beta was hypothesised to be greater than zero and the justification for the same was presented in chapter IV, section 7.2, on model and hypothesis.

This variable operationalises the qualitative aspect of the firm's attitude for asserting itself by foregoing current profits to make longterm investments that would liberate it from legitimate competitive forces. There are numerous studies in industrial economics and financial management which have explored this route to examine the impact of the dividend payout ratio on the market valuation of a firm's stock, which in turn determines the scope for tapping external sources of finance. However, this is not the goal of this study. The variable justifiably represents the proactive intentions of a firm in the absence of any contemporary evidence in the field of strategy to indicate otherwise. It should be noted that the research effort is to formulate an operational construct for the concept of investment strategy reflecting a proactive attitude.

5.4 Vertical Integration

Chapter IV, sec 7.3, has already laid out in great detail the interpretations and implications of vertical integration as a significant variable in a firm's proactive behaviour. To reiterate succinctly, firms pursue the strategy of vertical integration for the avoidance of transaction costs, acquisition of market power and more importantly, in this study, for harnessing and protection of critical competencies in the value creation chain. Systematic empirical study of this variable has been hampered by lack of data and difficulties in making measurements to capture the degree to which a firm is vertically integrated.

In keeping with the nature of this study, the attempt was to arrive at a construct which was well accepted and fairly measured (approximately) the degree/extent to which a firm was vertically integrated. The degree of vertical integration, in this study, was sought

to be measured by the value-added to net sales ratio. Value-added is defined as total net sales revenue less costs of purchased inputs. Specifically the ratio is expressed thus

$$\text{Degree of vertical integration} = \frac{\text{Value-added}}{\text{Net sales}}$$

where, Value-added is Net sales less Raw Material purchases, and

Net Sales is Gross sales less Excise Duty

This construct is adopted from the definition and formula given in the PIMS (Buzzell & Gale 1987, pg 171) studies and most empirical works done by the Association till date have employed the similar construct. The suggested ratio is also a standard measure for researches in industrial economics concerning the said variable. It is used for both a firm and also for a sector. In a sector without vertical integration, each firm would buy in semi-finished inputs from other firms and add to value added in its own operations, before selling to the next stage in the production process. The ratio would probably be low. On the other hand a sector which was integrated back to primary materials would have firms with high ratios. Unfortunately, the ratios depend on how close the firm is to primary production. Adelman's example (in Hay & Morris 1991, pg 345) makes this clear. Consider an industry with three firms, one-third of total value added. Assuming that the firm in primary production requires no material inputs; its ratio will be 1.00. The manufacturing firm will have a ratio of 0.5 and the distributing firm will have a ratio 0.33.

Given the Indian context, firms have traditionally been in the practice of buying major raw materials from sister concerns formed for the purpose of circumventing taxation laws. One of the limitations of this measure is its inability to incorporate this degree to

which a firm is vertically integrating. As it is inherently based on accounting values, realistic vertical integration strategies pursued by firms may not be captured.

It was hypothesised that a high vertical integration ratio should positively impact profitability. The functional form of this relationship is expressed thus:

$$\text{ROI} = f(\text{VI})$$

where, ROI is Return on Investment, and

VI is Vertical Integration.

For the above mentioned equation, vertical integration (VI) was regressed on profitability (ROI). The specific equational form of the mentioned function, in this section, is expressed along with the disturbance error term (u) thus:

$$\text{ROI} = \alpha + \beta_1 \text{VI} + u$$

where, the expected sign of beta was a priori hypothesised to be greater than zero and the justification for which was already presented in chp IV, sec 7.3, on model and hypothesis.

5.5 Marketing Intensity

This variable represents one of the three critical competencies in the pharmaceutical industry. The other two being product Research and Development and manufacturing process competencies. As spelt out in chp IV, sec 7.4, ideally the variable in question is a construct consisting of three components viz market orientation, firm reputation, and brand equity. Chapter IV has already defined each concept, justified its existence in the model of this study, and has also amply presented contemporary works explicating the role of each. As is apparent the three variables, earlier mentioned and

presented in detail, are qualitative factors each by itself a separate issue of study. Keeping in mind the objective of this study, the attempt was to capture the efficacy of the marketing effort made by a firm.

The PIMS studies (1987) and other related econometric studies (for a detailed list see Hay & Morris, 1991, p. 263-268) have taken marketing expenditure as a percentage of sales as a representative value of the degree of marketing intensity pursued by a firm. Studies related to the Indian Pharma industry have also used a similar measure (Nagarajan & Barthwal, 1990). This measure, in this study, has also been taken as a proxy of the combination of market orientation, firm reputation, and brand equity enjoyed by the firm. The marketing intensity formula is expressed thus:

$$MI = \frac{\text{Marketing Expenditure}}{\text{Net sales}}$$

where, Marketing expenditure includes the total expenses incurred for sales force maintenance, detailing, journal advertising, direct mail, promotional and distribution expenses, and

Net sales is the value of Gross sales less excise duty.

To capture the qualitative dimension of the efficacy of the marketing effort resulting in improved profitability - the effect of marketing intensity on market share had also to be explored. Also refer chp. IV, sec. 7.5. The market share values were taken from the ORG Retail Audit database. Refer also sec. 4.0 of this chapter. The diagrammatic hypothesised relationships to be investigated are presented in Fig. 5.2. The functional forms of the same are expressed thus:

$$ROI_t = f(MS_t) \text{ ----- (1A)}$$

$$MS_t = f(MI_{t-1}) \text{ ----- (1B)}$$

$$ROI_t = f(MI_{t-1}) \text{ ----- (1C)}$$

where, ROI_t is the Return on Investment of a firm for the current financial year

MS_t is Market share of a firm for the current financial year

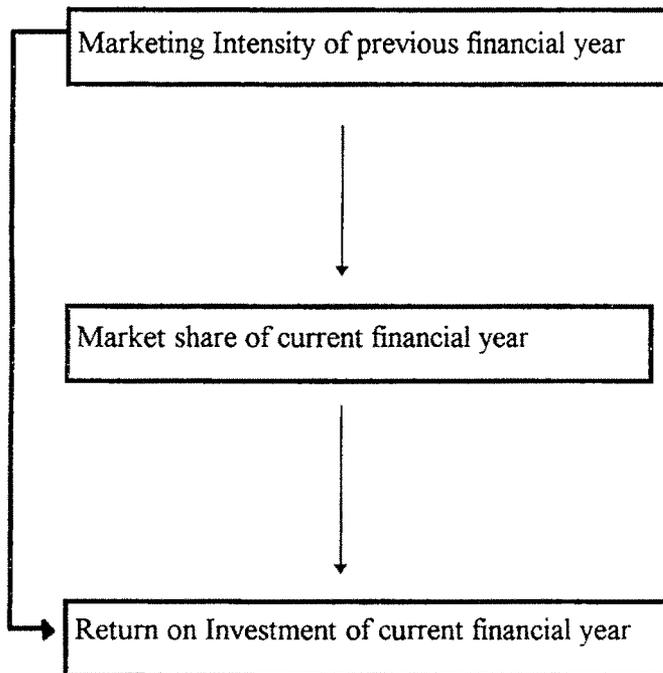
MI_{t-1} is the total marketing expenditure as a percentage of net sales for the previous financial year

It is reasonably postulated that the effect of marketing efforts would operate with a time lag of one year. Once again, with reference to the nature of this study such a measure, to capture yet another qualitative dimension of firm proactivity, was formulated at the initiative of the researcher

'Function 1A' represents profits as a function of market share. Ample proof for this relationship was provided in Chapter IV in the last proposition. Moreover, as was also explicated in chapter III the cornerstone of the Resource based perspective is to analyse those variables which lead to improved market share rather than examine the market share-profitability nexus in isolation. From this point of view market share may be taken as an 'output' variable that is a route to profitability

Figure 5.2

Marketing Intensity, Market Share, and Profitability Linkages



'Function 1B' captures the influence that the intensity of the marketing effort would have upon market share. While a multitude of factors would impact market share, the direct influence of marketing intensity's efficacy is undeniably true and is also a well accepted fact in standard strategic management literature.

'Function 1C' is the pivotal equation, which would demonstrate how marketing efforts would differentiate the firm's offering as being relatively superior leading to greater and better value addition. In the event of the earlier two functions (1A and 1B) turning insignificant, the establishment of the marketing intensity - profitability linkage would clearly demonstrate that it is firm proactivity that leads to differential performance.

For Function 1A, market share of the current financial year was regressed on return on investment for the same financial year. For Function 1B, marketing intensity values of the previous financial year were regressed on the current year's market share. Finally, for function 1C, the marketing intensity values of the previous financial year were regressed on the current year's return on investment.

The specific equational form of the above mentioned functions, in this section, is expressed along with the disturbance term (u) thus

$$ROI_t = \alpha + \beta_1 MS_t + u \text{ ----- (1A)}$$

$$MS_t = \alpha + \beta_2 MI_{t-1} + u \text{ ----- (1B)}$$

$$ROI_t = \alpha + \beta_3 MI_{t-1} + u \text{ ----- (1C)}$$

where, The expected signs of beta were hypothesised. Thus

$$\beta_1, \beta_2, \text{ and } \beta_3 > 0$$

The justification for the aprior expected signs has already been presented in chp IV, sec 7 4, on model and hypothesis

6.0 Functional And Equational Form Of The Model

The objective of the study is to explain differential performance amongst firms as a function of the proactivity of the firm which is attributable to the phenomenon of competitive dynamics. Specifically it is proposed that variance in profitability is determined by choice of high growth market segments, practice of ploughing back profits, policy of vertical integration, and the degree of marketing intensity existing. The four explanatory variables represent the proactivity of firms as explained in Chapter IV. Alternatively, the basic functional form of the mentioned proposition is expressed as

$$ROI = f(CMS, RR_{t-1}, VI, MI_{t-1})$$

where,

ROI = Return on Investment

CMS = Choice of market segments

RR_{t-1} = Retention Ratio, with one year time lag

VI = Vertical Integration

MI_{t-1} = Marketing Intensity, with one year time lag

The specific equational form of the above mentioned function is expressed alongwith the disturbance term (u) thus

$$ROI = \alpha + \beta_1 CMS + \beta_2 RR_{t-1} + \beta_3 VI + \beta_4 MI_{t-1} + u$$

where, the expected signs of beta were hypothesised thus

$$\beta_1, \beta_2, \beta_3 \text{ and } \beta_4 > 0$$

The justification for the a priori expected signs has already been presented in chapter IV on Model and Hypothesis. Further, various specifications of the above equation were also tested. These specifications are based on the operationalization of the variables and their concerned sub-functions, the description of which was earlier presented in sec 5.0

7.0 Statistical Analysis

To interpret fully the nuances of this study's proposed model, where all variables are represented in the form of ratios, relative comparisons between time periods, i.e., year-to-year comparisons, where each year was taken as an autonomous sample (refer sec.2.0 of this chapter), was essential. To incorporate the said exercise the following methodology was employed

Ideally speaking, the time-series analysis method would be appropriate where the purpose is centred on the evolution of a pattern through a period of many years, the criteria for analysis being not only the behaviour of selected variables in the model for the competitors in question, but also the behaviour shown by all variables through time for the entire group of firms concerned. Since, the period of this study was for 7 years only, mainly because of restrictions imposed by data availability, and the number of variables in the model being four leading to a loss of 5 degrees of freedom, opting for a time-series firm-wise regression analysis was ruled out. The other option of running cross-sectional

regression analysis for each year, resulting in 7 sets of results, thus was the only alternative left

The cross-sectional analysis takes into consideration all firms in an industry at a given point in time. While this method of analysis is not without its limitations, this researcher felt that inter-year comparisons through the time period would sufficiently capture the pattern of evolution of the variables, individually. On the other hand, the models' validity, too, could be tested over 7 sets of samples. Finally, data for all the firms and for all the years was pooled to form longitudinal data to run a regression which would capture the time element.

It would be reasonable to claim that this methodology would prove adequate albeit not comprehensive to represent the dynamics of proactive firm behaviour. Appendix II presents the data for the mentioned constructs of firm proactivity for the financial year 1993-94 of the sample firms.