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ACTIVITY-BASED COST ACCOUNTING : ITS APPLICATION IN UNIVERSITY FINANCIAL MANAGEMENT

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ABSTRACT

This paper seeks to investigate the applicability of activity – based costing as a means of reducing and managing costs in the context of financial management of educational systems, particularly universities. In the course of the study, the paper goes to achieve the fourfold objective of developing activity-based internal costing data for university financial management, of establishing benchmarking costs against optimum costs, of exploring the possibility of introducing accounting reforms, and of estimating the resource gap for estimating its impact on university financial management. For the purpose of the study, the entity selected is Gauhati University and its financials spread over a five-year period.

KEY WORDS

Activity-based costing ; Gauhati University ; Cost centre ; University budget ; Resource gap ; UGC ; Cost drivers.

Introduction

There has been a significant upsurge in the educational financial system during the reform period. Government financial support and grants to the higher educational institutions has been declining since 1991 owing to the resource constraints of the Government. Several universities and technical institutes have diversified their course curriculum and academic packages and award degrees keeping above break-even margin. The surplus, thus, generated enables them to sustain their continuity. The

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university financial system under this backdrop has been a matter of concern for the academic administrators and the policy planners. The universities in the UGC system find it difficult to match their ever expanding demand for resources and the limited income available at their disposal.

Subject Matter of Study

Considering the above issue we have undertaken a research investigation over the application of activity-based costing as a means of cost reduction and cost management relating to university system of education.

Objectives of the Study

The following are the objectives of the proposed study :

1. To develop activity-based internal costing data for university financial management.
2. To establish benchmarking costs against optimum costs. This is necessary in order to encourage accountable fiscal planning and budgetary policy.
3. To explore the possibility of introducing accounting reforms in university financial management.
4. To estimate the resource gap and its impact on financial management.

Methodology

The methodology adopted for the study is discussed below :

We have selected Gauhati University as an entity for the study and its financial estimates spread over a period of five years. For this purpose we have applied :

(a) Activities-based centre (ABC) data and benchmarking costs against finances available. This would encourage accountable university-wide fiscal planning and budgetary policy including accounting reforms, such as —

(b) Cost-based fee restructuring

(c) Internal and external sources of revenue

(d) Linking grants to performance

(e) Requirement of resources by the university and availability of resources over a period of 5 years.

For the purpose of this study we have also consulted 'Punnaya Committee Report of UGC', Pyalee Committee Report of the UGC,

Fee Fixation Policy of the Government of India, UGC and AICTE Regulation.

Estimation of Budget and its Revision

Budgetary estimate is simply an authorization to receive money and spend it out of the university exchequer. It is a ceiling within which we can spend. Budgetary estimate does not ensure availability of liquid cash to meet the budgeted expenditure. Justification regarding the estimation of certain receipts and expenses made in the budget is generally given in the supplementary note attached to the budget.

Nothing contained in financial estimates should be construed to convey any sanction or cited as an authority for incurring any expenditure or undertaking any liability. Competent sanction is required to be obtained invariably in advance. On production of a sanction letter followed by a request in writing to release cash, the university authority then releases cash for meeting an expenditure.

Having completed the transaction and specified expenditure, the official concerned spending the money shall furnish and produce necessary vouchers, cash memos etc. against a specific head of expenditure as a proof of making the expense. The spending authority shall prepare a receipts and payments account showing the surplus or deficit between the two and report the same to the sanctioning authority along with the vouchers and other documents. This will be subject to scrutiny and verification by the audit cell of the university. In case the audit cell is not satisfied with the accounts and vouchers, the spending authority will then try to give a satisfactory explanation, refund of cash, if necessary, to overcome the audit objections.

In case there is an increase in expenditure programme than what was budgeted, it then gives rise to revising the budget. The question of revising the budget during the year arises when a specific expenditure exceeds the budgeted provision. In this case the university authority has to arrange immediate resource for meeting that specific need of expenditure by revising the original budget. The entire budget is then revised and presented under a separate head called revised budget.

Often the university may be required to revise its financial estimates not only for expenditure but also for the income side as well. The increase of university's own resources may be due to revision of students' fee structure, academic fees, rent of residential quarters, and buildings, etc. On the expenditure side the revision

of salary structure of the teaching and non-teaching staff and also cost and price escalation of other materials and inputs may give rise to revision of the budget estimate.

Identification of Cost Centres of University Finance

For the sake of introduction of a costing technique we have decided to identify several functional activities as cost centres. It will be governed by the activity-based costing which is somewhat different and considered to be an effective instrument in cost control and accounting. Activity-based costing emphasizes indirect resources demanded by several services undertaken by the university. It also entails understanding of cost behaviour and helps identify the overhead cost. ABC as suggested by Cooper (1989) looks into analysis of small actions. These actions have been referred to as micro-activities (Turney and Stratton, 1992). We propose to categorize the university activities on the basis of resource linkage in the line of Panda (1999). Micro-activities or small actions performed at various levels have been identified as independent activity-based cost centres as discussed hereunder :

(a) The university has altogether forty-one teaching departments as in September, 1999 which are treated as separate cost centres.

(b) The four offices of the four Deans is another cost centre.

(c) Examination Department

(d) Central Library of the University

(e) Director of Students' Welfare

(f) University Student Hostels

(g) University Works Department

(h) University Health Service

(i) University Estate Department

(j) University Press

(k) University Model School

(l) University Publication

(m) Pre-examination Training Centre

(n) Office of the Vice-chancellor

(o) Office of the Registrar

(p) Office of the Treasurer

(q) Teaching Faculties of Arts, Science and Commerce.

Below we exhibit the expenditures (in Rs.) of a few important cost centres for two years :

YEAR	**1996–97 (Actuals)**	**1997–98 (Actuals)**
VC.'s Est.	6,89,358	9,21,724
Registrar's Est.	93,62,052	1,02,37,344
Treasurer's Est.	57,17,312	72,55,777
Academic Dept.	3,11,21,700	3,60,72,270
Examination Centre	47,99,141	52,82,938
Library Centre	38,94,371	40,66,541

For the purpose of application of activity-based costing in university finance, we propose that the total function of the university be grouped as a single activity centre, thereafter different functions of the university be classified as sub-activity centres. Cost pertaining to the single activity and that pertaining to the sub-activities may be identified; costs of each sub-activity or sub-centre may then be correlated with the resources made available to it over the years. Non-recurring grant from the State Government received every month towards salary payments and academic activities may be related to the costs incurred in such sub-centres.

Structure of University Budget

The university budget has been divided into four parts. Part-I relates to Non-plan Budget (General Fund). This is the normal budget of the University comprising of both capital and revenue expenditures including salary, administrative and other establishment costs.

Part–II is related to Plan Budget which consists of development grant from UGC and State Government. For the purpose of availing of the development grants, there has been a financial practice that the university will incur the expenditure first out of its own cash and then lodge its claim for reimbursement from the UGC or the State Government subsequently. Very often the University on account of liquid cash scarcity can hardly afford to make the expenditure despite having sanction from the funding agency. This creates a vicious circle for the non-percolation of the finance into the University. Many universities have suffered from making development grant owing to absence of means to spare fund for such purpose. The plan budget actually takes care of this and it includes the schemes on development that depend mainly on the UGC and the State Government.

Part–III is concerned with Endowment and Annual Non-recurring Grants (Earmarked Specific Funds). It is a budgetary grant generated out of endowment and out of non-recurring grants made available for specific purpose by specific funding agency against a particular research project allotted to the teaching departments. Such non-recurring grants are usually received from the UGC, CSTR, DST, State Government and other such funding agencies.

Part–IV is relates to Debts, Deposits and Advances. This part represents the debts, obligations and external liabilities, overdraft facilities from the bank obtained by the University. Deposits are made out of surplus resources for long-terms investment and to earn capital appreciation and gain out of it. It also includes advances made to employees and other groups.

There has been an unwritten system of budgetary exercise followed in the area of budgetary control mechanism. Every entity attempts to project a conservative estimate in respect of its receipt and a favulous estimate in respect of its expense. This is governed by the accounting principle of conservatism. This helps an entity to remain on the safe side and avoid an eventual 'cash-out' position. The University in course of preparing its budget or financial estimate projects a lower figure inn respect of income generated from internal source: keeping the expenditure schedule slightly exceeding the receipt and pressing the government to release the full liquid cash component of the expenditure. When succeeded, it helps the University authority to reduce its deficit or resource gap in the budget estimate. The State Government also follows the same conservative principle while presenting its budgetary demand and grants with the General Government.

Development Finance from UGC

The development grant of the UGC is subject to concurrence and matching grant extended by the State Government as education is in the concurrent list of our constitution.

1) Non-receipt of State Government concurrence to the effect that when the development project is completed out of the UGC fund within a given period of funding schemes, the State Government will assume financial obligation to sustain the project in future years. This is called UGC grant to the university or its affiliated college on a development scheme with State Government concurrence.

2) While for another kind of project, there is a provision for matching grant to be provided by the State Government against the development grant made available by the UGC. In absence of both concurrence and matching grant of the State Government, many development schemes of the University or its affiliated colleges cannot be implemented and sanctioned money is returned to the UGC as unspent for the given project. In absence of matching grant from the State Government several colleges shelved development programmes or diverted the UGC's share of funds for other uses. Under the UGC's Development of Colleges' Scheme, colleges fulfilling eligibility conditions under Sec. 2(F) and deemed fit to receive central assistance under Sec. 12(b) of the UGC Act, 1956, are granted between Rs. 6 lakh and Rs.13 lakh for development of infrastructure. The UGC provides assistance to colleges to meet needs like books and journals, basic scientific equipment and teaching aids and the construction, extension or renovation of buildings. Assistance from the UGC for all building projects is 50% of total allocation except with regard to women's hostel and construction of libraries. Remaining 50% of the total allocation of building cost should come from the matching grant of the State Government. Non-government colleges often garner funds from other sources including donation and internal funds. But the government colleges are placed in a disadvantageous position as they are absolutely dependent on government assistance which is not forthcoming.

Consequently, several development schemes have lapsed in absence of matching funds from the State Government. The UGC has allocated Rs. 4 crore in 1998–99 for various programmes and projects for colleges in the North East during the Ninth Plan period. In addition Rs. 2 crore were made available in 1998–99 for the region.

Requirement and Availability of University Finance

The State Government has been giving two types of grants to the University since 1948. One is statutory grant for the payment of salary and other benefits to the employees and the other is developmental grant for financing developmental works. The University also mobilises resources from its internal sources like fee, rent on quarters, etc. The UGC also provides grants for

construction of buildings, purchase of equipment for academic departments and books and journals for the library. On the basis of the resources available from these sources the Finance Committee of the University prepares the annual budget and after making necessary amendments the University Court approves the budget. The University would not have faced financial crunch if the State Government would have sanctioned the statutory as well as the developmental grant as per the budget. The earlier governments usually kept promise in respect of government grants and in case of deficits special grants were provided. But the present governments do not even provide the statutory grants fully as incorporated in the budgets, not to speak of the developmental grants. The basic cause of the University's deteriorating financial position is that in most cases the State Government has not been increasing proportionately the statutory grant against the natural increase in University's expenditure.

Whenever a deficit arises between the receipts and expenditures under non-plan budget, the deficit is met by way of withdrawal from emergency fund. This causes a serious implication in the long-run investment plan of the University; often fixed deposit certificates are encashed for the purpose. It has an evil effect in that the University authority cannot furnish proper statement of account at the time of audit, nor to the state government and to external funding agencies.

Reporting of University Finance

Each act of the University in respect of the State University or Central University, as the case may be, prescribes the statutory provisions with regard to financial control over its resources; authorisation for spending of money from the University's exchequer and furnish accounting information to the concerned funding agencies. Notwithstanding, the university finance and its expenditures are again subject to scrutiny by independent authority, say, the Accountant General [AG] of the State. The A.G. will certify the books of accounts and thus attest the same. Further, the University finance is also subject to scrutiny at periodical intervals by the local audit appointed by the State Government. The university is under mandate to prepare and furnish periodical statement of accounts from time to time and make it available to the regulating agency. This type of financial control is covered under the tenet of periodical reporting of financial affairs.

Now we proceed to justify this accounting principle through the provisions quoted in the connected stature. For instance, Section 31(3) read with Section 10(1) of the Gauhati University Act 1947 prescribes that the annual financial estimates of the University are to be presented to the Gauhati University Court at its Annual General Meeting to be held in January every year. Prior to this, these are to be approved by the Finance Committee and thereafter by the highest policy making body of the university, i.e., the Executive Council.

Budgetary Control

It would be pertinent in this connection to recapitulate that financial control and management of the University is exercised through the budgetary control system. Normally a budget is prepared for one financial year as a matter of estimate of receipts of revenue and proposed heads of expenditure. But mere budget estimate does not imply any sanction or authorisation for incurring any expenditure. Having included the items of revenue and expenses in financial estimates, the same shall have to be approved by the Syndicate or Executive Council. Budget provision embodied in the financial estimates does not ensure availability of liquid cash in receipt form and also for making expenditure. Budget is divorced from liquidity. Having prepared the budget and approved it by the concerned authority, the Financial Administrator or the Treasurer will try to manage liquid cash against the budgeted items. University's budget proposals for the Revenue Account of the General Fund is of the nature of maintenance expenditure and should not include non-recurring items. Proposals for capital expenditure on items like furniture, laboratory equipment of permanent nature, construction of building etc. should be shown under the capital budget.

Classification of Activity-based Costs in University Finance

We now propose to discuss the application of the techniques of activity-based costing (ABC) in university financial management. Under liberalized economy with reform programmes, huge resources are required to be invested in improving the quality of knowledge, education and technology as well as to equalize opportunities for aspirants of different categories. It has been felt necessary to raise the level of participation in higher education above 6 percent of age specific population in order to match the level of demand for higher and technical education. The demand

for education has been increasing following the complexities and job opportunities created in the economy. The University with the traditional funding pattern with finance from the State Government, specially non-plan grant for meeting regular expenses, finds it extremely difficult to cope with the supply side of education. In the broader perspective of education services of the university the supply-chain-services (which implies uninterrupted flow of services) may be recognized as one activity and the other sub-activities may also be brought under several cost drivers. Some of the important activities and their corresponding cost drivers are indicated below :

ACTIVITIES	**COST DRIVERS**
1. Correspondence Course	Printing cost of prospectus and application forms, study materials, paper costs on study materials, honorarium paid to the authors and editors of study materials, costs on study materials, paper costs on study materials, honorarium paid to the authors and editors of study materials, costs on computers and xerox machines, fees paid to the teachers engaged in counselling, salary and other overheads paid to the office and library staff, depreciation on furniture and equipment, repairs and maintenance, electricity charges and cost of library books.
Regular P.G. Course	Salary and other overheads for teaching and other non-teaching staff, retirement benefits in monetary terms, depreciation of departmental building, equipment, electrical installations, repairs and maintenance, contingency expense, research expenditures reimbursed by other funding agencies like UGC, CSIR, ICSSR, DST and State Government.
Support Service	
i) Model School	Salary and overheads of teaching and non-teaching staff, depreciation, cost of medicine and medical equipment.
ii) Hospital	Salary and overheads to hospital staff, depreciation, cost of medicine and medical equipment.

ACTIVITIES	COST DRIVERS
iii) Water Supply	Salary and overheads, cost of laying pipe-lines, capital works, lubricants, fuel, repairs and maintenance.
iv) Electric Power Supply	Salary and overheads, laying of electric power line, cost of transformer, substation and accessories.
v) Market Complex	Cost of constructing building, laying electric supply line, water supply, depreciation of buildings, cost of collection revenue from the occupants, printing of bills and money receipts.
vi) Library	Cost of library books; salary and overheads; printing of library cards; cost of drawers, almirah and book shelves; depreciation on building, books, almirah, shelves; cost of library furniture; repairs and maintenance; cost of setting and maintaining information centre, internet; fees paid to dot-com companies, web-side suppliers; cost on electricity; cost of pesticides.
vii) Canteen	Cost of building, depreciation on building, depreciation on furniture cost of utensils and depreciation thereon, cost of food articles, salary and overheads, cost of printing coupon.
viii) Printing & Xeroxing	Cost of printing machines, xeroxing machines, cost of building, furniture, royalty paid to the xerox machine supplier, electric charge, salary and overheads, cost of paper, ink, repairs and maintenance.
ix) Pre-examination Training	Salary and overheads, cost of preparing study materials, application forms, prospectus, advertisements, honorarium to resource persons, cost of xerox facility, teaching equipment and library books
x) Vehicle and Transport Service	Salary and overheads, lubricants, petrol and diesel, repair and maintenance, depreciation, uniform, name plate.

ACTIVITIES	COST DRIVERS
xi) Guest House	Building, furniture, utensils, water-supply charge, electric charge, telephone charge, guest register, guest card, cooks and peons, cooking shade, depreciation, maintenance of flower garden.
xii) Academic Staff college	Expenses borne by the UGC.
xiii) Women Studies and Research Centre	Salary and overheads; costs of library books, building, furniture etc.
xiv) Extension Education Centre	Salary and overheads; cost of library books, building, furniture, etc.
xv) Employment Centre	Advertisement, cost of building, depreciation, salary and oveheads, cost of booklets, prospectus and leaflets.
xvi) Recreation Centre	Cost of sports materials, musical instruments, electricity connection, water supply, cost of building, depreciation, depreciation of building, musical instruments and sports goods.

It becomes necessary to apply activity-based costing to (i) regroup activities in view of its associated emerging costs, (ii) reorganizing the activity, (iii) combining two or more activities into one group, and (iv) abolishing those activities which do not conform to break even level or which do not help meeting overhead cost. The following measures of cost control may be adopted under activity-based costing.

1) General cost awareness has to be created among the University functionaries.
2) The activities which are not fetching adequate return to sustain a function independently may be regrouped with another activity or sub-activity in order to make it economically viable.
3) Total human resource required for the university has to be rationally evaluated, reshuffling and replacement of employees may be undertaken keeping in mind the need for a particular activity. In many universities, it has been observed that they are overstaffed. Temporary ban on fresh recruitment may be a cost – effective drive. Filling up of the

vacancies after retirement may be done by inter activities transfer with post among the existing employees.

4) Following the introduction of newer course of studies, downsizing of the university is very essential to train up existing people in the new line of activity.

5) Arrangement of orientation programmes and training for both teaching and non-teaching employees is imperative for meeting the newer challenges. The money spent in training would be replenished by the cost-effective services in future period.

6) In many cases pertaining to selection of teachers, conduct of M. Phil and Ph.D. Viva, etc. may be carried out from among the experts available within the university and from the nearby universities and institutes. This will substantially reduce the cost burden.

Measures for Augmentation of Revenue

i) Diversification of academic curriculum has been suggested as one of the means of raising resources, say, introduction of certificate courses, diploma courses, distance education centre, correspondence courses, etc. Although the University of Gauhati has introduced post graduate correspondence courses in certain subjects yet due to the continuation of the private examination system side by side the University is unable to mobilize resources satisfactorily through correspondence course. The private examination system must be totally abolished and other possible subjects should to brought under correspondence courses.

ii) Raising of fee structure on the basis of activity-based costing is essential.

iii) Creation of chairs and centre of advanced learning out of the subscriptional donation from the non resident Indians and receiving donation in foreign currency will have positive bearing upon the growth of the University.

iv) Creation of alumni association; giving recognition and awards on the academic achievements and professional excellence in the post academic period.

v) Earmarking some seats for foreign students under inter-governmental agreement.

vi) Rendering consultancy services and selling of research outputs to the industrial users.

vii) Creating patent rights of the formula, of the products of the search outputs innovated by the researchers in University laboratory.

viii) Creating permanent infrastructure, namely auditorium, building, recreation centre, playground, guest house, and swimming pool which may be let out to the outside agencies.

ix) Undertaking bio-degradable activities, environmental park, botanical garden of tourist interest, site of historical monuments, and fishery by undertaking agroforestry operation.

x) Plantation of high yielding variety timbers and teak cultivation which would yield return within 15 years.

xi) Commercial utilisation of barren land situated at the University campus by plantation, fruit cultivation and other agro-based cultivation.

In conformity with some of our above suggestions, the reputed academic administrator Shri T. Rajagopalan in an article entitled 'Higher Education in Trouble' in the *Hindu* suggests to augment the revenues of universities and colleges put forward by Vice-Chancellors and principals in the past. These include the utilisation of the vacant sites in large tracts of campus land, plantation programme in areas where no building activity is envisaged and renting out auditorium and halls to outside agencies for their programmes.

Epilogue

Activity-based costing highlights the economics of activities and processes but by itself it is unable to produce change. It must be accompanied by activity-based management and activity-based auditing and thus translating information generated by ABC to reality.

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ACCOUNTING FOR POLLUTION : MAKE POLLUTERS PAY

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ABSTRACT

The author attempts to build a case in favour of accounting for pollution costs. In doing so, four important points are highlighted. Generation of pollution-related data is seen as a pre-requisite of control. The methods of ascertaining cost of pollution are examined. An equitable basis of distribution of costs of pollution over polluters is explored, and effective tax planning is proposed as a means of strategically internalising cost of pollution.

KEY WORDS

Cost of pollution; environmental damages; unit resource rent; marginal social cost; World Development Indicators 2000; emission charges; tradeable emission permits; environmental tax planning.

Introduction

The purpose of accounting is (a) measurement and (b) communication. Profits are to be measured, and the revenue and expense items of Profit & Loss Account are disclosed for communication. While the measurement aspect is given more importance by cost and management accounting the disclosure aspect is mostly dealt with by financial accounting. The financial accounting approach dealing with the disclosure requirement is a major area of environmental accounting. It must be noted that measurement is a pre-requisite to disclosure. In this study emphasis has been given on the measurement aspect. A cost is a burden firstly borne by the producer and then shifted on to the customers. Cost is measured by the producer not for bearing it but for shifting the

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burden on the customers. Cost is an outflow of resources of the organisation. Even if the costs are not measured the capital would be consumed and unless that is recovered through revenue there would be depletion of net wealth of the enterprise whether or not any reflection thereof is shown in accounts. Hence, it is in the interest of the enterprise to measure cost in order to recover it through revenue. Had it been such that an enterprise would have to bear costs only when the costs are measured would there be any measurement of cost initiated by the enterprise? In respect of cost of pollution, the situation demands an answer to this question, because the cost of pollution does not entail any release of resources of the polluting firm; rather it deteriorates the resources of the society.

The United Nations Conference on Environment and Development observed in Agenda 21 that "the costs and consequences of wasteful and environmentally damaging consumption are generally not borne by the producers and consumers who cause them". As the burden is borne by the society it must be measured by the society in order to shift the burden on the polluting firms. Only then the polluting firms would initiate accounting of such cost in order to recover it through revenue. Hence accounting for cost of pollution needs to be made at the national level first, and thereafter at the enterprise level.

Pricing is the mechanism through which the enterprise cost is transferred to the customers. For transferring the national costs to enterprises the mechanism of taxation may be equally useful. The cost of pollution accounted at national level may be distributed by way of taxation on an equitable basis on the polluting producers and polluting customers. Principle 16 of the Rio Declaration reads "National authorities should endeavour to promote the internalisation of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution."[1] The polluting firms paying the pollution tax would include the expenditure in their cost of production in their own interest. Again, the cost incurred for preventing pollution which is included in other cost of production would be identified and shown separately if any tax benefit is attached there to. One approach to control pollution and to make polluters pay is imposition of regulatory measures and the other approach is introduction of commercial devices whereby the polluters would no more simply comply with the regulation but would undertake active initiative to minimise the cost of pollution in their own interest. Both the approaches may be pursued at the

same time because application of one does not prevent the application of the other.

One question often raised is how far can pollution be measured and valued so that it can be accounted for? The question is based on the presumption that unless the measurement and valuation is completed accounting work cannot begin. As if anything less than 100% justice ought to be denied if 100% justice is not ensured. It is true that exhaustive accounting for cost of pollution is a far cry but that does not debar anybody from accounting for cost of pollution to the extent possible. Even though total cost of pollution is not captured in the accounting net, attempts should always be made to maximise the spread and depth of the net. One cannot deny any less than 100% justice on the plea that 100% justice seems impossible to ensure.

In this study an attempt has been made to discuss the following issues :

a) Generation of pollution-related data as a prerequisite for control.
b) Ascertainment of cost of pollution, albeit limitations.
c) Distribution of cost of pollution over polluters on an equitable basis.
d) Taxation as an effective tool for internalisation of cost of pollution.

Generation of Pollution-related Data

A prerequisite to the ascertainment of cost of pollution is the generation of pollution related data. The technical experts in the respective fields working under appropriate authority have to undertake the onerous job of measurement of the emission of polluting agents on the environment per unit of time by different production systems and by the consumption process. On the basis of the quantified data generated by the technical experts the valuation experts have to convert the quantitative expression into monetary terms. Then only the financial implication of the damages to the environment can be ascertained.

Environmental damages are measured at the macro level by different authorities, although in a limited way. Some examples of recorded data on environmental damages are presented below :

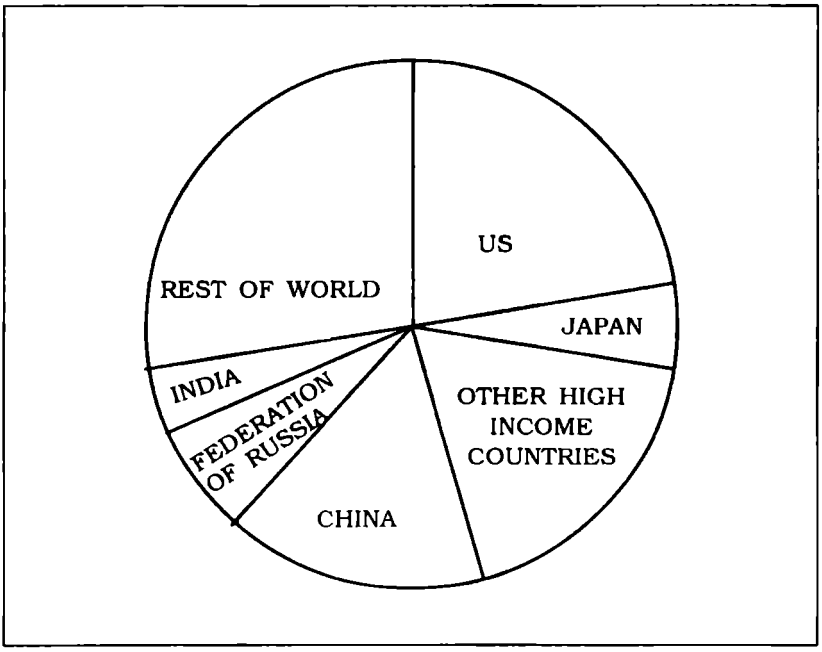
a) Air pollution

(i) Carbon dioxide emission :

	Million Metric Tons		Per Capita Metric Ton	
	1980	1996	1980	1996
India	347.3	997.4	0.5	1.1
Japan	920.4	1167.7	7.9	9.3
US	4575.4	5301.0	20.1	20.0

(ii) Share of the countries in carbon dioxide emissions in 1996 :

- US = 23%,
- Japan = 5%,
- Other high income countries = 19%,
- China = 15%,
- Russian Federation = 7%,
- India = 4%
- Rest of world = 27%.



(b) Water pollution

Emission of organic water pollutants :

	Kg. per Day	
	1980	**1997**
India	1,422,564	1,664,150
US	2,742,993	2,584,818
Japan	1,456,016	1,468,545

[Source : World Development Indicators 2000]

Ascertainment of Cost of Pollution

The damage caused to the environment has to be translated into monetary value. As the environment is not part of the market, its value cannot be directly obtained. Yet, estimation of external environmental costs have to be sufficiently reliable, because they will be used to calculate the level of the tax or the price of the emission permits which people and businesses will effectively have to pay.

Valuation of environmental deterioration would be attempted in two broad categories : (i) direct (ii) indirect.

(i) Direct methods include :
  (a) Valuation of impact on production
  (b) Valuation of impact on health
  (c) Replacement cost
  (d) Shadow prices
  (e) Defensive or protective cost

(ii) Indirect methods include two categories :
  (a) "market based valuation method", and
  (b) "contingent valuation method" (Freeman, 1993).

Two examples of the environmental cost estimates made by different authors and used by World Bank are presented below :

(a) For depletion of natural resources the costs are estimated on the basis of unit resource rent. An economic rent represents an excess return to a given factor of production. Because natural resources are fixed in extent (at least for a given state of technology) resource rent will persist over time. Unit resource rents are derived by taking the difference between world prices and the average unit extraction costs (including a "normal" return on capital) (Kunte, 1998).

(b) Pollution cost is calculated as the marginal social cost associated with a unit of pollution. For carbon dioxide the unit damage figure represents the present value of damage to economic assets and decline in human welfare over the time the unit of pollution remains in the atmosphere.

In World Development Indicators 2000, carbon dioxide damage is estimated on the basis of unit damage cost of $20 per ton of carbon. (Frankhauser, 1995).

Multiplying the cost per unit of resource depletion or environmental damage by the total units of resource depletion or pollution the total resource depletion cost and pollution cost of a country can be obtained.

The cost of pollution needs be accounted at the national level first, not only for the fair presentation of the national economy but also to create a basis for subjecting polluters to pay compensation for polluting.

The World Development Indicators 2000 present a countrywise picture of environmentally adjusted national accounts, a part of which is exhibited below.

The figures represent percentage of GDP for the year 1998.

COUNTRY	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
INDIA	20.9	9	11.8	3.3	1.5	0.4	1.6	1.4	10.3
BANDLADESH	17.1	6.2	10.9	1.8	0.2	0	2.1	0.3	10
PAKISTAN	12.7	7.4	5.3	2.3	1.5	0	1.3	0.8	4
SRI LANKA	18.9	5	13.9	2.6	0	0	1.5	0.2	14.8
CHINA	42.6	8.1	34.5	2	1.5	0.3	0.4	2.3	32
USA	17.4	12.6	4.8	4.6	0.6	0	0	0.4	8.4

A : Gross Domestic Savings **B** : Consumption of Fixed Capital
C : Net Domestic Savings **D** : Education Expenditure
E : Energy Depletion **F** : Mineral Depletion
G : Net Forest Depletion **H** : Carbon Dioxide Damage
I : Genuine Domestic Savings

H represents the cost of pollution to the national economy, although, it is a token representation only.

Distribution of Costs of Pollution

The task that rationally follows is the distribution of cost of pollution determined at macro level over the individual pollutants. That is in line with the "polluter pays" principle. It is not the ascertainment of total cost and accounting therefore, but the apportionment of cost of pollution which is most important for making polluters pay. Economic instruments or the market instruments are the effective tools for apportioning the national costs over the individual polluters. Examples of market instruments are :

(i)* Emission Charges *(first proposed by Pigou, 1920) i.e., pollution tax :

The polluter in order to minimise tax would try to reduce pollution by incurring abatement cost. The polluter's objective would be to minimise the total of pollution tax and abatement cost. Some examples of this tax, referred to as Pigouvian Tax may better establish the feasibility of the concept of pollution tax.

- The British Landfill Tax : In Great Britain, the external costs of dumping garbage in landfills have been estimated with the help of a research programme. A tax has been introduced at a level equal to the corresponding external costs (European Foundation, 1996).
- Airport Noise Tax : In some airports (for example in Switzerland), noise taxes are added to landing taxes. Noise taxes are calculated according to the type of the plane, and directly linked to the noise emitted during landing and take-off.
- A tax differentiation between leaded and unleaded gasoline exists in many countries.

(ii)* Tradeable emission permits *(first proposed by Dales, 1968) :

Tradeable emission permits can be grandfathered (i.e., distributed for free among incumbent firms) or auctioned or sold, each permit granting the right to emit one unit of pollution during a certain period of time. The government first determines the total quantity of emission for a country or a region. For example, if the government wants to limit total emission to 50000 tons of nitrogen oxide (NOx) per year, it will distribute 50000 permits to the firms, each one granting the right to emit one ton of NOx during one year. Participants can sell permits if reducing their emission is cheaper

than the price of the corresponding permits; conversely, they can buy additional permits if this is the cheaper solution. The objective of the producer would always be to minimise the overall costs of permits and abatement. The government can also set a limit to the total emission. In the process the polluter has to pay for pollution and at the same time rewarded for abating pollution.

Through market instruments the pollution costs are apportioned and internalised i.e., included in cost of production and full cost pricing is ensured.

Taxation for Internalisation of Pollution Costs.

For the individual firms, so far as the payment for pollution tax or emission permits are concerned, that can be known explicitly. But a significant part of the abatement costs incurred for saving pollution may not be distinguished objectively from the other cost of production. However, for environmental tax planning an objective measure has to be developed on the basis of predetermined measurement standards. The regulatory authorities in the sphere of environment and taxation in consultation with professional and academic bodies of accounting have to come forward with acceptable standards of measurement of abatement costs. This is important because the objective measure of abatement costs should have a direct bearing on the relief of environmental tax.

Conclusion

The observations made in the study are summarised below :

- Internalisation of costs is not the purpose of accounting but the cause of it.
- When costs of pollution are internalised the polluters would use all possible accounting tools in order to take judicious decision in the trade-off between generation of pollution and control of pollution.
- The willingness to comply with the regulations as to disclosure of cost of pollution and cost of abatement will increase on the part of the polluters if certain reward is attached in terms of tax relief.
- For fair reflection of cost of pollution in financial reports along with relevant disclosure, it is not the emotion of altruism but the power of rationality and self-interest that should be the guiding force.

- The use of accounting tools and compliance of disclosure requirements would ultimately contribute to control of pollution ensuring sustainable production and sustainable consumption.

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CREATIVITY : AN OVERVIEW

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ABSTRACT

Creativity as a concept has drawn enormous interest amongst the entrepreneurs, managers, academicians and researchers all over the world. From the early concept of inborn talent to scientific reasoning of left-brain and right-brain theory the concept has come a long way to be realised as one of the cornerstones of organisational success in the present century. This article on creativity tries to make an in-depth analysis of the concept and unearth the various techniques available for developing and grooming creative thinking among individuals and eventually how to achieve the goal of a creative organisation. Although the entire concept is based upon observations at various levels it would be wise to suggest that the real search for creative factors is still on both at individual level and organisational level.

KEY WORDS

Brainstorming, Incubation, Illumination, Storyboarding, Synectics, Validation, Fuzzy Logic.

Introduction

It so happened once, that an employee in Minnesota, Mining and Manufacturing, better known as 3M Inc., USA, called Art Fry, who regularly went to church and used to carry the Bible along with him in order to read out hymns from them, suddenly realised that his paper page markers used to get disarranged with increasing frequency. He therefore felt the need to try and find something that would not fall off automatically from the books, and would stick temporarily to the page as a marker while causing no damage either

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to the print or the paper. The search for such a material came to an end with the invention of "Post-it" notes from 3M. This story makes a perfect prelude to the discussion of the concept called creativity, which is the hallmark of many managerial success stories. Organisations across the world today are recognised by their creative strategies, decision-making and product range and no longer by their orthodox regimented approach towards achieving any given objective. Microsoft, Du-Pont, Sony, and 3M are some such names, which have time and again braved to bypass the usual norms of decision-making and are success stories of the present day corporate world. These organisations are today considered as creative organisations because of their in-built system, which nurtures, grooms and generates an environment for developing creative ideas and talents within the organisation and its employees. Experts are divided over the issue whether a creative idea is something that comes automatically to an individual or whether it is achievable out of proper care and training. In considering this dilemma, the present paper puts more stress on the second viewpoint and tries to find out what it takes to make an organisation creative. The approach of this paper is to discuss in detail and make an in-depth analysis of :

- The concept of Creativity
- Stages that shape and develop individual creative ideas.
- Analysis of a model that helps in developing a creative work environment within an organisation.

1. The Concept of Creativity

The Oxford Dictionary of Business (1995) defines the term creative as inventive or imaginative.

According to Bartol and Martin, (Bartol et al, 1998) 'Creativity is a cognitive process of developing an idea, concept, commodity or discovery that is viewed as novel by its creator or a target audience.' The ability to relate and to connect, sometimes in odd and yet in striking fashion, lies at the very heart of any creative use of the mind, no matter in what field or discipline. It is the ability to see and to respond. The above statements suggest and indicate the importance of the *thinking process* in creativity. Organisations strive to harness individual creativity and spur innovation. However, one should at this point take note of the distinction between

innovation and creativity. Creativity (Gray and Starke, 1988) is an individual's innate ability to generate new ideas or conceive new perspectives on existing ideas. Innovation on the other hand is a managed effort to create new products or services or new uses of existing products or services. Thus, creativity is an individual process that may or may not occur in an organisational setting, and innovation is an organisational activity aimed at stimulating and managing the creativity of employees. Creativity requires both convergent and divergent thinking (Fig. 1). Convergent thinking is the effort to solve the problems by beginning with a problem and attempting to move logically to a solution. Divergent thinking on the other hand is the effort to solve problems by generating new ways of viewing a problem and seeking novel alternatives. Divergent thinking helps develop alternative views of problems, as well as seek novel ways of dealing with them. Therefore, from another standpoint, creativity may be viewed as the process of developing original and imaginative views of situations. In other words, it is a process (Gray and Starke, 1988) of creating something new, original and unique and in the process helping an organisation in its trouble-shooting exercise

The model presented in Figure 1 is a metaphorical interpretation of how we think and what are our preferred ways of thinking.

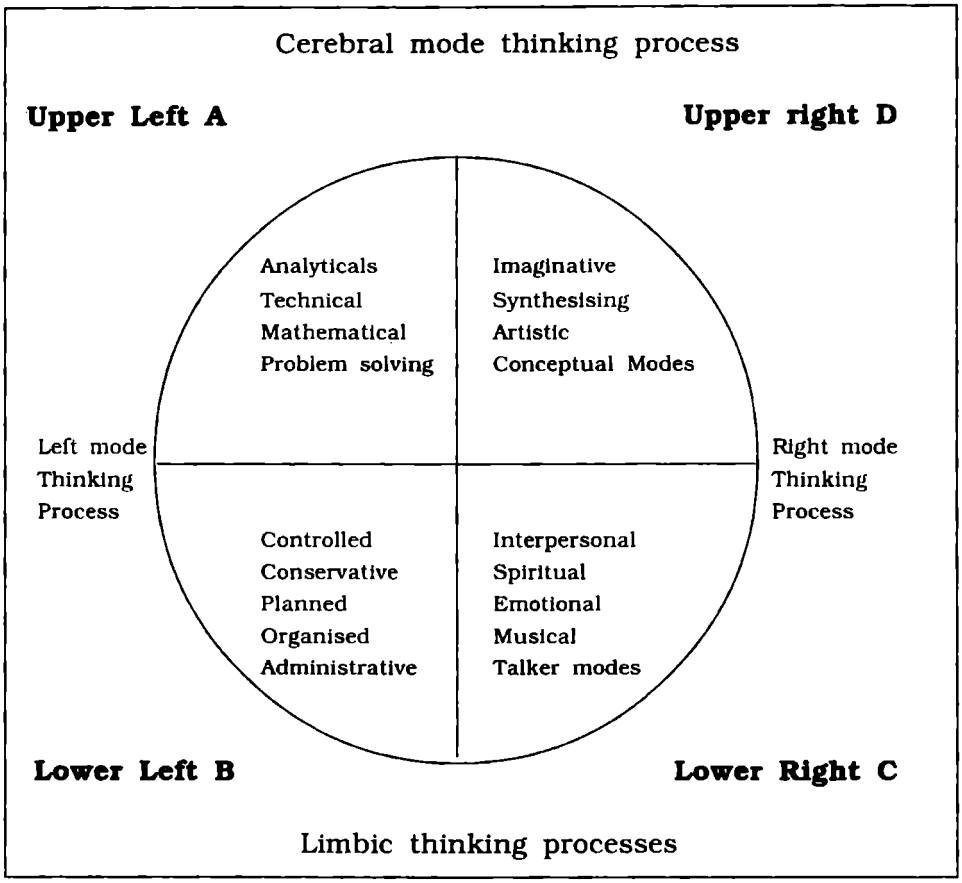


Fig. 1 : Whole Brain Model of Ned Harmann. (www.britannica.com.)

Left Brain	**Right Brain**
step-by-step reasoning	mystical
logical	musical
mathematical	"creative"
speaking	visual-pictorial
dominates right brain	submissive to the left brain
pattern user	pattern seeking

Creative thought can be divided into divergent and convergent reasoning :

Divergent thinking is the intellectual ability to think of many original, diverse and elaborate ideas.

Convergent thinking is the intellectual ability to logically evaluate, critique and choose the best idea from a selection of ideas.

Both abilities are required for creative output. Divergent thinking is essential to the novelty of creative products whereas convergent thinking is fundamental to the appropriateness.

The mode of activity one is in is that what makes creativity unique. For example, there is a distinction between real-time creativity and multistage creativity. Real time creativity is spur-of-the-moment, improvisational, and demands output in a short interval of time, whereas in multistage creativity, sufficient time is allowed for the generation and selection of ideas. "Being creative is seeing the same thing as everybody else but thinking of something different".

Although creativity has many aspects, generally, it would include the ability to take existing objects and combine them in different ways for new purposes. For example, Gutenberg took the wine press and the die/punch and produced a printing press. Thus, a simple definition of creativity is the action of combining previously uncombined elements. From art, music and invention to household chores, this is part of the nature of being creative. Creativity may also be seen as playing with the way things are interrelated. It is the ability to generate novel and useful ideas and solutions to everyday problems and challenges.

Creativity involves (Griffin, 1990) the translation of our unique gifts, talents and vision into an external reality that is new and useful. We must keep in mind that creativity takes place unavoidably inside our own personal, social, and cultural boundaries.

The more we define our creativity by identifying with specific sets of values, meanings, beliefs and symbols, the more our creativity will be focused and limited; the more we define our creativity by focusing on how values, meanings, beliefs and symbols are formed, the greater the chance that our creativity will become less restricted.

In the creative process there are always two different (but interrelated) dimensions or levels of dynamics (Kreitner et al, 1998) with which one can *"create :"*

- The system, which may be a particular medium (e.g. oil painting or a particular musical form), or a particular process (like a problem solving agenda, or an approach to creativity like Synectics). The creative person manipulates that means to a creative end.
- The second dimension is described by the conceptual "content" which the medium describes. Again, the creative person depicts, changes, manipulates and expresses somehow the idea of that content.

There is no one definition of creativity that everyone can agree with. Creativity researchers, mostly from the field of psychology, usually claim that being creative means being novel and appropriate. Subsumed under the appropriateness criterion are qualities of fit, utility, and value.

At least four aspects (Moorhead et al, 1989) of creativity have drawn much attention.

- The *creative process*, receiving the most attention, focuses on the mechanisms and phases involved as one partakes in a creative act.
- The second aspect of creativity is the *creative person.* Here, personality traits of creative people are central.
- The environmental atmosphere and influence are concerns of a third aspect, the *creative situation.*
- Lastly, the criteria or characteristics of *creative products* have been sought. This area is of particular importance because it is the basis of any performance assessment of real world creativity and may provide a window on the other aspects of creativity.

2. Stages that shape the individual creative ideas

Individual creativity processes have been keenly observed across the globe through extensive research and it has been suggested that uniformity exists with respect to individual's characteristics and traits in those demonstrating an uncanny inclination towards generation of creative ideas and views. The basic ingredients (Moorhead et al 1998) of a creative mind are :

- *Domain relevant skills :* These skills are associated with expertise in the relevant field. They include related technical skills or artistic ability, talent in the area, and factual knowledge.

- *Creativity relevant skills :* These skills include a cognitive style, or method, of thinking that is oriented to exploring new directions, knowledge of approaches that can be used for generating novel ideas, and a work style that is conducive to developing creative ideas.
- *Task motivation :* The individual must be genuinely interested in the task for its own sake, rather than because of some external reward possibility, such as money. Recent evidence suggests that primary concern with external rewards tends to inhibit the creative process. In other words it suggest that a scientist attempting to develop a new theory in order to obtain a prize or a bonus is not likely to be as creative as the one whose primary interest is to develop a new theory for sake of advancement of the discipline.

Creativity in individuals develop through the following five–stage process involving :

- **Preparation**
- **Concentration**
- **Incubation**
- **Illumination**
- **Validation.**

The concept of **preparation** is rather unique in this context. An individual does not prepare or organise himself with respect to any given task or assignment. On the contrary, he keeps himself relaxed and keeps looking for something unnatural, and unique in and around the environment in which he is operating. This may even result from interaction with people, friends and also family members. This is often referred to as a way of unconscious scanning and the arousal of the individual's intuition. Once he comes across an **idea** he stores the idea for further processing.

Concentration starts once the individual develops interest in the idea and starts cultivating the same, looking for its possible usage and application in and around a prospective consumer base.

Incubation is the germinating stage characterised with intense research and development on the idea. This process is rather blind since the research does not guarantee an outcome. It is usually the will and inclination of the researcher, his ability to visualise alternatives, and the environment in which he operates that helps in grooming and nurturing creative ideas for ensuring success in

the long run. This is where the organisational support becomes so vital and necessary.

Illumination may also be referred to as *eureka* stage. This is the stage where the research is considered to have reached its culmination point. An outcome is around the corner and it only needs some validation to concretise the hypothesis into a theory; i.e. an idea into a product in the marketing sense of the term.

The process of **validation** focuses on the use value of the concept, user acceptability in its present form, future growth opportunities and also includes inclusion of any changes that may emerge in the process.

3. Techniques for improving individual and group creativity

A good number of creativity techniques have evolved over the years to aid managerial thinking both at an individual and at group level. The more important of the techniques featuring in the literature on creativity are discussed below :

(a) Random Input

This method is a powerful lateral-thinking technique that is very easy to use. It is the simplest of all creative techniques and is widely used by people who need to create new ideas (for example, new products). It is said that Newton got the idea of gravity when he was hit on the head with an apple while sitting under an apple tree. It is not necessary to sit under trees and wait for an apple to fall – we can get up and shake the tree. We can produce our own chance events.

(b) Problem Reversal Method

The world is full of opposites. Of course, any attribute, concept or idea is meaningless without its opposite.

According to this method, the following sequence of events is necessary.

1) State your problem in reverse. Change a positive statement into a negative one.
2) Try to define what something is *not*.
3) Figure out what everybody else is *not* doing.
4) Use the "What If" Compass.

5) Change the direction or location of your perspective.
6) Flip-flop results.
7) Turn defeat into victory or victory into defeat.

1. Make the statement negative

For example, if you are dealing with Customer Service issues, list all the ways you could make customer service *bad*. You will be pleasantly surprised at some of the ideas you will come up with.

2. Doing what everybody else doesn't

For example, Apple Computer did what IBM didn't, Japan made small, fuel-efficient cars.

3. The "What-If Compass"

Just ask yourself "What if I ....." and plug in each one of the opposites. A Small sample :—

- Stretch it / Shrink it.
- Freeze it / Melt it.
- Personalise it / De-personalise it.

4. Change the direction or location of your perspective

Physical change of perspective, Manage by Walking around, or doing something different.

5. Flip-flop result

If you want to increase sales, think about decreasing them. What would you have to do?

6. Turn defeat into victory or victory into defeat

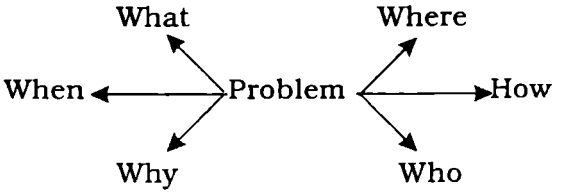
If something turns out bad, think about the positive aspects of the situation. If I lost all of the files off this computer, what good would come out of it?

(c) The Six Universal Questions Method

Idea generators should be aware of a simple universal truth. There are only six questions that one individual can ask another :

What? Where? When? How? Why? Who?

One may draw a mind map of the problem with these six words as nodes on the map as follows :



(d) Lateral Thinking Method

Edward de Bono writes in *"Serious Creativity"* (de Bono, 1980), how he became interested in the sort of thinking that computers could not do : creative and perceptual thinking. The entry in the Concise Oxford Dictionary reads : "seeking to solve problems by unorthodox or apparently illogical methods." Lateral thinking is about moving sideways when working on a problem to try different perceptions, different concepts and different points of entry. The term covers a variety of methods including provocations to get us out of the usual line of thought. Lateral thinking is cutting across patterns in a self-organising system, and has very much to do with perception.

The term "lateral thinking" can be used in two senses :

- **Specific :** A set of systematic techniques used for changing concepts and perceptions, and generating new ones.
- **General :** Exploring multiple possibilities and approaches instead of pursuing a single approach.

(e) Six Thinking Hats Method

Early in the 1980s Dr. de bono (de Bono, 1980) invented the *Six Thinking Hats* method. The method is a framework for thinking and can incorporate lateral thinking. Valuable judgmental thinking has its place in the system but is not allowed to dominate as in normal thinking. Dr. de Bono organised a network of authorised trainers to introduce the Six Thinking Hats.

The key point to note is that the six hats represent six modes of thinking and are directions to think rather than labels for thinking. That is, the hats are used proactively rather than reactively.

The method promotes fuller input from more people. In de Bono's words it "separates ego from performance". Everyone is able to contribute to the exploration without denting egos as they are just using the yellow hat or whatever hat. The six hats system encourages performance rather than ego defense. People can contribute under any hat even though they initially support the opposite view.

The key theoretical reasons to use the *Six Thinking Hats* are to :

- Encourage parallel thinking
- Encourage full-spectrum thinking
- Separate ego from performance

There are six metaphorical hats and the thinker can put on or take off one of these hats to indicate the type of thinking being used. This putting on and taking off is essential. The hats must never be used to categorize individuals, even though their behavior may seem to invite this. When done in groups, everybody wear the same hat at the same time.

White Hat thinking

This covers facts, figures, information needs and gaps. "I think we need some white hat thinking at this point ...." means Let's drop the arguments and proposals, and look at the data base.

Red Hat thinking

This covers intuition, feelings and emotions. The red hat allows the thinker to put forward an intuition without any need to justify it. "Putting on my red hat, I think this is a terrible proposal." Usually feelings and intuition can only be introduced into a discussion if they are supported by logic. Usually the feeling is genuine but the logic is spurious. The red hat gives full permission to a thinker to put forward his or her feelings on the subject at the moment.

Black Hat thinking

This is the hat of judgment and caution. It is the most valuable hat. It is not in any sense an inferior or negative hat. The black had is used to point out why a suggestion does not fit the facts, the available experience, the system in use, or the policy that is being followed. The black hat must always be logical.

Yellow Hat thinking

This is the logical positive. Why something will work and why it will offer benefits. It can be used in looking forward to the results of some proposed action, but can also be used to find something of value in what has already happened.

Green Hat thinking

This is the hat of creativity, alternatives, proposals, what is interesting, provocations and changes.

Blue Hat thinking

This is the overview or process control hat. It looks not at the subject itself but at the 'thinking' about the subject. "Putting on my blue hat, I feel we should do some more green hat thinking at this point." In technical terms, the blue hat is concerned with meta-cognition.

(f) The Discontinuity Principle Method

The more you are used to something, the less stimulating it is for thinking.

When you disrupt your thought patterns, those ideas that create the greatest stimulus to our thinking do so because they force us to make new connections in order to comprehend the situation. Roger van Oech calls this a "Whack on the Side of the Head", and Edward de Bono coined a new word, **PO,** which stands for "Provocative Operation". Try programming *interruptions* into your day. Change working hours, get to work a different way, listen to a different radio station, read some magazines or books you wouldn't normally read, try a different recipe, watch a TV program or film you wouldn't normally watch.

Provocative ideas are often stepping stones that get us thinking about other ideas.

(g) Brainstorming Method

This term has come to be commonly used in the English language as a generic term for creative thinking. The basis of brainstorming is generating ideas in a group situation based on the principle of suspending judgment – a principle which scientific research has proved to be highly productive in individual effort as well as group effort. The **generation** phase is separate from the **judgment** phase of thinking.

In Michael Morgan's book Creative Workforce Innovation (Morgan, 1978) he gives the following guidelines :

Brainstormfing is a process that works best with a group of people when you follow the following four rules.

1. Have a well-Define and clearly stated problem
2. Have someone assigned to write down all the ideas as they occur
3. Have the right number of people in the group
4. Have someone in charge to help enforce the following guidelines :
   - Suspend judgment
   - Every idea is accepted and recorded
   - Encourage people to build on the ideas of others
   - Encourage way-out and odd ideas

Edward de Bono (de Bono, 1980) describes brainstorming as a traditional approach to do deliberate creative thinking with the consequence that people think creative thinking can only be done in groups. The whole idea of brainstorming is that other people's remarks would act to stimulate your own ideas in a sort of chain reaction of ideas.

Groups are not at all necessary for deliberate creative thinking, and de Bono (1980) describes techniques for individuals to use to produce ideas. In a group you have to listen to others and you may spend time repeating your own ideas so that they get sufficient attention. Thinking as a group using brainstorming can certainly produce ideas, but individual thinking using techni-ques such as those described by dle Bono should be employed.

He believes that individuals are much better at generating ideas and fresh directions. Once the idea has been born then a group may be better able to develop the idea and take it in more directions than can the originator.

(h) Forced Analogy Method

Forced analogy is a very useful and fun-filled method of generating ideas. The idea is to compare the problem with something else that has little or nothing in common and gaining new insights as a result.

You can force a relationship between almost anything, and get new insights - companies and whales, management systems and telephone networks, or your relationship and a pencil.

Forcing relationships is one of the most powerful ways to develop ways to develop new insights and new solutions. A useful way of developing the relationships is to have a selection of objects or cards with pictures to help you generate ideas. Choose an object or card at random and see what relationships you can force.

Use mind mapping or a matrix to record the attributes and then explore aspects of the problem at hand.

Robert Olson in his book *'The Art of Creative Thinking'* (Olson, 1984) describes the problem of examining a corporate organisation structure by comparing it to a matchbox.

Matchbox Attributes	**Corporation**
Striking surface on two sides	The protection an organisation needs against strikes
Six sides	Six essential organisational divisions
Sliding centre section	The heart of the organisation should be slidable or flexible
Made of cardboard	Inexpensive method of structure–dis posable

(i) Attribute Listing Method

Attribute listing is a great technique for ensuring all possible aspects of a problem have been examined. Attribute listing is breaking the problem down into smaller and smaller bits and seeing what you discover when you do.

Let's say you are in the business of making torches. You are under pressure from your competition and need to improve the quality of your product. By breaking the torch down into its component parts – casing, switch, battery, bulb and the weight – the attributes of each one – you can develop a list of ideas to improve each one.

Attribute Listing - Improving a torch		
Feature	Attribute	Ideas
Casing	Plastic	Metal
Switch	On / Off	On / Off / low beam
Battery	Power	Rechargeable
Bulb	Glass	Plastic
Weight	Heavy	Light

Attribute listing is a very useful technique for quality improvement of complicated products, procedures for services. It is a good technique to use in conjuction with some other creative techniques, especially idea-generating ones like brainstorming. This allows you to focus on one specific part of a product or process before generating a whole lot of ideas.

(j) Imitation Method

How many ideas are really original?

It is quite valid to imitate other's idea as a preparatory step to original thinking. Try what all the "great" creators have done : *imitate, imitate, and imitate.* After you have imitated enough, you will find your preferences shape what you are doing into a distinct style. Originality is a natural result of sincere creative pursuit. For example, Isaac Newton Said : "If I have seen farther it is by standing on the shoulder of giants".

Just as the Beatles started out playing cover tunes, J. S. Bach went blind in his old age copying scores of other musicians (for personal study), Beethoven played on the themes of his time, and Jazz musicians insert popular melodies into the middle of bizarre atonal solos. Ideas are constantly on the move, much to the annoyance of patent and copyright lawyers! Certainly, ideas may be exploited by the materially minded, just like anything else. But if you truly comprehend an idea, it is yours.

For instance, Dean William R. Inge said : "What is originality? Undetected plagiarism".

T. S. Eliot said : The immature poet imitates; the mature poet plagiarizes.

(k) Storyboarding Method

Storyboards go back to the very beginnings of cinema, with Sergei Eisenstein using the technique. In the world of animation,

Walt Disney and his staff developed a Story Board system in 1928. Disney wanted to achieve full animation and for this, he needed to produce an enormous number of drawings. Managing the thousands of drawings and the progress of a project was nearly impossible, so Disney had his artists pin up their drawings on the studio walls. This way, progress could be checked, and scenes added and discarded with ease.

When you put ideas up on Story Boards, you begin to see interconnections, how one idea relates to another, and how all the pieces come together. Once the ideas start flowing, those working with the Story Board will become immersed in the problem. People will "hitch-hike" onto other ideas.

(l) Nominal group technique (NGT) Method

Each member in this case is allowed to offer his or her idea in round-robin session, which they can improve before finally sitting down for clarification and evaluation.

(m) Delphi Method

This is similar to the above method (Luthars, 1998) except for the fact that in this case the members are not physically present, which makes this method a time consuming exercise.

(n) Synectics Method

The term *Synectics* is devined from Greek word *synectikos* which means "bringing forth together" or "bringing different things into unified connection".

Since creativity involves the coordination of things into new structures, every creative thought or action draws on synectic thinking.

Buckminster Fuller (Kreitnar et al, 1998) summed up the essence of *synectics* when he said all things regardless of their dissimilarity could somehow he linked together, either in a physical, psychological or symbolic way.

Synectic thinking is the process of discovering the links that unite seemingly disconnected elements. It is a way of mentally taking things apart and putting them together to furnish new insight for all types of problems.

William Gordon set forth three fundamental precepts of synectic theory :

1) Creative output increases when people become aware of the psychological processes that control their behaviour.

2) The emotional component of creative behaviour is more important than the intellectual component.
3) The emotional and irrational components must be understood and used as "precision tools in order to increase creative output".

(o) DO IT Method

The Name is based on the following abbreviation :
Define **O**pen **I**dentify **T**ransform
The pattern of the DO IT process emphasises the need to **Define** problems, **Open** yourself to many possible solutions, **Identify** the best solution and then **Transform** it into action effectively.

Circle the best of the ideas generated so far during the Define and Open steps.

(p) Unconscious Problem Solving Method

This method relies on the unconscious mind to be continually processing the various sensory inputs stored in short-term and long-term memory.

Using your unconscious to solve problems is a process of **listening** and a readiness to **record ideas** as they percolate into your conscious mind.

Some of the greatest thinkers were great **relaxers**. Einstein was a daydreamer and spent much of his relaxation time sailing on a lake. Ralph Waldo Emerson enjoyed fishing.

It's all very well to work hard on a problem under the stressful pressure of deadliness, but the opposite condition of relaxation and **not** working on a problem is very valuable.

A practical application of this technique is to saturate yourself in the problem and then take a break. Write down the problem on a writing pad and leave it by your bedside. The next morning, take that pad and start writing down your ideas. Aim to write three full pages of anything that comes to mind. Explore your dreams. The important thing is not to try too hard. Go with the flow and incubate.

(q) Fuzzy Thinking

Western thinking is based on Aristotle and is around 2000 years old. Hence much of our logic and decision-making depends on true/false or yes/no decisions. Are you tall or short? Do you like your job – yes or no? Such questions have answers indicating different

levels of truth. Lotfi Zadeh was the pioneer in the area of *fuzzy logic or fuzzy thinking.* Although the main application of fuzzy logic has been in process control (train controllers, air conditioning, control of nuclear reactors, etc), the principles are important to the understanding of how we think. Answers to questions such as "Is the Salary Good". "Can we be happy" will have varying degrees of truth. In Aristotelian logic, there is true and false. With fuzzy logic, there is a scale of 0 to 1 where truth would be 1 and false would be 0. Decisions made with fuzzy logic take into account these varying degrees of truth for a variety of inputs, and produce an output (action) based on the inputs.

4. A Model of Organisational Creativity & Innovation Process

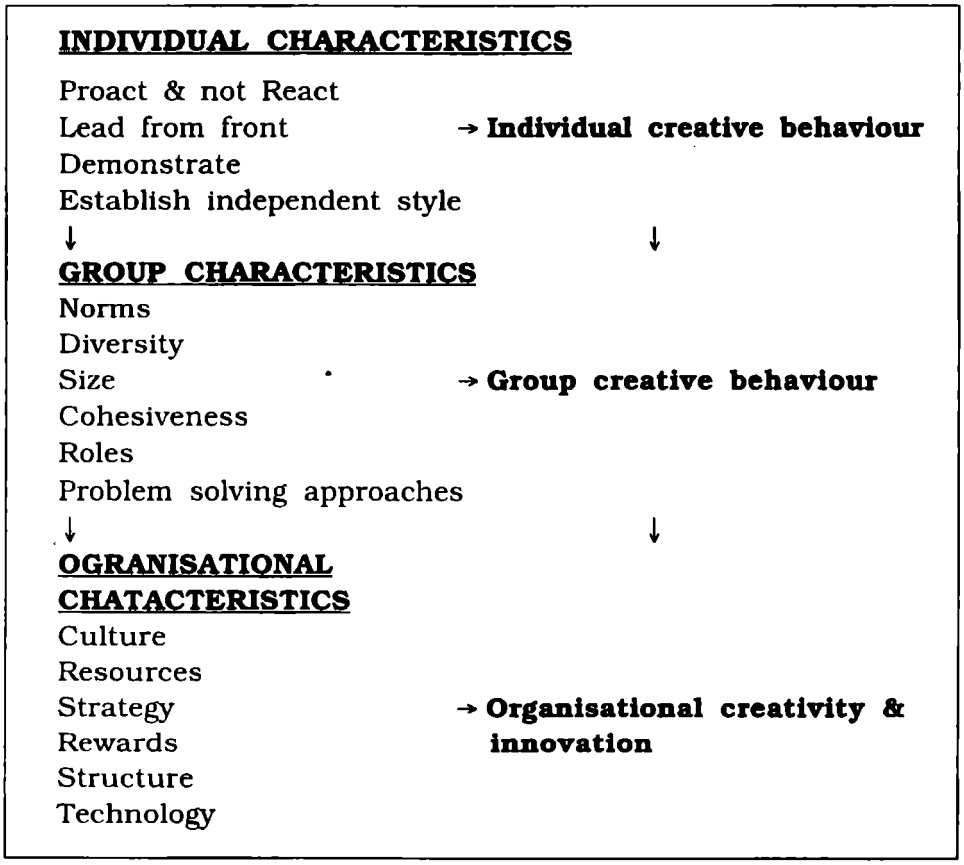


Fig. 2. Woodman, Sawyer Griffin Models (Adapted from the Woodman, Sawyer and Griffin model, 1993)

Krietner et al (1998) suggest certain properties (Figure 2), which are expected to be present in individuals, groups and eventually in organisations that would help in grooming creative ideas and talents towards fostering a creative organisation.

Individuals, who possess leadership qualities love to experiment with new ideas, and have their own unique styles of working are found to be creative.

Similarly groups are expected to lay down their norms, which are conducive to development of creative ideas. At the same time it should be aware about their size, diversified expertise pool, unity, responsibilities and the sincerity to accept challenges.

The collective features of individuals and groups need to be duly supported by organisational policies that should reflect the eagerness on the part of the organisation to pioneer new ideas and help it in promoting support for creative thinking. Modern technology, adequate financial and material resources, proper reward schemes, proper infrastructure and strategy, along with an effort to create a culture or habit among the employees to strive continuously to be different from others play a major role in sustaining the process of creative thinking within an organisation.

Conclusion

The study tries to provide a comprehensive list of various techniques for grooming creative thinking both within and outside organisational boundaries. Apart from this it also gives an analysis of a modified model of organisational creativity that provides a clear picture of those areas, which an organisation is required to concentrate in order instill that sense of creative thinking among the workers and groups within it. It may be prudent however to conclude this article by suggesting that no theory or scientific reasoning has been able to justify in conclusive terms the real source of creative juices that flow in an individual. These theories are all outcome of observations at various levels and hence the real search for reasons and factors that make and build creative mind is still on.

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ECONOMIC VALUE ADDED (EVA) — A CONCEPTUAL STUDY

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ABSTRACT

Economic Value Added (EVA), the registered trade-name of Stern-Stewart & Company, USA, has emerged as a fundamental measure of corporate performance in recent years. Hailed by *Fortune* as the "New Key to Creating Wealth", EVA duly recognises the fact that true profits don't begin until the full cost of capital (i.e., debt and equity), like all other costs, has been covered. In this paper, the conceptual aspect of EVA has been discussed in detail. A comparison is also made between EVA and residual income.

KEY WORDS

EVA, NOPAT, WACC, CAPM, EVA Spread, Residual Income.

1. Introduction

Measuring profit net of the cost of invested funds i.e., EVA is conceptually not new. Alfred Marshall, the noted economist, indicated in the 1800s that a firm earns profit only when its revenue exceeds its operating cost and the cost of invested funds. A similar concept, 'residual income', was discussed in the management accounting literature in the 1960s. However, neither measure of economic income was widely used in either accounting or management practice.

In order to overcome the limitations of accounting-based measures of financial performance, Joel Stern, managing partner of M/S Stern Stewart & Company, USA pioneered the concept of Economic Value Added (EVA) as a measure of business performance

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in the 1980s. Hence, the term **economic value added** is a registered trademark of Stern Stewart and Company, USA and is written as EVA™.

Several factors led to the popularity of EVA concept during the 1980s. The threat of leveraged buyouts and other forms of corporate takeover during this period forced managers to focus on creating value for stockholders. Similarly, the deregulation of capital markets and the growing influence of institutional investors placed increased pressure on managers to make economic decisions that maximized shareholder value. Unlike accounting measures of financial performance, EVA provides a measure of economic value enabling managers to better evaluate the impact of resource allocation decisions upon the firm's stockholders. The concept of "Economic Value Added" has made its entry into the Indian corporate environment in the year 1992.

The objective of this paper is to examine the concept of EVA and its measurement. EVA spread is compared with traditional spread and the issues of implementation and enhancement of EVA are then analysed. Finally, residual income is contrasted with EVA.

The remainder of the paper is organized as follows. Section 2 deals with the conceptual and measurement aspects. This is followed by a discussion on EVA spread vs. traditional spread in Section 3. Section 4 and 5 discuss the process of implementation of EVA and ways to raise EVA respectively. Section 6 makes a comparison between EVA and residual income. Finally, conclusions are drawn in Section 7.

2. Definition of EVA

The Economic Value Added (EVA) metric is a quantitative technique to evaluate a firm's financial performance. Any surplus generated from operating activities over and above the cost of capital is termed as Economic Value Added (EVA).

Operationally, a firm's EVA is the excess of after tax operating profits over the required minimum rate of return that the investors could get by investing in securities of comparable risk.

Symbolically,

$$EVA = NOPAT - (WACC \times TC) \quad \ldots\ldots (1)$$

where NOPAT = Net Operating Profit After Tax i.e., Profits after depreciation and taxes but before interest costs

(*NOPAT thus represents the total pool of profits available on an ungeared basis to provide a return to lenders and shareholders)

WACC = Weighted Average Cost of Capital expressed in %

TC = Total Capital Employed.

The equation described in (1) above suggests that a firm earns profit only when its revenue exceeds its operating cost and the cost of invested funds; the EVA technique measures the wealth created or destroyed from a firm's operations. A positive EVA indicates that the firm has created economic value for its stockholders, whereas a negative EVA indicates that economic value has been destroyed.

One point to be noted here is that the EVA calculated above is a rupee figure and not a percentage, i.e., EVA measures the absolute rupee value of wealth created. Further, EVA calculation removes the distinction between the providers of capital because the total capital employed in the business, whether provided by shareholders or creditors, is taken into consideration. That is, EVA figure measures the value added after the claims or expectations of each of the group of capital providers have been met.

Thus, EVA is just a way of measuring a firm's real profitability. What makes it so revealing is that it takes into account a factor which no conventional measure includes: the total cost of the firm's capital which is tied up in heavy equipment, land and building and other fixed assets and working capital like cash, inventories and receivables.

2.1 Step-by-Step Approach to Calculate EVA

The calculation of EVA entails the following multi-stage process :

Step 1 : Calculate *NOPAT*

Step 2 Calculate the value of economic capital (i.e., *total capital employed*)

Step 3 : Calculate *cost of debt*

Step 4 Calculate *cost of equity* under *CAPM* approach

Step 5 Calculate *cost of preference capital*

Step 6 Compute *WACC* (weighted average cost of capital) by multiplying the costs of debt (calculated in Step 3), equity (calculated in Step 4) and preference capital (calculated in Step 5) with their respective weights in the firm's capital structure and adding them

Step 7 : Calculate the *capital charge* or cost of capital by multiplying the *WACC* (calculated in Step 6) with the total capital employed figure (calculated in Step 2)

Step 8 Compute *EVA* by subtracting the capital charge or cost of capital (calculated in Step 7) from NOPAT (calculated in Step 1)

Calculation of NOPAT, WACC and TC are described in detail in the following sections.

The flowchart diagram to calculate EVA may be shown in Fig 1 :

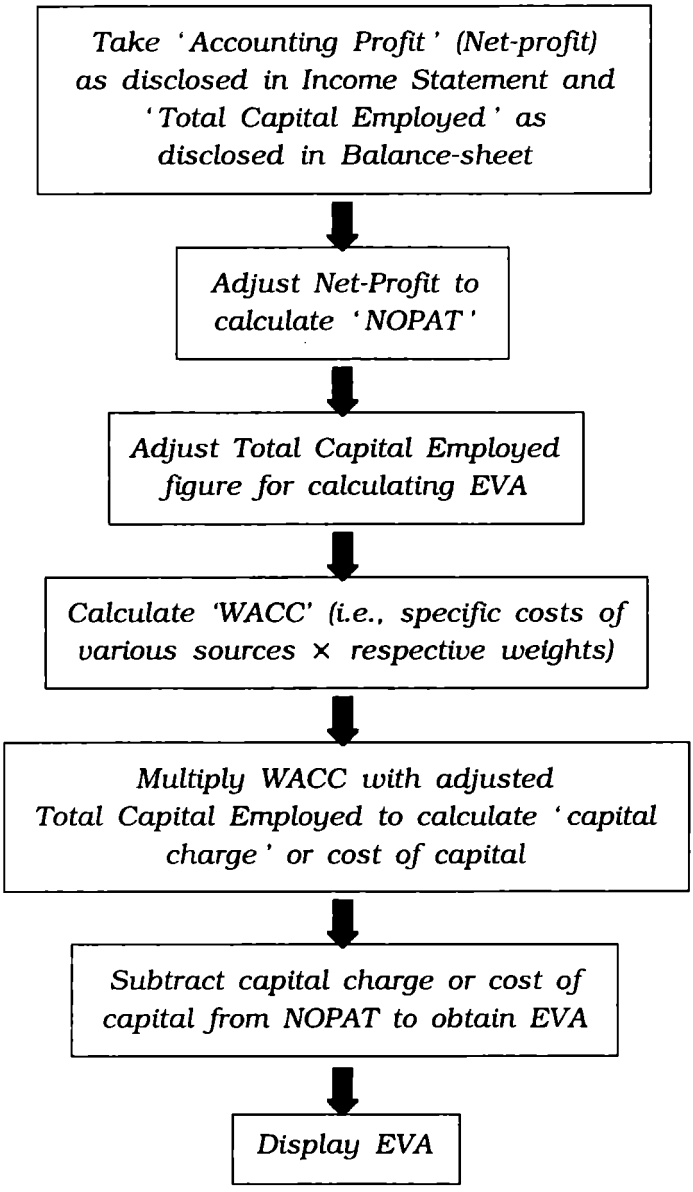

Fig. 1: Flowchart to calculate EVA.

2.2 Net Operating Profit After Tax (NOPAT)

NOPAT, as the term itself suggests, is the quantum of net operating profit that remains in the business after the payment of tax. NOPAT is measured by adding back *interest payments* and subtracting and adding *non-operating income* and *expenses* respectively to the Net Profit figure obtained from the Income Statement of the firm. However, generally accepted accounting principles (GAAP) give a lot of flexibility to corporates in accounting for certain matters like valuation of inventory, R&D expenses, depreciation etc. A company's accounting for these matters may not be based on sound economic principles and may even distort the effect of management actions. For this reason, suitable adjustments are to be made to a company's accounting profit before arriving at the true economic profit. *Stern-Stewart* has identified 164 potential adjustments to GAAP-based earnings. But, in practice, firms generally have 20 to 25 issues and make 10 to 15 adjustments to accounting income.

Symbolically,

NOPAT = Net-profit (Accounting Profit) + Interest Expenses + Non-Operating Expenses – Non-Operating Income ± Stern-Stewart adjustments

..... (2)

Note : Non-operating expenses and income include extra-ordinary items. As an exception, it may be mentioned that Stewart has considered regular non-operating income like interest/dividend on investment as part of NOPAT.

Some of the Stern-Stewart adjustments are as follows :

(i) Under *GAAP*, research and development (R&D) costs are expensed in the period incurred even though the expenditures are made with the expectation of future benefits. But such conservative nature of financial reporting may not be justified on the ground that successful R&D projects enhance the firm's future earnings potential. Hence, while measuring EVA, the NOPAT figure calculated from the Profit and Loss Account (i.e., Income Statement) is adjusted by *adding back* the R & D expenses and capitalizing them in the

balance-sheet. Such capitalized R&D costs are then amortised over the anticipated useful life of the resulting asset.

(ii) During periods of rising prices, companies save taxes by adopting the Last-In-First-Out (LIFO) system of inventory valuation. Under the *LIFO* method, costs of the recently acquired inventory are charged to production and sales while the costs of earlier purchases are accumulated in inventory thereby understating the inventory and the profits. For calculating EVA, the LIFO system of valuation is changed to First-In-First-Out (FIFO) basis which is a better method for estimating current replacement costs. NOPAT is adjusted for this change from *LIFO* to *FIFO* by adding back the difference between the LIFO and FIFO inventory values.

(iii) Deferred taxes arise due to the difference in timing of recognition of revenues and expenses for financial reporting versus reporting for tax purposes. It basically refers to the difference between accounting provision of taxes and the tax amount actually paid and hence NOPAT is adjusted for this difference so that it reflects the tax actually paid by the firm.

(iv) NOPAT is adjusted for the excessive depreciation charges, if made.

(v) NOPAT is also adjusted for certain marketing expenses like advertising and sales promotional expenses incurred for launching a new brand by capitalizing them and amortising over the period during which benefits will be reaped.

(vi) Goodwill of an acquired business, if written off, is capitalized and adjusted in NOPAT.

(vii) Expenses incurred on employee training are also capitalized and adjusted in NOPAT.

(viii) Operating leases are capitalized. The net present value of the lease payments is also capitalized and accordingly NOPAT is adjusted.

(ix) NOPAT is adjusted for the restructuring expenses and such other expenses which will benefit the firm in the long run by capitalizing them and amortising over a period.

(x) NOPAT is adjusted by adding back the provision for warranty claims, provision for bad and doubtful debts and the like. These are accounted for on cash basis.

Similar other adjustments are made to NOPAT if they distort the economic profit figure significantly.

2.3 Total Capital Employed (TC)

Total Capital Employed or *Economic Capital* consists of adjusted Equity Shareholders' fund, all interest bearing obligations and preference share capital, if any, circulating in the business. Every adjustment (Stern-Stewart adjustment) in NOPAT, as described in *Section 2.1* above, is also adjusted to equity shareholders' fund to arrive at the value of economic capital. This value of capital employed is calculated from the liabilities side of the balance-sheet of the firm. Alternatively, from the assets side of the balance-sheet, capital employed is the sum total of net fixed assets (i.e., fixed assets less non-interest bearing current liabilities) after effecting the Stern-Stewart adjustments.

The pertinent questions that arise here are :

- Whether the capital employed be taken at its opening value at the beginning of the year or the year-end value or the average of the two?
- Should the capital employed be taken at the book value or the market value?

The answer to the first question is to use the average capital employed figure for calculating EVA as this was the effective capital available to the management to earn returns of investment during the period under consideration.

As regards the second question, it is prudent to use the book value figure of capital employed in EVA calculation since this is the amount that has been entrusted to the management to employ in the business. The market value of a firm is the investors' capital and it is not the same as the firm's capital. For example, if the market price of the stock of a company is Rs. 120 and it's book value is Rs. 80, then the investor can sell the stock for Rs. 120 and so it is his capital. But the firm can sell its assets worth Rs. 80 only as this is the amount invested in the assets. Also, if the firm's assets are destroyed in a fire, then it would need Rs. 80 (ignoring inflation) to invest in similar type of assets. So, capital employed by the firm is Rs. 80 i.e., the book value of net assets and not its market value.

2.4. Weighted Average Cost of Capital (WACC) After Tax

WACC is the weighted average of the cost of debt, cost of equity and cost of preference capital, if any, with their weights being equivalent to the proportion of each in the total capital. A firm also employs retained earning in its business. Retained earning refers to that part of profit ploughed back by the company for its re-investment in the business. That is, it is taken as the investment of the owners i.e., the existing equity shareholders in the firm itself. Hence, retained earning is treated at par with equity share capital in determining the WACC. This means that the cost of retained earning may be measured in exactly the same way as equity share capital. Thus, retained earning has been clubbed with equity share capital to determine the weighted average cost of equity.

Calculation of the cost of debt, cost of equity and cost of preference share capital are explained below :

Symbolically,

$$\text{WACC} = (K_d \times W_1) + (K_e \times W_2) + (K_p \times W_3) \quad \ldots\ldots (3)$$

where K_d = cost of debt

K_e = cost of equity

K_p = cost of preference capital

and W_1 , W_2 ,W_3 are the weights assigned to debt, equity and preference capital respectively.

The proponents of EVA prefer market value weights to book value weights in computation of weighted average cost of capital because market value reflects the efficiency of the firm. The market values of various sources of funds are computed and their proportions to total market values of all the sources are used as market value weights to determine WACC.

2.4(a) Cost of Debt (K_d)

The cost of debt is simply its after-tax interest rate. That is, K_d is obtained by adjusting the pre-tax debt interest for the tax deduction.

Symbolically,

$$K_d = \frac{I(1-t)}{D} \times 100 \quad \ldots\ldots (4)$$

where I = pre-tax interest on debt
t = effective tax rate applicable to the firm
D = debt capital.

Cost of debt may either be computed after-tax or before-tax. But costs of equity and of preference capital are always calculated post-tax as these are met out of after-tax profits. So, in order to bring in uniformity and consistency in the treatment of specific costs of various sources of capital for determining WACC, cost of debt should always be calculated post-tax. Moreover, as the tax shield enjoyed on cost of debt reduces the effective debt cost, it shall be prudent to use after-tax debt cost to calculate WACC.

2.4(b) Cost of Equity (K_e)

Although equity capital does not require obligatory cash outlays as does debt, there is no reason to believe that it is 'free'. It involves an implicit expense in the form of opportunity cost which is the total return that an investor in a company's equity could expect to earn from alternative investments of comparable risk. Thus the operating profits must cover this opportunity cost of equity before the firm has made its stockholders better off.

The dividend based approach or earnings based approach of finding out cost of equity is not the proper way of calculating the return expected by equity shareholders. These approaches measure only the explicit cost of servicing equity. But the true measure of equity cost is not what a company offers but what investors expect. The expectations of the investors is the true cost of equity. The opportunity cost of equity capital is calculated by following the *Capital Asset Pricing Model (CAPM).* CAPM has also been recommended by Stern Stewart and Company, USA. The primary use of the CAPM is to determine minimum required rates of return from investment in risky assets. According to CAPM, the cost of equity is composed of a risk-free rate of return for a stock-market plus a risk premium representing the volatility of the firm's share price. The cost of equity, being a risky instrument, can therefore be determined through CAPM.

Symbolically,

$$R_j = R_f + \beta_j (K_m - R_f) \quad \ldots\ldots (5)$$

where R_j = Expected rate of return on scrip j i.e., Cost of Equity

R_f = Risk-free rate of return i.e., the average return on a long-term government bond

β_j = Beta coefficient measuring market risk of security j i.e., β is a statistical measure of the sensitivity of a security's return to changes in the market return

K_m = Expected market rate of return i.e., the average return derived from a representative market index

$\beta_j (K_m - R_f)$ = Risk-premium.

The above equation indicated that the required rate of return on equity (i.e., cost of equity) is equal to the sum of two terms – the risk-free return and an increment that compensates the investor for accepting the security risk.

2.4(c) Cost of Preference Capital (K_p)

The cost of preference share capital is taken to be its fixed rate of dividend. Since preference dividend is paid from post-tax profits, no separate adjustment for tax is necessary for determining the cost of preference capital (K_p).

Symbolically,

$$K_p = \frac{C}{P} \times 100 \quad \text{..... (6)}$$

where C = dividend on preference shares (fixed)

P = preference share capital.

3. EVA Spread vs. Traditional Spread

Recall the EVA equation No. 1 defined in Section 2 :

EVA = NOPAT – (WACC × TC)

Since NOPAT can be expressed alternatively as a rate of return on invested capital times capital, the above equation can be restated as :

$$EVA = (ROCE \times TC) - (WACC \times TC)$$

or $$EVA = (ROCE - WACC) \times TC \quad \text{..... (7)}$$

where ROCE = Return on Capital Employed = NOPAT/TC

The difference between ROCE (return on capital employed) and WACC (cost of capital) is the *spread.* The spread is an indicator of

managerial efficiency as it shows whether a company has earned a return from its business that is more than its total cost of capital. The higher the spread, the higher is the value addition and vice-versa.

EVA analysis focuses on the spread, but EVA spread is conceptually different from the traditional spread atleast in two respects :

- Meaning of Return on Capital Employed (ROCE)
- Derivation of Weighted Average Cost of Capital (WACC)

Traditional spread is the difference between ROCE and WACC where WACC is determined using servicing cost of capital employed rather than opportunity cost of capital. The distinguishing features of EVA spread vis-a-vis traditional spread are as follows :

Particulars	Traditional Spread	EVA Spread
1. Meaning of ROCE	Here, return is equivalent to Profit After Tax (PAT) plus interest on borrowings.	Return is given by NOPAT in this case. NOPAT is PAT plus interest on borrowings net of extraordinary items and Stern-Stewart adjustments.
2. Derivation of WACC	In determining WACC, dividend is taken as cost of equity i.e., opportunity cost of equity capital is not generally considered. Only effective cash outflow is considered while deciding upon the cost of capital.	While deriving WACC, cost of equity is determined under CAPM approach. Market related cost of equity capital is considered here and accordingly this takes care of the share-holders' value.
3. Effect of spread	Positive spread indicates actual cash surplus while negative spread indicates actual cash drain.	Spread indicates economic surplus or deficit after providing for opportunity cost of capital.

There are two factors that drive EVA – the spread and the capital employed. Given a particular level of spread, EVA would depend on the capital employed figure. Given a particular level of capital employed, EVA would depend on the extent of spread. In general, if the spread is positive, EVA would also be positive.

The spread denotes the relative profitability while invested capital (i.e., capital employed) denotes size or growth. If a company has negative profitability (i.e., spread), growth in size would mean more negative EVA. In such a situation, the company should either try to increase the ROCE or economise the capital invested in order to reduce the impact of negative EVA and hence improve EVA. On the other hand, if the spread is positive, growth in firm size would indicate higher EVA. Thus EVA spread indicates whether the shareholders earn a return that compensates the risk taken by them. A zero EVA spread indicates that the return earned is just sufficient to compensate the risk.

The calculation of EVA based on spread may be diagrammatically shown in Fig. 2.

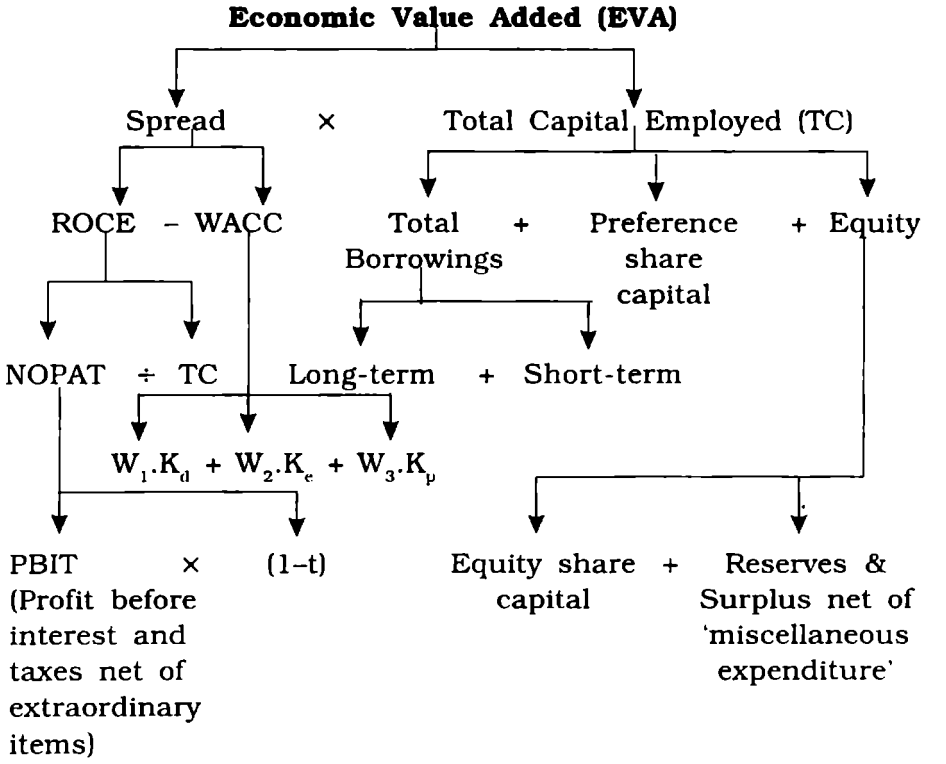

Fig. 2 : Calculation of EVA based on spread.

4. Process of Implementation of EVA

The EVA implementation should instill the following four overlapping phases, all beginning with the letter 'M'.

- Measure
- Management System
- Motivation
- Mindset

When companies employ EVA to the fullest, which is what they must do to realize its benefits, it becomes far more than just another way of adding up costs and computing profits.

At the outset, EVA must be developed as a fundamental *measure* of corporate performance. It is the corporate performance measure that is tied most directly, both theoretically and empirically, to the creation of shareholder wealth. It is the only performance measure that always gives the "right" answer in the sense that more EVA is always unambiguously better for shareholders, which makes it the only genuine *continuous improvement* metric; in contrast, actions that increase profit margins, earnings per share, and even rates of return may sometime destroy shareholder wealth.

The second phase is to develop and institute EVA as a *management system.* By a financial management system we mean the set of financial policies and procedures, and measures and methods, which guide and control a company's operations and strategy. The EVA framework should help in developing a comprehensive new system of corporate financial management that will guide every decision, from annual operating budgets to capital budgeting, strategic planning and acquisitions. It should show managers which decisions will increase economic profits and generate the most wealth for shareholders.

In the third phase, EVA should be used for *motivation* of all managers and employees of the organization so that they work cohesively and enthusiastically to achieve the very best performance possible. This aspect is concerned with tailoring the incentive compensation system that truly aligns the interests of managers with those of shareholders and causes the managers to think and act like owners.

The last phase should firmly implant EVA as a *mindset* with important constituencies inside and outside of the firm. In other words, it should cover training and communication. The EVA framework should be developed as a simple but effective method

for teaching business literacy to even the least sophisticated workers. It should also be developed as a framework that companies can use to communicate their goals and achievements to investors, and that the investors can use to identify companies with superior performance prospects.

5. Enhancing EVA

Recalling the EVA equation defined in Sections 2 and 3, it may be inferred that EVA focuses on the following five key factors to analyse how shareholders value is created :

(1) Net Operating Profit After Tax but before financing costs (NOPAT)

(2) Weighted Average Cost of Capital (WACC)

(3) Investment in the business (i.e., total capital employed i.e., TC)

(4) The rate of return on investments (ROCE)

(5) The competitive advantage period i.e., the length of time a company can sustain returns above its cost of capital.

Thus a change in any of the above factors will bring about a change in EVA. There are just four fundamental ways in which EVA can be improved :

(1) **Increasing NOPAT without using more capital** [EVA↑ = NOPAT↑ – (WACC × TC)] The underlying theme is to earn more profit with the same amount of capital either by cutting costs or increasing sales revenue through higher unit price or volume. That is, the aim would be to increase revenue-related activities while holding invested funds constant so that greater operational efficiency may be achieved.

(2) **Reducing the capital employed (TC) without affecting the earnings** [EVA↑ =NOPAT–(WACC × TC↓)] In this case, EVA may be improved by releasing capital from the activities that do not cover the cost of capital i.e., by liquidating unproductive capital. Thus the aim would be to use less capital and return the excess capital to shareholders through higher dividends or stock repurchases while holding the revenue generating activities constant.

(3) **Investing capital in high-return projects** [EVA↑ = (ROCE↑ – WACC) × TC] The underlying theme is to invest additional

capital in projects yielding after tax returns on invested capital that are higher than the total cost of the capital they require i.e., to engage in profitable growth.

(4) **Reducing the cost of capital** [EVA↑=NOPAT–(WACC↓ × TC)] This means employing more debt in the capital structure of the firm as debt capital is cheaper than equity or preference capital. Using more debt capital will, however, increase the financial risk of the firm. So, EVA can be improved by judiciously increasing the level of financial leverage (i.e., debt capital) if the company has low business risk (i.e., operating leverage arising out of fixed production costs).

Out of these four ways to improve a firm's EVA, continuous improvement in EVA can be achieved only by improving the efficiency of capital utilization and this efficiency will drive the value to the shareholders.

6. EVA vs Residual Income

EVA refers to the amount by which profits in any given period exceed or fall short of the cost of all capital used to produce those profits. This is a number that economists refer to as *residual income* which means exactly what it implies i.e., the residue left over after all costs have been covered. It is strange but a fact that EVA has gained so much of popularity in recent years when the concept of residual income has been in existence even before EVA, EVA is just a *refinement* of residual income.

Residual income, recognized since the 1770s, is based on the premise that in order for a firm to create wealth for its owners, it must earn more on its total invested capital than the cost of that capital. Thus, residual income (RI_t) *equals* traditional accounting income (i.e., net profit-NI_t) *minus* a charge for the cost of *equity* capital, where the cost of equity capital can be expressed as the beginning period book value of equity (BV_{t-1}) times the cost of equity capital (K_e). That is, notationally,

$$RI_t = NI_t - (K_e \times BV_{t-1}) \quad \ldots\ldots (8)$$

Alternatively, residual income (RI_t) is the net operating profits after tax ($NOPAT_t$) *minus* the total cost of capital as measured by the weighted average cost of capital ($WACC_t$) times the total invested capital (TC_{t-1}) at the beginning of period value.

Notationally,

$$RI_t = NOPAT_t - (WACC_t \times TC_{t-1}) \quad \ldots\ldots (9)$$

Figure 3 represents the relationship between EVA, Residual Income, NOPAT (exclusive of Stern-Stewart's adjustments), and Cash Flow from Operations (CFO).

EVA = *Economic Value Added*
= *Residual Income* (RI) ± Acct. Adj.
= [*Net Operating Profits* After Tax (NOPAT) – Cap. Chg. ± Acct. Adj.
= [*Accounting Income (i.e., Net Profit after tax)* + *Int.*] – Cap. Chg. ± Acct. Adj.
= [*Cash Flow from Operations (CFO)* – Accruals] + Int. – Cap. Chg. ± Acct. Adj. ..... (10)

Note :

- *Acct, Adj.* = Stern-Stewart's adjustments to NOPAT and Capital (TC) for alleged accounting distortions.
- *Cap. Chg.* = Capital charge i.e., charge for the estimated current cost of debt and equity capital i.e., (WACC× TC) where WACC is the weighted average cost of capital.
- *Int.* = Interest charge on debt (added back to net profit after tax to produce the operating profit figure before financing costs).
- *Accruals* = These are introduced by the financial accounting process (e.g. depreciation) and are deducted from CFO to obtain net profit.
- *NOPAT* = This figure of NOPAT should not be con-fused with Stern Stewart's NOPAT that includes adjustments to accounting earnings and capital. That is, this NOPAT figure is exclusive of Stern-Stewart's adjustments.
- *Accounting* Income (Net-Profit) = This represents after-tax net profit before extraordinary items.

Fig. 3 : Reconciling Cash-Flow from Operations, Accounting Income, NOPAT, Residual Income and Economic Value Added

Figure 3 summarises the steps that transform underlying cash flows from operations (CFO) into Stern Stewart's economic value added (EVA). Adjusting CFO for accounting accruals (such as depreciation) yields *accounting income.* Adding back interest expense to accounting income yields NOPAT. Subtracting the current cost of both debt and equity capital from NOPAT yields *residual income* (RI). Stern-Stewart's adjustments are made to NOPAT and capital components of residual income for "accounting anomalies" or "distortions" to obtain *economic value added* (EVA).

It is clear from the above discussion that where accounting income measures *profits* net of interest expense on debt capital, residual income measures *profits* net of the full cost of both debt and equity capital as does EVA. Therefore, the key difference between accounting income and residual income (RI) is the cost of equity capital. Moreover, although RI and EVA are conceptually same, the key *difference* between the two are *Stern-Stewart's accounting adjustments.* Stern-Stewart argues that these EVA adjustments produce a better measure of residual income that enhances comparability and also reduces distortions of managerial incentives introduced by standard GAAP accounting. Thus, for calculating RI, the profit and capital employed figures are taken at their book values i.e., the same as appearing in the financial statements. This means that no adjustments are made to profit and capital employed figures as reported in the Profit & Loss Account and Balance-sheet respectively unlike EVA.

7. Conclusion

The attraction of EVA as a metric for evaluating a firm's operations and for guiding management decisions is based on theoretical as well as practical considerations. EVA measures the amount of value a firm creates during a defined period through operating decisions that improve margins, efficiently utilize its production facilities, improve management of working capital and redeploy under-utilised assets.

The biggest advantage of EVA is that it forces management to expressly recognize its cost of equity and to take that cost into account in all its decisions. It makes managers conscious of the cost of every rupee they spend and thus hold management accountable for all economic outlays whether they appear in the income statement or on the balance sheet or in the footnotes to financial statements. Moreover the adjustments made to accounting

profits for calculating EVA forces managers to focus on value creating activities rather than wasting time and energy on playing with the accounting principles and numbers.

The claim that EVA is a better measure for performance evaluation compared with the traditional accounting measures of income need to be empirically validated in Indian conditions. Conceptually, the treatment of cost of equity sources in measuring EVA appears very logical.

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CORPORATE PERFORMANCE ANALYSIS VIA SWOT INDEX

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ABSTRACT

The SWOT analysis is one of the preferred methods for analysing the performance of the corporates. The analysis, however, is overwhelmingly based on analyst's subjective judgement. Such an analysis is likely to reflect analyst's bias and may ultimately lead to wrong results. To overcome subjective bias it is necessary to introduce objective analysis. This paper attempts to use vector analysis in the corporate behaviour of sick industries. The results show that the analysis can accurately describe the state of corporate health profile of the investigated companies.

KEY WORDS

Vector, Resultant, Force, SWOT-index, Filtration-effect, Modulus, Matrix, Vector-factor, Parameter

1. Introduction

The analysis of performances of corporation can take several routes. It could be financial, managerial, market-wide or could be a hybrid analysis encompassing all the above areas. A hybrid analysis of corporate, brings out the skills of the analyst and usually focus hitherto unexplored areas of corporate performance. One of these most widely used forms of analyses is the SWOT analysis. More distinctively, the analysis revolves round the strength, weakness, opportunity and threat parameters of a corporation. However, an acceptable analysis should have a theoretical foundation and a method that is least cumbersome, allows greater flexibility to users and easy to arrive at the required result, on the basis of which important corporate decisions could be taken. A look into the identifiable parts of the SWOT analysis reveals that decision

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on the basis of SWOT analysis is usually a complex process and a good deal of subjective inputs are interlocked in the analysis to derive the final result. One way to overcome this drawback, is to infuse objective analytical tools into the analysis, Such a process would rest on theoretical treaties and would be more accurate in the interpretation of the results. In this article we attempt to make such an effort for enlarging the scope of SWOT analysis. Since, overlapping signals emanate from the SWOT parameters, it is necessary at this stage to devise a composite index on all parameters, so that a definite conclusion could be conveniently drawn from the analysis of such a composite index.

2. Methodology

A firm, as observed, operating in an economic environment, is influenced by various contributing economic forces. These forces cumulatively shape the firm's actual performance. They can be grouped under macro and micro categories, while some can be uniquely traced to the firm, that influence only the firm in question. Hence evaluation of a firm's activity with respect to the total environment would depend on individual characteristics of environmental and other macro (industry-level) variables as well as on the nature of particular attributes reacting uniquely on the investigated firm.

If the total contribution of these forces is measured and reflected on a scale, a definite profile of the firm can possibly be obtained, which could be used for the purpose of differentiation with respect to other firms belonging to the same category of industry. Based on the above premises, it is possible to construct an index, which may conveniently be called SWOT Index, that will show the relative intensity of these micro and macro forces on the unit. The index will be so called, as it will be a composite index of four parametric characteristics of an unit viz. Strength, Weakness, Opportunity and Threat. Out of these, Strength and Opportunity are two favourable factor, while Weakness and Threat consist of two unfavourable factors influencing the unit. The composite index will show the profile of economic health of the company, from which, we could draw or form decisions regarding future course of action best suited for the company. It can additionally, be possible to compare two or more firms belonging to the same industry segment of given economic fundamentals.

3. The Model

In order to construct the model, the SWOT parameters are divided into three major economic functions viz. environmental,

industry and unit level attributes. The probable matrix is given below.

Environmental (Macro) Factor Weightage (Composite)	**Industry** (Macro) Factor Weightage	**Unit** (Micro) Attribute Weightage	Total Score
Strength			
Weakness			
Opportunity			
Threat			

The above weightages can be regarded as vectors i.e. environmental vectors, industry-across vectors, unit-attribute vectors. A short description of functions and characteristics of each vector is given below :

4. Environmental Factor Weightage

The factors that consist the environmental factor weightage may relate to, government policy affecting all the industry segments, change of customers needs, alternative high technology product etc. In the recent era of globalisation and liberalisation, the protection given to a particular industrial segment may be withdrawn and that may lead to a considerable reduction of strength factor of the environment. In our study, we evaluated the intensity of this vector on a 10-point scale. If the influence of the vector is severe on the industry and on the unit, intensity on the 10-point scale would be high, while a less severe vector would have a low score on the above scale.

5. Industry Factor Weightage

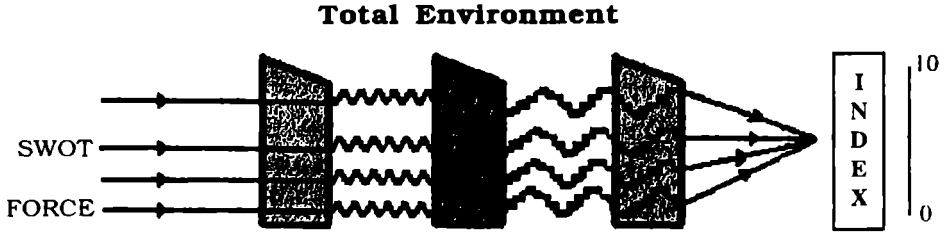
The industry (macro) factor is a factor that influence the industry segment in which the investigated firm belongs to and its influence could be felt on all the firms of the same industry, same size, approximately identical product mix and operating in loosely in the same geographical area. The factors are also similarly evaluated on a 10-point scale. The macro factor may relate to organisational culture of the industry as a whole, market reputation of the product manufactured by the industry etc. We may explain the situation by comparing the present state of jute and information technology industry. In the jute industry, although there has been potentiality of growth for its environment friendly features, hardly

there has been any effort to bring out diverse products, The research and development of the product are practically non-existent. As a result, even if there is potentiality, there is no growth of the industry. The industry leaders are more to blame for this fiasco. Accordingly, industry level forces (macro forces) are conspicuously unfavourable. In contrast, the IT industry in India is globally competitive. Accordingly, if the same factors are considered for IT industry, the positive factors would have far greater weightage than the negative factors. While, in the former case, it is the negative factors that would get more weightage relative to positive factors. Additionally, the economic environment in the IT industry segment, global competitiveness and opportunity will continue to attract talented and skilled workforce to this sector than to jute sector. As a result, the jute industry would tend to suffer from sector specific resource (financial/human resource) allocation constraints. These factors would have a direct effect on the representative units of the industry

6. Unit Level Weightage

The Unit Level factor weightage are evaluated on the basis of our detailed analysis of the performance of the firm and indexed on a 10-point scale. There are various factors that can be isolated under each parameter, viz. Strength, Weakness, Opportunity, and Threat. We have, however, selected only the three most important factors for causing sickness in the unit, for constructing our index. We believe that these three factors would reveal enough to define in its entirety the profile of the parameters both at environmental and industry level. The scoring on a 10-point scale was made entirely on the basis of our in-depth analysis of the sample unit.

The final effect of these forces on the unit can be measured in a structured manner as shown in the diagram below :



Legend :

Environmental Level O Industrial Level O Unit Level O

Fig.1

The incidence of forces can be evaluated from the filter-effect of the universal economic environment. The economic universe would generate forces for the creation as well as destruction of firms producing goods and services etc. These forces, so generated, pass through specific economic environmental field-filter, that is guided by the factors, like government policy etc. After passing through this phase, it is further influenced by the specific industry characteristics and is shown as the industry-level field-filter. Finally, the forces reach the unit through the vector field-filter of individual attribute affecting the unit. At this final stage, the forces cause the actual effect on the unit, that is reflected in the actual performance of the unit. Hence, in another sense, the index is a good estimation of the performance of the unit, revealing thereby the economic health of the unit.

7. The Mathematical Foundation

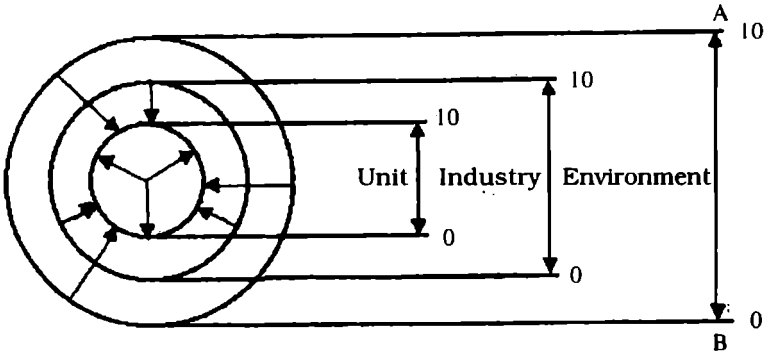


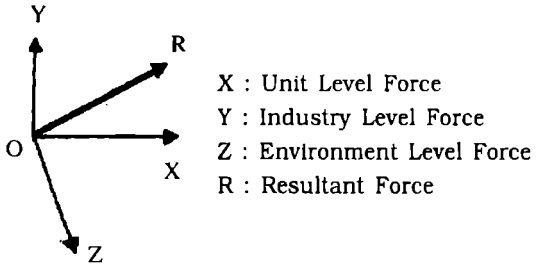
Fig. 2

In order to provide further theoretical foundation of the index, we have subjected the index to a model specific evaluation. The model for action-reaction effects on the economic forces of the unit is given above (Fig. 2).

The above model depicts the action-reaction dynamics of forces on the unit. The forces comprise, unit-level forces, industry-level forces and environmental level forces. How these forces finally act on the unit are also shown in the above diagram (Fig-2). As can be observed, the above forces can be individually represented as follows :

The forces are in x, y and z directions and the resultant force (**R**) can be calculated on the basis of vector force properties. In order to provide a complete description of the vector, it is necessary to measure the magnitude and direction of the said vector. The vector (economic) acting on a unit is unidirectional towards the unit, since the effect of these forces on the unit causes the actual performance of the unit. Hence, if the magnitude of the vector is evaluated, its

description would be complete. In the figure-3 below, OX, OY and OZ are mutually perpendicular and the resultant **R** is given by :



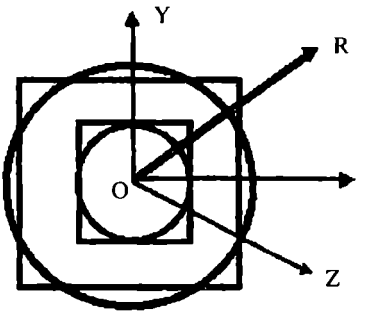


Fig. 3

$$R^2 = OX^2 + OY^2 + OZ^2$$

$$\text{Hence, } |R| = \sqrt{OX^2 + OY^2 + OZ^2} = \sqrt{X^2 + Y^2 + Z^2}$$

Further, from vector properties, it can also established that a sum of vectors is equal to the sum of the individual associated vectors. We would use, these two important properties of vector while calculating our index.

Since, all the external forces, viz, industry and environmental, are found to be active within the company after 'filtration-effect', we can resolve the forces accordingly and the resultant would be acting on the unit. Hence, if the unit-level force is measured on a 10-point scale, the scoring devices of the other forces, viz. industry and environmental forces should also have to fall on a same measurement scale, i.e. 10-point scale on unit-level. On the basis of the above criterion, the model (Fig. 2) is built. The industry level forces are acting on the unit and when these are measured, they fall on a magnified scale (10-point), as constructed for the unit-level forces. In other words, if the characteristic unit-level force is magnified, it would create a spectrum on a field described by the plane AB (Fig. 2). In all the cases, it is the same spectrum that is taken into consideration and therefore, magnitudnal mix of the forces that created the spectrum, would be same for each level, viz. unit, industry and environmental. Hence, the scale that we have used for all the stages is the same, which permits us to calculate intensity of the force finally acting on the unit, on the basis of the above scale.

8. The Model Construction

Since, SWOT index could give several parametric signals and the experimental scope is vast, we have narrowed down our effort to test the efficiency of the SWOT index in only one economic phenomenon, i,e., to decide on the future course of sick industrial units. For the purpose, we have identified three measurable factors under each parameter, namely, strength, weakness, opportunity and threat and have evaluated their score on individual parameters and on the composite index. There are several steps in the process. We describe below such steps successively.

Step-1

In the first step, we identify several factors that influence the performance of the unit under various parameters viz. unit-level, industry-level and environmental-level. They are grouped as follows :

Factors

	Unit Level	**Industry Level**	**Environmental Level**
Parameter			
Weakness	R_1	M_1	E_1
	R_2	M_2	E_2
Threat	R_3	M_3	E_3
	R_4	M_4	E_4
	etc.	etc.	etc.
	R_i = Causes of dysfunctions for the unit.	M_i= Reasons for which, industry segment may turn sick.	E_i= Reasons for environmental problem related to the investigated industry segment.

	Unit Level	**Industry Level**	**Environmental Level**
Parameter			
Strength	S_1	N_1	F_1
	S_2	N_2	F_2
Opportunity	S_3	N_3	F_3
	S_4	N_4	F_4
	etc.	etc.	etc.
	S_i = reasons for growth	N_i= Favourable features of the industry	F_i= Environmental incentives given to the industry segments.

Step–2

We now assign score to all these vector causes under each level, viz. unit-level, industry-level and environmental-level. The industry-level matrix has been drawn up on the basis of matching unit-level cause with the industry-level factor. For instance, factor M_3 at industry level can be linked predominantly to E_3 while M_2 to E_2. In this way, environmental level matrix is constructed. The relative matrix would be as follows :

Unit-Level

Causes of Sickness (Ri) Reason for Turnaround (Si)	Score	Parameter
R_1	2	Weakness
R_2	1	Threat
S_3	4	Strength
S_4	3	Opportunity
etc.	etc	

Unit-Level

Causes of Sickness (Ri) Reason for Turnaround (Si) at Unit Level	Causes of Sickness (Mi) Favourable Features (Ni) at Industry Level	Parameter	Score
R_1	M_1	Weakness	5
R_2	M_2	Threat	2
S_3	N_3	Strength	6
S_4	N_4	Opportunity	2

Environmental Level

Unit Level Causes of Sickness (Ri)/ Turnaround Causes (Si)		Industry Level Csuses of Sickness (Ri)/ Turnaround Causes (Si)		Environmental Problems (Ei)/ Incentives (Fi)		Parameter
Factor	Score	Factor	Score	Factor	Score	
R_1	2	M_3	5	E_3	6	Weakness
R_2	1	M_2	2	E_1	5	Threat
S_3	4	N_1	6	F_4	8	Strength
S_4	3	N_4	2	F_2	2	Opportunity

As can be observed in the (Fig. 3) that forces can act on three characteristics planes, given by, environmental-level field, industry-level field and unit-level field.

The three characteristic forces are lying on X, Y and Z axes. The modulus of R of these forces is given by

$$|R| = \sqrt{X^2 + Y^2 + Z^2}$$

Since, the resultant is a composite measure, hence it is a vector that could be included in the construction of the SWOT Index.

Finally, as these are vectors, they will be governed by the additive property of the vector. Hence, the Index will be represented by the summation of the values of individual resultants. Moreover, there are two negative factors viz. weakness and threat. The sign of these vectors will be negative and therefore the index could be mathematically expressed as follows: $\sum R_{iso} - \sum R_{jwt}$, where $\sum R_{iso}$= individual resultant vector in the parameters of strength and opportunity, while $\sum R_{jwt}$ = individual resultant vector under the parameters of weakness and threat.

Upon generalisation, the SWOT index matrix and the composite score would take the following form :

Parameter	**Environ-mental**		**Industry**		**Unit**		**SWOT**
	Factor	**Score**	**Factor**	**Score**	**Factor**	**Score**	**Index**
Strength	Fi	Xi	Ni	Yi	Si	Zi	$\sqrt{X^2i + Y^2i + Z^2i}$
Opportunity	F_1	X_1	N_1	Y_1	S_1	Z_1	$\sqrt{X^2i + Y^2i + Z^2i}$
$\sum R_{iso}$					$\sqrt{X^2i + Y^2i + Z^2i} + \sqrt{X^2_1 + Y^2_1 + Z^2_1}$		
Weakness	Fi	Ai	Mi	Bi	Ri	Ci	$\sqrt{A^2i + B^2i + C^2i}$
Threat	F_1	A_1	M_1	B_1	R_1	C_1	$\sqrt{A^2_1 + B^2_1 + C^2_1}$
$\sum R_{jwt}$					$\sqrt{A^2i + B^2i + C^2i} + \sqrt{A^2_1 + B^2_1 + C^2_1}$		

Total Score (SWOT Index) =

$$\left(\sqrt{X^2_i + Y^2_i + Z^2_i} + \sqrt{X^2_1 + Y^2_1 + Z^2_1}\right) - \left(\sqrt{A^2i + B^2i + C^2i} + \sqrt{A^2_1 + B^2_1 + C^2_1}\right)$$

Where Fi, Ni, Si are the activities enhancing the strength of the company, while Xi, Yi, Zi are relative intensities of those activities drawn on 10-point scale. Similarly, F_1, N_1 and S_1 are the activities or factors catalysing efforts of the unit to exploit environmental opportunities to the advantage of the unit, and their relative scores are marked by X_1, N_1 and S_1 respectively. Similar are the factors, viz. Ei, E_1, Mi, M_1 and Ri, R_1 for weakness and threat parameters and their relative scores are Ai, A_1, Bi, B_1, Ci and C_1 respectively.

Since, R is given by $\sqrt{X^2+Y^2+Z^2}$ and hence for R_1–M_3–E_3 combination,

$$\sqrt{2^2+5^2+6^2} = \sqrt{65} = 8.06,$$

While for R_2–M_2–E_1 combination, the resultant would be

$$\sqrt{1^2+2^2+5^2} = \sqrt{30} = 5.48$$

For R_3–M_1–E_4 and R_4–M_4–E_2, the respective resultant would be

$$\sqrt{4^2+6^2+8^2} = 10.77 \text{ and } \sqrt{3^2+2^2+2^2} = 4.12$$

As $\sum R_{iso}$ = 10.77 + 4.12 = 14.89 and $\sum R_{iwt}$ = –(8.06 + 5.48) = –13.54, then the index score would be I = 14.89 – 13.54 = 1.35.

Step–3

Based on the above matrix, the index score can be calculated as follows :

Final Matrix

Parameter	Character	Environmental		Industry		Unit		Aggregate	
Strength	Positive	F_4	8	N_1	6	S_3	4	(+)	10.77
Weakness	Negative	E_3	6	M_3	5	R_1	2	(–)	8.06
Opportunity	Positive	F_2	2	N_4	2	S_4	3	(+)	4.12
Threat	Negative	E_1	5	M_2	2	R_2	1	(–)	5.48
Total Score								(+)	1.35

The basic objectives for constructing SWOT index as explained earlier, are broadly to find out :

(a) differential severity of the ailments in the sample units ;

(b) what parameters contribute to the maximum extent for the ailments ;

(c) how the intra parameter weightages influence the total index score ;

(d) whether the unit would survive under present condition and if so, what strategy should be built up around the parameters to make the revival plan a success.

In order to achieve the above objectives, the parameters are required to be evaluated objectively rather than subjectively, as we believe that subjective evaluation may reflect investigator's bias and may leave a wide space for criticism and arguments.

The detailed procedure to be followed for constructing the index, has already been spelt out earlier. The next step revolves round in the identification of vector identity of factors under each parameter.

9. Selection of Vector Factor

We have identified several ratios as class representatives of the parameters. The selection of ratios is influenced by several factors, chief among them are the followings :

(i) The ratios represent a magnitude of variance between two items of financial variables. So they have scalar values.

(ii) The ratios vary over time. The variations are statistically significant over time. In fact, an enormous body of literatures is available, which identifies several ratios that could predict economic event, for example, bankruptcy, with considerable accuracy before a significant period of time, for instance 2-3 years before actual happening of the event. Hence, the ratios are capable of showing the direction. The celebrated works of Beaver, Altman may be cited as examples.

If the above two factors are considered, it would be observed that the ratios have magnitude as well as direction in their identity and as a logical consequence, they may be regarded as vector. Hence, in pursuant to the above logic, the ratios are selected as vector factors for the individual parameters. Additionally, the ratios are objective functions and any interpretation of their behaviours are required to be made objectively. Therefore, subjective bias entering into the investigation would either be low or non-existent. In the next section we describe what ratios we have selected and the underlying reasons for their selections.

10. Selection of Ratios

We initially considered 23 ratios, which were found to be significant in assessing the viability of the investigated units. The ratios are given below :

i) Capital/Labour Pay Out Ratio.
ii) Current Ratio.
iii) Debt Equity Ratio.
iv) Sales to Total Assets.
v) Working Capital Turnover Ratio.
vi) Net Fixed Assets to Total Assets Ratio.
vii) Gross Value Added per Rupee Wages paid.
viii) Return on Total Assets.
ix) Return on Equity.
x) Return on Capital Employed.
xi) Gross Profit Ratio.
xii) Net Profit Ratio.
xiii) Return on Preference Capital.
xiv) Gross Value Added per Employee.
xv) Return on Gross Fixed Assets.
xvi) Total Net Working Capital/Total Assets.
xvii) Retained Earnings/Total Assets.
xviii) PBT/Total Assets.
xix) Total Gross Margin/Gross Value Added.
xx) PBDIT/Sales.
xxi) Net-worth/Value of Output.
xxii) (PBIT + Indirect Tax + Excise)/Sales.
xxiii) Cash loss to implied subsidy.

From the above, group, three individual ratios are selected for each parameter and they are grouped as under :

Strength	Weakness	Opportunity	Threat
1. Gross Profit Ratio	4. PBDIT/Sales	7. Working Capital Turnover Ratio	10. Total Gross margin to gross value added
2. (PBIT+Indirect Tax+Exercise)/ Sales	5. Net Worth/ Sales	8. Gross Value added per Re waged paid.	11. Capital/Labour pay out
3. Return on Gross Fixed Assets.	6. Cash loss to Implied subsidy	9. Cash loss to implied subsidy.	12. Return on total Assets.

We now explain the reasons behind selection of Ratios under each parameter viz. Strength, Weakness, Opportunity and Threat.

11. Strength Parameter

The economic strength of a company is dependent on its ability to withstand the market competition, internal chaos as well as environmental dysfunctional economic forces (conveniently identified by Government's fiscal policy). The market competition can be identified by indicators like sales growth, while the effect of internal chaos i.e. extent of efficiency in operation could be indirectly evaluated by corresponding gross profit. In other words if both the market competition and the internal chaos are to be objectively evaluated by the help of an indicator, it is natural that the G. P. ratios as given by GP/Sales would be best suited. Similarly one of the indicators for evaluation of the environmental factors like effect of government's fiscal policy, could be (PBIT+Indirect Tax+Excise)/ Sales. Accordingly we have selected this ratio as the second ratio under the Strength Parameter.

Similar is the case for selecting return on gross fixed assets, since it also gives us an indication of the extent of internal chaos i.e. internal efficiency of the company in an indirect way.

12. Weakness Parameter

The economic weakness of a company is usually due to loss of market, increase of internal chaos i.e. greater efficiency in operations, detrimental effect of government economic policy. It is therefore clear that economic assessment of weakness is a diametrically opposite assessment of its strength. In other words, the factors for evaluation of this parameter would be same as under strength parameter since these are two faces of the same coin. The analysis is little stretched, however, in this case, vis-a-vis the strength parameter and hence we have selected some nearly identical ratios like PBDIT/Sales and Net Worth/Sales. In addition, it is observed that final collapse has been prevented by the government by periodic infusion of funds, so that the unit can carry on its operations. This is a singular factor in favour of the company from its impending winding up. However, we have considered this factor as another main weakness since this subsidy hinder the entrepreneurship of the workforce. It further leads to continuation of the ailments to its present chronic stage. The ratio, Cash loss to implied subsidy has been selected for the above reasons.

13. Opportunity Parameter

The factors under this parameter relates to the environmental opportunity available to the company and how these opportunities are exploited by it. The factors under this parameter could be (i) gap between demand and supply (ii) how efficiently the products are being manufactured and available to the customers at a comparative price advantage etc. These factors are only indicative and not exhaustive. If the efficiency of the company is to be understood under opportunity parameter it is obvious that cost control and efficient manufacturing operations are two important factors under the above category. The ratios that could suitably draw out the profile of the above factors would be :

1. Working Capital Turnover Ratio
2. Gross Value Added/Re Wages Paid

We have earlier explained that the subsidy is an indirect factor of strength of the Company, though it also could be surrogate measure of weakness of the unit. This indirect measure is important from 'opportunity' view point. Accordingly, the ratio of cash loss to implied subsidy has been selected, as it counts an opportunity to remain under operative condition even in the face of severest economic disaster.

14. Threat Parameter

The threat to the core competency of the company could be conveniently evaluated by the gross margin, labour cost and economic return earned by the company. It is for this reason we have selected the following ratios :

(i) Total gross margin to gross value added.

(ii) Capital/Labour Cost.

(iii) Return on total Assets.

Having selected the above ratios it is now our endeavour to construct a matrix as per step 2.

The constructed matrices under three separate economic parameter are given below :

(i) Environment/Unit Matrix (Table–A).

(ii) Industry/Unit Matrix (Table–B).

(iii) Environment/Unit Vector and Industry/Unit Matrix (Table–C).

(iv) Final Matrix (Index Value) (Table–D).

15. Selection of sample companies

For the purpose of selection of our sample we confined to those units which are sick as per definition of the BIFR. We have selected six such companies and their names are given below :

1. Durgapur Chemicals Limited (DCL)
2. Eastern Distilleries and Chemicals Limited (EDCL)
3. National Iron and Steel Company Limited (NISCO)
4. Neo Pipes and Tubes Company Limited (NPTCL)
5. Electro Medical and Allied Industries Limited (EMAIL)
6. Kalyani Spinning Mills Limited (KSML)

16. Results

We have already explained the mechanism for evaluation of index score of the individual units in the earlier paragraph. On a 10-points scale the composite measure for favourable index score of a unit would aggregate to 103.92, while the unfavourable score will be a score of - 103.92. In other words, the composite index score would vary between +103.92 and -103.92. If the above scale is divided into four equal parts, the first quartile point would fall at +51.96, the second quartile point or the mid point would be zero, while the third quartile point would be at -51.96. The coordinate value of the quarter points would be an important criteria for the evaluation of the health profile of our sample units.

The mid point at zero would mean an economic state of the unit where the environmental policies as well as growth factors are at break-even position. In other words, any adverse change in the economic policies would pull the units towards its ailing phase while favourable economic policies would push the unit towards healthy track.

The first quartile point at 51.96 would reveal an economically strong company with a prospect of healthy growth. The indicative value of the third quartile point viz -51.96 shows precarious economic condition of an unit, in which a very severe ailment has set in. It also shows that unless major economic turn-around steps are taken at this juncture, the sample unit would be unviable for all practical purposes. Moreover, any score below this point would mean an economic condition where no nursing step could possibly revive the company from its ailing state. Alternatively the units falling under this category would be best abandoned rather than making efforts of revival through a nursing plan.

The individual index score of the units under our study are given in the table 1

Table 1

Name of the Unit	Composite Index Score	Remarks	Status
1. DCL	-78.04	Below the third quartile point.	Unviable
2. NPTCL	-63.12	Below the third quartile point	Unviable
3. NISCO	-65.72	Below the third quartile point	Unviable
4. EDCL	-28.91	Above the third quartile point but below the mid point	Vigorous nursing needed to revive the unit.
5. EMAIL	-33.12	Above the third quartile point but below the mid point	Vigorous nursing needed to revive the unit.
6. KSML	-79.66	Below the third quartile point	Unviable

From the above table it is quite clear that the following companies are required to be abandoned as any nursing plan would fail to revive the company from their sick state :

1. Durgapur Chemicals Limited.
2. Neo-Pipe and Tubes Company Ltd.
3. National Iron and Steel Company Ltd.
4. The Kalyani Spinning Mills Ltd.

All the above units are either on the third quartile point of index score or falling below that point.

It may be further observed that the subsidy provided by the government to the above companies is singularly responsible for the economic survival of the company. If the subsidy is withdrawn by the government, the collapse of the unit will be instant and definite. At this stage, we are not evaluating the secondary and tertiary effect of the collapse of these units on the economic and social environment, since it is beyond the scope of the present study. However, from a pure micro-economic point of view there has been no need for sustaining the operational cost of the unviable units by the government. The composite index score has conclusively shown effectiveness of the nursing plan towards a viable turn-around.

In respect of the other two companies viz. Eastern Distilleries & Chemicals Ltd. and Electro-Medical & Allied Industries Ltd. there is a scope for improvement of the health of these companies. However, immediate and vigorous nursing is needed to revive these units.

We, therefore, observe that out of six units in our sample, only two are expected to turn around within a reasonable period of time provided viable and vigorous nursing plan is implemented immediately. In the remaining four cases, no revival plan would possibly succeed to turn these companies back to their healthy state.

17. Conclusion

The SWOT analysis is an analytical tool used by an investigator to examine his desired choice of areas in corporate behavior. The effectiveness of the analysis is dependent on the analyst's skill and his qualitative assessment. As a result, the investigator may suffer from wrong qualitative choices and biased views. In order to overcome such possibilities, it is desirable to convert the qualitative analysis to a quantitative analysis. In other words the route should be changed from subjective examination to objective assessment. This paper suggests one such method of objective evaluations. Here we investigated the case of industrial sickness and for the purpose we have selected a sample of six companies. A set of financial ratios is chosen as objective functions under each parameter, on the basis of pre-determined criterion. Finally, a rank matrix is constructed for all the objective functions. Since, the behaviour of these objective functions are like vectors, the index is constructed on the basis of vector properties. We term the index as 'SWOT INDEX'. The index has also ranked on the basis of its absolute values. These ranking are then used to asses the relative strength and weakness of the investigated companies. We have constructed the 'SWOT Index' for all the companies and have ranked them in descending order. The result shows that the index can accurately describe the state of corporate health profile of the investigated companies on a given scale. Further, the index is also helpful in forecasting the future course of action. We have already predicted the future health profile of the investigated units and the model's accuracy can only be evaluated over a future time period. The present ranking, however, compares favourably with the present and past corporate health profile of the sample companies. The SWOT Index can also be conveniently applied to evaluate other corporate parameters, like, brand strength, corporate health, marketing strategy etc. The

objective functions, in those cases need to be appropriately selected so that their behaviours corresponds to that of vectors. The Index can then be used to select the best alternative.

18. Limitations

It can be well argued that choice of objective functions is crucial to the index construction and different objective function would give different index score. In that event also, the information content of the index score will not be reduced as its interpretation will take different route. For instance, the different financial ratios will have different score on the scale and the aggregate value of the score is expected to be nearly identical. However, it is advisable to take as many factors as possible instead of restricting it to three only, as done in our study. The second obstacle that is encountered is the subjective allowance for assigning the vector score for each factor, under each parameter. Further research is necessary in this regard. One way to overcome this is to build up further matrix and the vector score can be worked out mathematically from them.

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TABLE—A

VECTOR VALUE ON THE BASIS OF ENVIRONMENT/UNIT MATRIX

Parameter	DCL Absolute Value	DCL Vector Value(a)	NPTCL Absolute Value	NPTCL Vector Value(a)	NISCO Absolute Value	NISCO Vector Value(a)	EDCL Absolute Value	EDCL Vector Value(a)	EMAIL Absolute Value	EMAIL Vector Value(a)	KSML Absolute Value	KSML Vector Value(a)	(b) Environment Vector Value
Strength													
1. Gross Profit Ratio (%)	-0.37022	0	-0.70055	0	-1.09515	0	-0.04304	0	0.002195	1	-0.2789	0	11.9
2. (PBT+Int.+ Indirect Tax+ excise)/Sales	-2.1908	0	-1.1344	0	-3.0358	0	-0.1645	1	0.2675	2	-6.0562	0	4.824
3. Return on Gross Fixed Assets (PBDIT/F.A)	-4.21198	0	-1.1124	0	-2.7381	0	-0.2005	10	0.01	1	-5.1457	0	0.0786
Weakness													
4. (PBDIT)/Sales (%)	4.2198	10	-1.1124	10	-2.7381	10	-0.1995	10	0.01	1	-5.1457	10	11.9
5. (Net Worth- Intagible Assets)/Sales	-230.332	10	-16.34	10	-14.41	10	-0.2505	6	-4.3106	10	-135.707	10	0.622
6. Cash Loss govt. subsidy	11.49557	10	2.9685	10	8.36993	10	1.45	10	0.268785	4	7.202615	10	0
Opportunity													
7. Working Capital Turnover Ratio	-0.31	0	-1.473	10	-0.236	10	1.192	10	0.847	10	-4.38	0	0.122
8. Gross Value added per Re. wages paid	-0.186	0	-0.476	0	-25.102	0	-0.268	0	1.031	1	-0.233	0	12.837
9. Cash loss to govt subsidy	11.5	10	2.93	10	8.37	10	0.2005	10	0.251	1	7.202	10	0

TABLE—A (Contd.)

VECTOR VALUE ON THE BASIS OF ENVIRONMENT/UNIT MATRIX (Contd.)

Parameter	DCL Absolute Value	DCL Vector Value(a)	NPTCL Absolute Value	NPTCL Vector Value(a)	NISCO Absolute Value	NISCO Vector Value(a)	EDCL Absolute Value	EDCL Vector Value(a)	EMAIL Absolute Value	EMAIL Vector Value(a)	KSML Absolute Value	KSML Vector Value(a)	(b) Environment Vector Value
Threat													
10. Total Gross Margin/Total Value added	-4.21198	10	-1.1124	10	-2.7381	10	-0.2005	9	0.01	9	-5.1457	10	11.9
11. Capital/Labour Paid out Ratio	2.43	8	-3.06	10	-3.41	7	-4.37	6	6.78	4	-1.27	9	10.76
12. Return on total Assets	-0.036	10	-0.083	10	-0.054	10	-0.23	10	0.028	0	-0.065	10	1.4

(a) Vector Value is computed with respect to Environmental absolute value as given in Column (b) vis-a-vis the individual absolute value.

DCL = Durgapur Chemicals Ltd.

NPTCL = Neo Pipes and Tubes Co. Ltd.

NISCO = National Iron & Steel Co. Ltd.

EDCL = Eastern Distilleries & Chemical Ltd.

EMAIL = Electro-Medical & Allied Industries Ltd.

KSML= The Kalyani Spinning Mills Ltd.

TABLE—B

VECTOR VALUE ON THE BASIS OF INDUSTRY/UNIT MATRIX

Parameters	EMAIL			NPTCL			DCL			KSML			NISCO			EDCL			Remarks
	Industry Absolute Value	Unit Absolute Value	Rank Vector Value	Industry Absolute Value	Unit Absolute Value	Rank Vector Value	Industry Absolute Value	Unit Absolute Value	Rank Vector Value	Industry Absolute Value	Unit Absolute Value	Rank Vector Value	Industry Absolute Value	Unit Absolute Value	Rank Vector Value	Industry Absolute Value	Unit Absolute Value	Rank Vector Value	
1. Gross Profit Ratio (%)	17	0.002195	1	9.8	0.70055	1	18.55	-0.37022	0	7.0	-0.2789	0	12	1.09515	1	22	0.04304	1	The vector value of the individual unit is calculated by comparing the absolute value of the individual raitos under each parameter at unit level with that of at industry level
2. (PBT+Int.+Indirect Tax+excise)/Sales	0.13	0.0051	1	0.071	-1.344	0	0.135	-2.1908	0	0.025	-6.0562	0	0.063	-3.0358	0	0.1867	0.1645	5	
3. Return on Gross fixed Assets (PBDIT/F.A)	47.33	0.0167	0	31.86	-0.426	0	37.94	-0.22	0	18.39	-0.4332	0	12.73	-0.1104	0	50.88	0.221	1	
Weakness																			
4. (PBDIT) Sales (%)	17.0	0.0022	9	9.8	-0.701	10	18.55	-0.3702	10	7.0	-0.2789	10	12	-1.11	10	22	0.0403	9	
5. (Net Worth-Intangible Assets)/ Sales	0.581	-0.946	10	0.583	-10.295	10	0.6649	-20.208	10	0.563	-7.356	10	1.178	-1.095	10	0.8976	-0.0401	10	
6. Cash Loss to implied subsidy	0	0.048	4	0	1.29	10	0.0	0.91	10	0	0.85	10	0	0.23	8	0	0.059	4	As above
Opportunity																			
7. Working Capital Turnover Ratio	0.17	1.9245	10	0.26	3.34506	10	0.19	-0.699	0	0.01	-9.952	0	0.18	0.5348	10	0.21	3.292	10	
8. Gross Value added per Re wages paid	5.71	1.013	5	3.54	-0.476	0	8.96	0.186	1	2.12	0.233	1	6.9	-25.102	0	7.82	1.192	2	As above
9. Cash loss to govt. subsidy	0	0.048	4	0	1.29	10	0	0.91	10	0	0.85	10	0	0.23	8	0	0.059	4	
Threat																			
10. Total Gross Margin/Total value added	0.54	0.0129	6	0.45	-3.102	10	0.70	-4.366	10	0.30	-3.284	10	0.59	meaning-less	10	17.2	0.1608	9	
11. Capital/Labour paid out Ratio	8.89	6.78	6	9.07	3.06	3	21.59	2.43	2	3.27	1.27	3	36.78	341.86	10	16.78	4.37	4	As above
12. Return on total Assets. (%)	41.04	-0.0015	10	25.29	-0.083	10	30.79	-0.036	10	2.52	-0.0847	10	7.14	-0.054	10	46.79	0.023	5	

EMAIL = Electro-Medicl & Allied Industries Ltd.
NPTCL = Neo Pipes and Tubes Co. Ltd.
DCL = Durgapur Chemicals Ltd.
KSML= The Kalyani spinning Mills Ltd.
NISCO = National Iron & Steel Co. Ltd.
EDCL = Eastern Distilleries & Chemical Ltd.

TABLE—C

DERIVATION OF UNIT LEVEL VECTOR VALUE ON THE BASIS OF ENVIRONMENT/UNIT VECTOR AND INDUSTRY/UNIT VECTOR

Parameter	EMAIL			NPTCL			DCL			Remarks
	Environment/ Vector Value	Industry/ Unit Vector Value	Resultant Unit Vector Value	Environment/ Vector Value	Industry/ Unit Vector Value	Resultant Unit Vector Value	Environment/ Vector Value	Industry/ Unit Vector Value	Resultant Unit Vector Value	
Strength										Resultant Vector is calculated on the basis of the following expression :
1. Gross Profit Ratio	1	1	1	0	1	1	0	0	0	
2. (PBT+Int.+Indirect Tax+Excise)/Sales	2	1	2	0	0	0	0	0	0	$\frac{\sqrt{X^2+Y^2}}{14.14} \times 10$
3. Return on Gross Fixed Assets (PBDIT/F.A)	1	0	1	0	0	0	0	0	0	
Weakness										since the vector scale is a 10-point scale, while the maximum resultant vector value would be 14.14.
4. (PBDIT)/Sales	1	9	6	10	10	10	10	10	10	
5. (Net Worth-Intangible Assets)/Sales	10	10	10	10	10	10	10	10	10	
6. Cash Loss to govt. subsidy	4	4	4	10	10	10	10	10	10	
Opportunity										
7. Working Capital Turnover Ratio	10	10	10	10	10	10	10	10	10	
8. Gross Value added per Re Wages paid	1	5	4	0	0	0	0	1	1	As above
9. Cash loss to govt subsidy	0	4	3	10	10	10	10	10	10	

TABLE—C (Contd.)

DERIVATION OF UNIT LEVEL VECTOR VALUE ON THE BASIS OF ENVIRONMENT/UNIT VECTOR AND INDUSTRY/UNIT VECTOR

EMAIL	NPTCL			DCL						
Parameter	Environment/ Vector Value	Industry/ Unit Vector Value	Resultant Unit Vector Value	Environment/ Vector Value	Industry/ Unit Vector Value	Resultant Unit Vector Value	Environment/ Vector Value	Industry/ Unit Vector Value	Resultant Unit Vector Value	Remarks
Threat										
10. Total Gross Margin/ Total Value added	9	6	8	10	10	10	10	10	10	
11. Capital/Labour paid out Ratio	4	6	5	10	3	7	8	2	6	As above
12. Return on total Assets	0	10	7	10	10	10	10	10	10	

DCL = Durgapur Chemical Ltd.
NPTCL = Neo Pipes and Tubes Co. Ltd.
NISCO = National Iron & Steel Co. Ltd.
EDCL = Eastern Distilleries & Chemical Ltd.
EMAIL = Electro Medical & Allied Industries Ltd.
KSML = The Kalyani Spinning Mills Ltd.

TABLE—C (Contd.)

DERIVATION OF UNIT LEVEL VECTOR VALUE ON THE BASIS OF ENVIRONMENT/UNIT VECTOR AND INDUSTRY/UNIT VECTOR (Contd.)

Parameter	KSAIL			NISCO			EDCL			Remarks
	Environment/ Vector Value	Industry/ Unit Vector Value	Resultant Unit Vector Value	Environment/ Vector Value	Industry/ Unit Vector Value	Resultant Unit Vector Value	Environment/ Vector Value	Industry/ Unit Vector Value	Resultant Unit Vector Value	
Strength										Resultant Vector is calculated on the basis of the following expression :
1. Gross Profit Ratio	0	0	0	0	1	1	0	1	1	
2. (PBT+Int.+Indirect Tax+Excise)/Sales	0	0	0	0	0	0	1	5	4	
3. Return on Gross Fixed Assets (PBDIT/F.A)	0	0	0	0	0	0	10	1	7	$\frac{\sqrt{X^2+Y^2}}{14.14} \times 10$
Weakness										since the vector scale is a 10-point scale, while the maximum resultant vector value would be 14.14
4. (PBDIT)/Sales	10	10	10	10	10	10	10	9	10	
5. (Net Worth-Intangible Assets)/Sales	10	10	10	10	10	10	6	10	8	
6. Cash Loss to govt. subsidy	10	10	10	10	8	9	10	4	8	
Opportunity										
7. Working Capital Turnover Ratio	0	0	0	10	10	10	10	10	10	
8. Gross Value added per Re. Wages paid	0	1	1	0	0	0	0	2	1	As above
9. Cash loss to govt subsidy	10	10	10	10	8	9	10	4	8	

TABLE—C (Contd.)

DERIVATION OF UNIT LEVEL VECTOR VALUE ON THE BASIS OF ENVIRONMENT/UNIT VECTOR AND INDUSTRY/UNIT VECTOR (Contd.)

Parameter	KSAIL			NISCO			EDCL			Remarks
	Environment/ Vector Value	Industry/ Unit Vector Value	Resultant Unit Vector Value	Environment/ Vector Value	Industry/ Unit Vector Value	Resultant Unit Vector Value	Environment/ Vector Value	Industry/ Unit Vector Value	Resultant Unit Vector Value	
Threat										
10. Total Gross Margin/ Total Value added	10	10	10	10	10	10	9	9	9	
11. Capital/Labour paid out Ratio	9	3	7	7	10	9	6	4	5	As above
12. Return on total Assets	10	10	10	10	10	10	10	5	8	

DCL = Durgapur Chemicals Ltd.
NPTCL = Neo Pipes and Tubes Co. Ltd.
NISCO = National Iron & Steel Co. Ltd.
EDCL = Eastern Distilleries & Chemical Ltd.
EMAIL = Electro Medical & Allied Industries Ltd.
KSML = The Kalyani Spinning Mills Ltd.

TABLE—D

FINAL MATRIX

Parameter	EMAIL				NPTCL				DCL			
	Environment Vector Value(a)	Industry Vector Value(b)	Unit Vector Value©	Resultant Vector Value	Environment Vector Value(a)	Industry Vector Value(b)	Unit Vector Value©	Resultant Vector Value	Environment Vector Value(a)	Industry Vector Value(b)	Unit Vector Value©	Resultant Vector Value
Strength												
1. Gross Profit Ratio	1	1	1	1.73	0	1	1	1.41	0	0	0	0
2. (PBT+Intt.+Indirect Tax+Excise)/Sales	2	1	2	3.0	0	0	0	0	0	0	0	0
3. Return on Gross Assets	1	0	1	1.41	0	0	0	0	0	0	0	0
∑*Strength*				6.14				1.41				
Weakness												
4. PBDIT/Sales	1	9	6	9.38	10	10	10	17.32	10	10	10	17.32
5. (Networth-Intangible Assets)/Sales	10	10	10	17.32	10	10	10	17.32	10	10	10	17.32
6. Cash Loss to govt. subsidy	4	4	4	6.93	10	10	10	17.32	10	10	10	17.32
∑ *Weakness*				33.63				51.96				51.96
Opportunity												
7. Working Capital Turnover Ratio	10	10	10	17.32	10	10	10	17.32	0	0	0	0
8. Gross Value added per Re wages paid	1	5	4	6.48	0	0	0	0	0	1	1	1.41

TABLE—D (Contd.)

FINAL MATRIX (Contd.)

Parameter	EMAIL				NPTCL				DCL			
	Environment Vector Value(a)	Industry Vector Value(b)	Unit Vector Value©	Resultant Vector Value	Environment Vector Value(a)	Industry Vector Value(b)	Unit Vector Value©	Resultant Vector Value	Environment Vector Value(a)	Industry Vector Value(b)	Unit Vector Value©	Resultant Vector Value
9. Cash loss to govt. subdity	0	4	3	5.0	10	10	10	17.32	10	10	10	17.32
∑ *Opportunity*				28.80				34.64				18.76
Threat												
10. Total Gross margine/Total value added	9	6	8	13.45	10	10	10	17.32	10	10	10	17.32
11. Capital/Labour paid out ratio	4	6	5	8.77	10	3	7	12.57	8	2	6	10.20
12. Return on Gross Fixed Assets.	10	10	7	12.21	10	10	10	17.32	10	10	10	17.32
∑*Threat*				34.43				47.21				44.84
∑*Resultant* (Index Score)				-33.12				-63.12				-78.04

(a) Vector Value from Environment/Unit Matrix

(b) Vector Value from Industry/Unit Martix

© Vector Value from Environment/Unit Industry/Unit Matrix

DCL = Durgapur Chemicals Ltd. EDCL = Eastern Distilleries & Chemical Ltd.

NPTCL = Neo Pipes and Tubes Co. Ltd. EMAIL = Electro Medical & Allied Industries Ltd.

NISCO = National Iron & Steel Co. Ltd. KSML = The Kalyani Spinning Mills Ltd.

TABLE—D (Contd.)

FINAL MATRIX (Contd.)

Parameter	KSML				NISCO				EDCL			
	Environment Vector Value(a)	Industry Vector Value(b)	Unit Vector Value©	Resultant Vector Value	Environment Vector Value(b)	Industry Vector Value(b)	Unit Vector Value©	Resultant Vector Value	Environment Vector Value(a)	Industry Vector Value(b)	Unit Vector Value©	Resultant Vector Value
Strength												
1. Gross Profit Ratio	0	0	0	0	0	1	1	1.41	0	1	1	1.41
2. (PBT+Intt.+Indirect Tax+Excise)/Sales	0	0	0	0	0	0	0	0	1	5	4	6.48
3. Return on Gross Fixed Assets.	0	0	0	0	0	0	0	0	10	1	7	12.25
∑*Strength*				0				1.41				20.14
Weakness												
4. PBDIT/Sales	10	10	10	17.32	10	10	10	17.32	10	9	10	16.76
5. (Networth-Intangible Assets)/Sales	10	10	10	17.32	10	10	10	17.32	6	10	8	14.14
6. Cash Loss to govt. subsidy	10	10	10	17.32	10	8	9	15.65	10	4	8	13.42
∑*Weakness*				51.96				50.29				43.92
Opportunity												
7. Working Capital Turnover Ratio	0	0	0	0	10	10	10	17.32	10	10	10	17.32
8. Gross Value added per Re. wages paid	0	1	1	1.41	0	0	0	0	0	2	1	2.24
9. Cash loss to govt. subsidy	10	10	10	17.32	10	8	9	15.65	10	4	8	13.42
∑*Opportunity*				18.73				32.97				32.98

TABLE—D (Contd.)

FINAL MATRIX (Contd.)

Parameter	KSML				NISCO				EDCL			
	Environment Vector Value(a)	Industry Vector Value(b)	Unit Vector Value©	Resultant Vector Value	Environment Vector Value(b)	Industry Vector Value(b)	Unit Vector Value©	Resultant Vector Value	Environment Vector Value(a)	Industry Vector Value(b)	Unit Vector Value©	Resultant Vector Value
Threat												
10. Total Gross margin/ Total value added	10	10	10	17.32	10	10	10	17.32	9	9	9	15.59
11. Capital/Labour paid out ratio	9	3	7	11.79	0	10	9	15.17	6	4	5	8.77
12. Return on Gross Fixed Assets.	10	10	10	17.32	10	10	10	17.32	10	5	8	13.75
$\sum$*Threat*				46.43				49.81				38.11
$\sum$*Resultant* (Index Score)				-79.66				-65.72				-28.91

(a) Vector Value from Environment/Unit Matrix

(b) Vector Value from Industry/Unit Martix

(c) Vector Value from Environment/Unit and Industry/Unit Matrix

DCL = Durgapur Chemicals Ltd.

NPTCL = Neo Pipes and Tubes Co. Ltd.

NISCO = National Iron & Steel Co. Ltd.

EDCL = Eastern Distrilleries & Chemicals Ltd.

EMAIL = Electro Medical & Allied Industries Ltd.

KSML = The Kalyani Spinning Mills Ltd.

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STOCK INDEX FUTURES—THE FIRST FINANCIAL DERIVATIVE INSTRUMENT IN THE INDIAN STOCK MARKET

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ABSTRACT

In India, a particular form of derivative instrument—Stock Index Futures (SIF) has just been introduced in its stock market. What is quite usual with any new begining, has happened with SIF also. A cross section of the market players have supported it while a few, as usual, remained skeptical.

This article seeks to establish the characteristics of SIF among other derivative instruments. For this purpose, the author finds the reasons for introduction of SIF while the badla system was ruling the Indian stock market as the only speculative and hedging instrument. The pros and cons of the various issues regarding SIF are also examined.

KEY WORDS

Derivative instrument, Stock Index Futures, Options, Options on individual stock, Future, Index Multiplier, Value at Risk, GARCH, EWMA, IASC, Contract maturity.

1. Introduction

The first financial derivative instrument was introduced in the Indian stock market lately. On 9th June, 2000, Stock Index Futures (SIF) was traded in the Bombay Stock Exchange (BSE). Three days later NSE joined the league. At this moment the aggregate volume of transaction in the SIF segment is extremely low. It is less than 0.5% of the volume traded in the cash markets. However, US picture is extremely opposite. Volume in the derivative segment in the USA

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is 5 times higher than their cash counterpart. While US experience offers a strong base upon which one could be optimistic about SIF's future in India, the initial reaction that has been observed, is mixed. While Mr. Nachiket More (General Manager, ICICI–a Wharton School educated derivative wizard!) is unhesitatingly optimistic about the future of SIF, Nimesh Shah of VFC Securities is totally pessimistic. Doubts have also been raised with reference to the issues like (i) accounting, (ii) taxation as well as (iii) composition of the underlying asset (i.e., index; either 'sensex' or 'nifty').

Against this backdrop, this article has been written to create a platform for further study in this crucial area. Author has kept himself refrained from offering any suggestions or policy implications. The article has been arranged in five sections. Section I describes the purpose and plan of the article. Section II seeks to establish the characteristics of SIF among other derivation instruments. Section III finds the reasons for introduction of SIF while badla system was ruling the Indian stock market as the only speculative as well as hedging instrument. Section IV examines the pros and cons of the various questions regarding SIF. Section V concludes the article.

2. Characteristics of SIF

The purpose of this section is to understand the nature and characteristics of the SIF. At the outset of this article it has been mentioned that SIF is a derivative financial instrument. A derivative instrument is one whose performance is based on the behaviour of the price of an underlying asset. The underlying asset itself need not be bought or sold. Excepting currency swaps, a derivative instrument requires no movement of principal funds. It is because of this characteristics, a derivative financial instrument is used for hedging as well as speculative purpose.

Basically there are four key financial techniques; forwards, futures, options and swaps which are applied on different underlyings e.g., foreign exchange, government bonds, implied forward rates or concerned index. The result is different financial instrument e.g., currency options, interest rate swaps, interest rate futures or stock index futures. In India, this last form of derivative financial instrument is currently functioning on NSE-50 index (Nifty) or BSE-30 (Sensex) index.

In Section V of this article, a few favourable arguments as well as apprehensions have been expressed about options on individual stocks. Therefore, a brief discussion about the features of option trading is considered to be relevant here.

An option gives the buyer, the right but not the obligation to buy or sell a standard quantity of specific financial instrument at a specific rate on or before a future date. Option allows the buyer to walk away from his obligation when his predictions go right and at the same time, the insurance, if his predictions go wrong.

On the other hand, both in financial futures and forward foreign exchange transaction, clients are under obligation of a guaranteed rate. These products (futures and forwards) offers certainty, irrespective of any fluctuating market conditions.

A future has got 3 distinct characteristics. First, it is highly standardised. Not the parties but the exchanges in which the trade takes place-sets all the terms and conditions of the contract. Second, stock exchanges bear the counterparty risk. Third, to exit a long futures position, that is to get rid of a contract which has been purchased, one has to sell an identical contract of sell. Actual delivery is not essential.

SIF is a specific form of future agreement between two parties to compensate each other for movements in the value of a stock index over the contract period. The value of the stock index is defined as being the value of the index multiplied by a specific monetary amount (the index multiplier) which may vary from the SIF to the other. For example, for Financial Times Ordinary Stock Index, the multiplier is 25 and for S & P CNX Nifty, the same is 200.

The SIF can either be bought or sold. If a trader believes that the index will fall, she will sell the future. If she thinks that the index will rise, she will buy the future. Profits or losses are determined on the basis of number of SIF bought or sold. SIF contracts are settled not with the delivery of a basket of shares but with cash settlement. Nearly 2% of the SIF contracts reach delivery or contract expiry. Following illustration will make the nature of SIF transaction clear.

Illustration

Suppose a trader has an investible surplus of Rs. 8,00,00,000. On the date of transaction, sensex is 4,000 and the multiplier is

200. The trader predicts that the sensex will move up and she decides to invest all her surplus is SIF.

In that case she will be buying $\frac{\text{Rs. } 8,00,00,000}{4000 \times 200}$ or 1000 SIFs

If it is a 3 months contract and at the expiry of three months if sensex goes up to 4500, then her profit would be [i.e. (4,500 – 4,000) × 200 × 100] or Rs. 1,00,00,000.

On the other hand, if the sensex comes down to 3,700 level, her loss would be; 300 × 200 × 100 or Rs. 60,00,000.

Before giving clearance to the SIF trading, SEBI constituted (i) L. C. Gupta Committee (LCGC) and (ii) J. R. Varma Committee to preview the situation. LCGC, constituted in November 1996, had gone for a questionnaire survey addressed to the potential players in the financial derivative market in India. Total 112 respondents replied to the various questions addressed to them. From the survey it is known that 98% respondents felt that SIF should be introduced in the Indian market and 3 months maturity SIF contracts were favoured by 93% of the respondents. Having the affirmative opinion from the potential players in the derivative market, LCGC had given clearness to SIF trading and recommended that :

(i) the derivative trading should have at least 50 members to start derivative trading.

(ii) Existing members cannot automatically become derivative members. Along with a minimum network of Rs. 3 crore and a deposit of Rs. 50 lacs with the clearing corporation, they are expected to clear the NCFM examination on 'derivative' module, conducted by the NSE.

(iii) There will be two-tire membership. Trading member will be the member of the exchange and the clearing members would be the members of the clearing corporation.

(iv) transaction in the derivative segment should be demarcated by 'Pro' and 'Cli' for proprietor's transaction and client's transaction respectively.

In March 1998, LCGC submitted its report. The report recommended the introduction of derivative market in a phased manner beginning with the introduction of index futures. The SEBI Board, while approving the introduction of index futures trading mandated the setting up of a group to recommend measures for risk containment in the derivatives market in India. In June 1998, J. R. Varma Committee was formed. The committee opined that :

1. As the statistics on the volatility of the index futures market do not exist, reliance has to be made on the volatility in the underlying securities market.
2. As no cross margining has been permitted by the LCGC, index arbitrage would be costly and therefore possibly inefficient.

The committee took on record the estimation and backtesting results provided by Prof. Varma for his on going research work on Value at Risk (VaR) calculations in the Indian financial market. The group has evaluated and approved VaR as the appropriate risk measurement methodology.

The successful use of VaR models is critically dependent upon estimates of the volatility of the price of the underlyings. The principal difficulty is that the volatility is not constant over time. If it were, it could be estimated with very high accuracy by using sufficiently large sample of data. Thus models of time varying volatility become very important. Practitioners have often dealt with time varying parameters by confining attention to the recent past and ignoring observations from the distant past.

Econometricians too have developed sophisticated models of time varying volatility like the Generalised Auto–Regressive Conditional Hetroscedasticity (GARCH) model. GARCH considers the factors responsible for the long term volatility in the market.

Unlike GARCH, exponentially weighted moving average methods (EWMA) popularised J. P. Morgan's Risk Matrics system. EWMA is computationally very simple to implement. The volatility at the end of the day 't' is estimated using the previous volatility estimates a_{t-1} (at the end of day t–1), and the return r_t observed in the index during 't' :

$$(a_t)^2 = \lambda\ (a_{t-1})^2 + (1 - \lambda)\ (r_t)^2$$

Where λ is a parameter which determines how rapidly volatility estimates change.

The EWMA method requires the specifications of the value of λ. One can estimate itself statisfically by the method of maximum likelyhood. This processs yielded on estimate for λ for .923 for the Nifty and .929 for the sensex. These values are not significantly different from the value of .94 for λ used in J. P. Morgan's Risk Matrics system.

3. Reasons for the Introduction of SIF

Not just SIF, reasons behind the innovation and introduction of any financial instrument are basically two. Either the existing supply of financial products are unable to meet the demands of the market (change in supply condition) or the new product is relatively superior to its near competitor (change in demand condition). However, there exists a third reason of avoidance of existing regulation. Bank credit cards commercial papers, GDRs, ADRs, etc. are the innovations in response to change in supply condition. Eurodollars, Money Market Mutual Funds etc. have been innovated to avoid stringent regulation. Innovations of derivative financial products are mainly in response to change in demand condition of the financial products.

There were two main reasons for choosing index futures as introductory derivative securities. The first was that index futures provide the required mechanism for hedging risks of investments in equity. The second and perhaps the more important reason from a regulator's perspective was that unlike derivatives on individual stocks, manipulation of prices of instruments based on indices is difficult.

A derivative instrument could be used either to hedge or to speculate. Before the introduction of SIF, badla was prevailing in the Indian stock market as the only hedging instrument. BSE continued to support badla while NSE favoured SIF. This section of the article examines this transition phase of the Indian stock market.

An ideal stock market ensures the fair price discovery process. The biggest problem with badla is the mixing up of cash market price and the future market price. It adds to the confusing price discovery process in the Indian stock market. In badla, we never observe the spot price. The maturity of a badla contract is one settlement period or 15 days. In practice, the weighted average delivery period/works out only to be 52.5 days. In other words, the observed price is not the spot price but the 52.5 days future price. In badla system a broker is allowed to lever his capital many time. It is obvious that the broker would prefer it. As the supply of the securities go up, delivery becomes easy and bears become bolder. Badla or contango rises high. On the other hand, if the supply is lower and the bulls have already accumulated a big position then bears go panic to cover their position. Prices rise to artificial squeeze and the bulls

extract backwardation. If not adequately prepared, the bulls might lose. The game ends if the bulls staying power is lost. This the stock price is dictated by the (i) technical position of the market and (ii) staying power of the bulls and bears. In the short run, this is unlikely to bear any relation to the company's fundamentals. This faulty price discovery system might hinder the efficient capital allocation process.

While badla system fails to handle the hedging issues of the Indian stock market, there exists many reasons for the international acceptance of the SIF and for the strong preference for this instrument in India too. In Indian stock market, institutional investors, foreign or Indian have become the most predominant factor. SIF is more suited to them than indigenous badla. SIF is exchange monitored and more cost effective than derivatives based on individual stocks. Even pension funds in the USA are known for using stock futures for their risk hedging purpose.

The second reason in favour of introduction of SIF is equally strong. Stock Index is relatively more difficult to be manipulated as compared to individual stock prices. As a result, the possibility of cornering is reduced. This is partly due to the fact that an individual stock has limited supply which can be covered. However, manipulation of SIF can also be attempted by influencing the cash price of its component securities. But the possibility of that kind of evil play is much narrow in case of SIF in comparison to its indigenous counterpart, 'badla'.

All over the world, SIF enjoy distinct popularity over other equity derivative instruments. It is less volatile than individual stock. It implies low capital adequacy and margin requirements than derivatives on individual stocks. Transaction costs and regularity complexities are also less. It provides a less experienced but more speedy transaction market for the investors to alter their exposures to more economic information.

However, nothing could be an unmixed blessings. Critics have already expressed their doubts from different angles. Section IV focuses on some of these doubts

4. SIF—Some Doubts

Apprehensions, possibly arising out of lack of proper understanding, considerably delayed the introduction of derivative instruments in the Indian stock market. Soon after the green signal

from the parliamentary committee on finance, SEBI permitted the stock exchanges to start trading in index futures contracts. In his press interview (The Business Standard, September 16, 2000) Mr. J. R. Varma, a SEBI board member, who headed a committee set up by SEBI to measure the risk containment of SIF, said,

> "In recorded history, derivative trading was conducted in Japan for rice. The US has adopted this system and Chicago has the world's most advanced derivatives market after going through an evaluation process. We have adopted the best of all systems".

Yet, the matters of concern expressed by the critics are worth mentioning. Let us begin with accounting issues.

It is not just SIF accounting, any hedge accounting could be accomplished in number of ways. Different ways will obviously produce different results. International Accounting Standard Committee (IASC) has released IAS 32 (Financial Instrument : Disclosure and Presentation) to be effective from 1st January, 1996. The standard emphasised on proper disclosure of derivative transactions. IASC has released another standard covering the methodology of recognition and measurement issues. The Accounting Standard Board inthe UK is also working on a similar projects. In India while ICAI has already come up with a comprehensive guidelines in this respect, not a single acceptable standard has yet been formulated. While the trading in the SIF segment has already been started, the release of a comprehensive standard in this area is of crucial significance.

Regarding taxation, there exists several scope of doubts. The pivotal point from which the doubts are originating, is whether the nature of the SIF transaction be treated as hedging or speculative? While SEBI and the brouses are in favour of treating the SIF transaction as hedging, CBDT perhaps is having an opinion to treat SIF as stock in trade and to treat the resultant profit as speculative in nature. The main difficulty with this treatment is that the non-speculative losses cannot be set off against this profit. As a result, SIF is bound to be unpopular among the investors, if not withdrawn altogether. On the other hand SEBI and the brouses want that the gains from SIF be treated as STCG like forward foreign exchange transactions. The argument here is that index futures are meant to be hedging mechanism for the market players.

Arguments that might have been raised by the CBDT are (i) absence of physical delivery and (ii) absence of transfer. However, validity of both such arguments are in question. In case of ordinary

trading in respect of individual share, one can think of physical delivery but in case of SIF, the index is asset. How could the same be delivered physically?

The second counter argument is in relation to transfer. When a trader buys SIF contracts, she simply buys right to get the price differential as a profit or to incur a loss, if the expectation goes wrong. The contract by nature is divided into two limbs and the other one is automatically attracted. Thus on settlement, there is extinguishment of right in the asset and there is a case of valid transfer.

It is hoped that the learned CBDT in their wisdom would issue a circular specifically clarifying the way in which SIF transaction be treated.

Apart from the problem of taxation the composition of the index has come in for criticism. The fact that 3 scrips make up almost 30 percent of the sensex may not make the index derivatives an ideal hedging mechanism in itself unless used judiciously and timely. Besides, all forms of futures have very high administrative overheads because of mark to market features of all future contract. A position created in the future requires continuous attention a feature that is particularly disliked by retail investors. More often, therefore regulations tend to lean towards caution and impose risk containment measures that are counterproductive to generation of volume and liquidity.

5. Conclusion

Volumes of transactions in the SIF segment have been as low as Rs. 4 lacs to as high as Rs. 2.35 crores for August 2000 contracts. The record of Rs. 15/- crores worth of volume achieved some two months back remains in tact.

Whenever a new financial instrument is introduced for the first time, it takes about 8 to 12 months to pick up. This has happened in US where new financial products are introduced almost on a regular basis. In case of SIF is India, it has not been an exception. The derivative segment of the Indian stock market is likely to pick up once new products like index options and options on individual stock are introduced.

The risk containment in case of options is administratively much easier. A long position needs no margins or mark to market

since the buyer incurs the maximum possible loss from the position created right at the beginning — the price of the option purchased. As regards the short positions, if only covered options are allowed to be written, then again there would be no risk associated with the short positions. A simple mechanism of flagging-off the shares supporting the short positions in the demat account would ensure that these shares cannot be sold in the cash market. Trading in options thus totally eliminates the cumbersome book-keeping associated with trading in futures and is perfectly safe as long as naked option writing is not permitted.

Options on individual stocks is likely to generate considerable buying interest in the retail level. Similarly, options would provide institutions (e.g., insurance corporation) a method of earning commissions that traditionally do not trade actively, either by choice or because of regulations — a method of earning commissions on their holdings. There would thus be both demand and supply of options to ensure liquidity.

However, effect of price-rigging in the cash market cannot be ruled out. But to avoid this possibility, options on individual shares may be allowed only against shares that have adequate liquidity. At least a dozen of shares exist at the present moment that qualify immediately for introduction of options. Investors might be provided with the opportunity to hone their skills in transacting in derivatives. Even Malaysia had mock trading session of SIF for 6 months before they went live. This learning would provide a platform for popularising the whole range of derivative products which are likely to arrive in the Indian stock market. Within a couple of years or even earlier.

All these optimistic thoughts are fine. There is no harm in dreaming to reach the US target of 5 : 1. But the possibilities of risks must be kept in mind. In the US, top 5 securities traders accounted for about 87 percent of the total derivative activities and 8 dealers account for about 56% of the world wide national accounts of interest rate and currency swaps. Unwanted! but possibility of having almost a similar profile in India cannot be wiped out once the derivative products would be allowed to be traded. LCGC has already expressed their concern about it and has suggested stricter control both about cash as well as derivative segments of the Indian stock market. The consequence of lack of discipline can be disastrous. Possibility of insider trading too, cannot be ruled out. It is hopeful that SEBI has just started learning these ground realities.

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A STUDY OF THE PERFORMANCE OF PUBLIC SECTOR BANKS IN INDIA DURING THE POST-LIBERALISATION ERA

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ABSTRACT

The on-set of new economic policy in 1991 seeking to open up and liberalise the Indian economy has brought about significant changes in the financial sector of the country. Banking being the core element of the financial sector, has been experiencing tremendous changes since then. In the banking sector, the emphasis has shifted from social banking to efficient, profitable and customer-oriented banking. The present paper makes an attempt to analyse the impact of economic reform on the profitability of the public sector banks in India.

KEY WORDS

Reform, Protectionism, Liberalisation, CFS, CRR, SLR, Capital adequacy, Income recognition, Asset classification, Provisioning standards, NPA, Owners equity.

1. Introduction

The Indian Economy has witnessed a sea change in the present decade. Since independence, the policy of protectionism was pursued in all spheres in the economy, particularly in the financial sector. However, the New Economic Policy which came into force from 1991 onwards attempted to lift the cosy blanket of protectionism and a series of reform measures were initiated to liberalise Indian economy sc that it may fit in a globalised economy. To withstand international competition and make Indian business at par with its foreign counterparts, it is absolutely necessary that the financial sector should keep pace with the changing environment

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and requirement of the economy as a whole. In other words, the success of economic liberalisation to a great extent depends on the success of financial sector reforms. The banks constitute the core element in the financial sector and hence the most important thing of the financial sector reform is to make banks profitable, efficient and customer oriented. In Indian context, as the banking is mainly done by public sector banks. so the main task of reform is to make the public sector banks contribute in a positive manner towards the changing scenario of open, efficient and liberalised economy.

In this paper, an attempt has been made to analyse impact of reforms on the profitability of the Indian public sector banks. For this purpose, the paper has been divided into the following sections (after the introductory section) :

2. A brief discussion on the key elements of Narasimham Committee's recommendations.
3. Description about the sample and the methodology of the study.
4. Major findings of the study.
5. Concluding observations.

2. A Brief Discussion on the Key Elements of Narasimham Committees Recommendations

The financial system in India is built on a vast network of financial institutions and markets over time and the sector is dominated by banking sector which accounts for about two-thirds of the assets of organised financial sector.

In an attempt to liberalise Indian economy, in perspective of globalisation of world economy, financial sector reform has got its kick off in 1992, with the recommendations of Committee on Financial System (CFS or Narasimham Committee).

However, we would take a brief note on the recommendations of Narasimham Committee on key issues, taking into account their pre-reform status, reform measures, and comments.

HIGHLIGHTS OF NARASIMHAM COMMITTEE REPORT

Elements of reform	Pre-reform status	Reform measures	Comments
Reduction of Cash Reserve ratio (CRR)	CRR 15 per cent on Net Demand and Time Liabilities (NDTL) Incremental CRR of 10 percent on NDTL over the level of NDTL as on May 3, 1991.	1991-November* 1997- Average CRR reduced from 15 percent to 9.5 percent in phased manner. In 1992-93 incremental CRR of 10 percent on NDTL was withdrawn but subsequently it was imposed on Foreign currency Non-residents (Banks) Liabilities.	Minimum CRR as per law is 3 percent. It should be considered along with reduction in fiscal deficit, reduction in overall liquidity position etc.
Reduction of Statutory Liquidity Ratio (SLR)	SLR 38.5 percent on domestic liabilities and 30 percent on non-resident liabilities (effective SLR 37.4 percent.)	SLR is reduced in a phased manner to 25 percent on entire NDTL which is minimum under the Act.	Further reduction can be carried out along with reduction in fiscal deficit.
Interest rate deregulation i) Deposit rates	Administered interest rates structure on all deposits including term deposits of various maturities. Regulations on premature withdrawal of deposits and loans against fixed deposits. Interest rate on term deposits uniform for term deposits and loans against fixed deposits. Interest rate on term deposits uniform for term deposits of same maturity irrespective of size. Foreign currency (Non-resident) Deposits Scheme - Interest rates prescribed by RBI and exchange risk also borne by RBI.	1992 - Deposits rates were subject to only celling rate as against prescribed rates earlier. 1993 - New Foreign currency (Non-Resident) Deposits (Banks) scheme introduced. Exchange risk has to be borne by the banks. Interest rates were prescribed by RBI. The earlier scheme was phased out and closed by August, 1994. 1995-96 - Banks are given freedom to fix their own interest rates on domestic and NRE deposits with maturity over two years which has later reduced to one year. 1997 - Interest rates on bank deposits of less than one year was linked to Bank Rate. 1997 - Banks are given full freedom to determine interest rate on term deposits of 30 days and above. 1997 - Interest rates on Foreign currency deposits to be determined by banks subject to celling rate prescribed by RBI followed by freedom to offer interest rates linked to LIBOR.	The deregulation of interest rates on savings deposits will be examined at the appropriate time.

HIGHLIGHTS OF NARASIMHAM COMMITTEE REPORT

Elements of reform	Pre-reform status	Reform measures	Comments
ii) Lending rates	Lending rate structure consisted of six categories based on size of advances. Under one category the RBI had prescribed a minimum lending rate.	1992-94 Rationalisation of lending rate structure from the earlier six categories to three categories. 1994 - Banks are given freedom to fix their own Prime Lending Rate (PLR) for advances over Rs. 2,00,000 (about US $ 4500)	Certain ceilings on advance in foreign currency could be reviewed.
Pruden tial Norms			
A) Capital adequacy	No capital adequacy requirement.	1992- Capital to risk asset ratio of 8 percent prescribed as per Basle Committee norms to be achieved in a phased manner as follows : Foreign banks by March 31, 1993. Indian Banks with international operations by March 31, 1994 Other banks - 4 percent by March 1993. 8 percent by March 1996.	The Narasimham Committee has suggested increase in capital adequacy ratio to 10 percent. 9 percent to be achieved by March 2000 and 10 percent by 2002. Decision about further enhancement will be announced later.
B) Income recognition	Income recognition based on health code system under which advances were categorised into eight categories of which four categories were deemed as non-performing vis. i) debts recalled ii) suit filed accounts iii) decreed debts iv. debts classified as bad and doubtful. Banks could not recognise income on these categories. No clear definition of problem credits. Subjectivity in definition of problem credits.	Banks can not recognise interest income on all non-performing assets. Non-performing assets identified as assets on which interest is past due for a period of four quarters ending on March, 1993, three quarters ending on March 31, 1994 and two quarters ending on March 31, 1995 and onwards. An amount is considered to be past due when it remains outstanding for 30 days beyond due date.	The Narasimham Committee II has recommended that RBI should implement the international norm of 90 days in a phased manner by 2002.

HIGHLIGHTS OF NARASIMHAM COMMITTEE REPORT

Elements of reform	Pre-reform status	Reform measures	Comments
C) Asset classification	Assets were classified into eight health code categories as under 1. Satisfactory 2. Irregular 3. Sick-viable under nursing 4. Sick-non-viable/ sticky. 5. Advances recalled. 6. Suit filed accounts 7. Decreed debts 8. Debts classified by the bank as bad & Doubtful. The classification was not objective.	1992 - All advances have to be classified by banks into four broad groups. a. Standard b. Sub-standard c. Doubtful d. Loss	The Narasimham Committee recommended the classification should be raised as per international standard.
D) The provisioning standards	The provisions to be made by banks was left to the discretion of the bank, RBI inspections officers however determine whether provisions were adequate to assess the real value of capital & reserves.	1992–10 percent general provision on outstanding such standard advances. 100 percent provision on unsecured portion of doubtful debts. 20 percent to 50 percent provision on secured portion of doubtful assets over a three year period. 100 percent on loss assets. 1993 - Banks were allowed to make provision on sub-standard & doubtful assets in March 1993 spread over two years. In subsequent years no such relaxation has been given.	The Narasimham Committee II has recommended that in case of all future loans, asset classification and provisioning norms should apply even to Government guaranteed advances in the same manner as for any other advance. The Narasimham Committee II has recommended that a general provision on standard assets of say 1 percent may be introduced in a phased manner.

The Narasimham Committee recommendation covered important and vast areas like disclosures, transparency, risk management. We have discussed some of the relevant points in brief. From our above discussion, it is clear that Indian banking system has undergone a sea change. Public Sector Banks were exposed to stiff competition from the emerging new private sector banks, existing and new foreign banks in a highly professional environment, where transparency becomes the key word.

In this critical context, the first element which got affected was profit of public sector banks. Stricter provisioning, high NPA, stiff competition begin to erode the profit of the public sector banks. However, they did not give it up. They came back very steadily.

The second crucial aspect was the size of the organisation. However, size can be measured in terms of assets as well as in terms of capital. Here, we have considered owner's equity i.e., capital plus reserves determining the inner strength of the bank. Higher size aids the bank to cope with the changing environment. Though a bank with smaller size and higher competency can grow better than others.

However, the key word should be profitability. Profitability indicates earning capacity of the banks. It highlights the managerial competency of the bank. It also portrays work culture, operating efficiency of the bank.

In our study we shall analyse a sample of public sector banks' profitability during 85–86 to 96–97 and we shall try to analyse the effect of liberalisation on these banks.

3. Description about the Sample & Methodology of the Study

We have arranged all the public sector banks, i.e., State Bank of India except its subsidiaries and other 19 public sector banks, in terms of owner's equity, i.e., capital plus reserves. Thereafter, we have selected six banks for our study, two from the top, two from the middle and two from the bottom of the list.

The selected banks are :

State Bank of India

Canara bank

Punjab National Bank

Syndicate Bank

Vijaya Bank

Corporation Bank

Necessary data was collected from IBA bulletins for the year 1986, 1987, 1988-89*, 1990-91, 1991-92, 1992-93, 1993-94, 1994-95, 1995-96, 1996-97.

*Accounts for this period were for 15 months.

Key parameters selected for study are :

1. Net Profit and
2. Net Worth

Key ratio computed was : $\frac{\text{Net Profit}}{\text{Net Worth}} \times 100$

Rate of change computed : $\frac{\text{Ratio}(Yr_1) - \text{Ratio}(Yr_0)}{|\text{Ratio}(Yr_0)|} \times 100$

4. Major Findings of the Study

From the Table it is clear that all individual banks and public sector banks as a whole was hit hardly by the wave of liberalisation which is prominent from the figure of 1992-93. Except State Bank of India, all the other banks along with public sector banks as a whole recorded a negative growth in profitability. State Bank of India, however, recorded a positive growth, but the rate of growth gradually declined.

However, 1993-94, can be identified as a year of recovery. All the individual banks except SBI along with the total of twenty public sector banks improved their performance. Except SBI all the individual banks recorded positive growth in 1993-94. Total public sector banks have recorded their positive growth.

The year 1994–95, again produced mixed results. Except PNB all the individual banks had improved their performance, though rate of growth gradually declined. Total public sector banks figure however, has recorded an improvement in performance and had showed a positive growth rate.

The year 1995–96 was not very good for many individual banks. Two out of six banks recorded negative growth rate while the other four had produced positive growth rate. Total public sector banks had recorded negative growth rate.

In the year 1996–97 except two, all the banks along with total public sector banks have recorded positive growth rate.

Now, we propose to analyse the performance of individual banks.

State Bank of India, having highest owner's equity has started with a negative growth rate in 1987, but subsequently recorded

positive growth rate in 1988–89. In the year 1989–90 like all the individual banks SBI too along with total public sector banks have recorded negative growth rate. Thereafter it recovered in the subsequent years but again recorded reduced growth rate in 1992–93. In the following year i.e., 93–94, State Bank of India has suffered a setback though it recovered in subsequent years. It is highly interesting to note that out of 4 pre-liberalisation years, i.e., for 1986–87 to 1990–91, in 3 years, State Bank of India has produced better result than total public sector banks. Again, out of six years including 1992–92, the year of change and 5 post-liberalisation years, State Bank of India has produced better result than total public sector banks in three years. Out of data available from 10 years, SBI has recorded better result than total public sector banks in six years. So, it can be understood that higher owners' equity has helped the bank to yield good result.

Canara Bank, having second largest owners' equity could not perform well in pre-liberalisation era except in 1987 where it recorded positive growth. It has achieved good result in 1991–92, in the year of change. In the post-liberalisation era, Canara Bank has started with a negative growth rate in 1992–93. It however, recovered in subsequent years but had recorded negative growth rate in 1996–97. Out of data available from 10 years, Canara Bank produced better result than total public sector bank in six years. Again, bigger size helped the bank to achieve such result.

Punjab National Bank had recorded two losses out of 4 pre-liberalisation years. It recorded a positive growth rate in 1991–92, but subsequently had recorded three negative growth rate in 1992–93, 1994–95 & 1995–96 respectively. Out of data available for 10 years Punjab National Bank has achieved better result than total Public Sector Bank in six years.

Syndicate Bank has recorded successive losses from 1987 to 1992–93, but after producing two consecutive losses in 1991–92 & 1992–93 respectively it recorded four successive positive growth rate in post-liberalisation era. It has recorded 3 better results then total public sector banks out of 10 years.

In the middle group, Syndicate Bank has recorded worst result, though it is highly interesting to note that Syndicate Bank has achieved positive growth in post-liberalisation era.

Vijaya Bank starting in 1987 with a positive growth rate, thereafter has recorded negative growth rate in 3 years out of 4 years of pre-liberalisation era. In 1991–92 it has achieved very good result. It has suffered from negative growth rate in two years out

of five post-liberalisation years. Out of 10 years Vijaya Bank has secured better result than total public sector banks in 5 years. Then we observe that, Syndicate Bank from middle group performed worse than Vijaya Bank, from lower group.

Corporation Bank had started with a positive growth rate, but in subsequent three years, it had suffered from losses. It has achieved negative growth rate in the year of change in 1991–92. Though in the post-liberalisation era, it had started with negative growth rate, in subsequent years it had achieved consecutive positive growth rates except 1996–97. Out of 10 years, it has secured 5 better results in comparison with total public sector banks.

5. Concluding Observations

It can be concluded that though size helps the banks in performing results, but it is only one parameter out of a large number of parameters that can be evaluated. A bank with comparatively lower size can do better if the other parameters go favourably with it. Specially, after liberalisation, there will be a number of other factors, which would affect performance of the public sector banks. Some of the other elements that can be considered are prudent management policy, good work culture, sound risk management capability and so on. In this critical juncture, only the most competent will survive. This is why, it was observed that two banks with lowest owner equity viz. Vijaya Bank and Corporation Bank have attained better result. So, it can be safely concluded that in this sort of professional environment intense competition in banking sector in post liberalisation period will give the customers highest satisfaction.

Table–1

Profitability Ratio of Sample Public Sector Banks : $\frac{\text{Net Profit}}{\text{Net Worth}} \times 100$

Year	Name of Banks	State Bank of India	Canara Bank	Punjab National Bank	Syndicate Bank	Vijaya Bank	Corporation Bank	Total Public Sector Banks
	1986	6.22	11.11	8.88	9.46	13.04	12.50	9.21
	1987	5.17	18.60	12.95	9.21	24.00	22.22	9.76
	1988–89	8.88	15.99	12.33	7.21	21.62	20.00	10.61
	1989–90	8.25	13.32	11.74	7.08	16.67	17.24	6.64
	1990–91	8.29	12.67	13.46	4.35	0.37	13.51	6.18
	1991–92	11.97	20.15	25.63	2.12	2.13	8.33	11.00
	1992–93	12.78	2.41	6.92	–354.50	–68.06	4.30	–34.21
	1993–94	6.69	7.66	9.51	–29.46	1.91	16.36	–22.91
	1994–95	15.12	11.76	6.79	–7.12	7.49	31.20	4.28
	1995–96	15.23	13.10	–8.27	1.37	–6.51	32.21	–1.31
	1996–97	16.91	7.18	17.73	4.49	2.67	31.25	9.37

Source : IBA Bulletin 1986 to 1996–97

Table–2

Growth of Profitability Ratio of Sample Public Sector Banks :

$$\frac{\text{Ratio}(Yr_1) - \text{Ratio}(Yr_0)}{|\text{Ratio}(Yr_0)|} \times 100$$

Name of Banks		State Bank of India	Canara Bank	Punjab National Bank	Syndicate Bank	Vijaya Bank	Corporation Bank	Total Public Sector Banks
Year	1986	—	—	—	—	—	—	—
	1987	–16.88	67.42	45.83	–2.64	84.05	77.76	5.97
	1988–89	71.76	–14.03	–4.79	–21.72	–9.92	–9.99	8.71
	1989–90	–7.09	–16.70	–4.79	–1.80	–22.89	–13.80	–37.42
	1990–91	0.48	–4.88	14.65	–38.56	–97.78	–21.64	–6.93
	1991–92	44.39	59.03	90.42	–51.26	475.68	–38.34	77.99
	1992–93	6.77	–88.04	–73.00	–16821.70	–3295.31	–48.38	–411.00
	1993–94	–47.65	217.84	37.43	91.69	102.81	280.47	33.03
	1994–95	126.01	53.52	–28.60	75.83	292.15	90.71	118.68
	1995–96	0.73	11.39	–221.80	119.24	–186.92	3.24	–130.61
	1996–97	11.03	–45.19	314.39	227.74	141.01	–2.98	815.27

Source : IBA Bulletin 1986 to 1996–97

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BOOK REVIEW

Applied Financial Accounting and Reporting

A Comparative Analysis of Sheet of Balances and Going Concern Concepts

P. K. Haldar

Mittal Publications, New Delhi, 1999
Pp. 322 + xii; price Rs. 550

In this book Dr. Haldar has undertaken a rather difficult task of reconciling the "sheet of balances" and the "going concern" concepts of the balance sheet. According to the author, these are the two extreme concepts concerning the nature and significance of the balance sheet. Dr. Halder has developed his case based on an extensive survey of available literature on the subject and on a close scrutiny of the responses to the questionnaires administered on some selected accounting academicians, practising accountants and corporate executives. The publication is of interest because it deals with issues which lie at the core of accounting. It merits a special consideration because it has been brought out at a time when the leading accounting standard- setting agencies of the world are endeavouring to promote the balance sheet as the foundation of their pronouncements. The pre-eminence of the balance sheet appears to have been clearly established in the conceptual frameworks that many of these agencies have developed in recent years for guiding their standard setting work. This represents a break from the traditional view, which gives the profit and loss account the pride of place in corporate financial accounting and reporting. The central theme in the profit and loss account oriented system is matching periodic revenues and expenses. The system looks at financial transactions and events from the perspective of how they affect the profit and loss account. There are some operational definitions of revenues and expenses and certain guiding principles as to their recognition and measurement. The system operates without there being any logically consistent

concept of capital and profit. In this system periodic profits are measured simply as the difference between revenues and expenses. The emphasis is, in fact, on the "difference". It is the matching process, which ultimately determines the debit and credit balances that have to be accommodated in the balance sheet. Thus, for all practical purposes, the balance sheet becomes subservient to the profit and loss account. Often it has to accommodate many debit and credit balances (e.g., deferred debits and credits) which are neither assets nor liabilities; these are simply the balances that are awaiting future extinguishment. As a matter of fact, the matching process has the ultimate effect of reducing the balance sheet to a mere "sheet of balances".

The profit and loss account fails in most cases to provide a logical starting point for resolving controversial accounting issues. The matching process on which it is based is heavily influenced by individual preferences and judgements. There are many costs that cannot be meaningfully matched with revenues. These costs are matched with revenues based on some arbitrary techniques and rules. This is definitely not a very happy situation for the accounting standard setters. So they are being inclined to demote the profit and loss account in favour of the balance sheet. Under the balance sheet approach, the focal point is assets and liabilities. These are the building blocks of measurement of both net profit and net wealth. The balance sheet approach regards profit as a matter of increased "well-offness" in the form of enhancement in net wealth. This is essentially a capital maintenance concept of profit the genesis of which is found in the writings of economists. According to the asset/liability approach, profit cannot emerge until the capital of the entity is maintained intact. Since asset and liability changes are real world phenomena, the balance sheet approach avoids relying on subjective judgements involved in periodic matching of revenues and expenses. If the balance sheet approach is strictly adhered to, it will significantly change the way transactions and events are recognised, measured, and reported in financial statements. In the balance sheet driven system the profit and loss account is relegated to a position of secondary importance. Its principal function lies in explaining the changes that have taken place in the equity section of the balance sheet. The elements of the profit and loss account (i.e., revenues, expenses, gains and losses) are all derived from the basic financial statement elements of assets and liabilities.

It has been argued from certain quarters that both the revenue/expense and the asset/liability approaches can be used simultaneously in the preparation and presentation of financial statements. According to this view the profit and loss account should be prepared based on the matching principle, while the balance sheet should be prepared based on the asset/liability approach. If this principle is followed, the articulation between the basic financial statements will be lost. To restore this, it will be necessary to introduce a new operating statement the function of which will be to account for all recognised gains and losses, which bypass the main profit and loss account.

Many of the issues referred to above have been dealt with in the study under consideration. The study is divided into eleven chapters. In addition to these eleven chapters there are several appendices, covering more than seventy pages, which contain useful information relevant to the study. In Chapter 1 a brief description is provided of the issues being investigated and the methodology being followed in conducting the investigation. Chapter 2 is devoted to an examination of the key attributes underlying the sheet of balances and the going concern concepts of the balance sheet. Chapter 3 considers the nature of the contents of the balance sheet under the two alternative approaches. In Chapter 4 consideration is given to the presentation aspect of the balance sheet. Chapter 5 explores the impact of the alternative approaches on accounting terminologies.

One of the key issues involved in the preparation and presentation of financial statements is valuation and measurement. A major portion of the present study is devoted to discussing this vital issue. In fact, the valuation and measurement issue constitutes the principal theme of discussions made in the following three chapters. Chapter 9 focuses on another important issue. This relates to accounting for intangibles. The question of inclusion of human assets in the balance sheet is discussed in Chapter 10. Chapter 11 is the concluding chapter. In this chapter the author summarises the key issues discussed in different chapters and suggests several measures that could be adopted as a means of narrowing the gap between the two extreme concepts of the balance sheet.

In his attempt to develop a means for harmonising the extreme views Dr. Haldar emphasises valuation and measurement. There is nothing objectionable in this. Valuation and measurement are undoubtedly very important aspects of accounting, but what seems

to be of far greater importance is recognition. Recognising an item in accounting means including it in the financial statements. Valuation and measurement are the last stages in arriving at the numbers at which items are to be included in the financial statements. The recognition issue has been dealt with in the study but in most cases it has been mixed with valuation and measurement. The two issues could easily be separated and that would enhance the usefulness of the study. Another important shortcoming of the study is that it does not give consideration to the vital phenomenon of the emergence of conceptual frameworks of accounting. The conceptual frameworks are now a very crucial force in governing the production of financial statements. Many of the key issues Dr. Haldar raises in his study have been addressed in these conceptual frameworks. However, despite these and some other shortcomings, the study can be recommended as a stimulating treatment of a complex subject. The study will provide interesting and valuable reading for those pursuing research in the area of financial reporting theory. It should also prove to be useful to those responsible for framing accounting policies and rules.

The book contains several editorial lapses that may easily have been avoided.

A. K. Basu

CORRIGENDUM

We regret that the following table was inadvertantly omitted from the text of the article entitled "Quantification of Corporate Social Cost and Benefits for Disclosure in Annual Reports-An Overview" (Page Nos. 92 to 108) by Manideep Chandra published in Business Studies, Issue No. XXII of January-July 1999.

TABLE—1

Company	Energy Conservation (Other than Annexure as per Section as per Section 217(1)(c) of the companies Act, 1956)	Environment Safety, Health or Pollution or Environment Compliance	Industrial Relation or Pesonnel	Rural Development or Social Welfare or Community Relief or Social Forestry	Human Resources or Employee Training or Employees' Welfare	Welfare of Worker Section or reserva-tion Policy	Official Language (Hindi) Implemen-tation	Workers Particition in Manage-ment	Vigilance	Sports	Contribution to State Exchequer
Andra Pradesh Paper Mill Ltd.	8	12	6	2	–	–	–	–	–	–	–
Atul Ltd.	2	9	14	12	–	–	–	–	–	–	–
Birla Corporation Ltd.	–	–	–	3	5	–	–	–	–	–	–
Cibatul Ltd.	–	8	6	–	–	–	–	–	–	–	–
Goodlass Narolac	–	4	–	5	–	–	–	–	–	–	–
Herdillia Chemicals	10	18	6	11	–	–	–	–	–	–	–
India Cement Ltd.	1	–	1	6	–	–	–	–	–	–	–
Jindal Strips Ltd.	–	–	–	–	8	–	–	–	–	–	2
Rastriya Chemicals Ltd.	5	8	–	–	–	–	–	–	–	–	–
HPCL	–	–	2	–	6	5	5	–	–	–	–
Hindusthan Paper	–	–	6	6	5	4	3	4	4	–	–
Gujrat State Fertiliser	–	8	2	–	–	–	–	–	–	–	–
Gujrat Nurmada	6	4	5	–	–	–	–	–	–	–	–
Coachin Refinaries Ltd.	22	22	1	29	7	7	22	–	–	–	–

TABLE—1 (Contd.)

Company	Energy Conservation (Other than Annuxeure as per Section as per Section 217(1)(c) of the companies Act, 1956)	Environment Safety, Health or Pollution or Environment Compliance	Industrial Relation or Pesonnel	Rural Development or Social Welfare or Community Relief or Social Forestry	Human Resources or Employee Training or Employees' Welfare	Welfare of Worker Section or reservation Policy	Official Language (Hindi) Implementation	Workers Particition in Management	Vigilance	Sports	Contribution to State Exchequer
Central Pulp	16	–	–	8	5	–	–	–	–	–	–
IOCL*	18	36	–	–	4	13	11	7	–	23	1
Hindusthan Organic Chemicals*	8	16	2	5	5	3	9	–	–	–	–
Asian Paints*	6	6	5	–	–	–	–	–	–	–	–
Gujrat Ambuja*	4	9	–	25	–	–	–	–	–	–	–
TISCO*	4	–	5	34	–	–	–	–	–	–	–
SAIL*	3	12	–	7	10	2	5	–	–	9	–
Tata Chemicals*	11	7	5	15	–	–	–	–	–	–	–
Bhadrachalam*	–	–	4	–	–	–	–	–	–	–	–
Orient Paper*	–	–	4	–	–	–	–	–	–	–	–
National Organic	1	5	4	2	–	–	–	–	–	–	–
ACC	4	–	1	–	–	–	–	–	–	–	–
Nagarjun Fertiliser*	1	1	1	–	–	–	–	–	–	—	–
Berger Paints*	3	–	2	–	–	–	–	–	–	–	–
Bharat Heavy Electricals	–	–	–	–	7	3	–	–	–	–	–

* It implies that to maintain definitional integrity in counting of lines, during counting different formats have been notionally converted into Type Face "New Times Roman size 12 point in a A4 size paper with conventional margins."

GUIDELINES FOR CONTRIBUTORS

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   Choi, F.D.S. and Mueller, G.G. International Accounting, Prentice Hall, 1984.

   Articles

   Spencer, M. H. 'Axiomatic Method and Accounting Science, The Accounting Review, April 1963.

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