Developing global competitiveness by assessing organized retail productivity using data envelopment analysis

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ABSTRACT

The purpose of this paper was to find out (using Regression, Data Envelopment Analysis and Sensitivity Analysis) how efficiently some of the top organized India retail companies have been performing relative to each other over the years and thereby to identify factors that help increase the efficiency of a retail company. The study was conducted based on the analysis of data downloaded from Prowess database for five Indian retail companies for the time period 2000-2007. The paper is deemed to be helpful to enable Indian retail companies gain a competitive advantage in the face of increased competition being faced in the emerging organized retail sector in India. The findings brought forth Advertising and Marketing expenses as the significant performance determining factors to be paid attention to.

Keywords: global competitive advantage, organized retail, data envelopment analysis (DEA), performance determinants, performance indicators

1. INTRODUCTION

With opportunities come challenges. Retail and real estate are the two booming sectors of India in the present times. Retail, one of India''s upcoming industries, has presently emerged as one of the most dynamic and fast paced industries of recent times with several players entering the market. Accounting for over 10% of the country''s GDP and around 8% of employment (Indian Retail Sector – An Outlook 2005-2010), retailing in India is gradually inching its way towards becoming the next boom industry. But, with this growth comes a host of challenges which existing players have to face and overcome to remain successful in the coming onslaught of heightened competition.

1.1. The Indian retail sector

A shopping revolution is ushering in India where, a large population in the 20-34 age group in the urban regions is boosting demand. This has resulted in huge international retail investment and a more liberal FDI policy making India currently the most attractive destination for global retailers with a GRDI score of 92 and a growth rate of 25 to 30% in the year 2007 (Global Retail Development Index, 2007). Since the time the Narsimha Rao Government kicked off reforms in 1991 and interest rate deregulation became a reality, the retail sector has been like a toddler waiting to grow big. It has taken some time but finally it seems that the evolution of organized retailing in India is picking up momentum.The world of retail merchandising has come a long way since the days when general stores, that stocked everything from groceries to stationery, and small shops that sold limited varieties of products, reigned supreme. There is a movement now from the unorganized to the organized sector. Several companies are setting up exclusive showrooms and large format stores such as Pantaloon, Shoppers'' Stop, Westside and several others are expanding. The whole concept of shopping has altered in terms of format and consumer buying behavior, changing the face of shopping in India. These trends indicate that retailing, as an industry, has come into its own. According to the Global Edge report on Market Potential for Emerging Markets (2008), India ranks eleventh in the list and has been able to maintain itself around this Figure for quite some years now. Infact, according to Global Retail Development Index (2007), India is positioned as the leading destination for retail investment topping the chart above Russia and China. Indian organized retail is growing at a faster pace than was expected and could constitute 25% of the overall retail sector by 2011. According to a study on retail sector prepared by Deloitte Haskins and Sells, organized retail in India had 8% share of overall retail market (total retail pie) in 2007 in comparison to 5% in the year 2006 and is expected to grow still further in the future.

1.2. Reasons for growth

Favorable demographic and psychographic changes relating to India''s consumer class, international exposure, increasing availability of quality retail space, wider availability of products and brand communication are all bringing forth major opportunities in the organized retail sector in India, which is poised for an emphatic phase of growth. For a successful retail story what is required is the proper exploitation of these opportunities. Over the last few years, many international retailers have entered the Indian market on the strength of rising affluence levels of the young Indian population along with the heightened awareness of global brands and international shopping experiences and the increased availability of retail real estate. Development of India as a sourcing hub shall further make India as an attractive retail opportunity for global retailers. PricewaterhouseCoopers in its third edition of Retail & Consumer study, "From Beijing to Budapest: New Retail & Consumer Growth Patterns in Transitional Economies," assesses growth opportunities in fourteen countries in Asia, Central and Eastern Europe (CEE) and Russia; it has determined six

countries with "GO" recommendations in terms of investment: China, India, Turkey, Thailand, Malaysia and Hungary. The study determines that the most immediate opportunities in the retail and consumer sector lie in China and that India offers more long-term potential for investment in the sector. The biggest positive point as far as the sector is concerned is that Indian population is witnessing a significant demographic transition. A large young working population with median age of 24 years, nuclear families in urban areas, along with increasing working-women population and emerging opportunities in the services sector are the key growth drivers of organized retail sector in the country. The highly fragmented structure of the Indian retail sector is also helping the growth of the sector. There is a great potential for the organized retail industry to prosper in. India, as a market for final consumption is very large. Many researches show that the total private consumption market in India is about Rs.15 trillion out of which about Rs 8.5 trillion is towards retail consumption. Though lucrative opportunities exist across product categories, food and grocery, never-the-less, presents the most significant potential in the Indian context as consumer spending is highest on food. While food and grocery represents about 6.5 trillion of retail consumption, clothing comes second with consumption of about Rs 600 billion (The Indian Retail Report 2005).The next level of opportunities in terms of product retail expansion lies in categories such as apparel, jewellery and accessories, consumer durables, catering services and home improvement. These sectors have already witnessed the emergence of organized formats though more players are expected to join the bandwagon. Some of the niche categories like books, music and gifts also offer interesting opportunities for the retail players. Wholesale trading is another area, which has potential for rapid growth. German giant Metro AG and South African Shoprite Holdings have already made headway in this segment by setting up stores selling merchandise on a wholesale basis in Bangalore and Mumbai respectively. Manufacturers in industries such as FMCG, consumer durables, paints etc are waking up to the growing clout of retailers as a shift in bargaining power from the former to the latter becomes more discernible. Already, a number of manufacturers in India, in line with trends in developed markets, have set up dedicated units to service the retail channel. Also, instead of viewing retailers with suspicion, or as a 'necessary evil' as was the case earlier, manufacturers are beginning to acknowledge them as channel members to be partnered with for providing solutions to the end-consumer more effectively. Rural Retailing has also being encased into by many companies. Of late, India's large rural population has caught the eye of retailers looking for new areas of growth. ITC launched the country's first rural mall 'Chaupal Saga', offering a diverse product range from FMCG to electronic appliances to automobiles, attempting to provide farmers a one-stop destination for all their needs. There has been yet another rural retail initiative by the DCM Sriram Group called the 'Hariyali Bazaar'' that has initially started off by providing farm related inputs and services but plans to introduce the complete shopping basket in due course. Other corporate bodies include Escorts, and Tata Chemicals (with Tata Kisan Sansar) setting up agri-stores to provide products/services targeted at the farmer in order to tap the vast rural market. With IT being the buzzword today how can Electronic Retailing be far behind. Videocon Group has entered the organized retail sector through an electronic retail chain, ,,Next'', under the venture Emart India. The two other electronic retail chains in the country have a regional or city presence: Viveks and Vijay Sales. Thus, with the growing popularity of Internet electronic retailing presents a golden opportunity to retailers.

1.3. Challenges faced by Indian retail

During the last 10 years, many retail start-ups promised a lot. A few folded up even before they really got started, a few others struggled and then burnt out before they could develop a sustainable business model and others are still evolving. Pantaloon, Shoppers'' Stop, Lifestyle, Westside and Globus are

few examples of an Indian success story in retail business. Despite the bright picture and future prospects that Indian retail presents today, the segment is still at a nascent stage. It faces hurdles like government regulations, logistics, low margins, vendor"s superior negotiating powers and fierce competition from Mom & Pop stores.Competition from foreign players planning to enter into the country (Walmart for example has already gained an entry in association with Bharti) represents a major threat to the Indian organized retail sector. These foreign players have a great deal of experience in this field and their economic power is also much stronger than that of the Indian players. In order to achieve success, the retailing industry will also have to counter competition from the unorganized sector. Traditional retailing is too well established in India to be wiped out. Besides, traditional retailers have negligible real estate and labor costs and little or no taxes to pay. In contrast, players in the organized sector have big expenses to meet, and still have to keep prices low to be able to compete with the traditional sector. Given the size, and the geographical, cultural and socio-economic diversity of India, there is no role model for Indian suppliers and retailers to adapt or expand in the Indian context. Also, one must remember that there is no right retail model. The perfect model is a question of management. The large scale of consumer diversity, in terms of size, geography, culture and socio-economic background, would necessitate a varied type of successful models. There are other issues that are needed to make the retailing industry a force to reckon with. For example, qualified manpower is required to look after day-to-day operations and cater to the wide spectrum of customer expectations. What is required at this stage is for Indian retail companies to understand the factors that have an affect on the performance of organized retail in India so as to help them develop a strong competitive advantage which will help them in facing and overcoming the above mentioned challenges. Thus, the purpose of this paper was to find out the relative efficiency of some of the top retailers of India and thereby to identify and analyze the factors which have an affect on the performance of organized retail in India. Indian retail companies can develop global competitive advantage through a proper understanding of these performance determining factors.

2. LITERATURE REVIEW

Retail productivity is an important issue and vast literature was found on its definitions and measurements. A review of this literature showed that multiple methodologies have been applied to assess productivity of individual retail stores, groups of stores, and the retail industry as a whole, but surprisingly little attention has been given to comparing the efficiency of retail organizations in India. Understanding and measuring the productivity and efficiency of retailers have been important issues in retailing research (e.g., Bucklin 1978; Ingene 1982, 1984; Ratchford and Brown 1985; Ratchford and Stoops 1988). Retail productivity has been considered important for society and for the individual retail firm (Bucklin, 1978; Ingene, 1984). But, despite a special issue of the Journal of Retailing in Fall, 1984 and subsequent researches, there is still no single widely accepted definition and measurement methodology for retail productivity. Most of the international studies of retail productivity in the 1950s were based heavily on concepts developed in productivity assessments in the manufacturing sector. The European Productivity Agency and the National Institute of Economic and Social Research had provided foundation studies of various industrial sectors and economists drew on these sources (Rostas, 1948). These studies effectively set the parameters for studies, not only related to manufacturing but also to retailing, for the next 30 years (Deurinck, 1955). On these foundations, and comparable ones in USA, several studies of retail productivity were undertaken. While in essence the concepts remain relevant, much has changed over 50 years in respect of both the nature of retail productivity and the factors affecting this productivity thus requiring new and innovative methods for measuring retail productivity and efficiency. Past researches have used and suggested the use of various measures

and methods to assess retail efficiency and productivity. Retail productivity is usually measured as ratios of outputs to inputs (Bucklin, 1978; Ratchford and Brown, 1985; Ratchford and Stoops, 1988). Bloom (1972) defined productivity as a ratio of output measured in specific units and any input factor also measured in specific units. A higher ratio of measured output to measured input factors can be directly interpreted as higher productivity. It can also be seen that the most widely used conceptualization of productivity has been as the ratio of outputs to inputs; total input productivity is defined as the ratio of all outputs to all inputs, and partial or single input productivity is the ratio of all outputs to a single input (Ingene, 1982, Lusch and Moon, 1984). The majority of measures of organization efficiency are input-output ratios, such as sales per square foot or sales per employee (Kamakura, Lenartowiez, and Ratchford 1996). Good (1984) provides a list of possible measures of retail outputs and inputs. Outputs are usually measured as the number of transactions, physical units sold, value added, and sales. Inputs are measured as the hours of labor employed, number of employees, wages, salaries and benefits paid, area of selling place, inventory, and advertising. Thus it can be seen that for the most part measures of company efficiency have been developed as macro tools, such as those created by the Bureau of Labor Statistics, and play an important role in assessing how efficiently a particular industry, or economy, is developing, absorbing technology, or offsetting rising wages. For these purposes, the existing techniques may be more appropriate. Apart from the industry level studies, understanding is also required at the individual store level for which, the macro tools are not suitable. Thus, there is a need for micro tools for use at the individual store level. Despite its popularity in literature, the output-to-input ratio approach to retail productivity has several problems. First, retail productivity has been used interchangeably with labor or salesperson productivity simply because retailing is often a labor-intensive activity (Bush, Bush, Ortinau, and Hair, 1990; Ingene, 1982, 1984; Stem and El-Ansary, 1992; Thurik and Wijst, 1984), even though there is a large non-sales portion of labor force in retail industries. As a result, retail productivity has sometimes been treated as an issue of sales management. Focusing on an individual salesperson does not directly meet the measurement criteria of retail productivity because labor is simply one of the input factors (Good, 1984).Second, traditional retail productivity studies have often focused on too micro units of analysis (e.g., salesperson evaluation; Bush, Bush, Ortinau, and Hair, 1990) or too macro units of analysis (e.g., retail industries or aggregation of stores; Goldman, 1992; Pilling, Henson, and Yoo, 1995). Previous research has ignored retail productivity with respect to individual stores and has not applied macro techniques to any extent as a managerial tool. Measuring productivity of individual stores would make the evaluation and control of managerial activities more feasible and objective. Thus, retail managers need such store level productivity measurement tools. Third, most previous measures have been absolute measures of productivity. These indexes are calculated by inserting numbers into the predetermined formulas or ratios. They do not take into account the performance of other retail organizations or other environmental circumstances. The productivity measurement of an individual retail organization should be "relative" and incorporate the performances of other similar organizations. Thus, literature related to retail productivity clearly shows that though simple to define, assessments of retail productivity based on simple ratios of outputs to inputs have been criticized for the following reasons: improper measurement of output (Achabal et al., 1984; Parsons, 1994; Oi, 1992); failure to account for changes in the quality of inputs or outputs over time or across stores (Doutt, 1984; Good, 1984; Lusch and Moon, 1984; Nooteboom, 1985; Oi, 1992); failure to account for the consumer's input to the process (Ingene, 1984; Oi, 1992); improper weighting of multiple inputs and outputs (Parsons, 1990); inability to separate differences in productivity from scale effects (Ratchford and Brown, 1985). In addition to these limitations, the traditional "ratio" approach to retail productivity presents other problems when the focus is evaluation of different retailers. These retail companies are typically located in

different markets and serve a diverse population of customers, leading to distinct operational characteristics at each organization. These differences are not taken into account by traditional productivity indices, leading to a biased assessment of the relative efficiency of different retail organizations. Thus, what is required is a new approach to retail productivity measurement that focuses on one organization relative to the best performers rather than the average performers as done in the traditional absolute measures. There are two major advantages of relative-to-best measures. First, in contrast to relative-to-average measures, relative-to-best measures are consistent with quality control movements such as benchmarking. The best performing units need to be used as role models or the bases for evaluation (Farrell, 1957). Second, in contrast to absolute measures, relative-to-best measures show contingent productivity, which takes into account performances of other comparable units and environmental factors. The absolute measures tend to focus only on controllable input factors such as labor and capital (Banker and Morley, 1986).Finally, previous techniques of retail productivity such as cost function and total factor productivity indexes have a few drawbacks. Regression in the form of a cost function imposes a particular functional form and total factor productivity refers to the measurement of efficiency of all employed inputs (Bucklin, 1978), and relates net output to the associated total factor input; that is, to the input of both labor and capital (Bloom, 1972). The weights employed in calculating indexes for total factor productivity (weighted sums of outputs divided by weighted sums of inputs) are often subjective. Consequently, in order to assess the productivity of organizations of a retail firm there is a need to develop an output-to-input ratio system which can handle multiple inputs and outputs in order to go beyond basic labor or capital productivity measurement. Ideally such a system would measure relative-to-best productivity or efficiency, as opposed to absolute or relative- to-average values, and resolve problems in traditional measurement techniques (such as cost functions and total factor productivity discussed above). In view of the changing scenario of the Indian Retail Industry, the scarcity of studies on the assessment of different retail organizations is not compatible with the importance of the topic. With so many opportunities as well as challenges facing the Indian organized retail sector, the organized retail companies of India need to develop global competitive advantage and become efficient in their operations. Thus, given the lack of studies undertaken in this area in the Indian scenario, this study was undertaken to gain an insight into the relative efficiency of different retail companies in India and to identify ways to increase the efficiency of inefficient companies. In order to overcome the shortcomings of the techniques previously used to asses productivity, Data Envelopment Analysis technique has been used to asses the relative efficiency and productivity of some of the top retailers of India. The study identifies and analyses the importance of performance determining factors in improving the efficiency of a retail company.

3. OBJECTIVES OF THE PRESENT STUDY

The present study was undertaken to understand the factors affecting the performance of organized retail in India so as to better understand ways to help companies develop global competitive advantage in the retail sector. In particular, the study focused on:

1. Identifying the factors that have an affect on the performance of organized retail in India.
2. 2.Analysis of the affect of these performance determining factors on the performance indicating factors
3. Identifying the more significant performance determining factors
4. Analyzing the relative efficiency of some of the top organized retail companies of India. 5.Comparing the inefficient retail companies with the efficient ones in order to identify the areas where improvement is required to help companies increase their efficiency.

4. METHODOLOGY OF RESEARCH

4.1. Data collection method & Justification of secondary source

The data used in this paper was collected from secondary sources. Data was obtained for 5 retail companies of India for the time period 2000 to 2007. The source of data was Prowess Database. Prowess is a database of large and medium Indian firms containing detailed information on over 20,000 firms. These comprise all companies traded on India's major stock exchanges and several others, including, the central public sector enterprises. The database covers most of the organized industrial activities such as banking, retailing, airlines and other service and manufacturing sectors of India. Prowess provides detailed information on each company including a normalized database of the financials covering 1,500 data items and ratios per company. Besides, it provides quantitative information on production, sales, consumption of raw material and energy etc. As Prowess database has found useful applications in places where trust and reliability matter the most, Prowess became the preferred source of data in respect of the variables identified for the present study.

4.2. Selection of Variables

On the basis of literature studied, data was gathered in respect of 12 variables out of which 9 were taken as performance determinants and 3 as performance indicators. The performance determinants included Advertising Expenses, Marketing Expenses, Capital employed, Current Assets, Gross Fixed Assets, Inventories, Power and Fuel Expenses, Salaries and Wages and Working Capital, while the performance indicators included Sales, PBIT and Return on Capital Employed. The different variables considered for the study have been tabled in Figure 1.
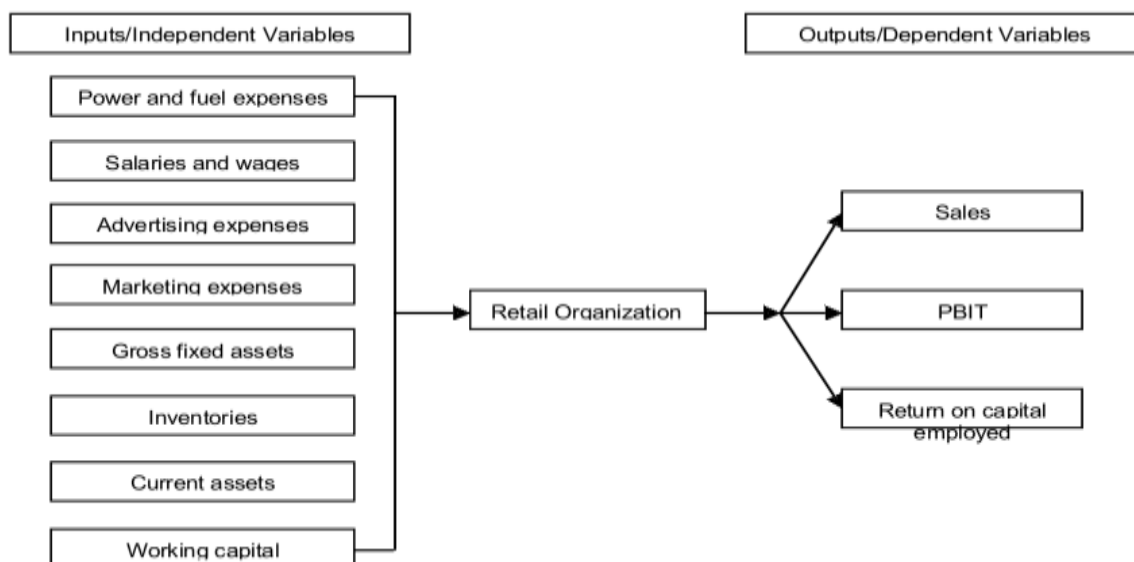
Figure 1: Conceptual Input Output framework

4.3. Method of analysis

Data was analyzed using two different techniques, Regression Analysis and DEA model. For Regression analysis, the nine performance determining factors were the independent variables while the three performance indicating factors were taken as the dependent variables. In the DEA Model, the performance determinants were used as the Input variables while the performance indicators were used as the Output variables.

4.4. Justification for using DEA method of analysis

Efficiency is usually measured as ratios of outputs to inputs. A higher ratio of measured output to measured input factors can be directly interpreted as higher efficiency. There are a number of methodologies which can be used for evaluation of efficiency of a unit such as, output-to-input ratio approach, regression, cost function, total factor productivity indexes and many others. DEA was chosen as the primary technique for efficiency evaluation since it was seen that though DEA works on the same concept as the traditional techniques of measurement, it covers lots of other aspects which the traditional techniques lack. DEA also has certain drawbacks but its advantages overshadow its disadvantages. The major advantages of DEA based method of efficiency evaluation includes utilization of both output and input observations, accommodation of multiple inputs and outputs, accommodation of both controllable and uncontrollable factors, computation of a single index of productivity, development of a relative measure of performance for each retail outlet using best performers as the bases, and non-imposition of any functional form on the data. Moreover, unlike total factor productivity indexes, DEA gives each of the observations its own set of weights which make the analysis more appropriate.

5. RESEARCH FINDINGS AND ANALYSIS

5.1. Affect of the performance determining factors of organized retail on performance indicators using Regression Analysis

5.1.1. Affect of performance determining factors on Sales

The value of Adjusted R^2 was found to be .991 which shows that the model is a good fit. The significance of the F-value came out to be .000 which indicates that the model is statistically significant at 5% level of significance. In order to adjudge whether there exists multi-collinearity between the independent variables, Durbin Watson test was administered along with regression. The value of the Durbin-Watson test came out to be 1.629 which indicated that auto correlation was not present in the data. Considering the correlation coefficients among predictors, it was deduced that they were not related so data was free from multi collinearity. The Beta values and the significance levels of t-tests for significance of individual independent variables are given in Table 1.

Table 1: Regression Analysis with Sales as dependent variable

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	23.481	20.021		1.173	.253
	Advertising Expenses	-7.243	2.844	-.203	-2.547	**.018**
	Capital employed	.018	.185	.007	.098	.923
	Current Assets	.224	.503	.090	.446	.660
	Gross fixed assets	-.569	.594	-.132	-.957	.349
	Inventories	1.110	.166	.337	6.697	**.000**
	Marketing expenses	2.572	1.730	.048	1.486	.151
	Power and fuel expenses	54.275	11.873	1.069	4.571	**.000**
	Salaries and wages	-1.170	3.493	-.065	-.335	.741
	Working capital	-.520	.436	-.088	-1.194	.245

Dependent Variable: Sales

As can be seen from Table 1, only 3 of the independent variables were found to be statistically significant in the model at 5% significance level. These include - Advertising Expenses, Inventories and Power & Fuel Expenses. Looking at the Beta values for all these variables, it could be seen that Advertising Expenses was negatively related to the dependent variable i.e. Sales while the other 2 variables i.e. Inventories and Power & Fuel Expenses were both positively related to the dependent variable. Looking at the Beta values, it can be said that in absolute terms Power & Fuel Expenses with a Beta value of 1.069 had the maximum effect on Sales while Advertising Expenses with a Beta value of -.203 had the least effect. The estimated increase in sales for every unit increase or decrease in these variables is given by the standardized Beta values of these variables. Since the Advertising Expenses were negatively related to sales, it indicated that if advertising expenses are decreased by one unit, sales will increase by .203, if all the other variables remain unchanged. The positive effect of Inventories and Power & Fuel Expenses on Sales denotes that for every one

unit increase in Inventories, Sales will increase by .337 other variables remaining constant and for every one unit increase in Power & Fuel Expenses, Sales will increase by 1.069, if all other variables are unchanged.

5.1.2. Affect of performance determining factors on PBIT

The value of Adjusted R^2 was found to be .934 which shows that the model is a good fit. The significance of the F-value came out to be .000 which indicates that the model is statistically significant at 5% level of significance. The value of the Durbin-Watson test came out to be 1.267 showing that auto correlation was not present in the data. Considering the correlation coefficients among predictors, it can be said that they were not related so data was free from multi collinearity. The Beta values and the significance levels of t-tests for significance of individual independent variables are given in Table 2.

Table 2: Regression Analysis with PBIT as dependent variable

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	-10.749	8.005		-1.343	.193
	Advertising Expenses	-5.500	1.137	-1.032	-4.837	**.000**
	Capital employed	.020	.074	.055	.273	.788
	Current Assets	.120	.201	.323	.598	.556
	Gross fixed assets	-.317	.238	-.491	-1.333	.196
	Inventories	.218	.066	.443	3.285	**.003**
	Marketing expenses	5.479	.692	.690	7.920	**.000**
	Power and fuel expenses	9.555	4.747	1.262	2.013	**.057**
	Salaries and wages	-.589	1.397	-.219	-.422	.677
	Working capital	.047	.174	.053	.267	.792

Dependent Variable: PBIT

As can be seen from Table 2, only 4 of the independent variables were found to be statistically significant in the model at 5% significance level. These include - Advertising Expenses, Inventories, Marketing Expenses and Power & Fuel Expenses. Looking at the Beta Values for all these variables, it could be seen that Advertising Expenses was negatively related to the dependent variable i.e. PBIT while the other 3 variables i.e. Inventories, Marketing Expenses and Power & Fuel Expenses were positively related to the dependent variable. Looking at the Beta values it could be said that in absolute terms Power & Fuel Expenses with a Beta value of 1.262 had the maximum effect on PBIT while Inventories with a Beta value of .443 had the least effect on PBIT. The negative effect of Advertising Expenses on PBIT clearly shows that an increase in Advertising Expenses decreases PBIT and vice versa. Thus, every one unit decrease/increase in Advertising Expenses will lead to a 1.032 increase/decrease in PBIT, other variables remaining unchanged. The positive effect of Inventories, Marketing Expenses and Power & Fuel Expenses on PBIT indicates, that for every one unit increase in Inventories, Marketing Expenses and Power &

Fuel Expenses, PBIT will increase by .443, .690 and 1.262 respectively, if the other variables remain constant.

5.1.3. Affect of performance determining factors on Return on Capital Employed

The value of Adjusted R2 was found to be .748 which shows that the model is a good fit. The significance of the F-value came out to be .000 which indicates that the model is statistically significant at 5% level of significance. Existence of multi-collinearity between the independent variables was seen by administering Durbin Watson test along with regression. The value of the Durbin-Watson test came out to be 2.578 which showed that auto correlation was not present in the data. Considering the correlation coefficients among predictors, it was deduced that they were not related so data was free from multi collinearity. The Beta values and the significance levels of t-tests for significance of individual independent variables are given in Table 3.

Table 3: Regression Analysis with Return on Capital Employed as dependent variable

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	-22.488	11.973		-1.878	.074
	Advertising Expenses	-5.206	1.701	-1.273	-3.061	**.006**
	Capital employed	.021	.111	.074	.188	.853
	Current Assets	.280	.301	.977	.930	.362
	Gross fixed assets	.210	.355	.426	.592	.560
	Inventories	-.043	.099	-.115	-.436	.667
	Marketing expenses	5.816	1.035	.955	5.620	**.000**
	Power and fuel expenses	4.862	7.100	.837	.685	.501
	Salaries and wages	-1.733	2.089	-.839	-.829	.416
	Working capital	-.171	.261	-.254	-.655	.519

Dependent Variable: Return on Capital Employed

As can be seen from Table 3, only 2 of the independent variables were statistically significant in the model at 5% significance level. These include - Advertising Expenses and Marketing Expenses. Looking at the Beta Values for these 2 variables, it was seen that Advertising Expenses was negatively related to the dependent variable i.e. Return on Capital Employed while Marketing Expenses was positively related to the dependent variable. Looking at the Beta values it could be said that in absolute terms Advertising Expenses with a Beta Value of -1.273 had a more significant effect on the dependent variable than Marketing Expenses. Looking at the standardized Beta values of the 2 significant variables, it becomes clear that an increase/decrease in Advertising Expenses leads to a decrease/increase in Return on Capital Employed, because of the negative relation of Advertising Expenses with Return on Capital Employed, while an increase/decrease in Marketing Expenses leads to an increase/decrease in Return on Capital Employed, because of the positive effect of the former on the latter. Thus, for every one unit decrease/increase in Advertising Expenses, the Return on Capital Employed will increase/decrease by 1.273 while for every one unit increase/decrease in Marketing Expenses, Return on Capital Employed will increase/decrease by .955.

5.2. Comparison of Retail Productivity using Data Envelopment Analysis (DEA)

In order to measure and evaluate the efficiency of some of the top retail organizations of India, data related to five retail organizations was obtained from a well known financial software – Prowess, for a period of eight years starting from year 2000 and ending at 2007. The five retail organizations were coded as 1, 2, 3, 4, and 5 respectively in the following analysis. Appropriateness of company and data to DEA has been examined in this study in terms of many assumptions which were cited by Dyson et al (2001). One of them was homogeneity assumptions relating to the homogeneity of units under assessment. In general the units were understood to be similar in a number of ways. Retail Organizations in this study offer similar product categories by driving similar inputs. The second assumption according to Dyson et al. (2001) was about the input/output set. The study satisfied the second assumption because all retail organizations were evaluated on the same input and output parameters. The sets of factors were common to all organizations. The last assumption named as factor measurement was on the measurement scales of inputs and outputs. According to it, they should conform to ratio scales. The present study also supported the last assumption. Since the

efficiencies of various organizations were measured by DEA model, it was necessary to solve the model three, four or five times depending on the data available for the five different organizations under study for different years. Productivity or efficiency in the context of DEA dealt with producing the maximum quantity of outputs for any given amount of inputs or the minimum use of inputs for any given amount of outputs. The first task of DEA was to find the most efficient retail organization, which produced a so-called efficient frontier, which is a series of points, a line, or a surface connecting the most efficient retail organizations, which were determined from a comparison of inputs and outputs of all retail organizations under consideration. Thus, DEA produced the relative efficiency boundaries, which are called envelopes. Retail organizations lying on the efficient frontier were given the arbitrary efficiency score of one. In other words, any unit or organization whose efficiency score equaled one was defined as "efficient", otherwise "inefficient" (Bal and Örkcü, 2005). In other words, efficiency is the ratio of the weighted sum of outputs to the weighted sum of inputs. In the present study, the different retail organizations used 9 input variables as mentioned earlier and 3 output variables. Thus, for an organization to be efficient:

$$E_1 = \frac{A_1Y_1 + A_2Y_2 + A_3Y_3}{B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_9X_9} \leq 1$$

Where,

If $E_i < 1$ ➜ organization is inefficient.

If $E_i = 1$ ➜ organization is efficient.

and

E = efficiency of a retail organization

Y = outputs used in the DEA model

X = inputs used in the DEA model

A = weights DEA estimates for the outputs

B = weights DEA estimates for the inputs

The model was run for each organization by utilizing Solver bundled with Microsoft Excel. The results of the analysis are discussed under headings of Efficient and Inefficient retail organizations while areas of improvement for inefficient retail organizations were identified using Sensitivity/Gap analysis.

5.2.1. Efficient and inefficient Retail Organizations

The results obtained from data entered in the DEA model are tabulated in Table 4. It can be seen from this table that companies 1, 2, 3, and 5 were found to be running efficiently with company 1 showing consistency in efficiency across all the years studied. Organization 4 secured efficiency score less than 1 in the years 2005 and 2006 showing that it was relatively inefficient in these years in comparison to the other companies.

Table 4: Efficiency scores for companies in different years

Companies	Year							
	2000	2001	2002	2003	2004	2005	2006	2007
1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1
3	NA	NA	1	1	1	1	1	NA
4	1	1	1	1	1	0.463	0.616	1
5	NA	NA	NA	NA	NA	NA	1	1

Figure 2: Snapshot of DEA model for an efficient retail organization

In using DEA, the weights were estimated separately for each retail organization such that its efficiency was the maximum attainable. As can be seen in Figure 2, DEA estimated the weights 0.001, 0.043, 0.001, 0.951, 0.001, 0.001, 0.001, 0.001 and 0.001 for the input variables and 0.010, 0.000, and 0.058 for the output variables for retail organization 5 for the year 2006. DEA estimated the weights such that the estimated efficiency of retail organization 5 (E5) was the maximum possible. However, the weights estimated for retail organization 5 were such that when they were applied to the inputs (Xs) and outputs (Ys) of all other units in the analysis their ratio of weighted outputs to weighted inputs was less than or equal to 1. Similarly, DEA estimated a separate set of weights for each retail organization such that the estimated weights led to a maximum attainable efficiency for that organization. As seen from Figure 2, DEA optimized on each individual retail organization"s performance in relation to the performance of all other retail organizations. While using DEA, the estimated weights were constrained so that no one input or output variable dominated the efficiency estimation. Minimum limits were also set for the estimated weights so that all inputs and outputs were forced to play a role in efficiency computation. The efficiency computed by DEA assumed that 100% efficiency is attained for an organization only when (1) none of the outputs can be increased without either increasing one or more inputs or decreasing some of its other outputs and (2) none of the inputs can be decreased without decreasing some of its outputs or increasing some of its other inputs. Hence, 100% efficiency is defined to have been attained by a retail organization only when comparisons with other organizations do not provide evidence of inefficiency in the use of any inputs and in creation of any outputs.

5.2.2. Sensitivity/Gap analysis for inefficient Retail Organizations

At the individual retail organization level, DEA also provided rich diagnostic information through sensitivity analysis. For every retail organization not on the efficient frontier, DEA identified a set of efficient reference organizations in the corresponding envelope. These efficient reference organizations (whose efficiency is 100%) helped in identifying the inadequacies or slacks in the controllable inputs/outputs of the inefficient organization. By comparing the controllable inputs and outputs of the inefficient organization with the controllable inputs and outputs of a linear combination of the efficient reference organizations that comprised the frontier (a virtual organization), the amount of slack in each of the variables was computed. This can help the inefficient organization identify how to allocate resources more efficiently and improve its productivity. An inefficient organization may become efficient by increasing all outputs by an amount equal to its corresponding slack (i.e., move towards the efficient frontier vertically in the case of a 2-dimensional plot) or by decreasing all controllable inputs by amounts equal to its corresponding slacks (i.e., move towards the efficient frontier horizontally in the case of a 2- dimensional plot).

Table 5: Sensitivity analysis for retail organization 4 for the year 2005

| | (Units Rs. Crore) | | | |
Inputs	Estimated Weights	Value Measured	Value If Efficient	Improvement Scope/Slack
Power and fuel expenses	0.001	6.8	4.489	-2.311
Salaries and wages	0.021	14.86	12.205	-2.655
Advertising expenses	0.001	21.17	4.032	-17.138
Marketing expenses	0.001	13.68	2.700	-10.980
Capital employed	0.001	216.97	56.832	-160.138
Gross fixed assets	0.001	80.96	65.724	-15.236
Inventories	0.001	37.63	34.199	-3.431
Current assets	0.001	183.15	62.786	-120.364
Working capital	0.001	123.62	-1.337	-124.957
Outputs				
Sales	0.002	231.49	231.490	0.000
PBIT	0.001	25.72	25.720	0.000
Return on capital employed	0.000	9.49	25.982	16.492

Table 6: Sensitivity analysis for retail organization 4 for the year 2006

| | (Units Rs. Crore) | | | |
Inputs	Estimated Weights	Value Measured	Value If Efficient	Improvement Scope/Slack
Power and fuel expenses	0.001	9.69	7.178	-2.512
Salaries and wages	0.009	20.61	18.993	-1.617
Advertising expenses	0.001	29.85	7.532	-22.318
Marketing expenses	0.001	19.07	3.337	-15.733
Capital employed	0.001	335.32	137.685	-197.635
Gross fixed assets	0.001	97.24	82.077	-15.163
Inventories	0.001	53.36	53.360	0.000
Current assets	0.001	188.3	126.433	-61.867
Working capital	0.001	82.28	58.833	-23.447
Sales	0.002	343.23	343.230	0.000
PBIT	0.002	38	38.000	0.000
Return on capital employed	0.000	12.74	17.174	4.434

Table 5 and 6 show the gap calculated for various inputs of the inefficient organization by comparing them with the combined weighted inputs of all the efficient organizations for year 2005 and year 2006 respectively. Table 5 shows the sensitivity analysis results for retail organization 4 for the year 2005 while Table 6 has the sensitivity analysis results for retail organization 4 for the year 2006. These tables show the amount of slack in each of the controllable input and output observations for this retail organization. This slack was computed by comparing the input and output of retail organization 4 with the inputs and outputs of its efficient reference organizations. These efficient reference organizations were organizations which operate under circumstances similar to that of organization 4, but have 100% efficiency. The results show that retail organization 4 could have become efficient (increased efficiency from 0.463 to 1.00 in year 2005 and from 0.616 to 1.00 in year 2006) by increasing all outputs by the corresponding slack amounts or decreasing all

controllable inputs by corresponding slacks. Retail organization 4's estimated weights for the 12 variables are also shown in Table 5 and Table 6 for the year 2005 and 2006 respectively. DEA estimated these weights such that the estimated efficiency of 0.463 and 0.616 for retail organization 4 is the maximum attainable. No other combination of weights would have produced a higher efficiency estimate for retail organization 4 and yet satisfied all of the constraints in the optimization. As can be seen from tables 5 and 6, the maximum contribution to total input savings was from marketing expenses (2005:17% & 2006:25%) and advertising expenses (2005:17% & 2006:23%). Though working capital was seen as a major improvement area in the year 2005, it got substantially covered in the year 2006 (from 21% to 9%). Thus, retail organization 4 in order to become efficient needed to pay more attention on the marketing and advertising expenses as the most potential improvements factors. From the perspective of improving outputs, the results

suggested that a need existed to improve return on capital. Keeping these factors in mind, retail organization 4 became

efficient in the year 2007 as can be seen from Figure 5.

Figure 5: Snapshot of DEA model for retail organization 4 for the year 2007

6. IMPLICATIONS OF THE STUDY

The present study aimed at identifying the performance determining factors that have a significant effect on the performance indicators of Indian organized retailers. The study also explored the efficiency levels of five of the top retail organizations of India so as to identify their efficiency/inefficiency levels across the years relative to each other. An understanding of this was necessary to have a clear idea of the factors/variables which make a retail organization efficient or inefficient and thereby gain cognizance of the way in which an inefficient retail organization can be made efficient. The findings of regression analysis bring forth the performance determining factors which have a significant effect on the performance indicators. One variable which was commonly found to have a significant effect on each of the three performance indicators was Advertising Expenses. Advertising Expenses was found to have a negative effect on each of the three performance indicators i.e. Sales, PBIT and Return on Capital Employed. This clearly shows that the retail companies are spending more than the required amount on advertising. The amount of money being spent on advertising by companies should be used more judiciously by planning the investment depth in advertising arena incase the companies want to bring about an increase in their Sales, PBIT or Return on Capital Employed. This finding is also supported by the results of Sensitivity Analysis of the inefficient retail organization as shown by the DEA Model. Sensitivity/gap analysis of the inefficient retail organization clearly shows that one of the factors/inputs which needs to be reduced for the inefficient retail organization to become efficient is Advertising Expenses. The other significant performance determining factors as shown by regression analysis include Inventories, Power & Fuel Expenses and Marketing Expenses which were found to have a positive effect on either one or the other of the dependent variables - the performance indicators. Consequently, if retail organizations want to increase their performance, as denoted by either Sales, PBIT or Return on Capital Employed, they need to make an increase in their inventories, marketing expenses or power & fuel expenses. This can be justified by the reasoning that an

increase in inventories can help the organization in providing more choice to the customers and can also reduce out of stock situations for the company. An increase in marketing expenses might include promotional schemes, events and loyalty programs the retail organization undertakes/organizes from time to time. This increase leads to an increase in performance, as expenses in these make the retail organization more attractive for customers by offering something new every few weeks in the way of schemes, festivals, discounts or visual merchandising. These expenses also help in building the loyalty of a retail organization"s regular customers by giving them rewards for being loyal to a particular retail organization. Similarly an increase in power and fuel expenses leading to an increase in performance can be justified as follows. Increase in such expenses means more lighting inside the retail store and use of entertainment and visual media to attract the customers. Use of technology in the form of computerized systems, theft tracking machines etc also leads to an increase in such expenses which is offset by an increase in the efficiency of operations. The findings of the DEA Model help in determining the relative efficiency of some of the top retail organizations of India which helps in giving a benchmark of a relatively efficient retail organization against which other similar retail organizations can position themselves. The analysis helps in providing a suitable mix of inputs and outputs so as to make an inefficient organization efficient. For example the findings clearly indicate that retail organization 4 which came out to be relatively inefficient via the DEA Model should have focused on certain inputs specifically as for two consecutive years it failed to achieve efficiency and in both the years the slack had been in common input variables. Similarly, these efficiency improvement factors should be paid attention to by other retail organizations so as to improve their performance and become more efficient. Thus, beyond basic efficiency measurement, the findings of the present study can be used to improve individual store performance using the diagnostic information provided in sensitivity analysis. Similar analysis may also be used to compensate individual store operators which will motivate store operators to maximize operating efficiency as opposed to just increasing outputs. Efficiency based evaluation will motivate employees to not only work hard, but also work smart.

7. APPLICABILITY OF PRESENT STUDY TO OTHER ENVIRONMENTS

The present study is relevant to other developing countries particularly those with similar cultural values such as India. Countries in similar stages of development particularly the BRIC (Brazil, Russia, India and China) countries have been touted as being the power houses of the future in the BRIC Report prepared by Goldman Sachs in the year 2001, and defended in the paper Dreaming with BRICs: The Path to 2050 in the year 2003. All these countries are at similar stages of development and are thereby attracting a lot of attention and interest of foreign players. Retail is one of the highly attractive sectors in these economies attracting a great deal of interest of companies either domestic or foreign. Given the increased interest in the retail sector of these countries, the present study will be applicable for retail organizations in these countries irrespective of their size. The methodology used in the present study can be helpful to these organizations to increase their operational efficiency and gain a competitive edge and thereby be prepared for the competitive onslaught. Even for the retail organizations in developed countries, the present study is relevant since the input/performance determining and the output/performance indicating variables used in the present study are common for retail organizations across the spectrum irrespective of the level of development of the country.

8. LIMITATIONS OF THE STUDY

The present study though relevant in the highly volatile retail environment of today suffers from certain limitations. The study has been conducted only for 5 retail organizations of India, though there are many more in the market today. Also, the data for these companies has been taken only for 8 years and pertaining to only 12 variables. Though the variables which have been taken for the study are comprehensive enough in depicting the performance of retail organizations, a further study can be undertaken with more variables to make the analysis more thorough.

9. DIRECTIONS FOR FUTURE RESEARCH

A similar study can be conducted taking a larger number of retail organizations and variables into consideration to form a more comprehensive picture of the performance of retail organizations in India. The present study compares the performance efficiency of retail organizations having similar formats. The study can be extended to compare the efficiency of different formats of the same company to understand which format is performing more efficiently and hence is more suited for a developing country like India. For example, Spencer"s (a retail store chain in India) has different retailing formats under the names of Spencer"s Hyper, Spencer"s Super, Spencer"s Fresh, Spencer"s Express, and Spencer"s Daily which can be compared on the basis of efficiency/inefficiency in performance. Moreover, a comparative study can be undertaken to compare the performance efficiency of retail organizations in different countries so as to make a cross cultural comparison of the effect of different input variables on the output variables. The present study could also be extended to make an intra-company comparison whereby the performance efficiency of a particular company could be seen across the years so as to find out which factors increase the efficiency of the company in certain year"s vis-à-vis the other years.

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