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Measuring Retail Productivity in Indian Context

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Introduction

In this study, the focus is upon developing a constitutive and operational model of the construct "Retail Productivity" from a store level application and usage point of view. Retailers over the years have developed and used various methods for their performance measurement as well as development of strategy. Obviously, retail productivity is one of them and probably rather significant too. However, lack of clarity at the conceptual level has made retail productivity a synonym for retail performance and hence retailers use sales per square feet, employee turnover or return on investment to explain retail productivity / store productivity. Ingene (1982) highlights twelve different productivity definitions and their overall measures. As there is complete lack of standardization of the retail productivity score, productivity scores of two different stores (organizations) become totally non-commensurable for any comparative purpose. As a result, a superior retail productivity score fails to develop any sustainable strategy for future and an inferior retail productivity score fails to pinpoint areas of concern. With this core thought process, in this study, it is intended to define retail productivity conceptually, identify exhaustively the various constituents and their measures, determine their significance and finally integrate them all with a model for measuring retail productivity at individual store level. Consequently, it should help identify some store level issues and help development of strategic input to address those issues. Apart from that, As per Mishra (2011), the existing retail productivity models fail to provide satisfactory fit for Indian retail sector. Therefore, such a study would also define how the retail concepts are applied and validated with changing economic as well as retail landscape with evolving retail sector such as India.

One can proceed to the next phase of the study with a brief explanation of retail productivity and the consequent difficulty in developing a standardized measure for it. Productivity as a concept borrows its existence from the manufacturing sector (early twentieth century onwards) and the economic necessity to understand the performance of the manufacturing process. As most manufacturing business deals with conversion of raw materials (input) to finished goods (output) by machines, productivity of the manufacturing process deals with the relationship (ratio) between output and input. Hence, the performance of any manufacturing business can be easily determined by productivity (ratio of output to input). Here, assuming the quality of input to be constant over a period

of time, the term productivity refers to the efficacy of the production process (machines, installed processes, fuel etc.) only.

However, the situation gets complicated when productivity is applied to retail sector. While conceptually retail productivity would still be the ratio of retail output to retail input, the definition of both output as well as input are open to interpretation. The output in case of retail business is surely the physical items (merchandise) that consumers purchase from stores. However, the embedded service component (time utility, place utility, availability, variety as well as assortment etc.) adds value to the merchandise. Consequently, the conversion process involves procuring the merchandise and adding service component to provide the end consumer value added merchandise. Because of the obvious subjectivity in the whole definition and interpretation of output component, the measurement process is rather varied and dynamic. The input factors in the retail productivity construct automatically depend upon the treatment of the output and hence have different dimensions too. They could be single or multiple (labor, capital etc.); with or without considering the influence of correlates (size of store, type of store, store level and industry level consideration etc.). Accordingly, researchers use productivity study for different purposes. Hence for this study, retail productivity can still be defined as the ratio of retail output to retail input and it does indicate how adequately the raw input has been converted to the retail output.

As the objective of this study is to determine the significant constituents, their measure and the integrating model, it would quite appropriate to first look at the literature for the same. Some significant studies are observed with Arndt and Olsen (1975), Ingene (1982 and 1985), Reardon, Hasty and Coe (1996). Arndt and Olsen (1975) uses gross profit of 167 grocery and general stores in Norway as output and labor (number of persons engaged) as well as capital (floor area of the store in square meters) as input factors and Cobb – Douglas production function with linear regression as the method for developing their retail productivity model. Ingene (1982) identifies three measures of capital (capital intensity, average store size and retail space saturation), two measures of labor (labor wage rate and sales per employee), five measures of demographics (population growth, income, household size, mobility and congestion) and one measure of competition as input variables. He uses sales in monetary value as output variable and Ridge regression with Cobb – Douglas production function as the modeling method for defining retail productivity. Ingene (1985) modifies his previous model of retail productivity to eliminate the collinearity problem in his earlier model and suggests methodological modifications. Reardon, Hasty and Coe (1996) use a translog Cobb – Douglas function for development of their retail

productivity model. They use a non-probability sample of 871 retailers in U.S. with value added (Sales – cost of goods sold and other intermediate costs) as output factor and labor (number of employees), capital (square foot of retail space) and information technology (equipments, computers and systems) as input variables. They compare the results of the retail productivity model with input variables measured in numbers (and dummy variables) and value and found support for each of the three input variables. Analysis of the three studies reveal the necessity of a comprehensive and integrative retail productivity model that could be standardized, used at store level and help developing operating strategies in Indian context. The studies discussed above, validate the three input variables (labor, capital and IT) as significant independent variables for estimating retail productivity. However, these studies started with labor, capital and IT as input hypotheses and subsequently, proved the hypotheses empirically. None of the studies tried to determine exhaustively all the input variables and none of them tried to estimate total factor productivity comprehensively. Hence, these studies have rather limited applicability in estimating retail productivity at store level and develop sustainable strategies. Subsequently, application of Cobb – Douglas function with labor, capital and IT as input variables and sales as output variable (all measured in value) found little support for estimating retail productivity in emerging retail sectors (Mishra, 2011). As per Mishra (2011), the subsequent experimental study also validated the lack of usability of the available retail productivity model for estimating retail productivity at store level.

Therefore, the proposed model contributes to the retail literature in multiple significant ways. Firstly, it determines exhaustively (based on the study area and associated constraints) all the significant factors of retail productivity in Indian retail sector and provides their relative importance in retail decision making. Of course, this is made possible by considering a single vertical in retail business (Apparel and lifestyle) and a specific target group (SEC B+ and above). Secondly, this model is applicable at the individual store level (micro level) in contrast to the earlier studies (which are mostly macro level). Thirdly, it considers two different types of retail formats (small and medium sized) for model building and hence it provides a scope for intra as well as inter level comparison. Most significantly, it provides a theoretical framework for an extended and detailed retail performance evaluation where retail productivity is a necessary component.

The rest of the paper is organized as follows. In the “Conceptual background” section, modeling of output / dependent variable is highlighted. It also identifies the relevant correlates of the dependent variable. “Model development” section identifies each of the input as well as output variables for the

determination of retail productivity and develops their measurement methods. Subsequently a modified Cobb-Douglas model is proposed for the determination of total factor productivity. Various hypotheses are formulated as per the requirement. Because of the involvement of multiple empirical methods in the validation of the proposed model, there are multiple research methodologies highlighted in the text. There are separate research methodologies for determination of input variables, determination of output variables and empirical validation of the total factor productivity model. In the section "Results and interpretation for medium sized stores", the model fit for medium sized stores is analyzed and interpreted. In the sub-section "Discussion" the results of the model is validated with industry input (qualitative as well as quantitative). The same routine is followed for "Results and interpretation for small sized stores" with a change of scope. "Conclusion" section highlights the major contributions of this study and lists down the directions for continuation of the study.

Conceptual background

As per (Mishra, 2011), labor, capital and IT together or individually, fail to explain the retail productivity variable completely and most of the small as well as medium stores operate with rather poor efficiency level. Consequently, as suggested by (Mishra, 2011), both independent as well as dependent variables need to be re-examined and modified based on theoretical as well as field level inputs.

In this study, based on Achabal et.al (1984), Dubbelar et. al (2002) and Mishra (2011), the availability of merchandise (with their associated service components) for sales at the retail outlet is considered as the output variable for retail productivity estimation. Output of retail productivity will be availability of merchandise for selling (single / multiple). It can be measured as physical units or cost.

The first issue under consideration is the multiplicity of the output variable. The merchandise categories in any retail store are multiple and they need to be treated differently. All the items in the retail store do not belong to the same category and all of them do not serve similar purpose in the retail store. As per Levy, Weitz (2008) and Berman, Evans (2009), the fundamental principle of merchandise management involves identification of the key categories of merchandise (say yellow, orange and white goods) for any retail store; ascertain their purpose (say, crowd puller, staple and impulse) and subsequently develop the procurement as well as the delivery plan along with the planogram of the stores under consideration. The underlying philosophy here is that every category of item contributes

differently to the overall revenue and hence profitability; correspondingly, every category of item incurs some cost for its procurement, storage and presentation inside the retail store. Over and above all these, there is consumer preference and supplier availability which also guides the merchandise mix of the retail store. At the end of these, the numbers must make sense for the retailer to continue his business. This gets ascertained by the retailer during the merchandise management phase (which is under consideration here). Obviously, it means there is distinct categorization of the retail merchandise with the retailer. Based on the discussion above, the hypothesis is formulated and given below.

H_1: Each category of merchandise in any retail store constitute a separate output for the determination of retail productivity and hence commission different resource commitment (input variables)

Output of retail productivity would also include the embedded service component. As per Bucklin (1978) classification of services in any distributive business, they are logistical, informational and product functional respectively. Betancourt and Gautschi (1988, 1993) suggest the following five service categories. Accessibility of location (saving on time and transport cost for the consumer), level of product assortment (breadth and depth of any category; saves time and transportation costs of the consumers due to multiple trips to retail stores), assurance of immediate product delivery in the desired form, at the desired place and desired time (saves the costs of waiting time, non-availability of items, associated storage requirements if the product is not available in the desired quantity at the desired time), information (on price, availability and other characteristics of goods and services) and ambience (discount stores have it low whereas luxury stores have it high and hence is the associated costs). The works of Oi (1990), Smith and Hitchens (1985) on services components in retail output are in agreement with the above classification. However, taking the Betancourt and Gautschi (1988, 1993) classification as the basis of service component in the retail output, one can easily identify customers as a correlate of retail productivity. Different segments of consumers attach different levels of significance to these multiple service factors of the retail output. This is also validated by Ingene (1982) and Mishra (2011). Therefore, if one can map different consumer groups with the relevant service levels, one would be able to determine the intangible value component of the merchandise that are available for selling in various retail stores.

While multiple categories of merchandise and their associated service levels constitute output variable for specific consumer groups in estimating retail productivity, the relationship between

merchandise and the associated service component need to be ascertained. Assuming the same merchandise categories to be input (which is anyway true for any distributive business too), the strength of the service component decides the value of output parameter. Say merchandise category is A. The associated service component is α. For this study, A^{α} seems to be the most appropriate measure for retail output. It is ascertained with the following illustration:

Case 1

$\alpha = 1$

Interpretation: Input is equivalent to output. Retail productivity is 1. The retail store is equivalent to any other competitor (assuming others to be at 1); it does not add any value.

Case 2

$\alpha < 1$

Interpretation: Output is poorer than input due to extremely bad service (say items not available or store pretty dirty etc.). Retail productivity is less than 1. The retail store is poorer in comparison to its competitors (assuming others to be at 1); it is unlikely to succeed.

Case 3

$\alpha > 1$

Interpretation: Output much better than the input due to the good services that adds value to the merchandise. Retail productivity is more than 1. The retail store is doing better than its competitors (assuming others to be at 1); it might go on to succeed. Therefore, an exponential relationship between the merchandise and its associated service component is proposed.

Consequently, it is possible to determine the categories of merchandise in retail stores in numbers / cost and the associated service components too. The store type, store size and the customer characteristics have already been identified to be the confounding variables by Ingene (1982, 1985), Reardon et. al (1996) and validated in Indian context by (Mishra, 2011). These extraneous variables need to be controlled in the model development stage.

The multiplicity of the input variables (labor, capital, IT and more) has already been validated by Mishra (2011). With these conceptual extensions, appropriate retail productivity model could be developed.

Model Development

For developing an appropriate retail productivity model, some of the relevant studies of productivity with multiple input variables are highlighted below. Eslava, Haltiwanger, Kugler and Kugler (2004) used the KLEM production function (modified Cobb-Douglas model) to study the impact of reforms on productivity in Colombia and Moreno (2008) used a modified Cobb-Douglas model for studying retail productivity and technical efficiency in Spanish retail sector. Therefore, it seems appropriate to use standard multiple regression model using Cobb-Douglas production function to develop the retail productivity model. This would not only help identifying all the input factors of retail productivity (total factor productivity) and their relative significance to the retail stores at an individual level, but also would be useful in the real life application with store level assessment, estimation and industry acceptability in Indian context.

In order to develop a model for retail productivity in Indian context, the output variables need to be determined and their measure have to be identified. The same process has to be followed for input variables too. Subsequently, Cobb – Douglas production function can be used with the above mentioned output and input variables to develop the model for retail productivity.

Determination of Output factors

As discussed earlier in this paper, the output would be “the ability to make sales”. Converting this constitutional construct into operational definition, one can say, output would be “the availability of items / merchandise on the shelf” of the retail stores. This could be measured in terms of number of items available or cost of the number of items that are available depending upon availability of data and consistency of the model. This output figure would obviously include the following:

i) The products / items / merchandise that are available for selling in retail stores

ii) The service components associated with the merchandise in the retail stores that provide the customers with value and consequently the reason for them to choose one store over the other

It has already been discussed that each distinct category of merchandise should feature separately in the retail productivity model. Based on field observation, the available merchandise categories per store type are presented in table 1.

Table 1

Major Store Types	Merchandise Category 1	Merchandise Category 2	Merchandise Category 3	Merchandise Category 4
Food and Grocery	Staple	Destination	Luxury	Impulse
Apparel & Lifestyle	Core	Fashion	Accessories	
Specialty	Core	Seasonal	Luxury	Accessories

Here apparel and lifestyle segment data is used for model validation and hence there are three possible constituents (merchandise) of retail productivity output.

Store format and size have already been identified as confounding parameters (Mishra, 2011). In the study area (India), there are not too many large format stores per city in the apparel and lifestyle segment. Based on operational feasibility, small (less than 3000 sq.ft.) and medium (between 10,000 sq.ft. and 25000 sq.ft.) stores are being considered for retail productivity modeling. The incumbent hypothesis statement is given below.

H_2: The small and medium stores have different constitution so far as retail productivity modeling is considered.

The conceptual background highlights the inclusion of an exponential service component in the output modeling. However, it is needed to differentiate the service parameters that are specific to the merchandise categories and those which are generically applied to all items or can be treated as external variables. For determination of this, personal interviews are conducted with store / floor manager of 20 retail stores and the retailer point of view regarding the service parameters is ascertained. The internal assessment process of the retailers including store audit are also considered for identification of appropriate service components. Out of the five service categories of Betancourt and Gautschi (1988, 1993), level of product assortment, assurance of immediate product delivery in the

desired form, at the desired place and desired time and ambience are definitely category specific. Location seems to be a generic factor for all merchandise categories as the travel and transportation cost to the consumer cannot be separated for specific items (skus). Even from the operations and supply chain point of view, the impact of store location cannot be determined specifically for individual product categories. Apart from that, the information presentation part is a continuous activity that is embedded with different factors (customer interaction, product demonstration etc.) rather than being a specific activity. Hence it needs to be considered in a holistic way. Based on the interaction with the retail executives, the value / service component is divided into the following four categories (along with their subcategories Table 2). The advantage of this modified service / value parameter is from the data availability with the retailers' perspective (periodic audit).

Table 2 (value / service categories for retail productivity)

Serial No	Service / Value Category	Embedded subcategories
1.	Store Presentation	External façade (signage, window, drive way)
		Ambience (Lighting, Air conditioner, Music, Aroma
		Various design elements that communicate store image)
		Ease of shopping (Layout, adjacency, Ease of circulation, ease of locating the product that you want, ease of purchasing, Ease of value added services and facilities)
2.	Assortment Plan	
3.	Stock out percentage	
4.	Service Capability	Staff adequacy, staff grooming and presentability, Staff knowledge and skills, adherence to standards, customer interaction, safety

Table 2 can be validated against available secondary data. "Businessworld Marketing Whitebook (2009 -10)" provides some interesting details in this regard. Indian retail consumers are segmented into six distinct categories based on their demographic characteristics (viz., age, zone and population index, income etc.) and psychographic characteristics (consumption habits, behavioral patterns etc.). The segments are experiential shoppers (24%), status shoppers (17%), pragmatic shoppers (16%),

reassurance seekers (12%), dutiful shoppers (18%) and active shoppers (13%). The segmentation is basically a combination of

The shoppers described above, are surveyed regarding the features of any retail store that they would find significant. They are administered a multi-item likert type questionnaire with statements regarding the different features of any / their favorite retail store and it included many service factors too. The conclusion is drawn based on the percentage of them saying the feature is most important to them. The conclusion summery (Table 3) gives the number of items in the questionnaire describing categories in Table 3 and the median of the responses for each category of consumers to the items in the questionnaire.

Table 3 (Service significance for Indian Shoppers in %)

Service / Value Category	Number of Items	Active Shoppers	Status Shoppers	Dutiful Shoppers	Reassurance Shoppers	Pragmatic Shoppers	Experimental Shoppers
Store Presentation	5	61	61	56	56	52	57
Assortment Plan	7	63	62	59	58	67	62
Stock out percentage	4	64	62.5	59	57.5	55	58.5
Service Capability	8	64.5	61.5	60	54.5	55.5	58.5

Analysis of the Table 4 validates the significance of categories in Table 3. Therefore, it is proposed to formulate the output parameters model of retail productivity estimation in India as follows:

$$Y = [Y_f]^{v_j} + [Y_c]^{v_j} + [Y_a]^{v_j} \qquad \ldots . (1)$$

Where

Y = Retail Productivity output

Y_f = Fashion category SKU (measured in numbers present in stores)

Y_c = Core category SKU (measured in numbers present in stores)

Y_a = Accessory category SKU (measured in numbers present in stores)

V_j = Value added to the merchandise SKU for all j (category: Fashion, Core, Accessories);

j could vary between 1 to n based on the scores for its constituents

Research methodology for determination of output parameter

As both the retail productivity output and its constituents (value added) are multidimensional in nature, it is needed to identify each of the dimensions and their relative significance (to arrive at the output value). Conceptually, it is not much different from "value added" used in the previous studies (Reardon et.al, 1996). However, in this study, value added is devoid of the influence of demand factor as it is derived from the store level retailer opinion survey. 73 medium sized stores were identified from the telephone directory and yellow pages in Bangalore. A telephonic survey was conducted to find out their willingness to participate in this survey. About 60% positive responses (44 stores) were received. The criteria for selection of stores were the availability of a SOP manual (Standard operating procedure) with the store and continuous store audit for the last 3 years based on the SOP. The final sample size is 29. Extensive survey was conducted in these stores and interviews with the store manager (in some cases senior supervisor level employees) were carried out. The distinct merchandise categories and their associated service levels were determined. The generic services categories (applicable to the whole store) and the specific service categories (ascribed to specific merchandise categories) were identified. Subsequently, observation, depth interview and content analysis were followed to identify each constituent of the retail productivity output. One of our major focuses is the ability to apply this model on field. Therefore, instead of creating new data points for data collection, the existing data that is typically available with the retailers (store audit and SOP manual) were relied upon and the same measurement method (scale) was followed. The result of the retailer survey is discussed below.

The value function V_j can be defined as follows:

$$V_j = \left|(SP \times W_{lj}) + (A \times W_{lj}) + (SO \times W_{lj}) + (SC \times W_{lj})\right| \quad \ldots\ldots (2)$$

V_j = Value added for j^{th} category of merchandise

SP = Store presentation measured in a 10 point rating scale

A = Assortment plan measured in a 5 point discrete scale

(Exceeds Expectation; Meets Expectation; Acceptable; Not acceptable; Serious Concern)

SO = Stock out % measured in 5 point discrete scale

(Exceeds Expectation; Meets Expectation; Acceptable; Not acceptable; Serious Concern)

SC = Service capability measured in a 10 point rating scale

W_{lj} = Weight of j^{th} category (Fashion, Core, Accessories etc.) for l^{th} parameter

There are many components of the store presentation parameter which are presented below in table 4. Each of the components is measured separately using the given scale. Subsequently, a weighted average method is adopted to arrive at the store presentation score.

Table 4

Serial No.	Parameter	Items to be measured for each parameter	Measurement Scales
1	External Façade	Signage	5 point discrete
		Window	5 point Discrete
		Driveway	5 point Discrete
2.	Ambience	Lighting	5 point Discrete
		Air conditioner	5 point Discrete
		Music	5 point Discrete
		Aroma	5 point Discrete
		Design elements that communicate brand image	5 point Discrete
3.	Ease of shopping	Layout	2 point Discrete
		Adjacency	2 point Discrete
		Ease of circulation	5 point Discrete
		Ease of locating the product that you want	5 point Discrete
		Ease of purchasing	5 point Discrete
		Checkout	5 point Discrete
		Value added services (gift wrapping, alteration etc.)	2 point Discrete
		Facilities (Rest rooms, drinking water, resting area etc.)	2 point Discrete

There are many components of the service capability parameter which are presented below in table 5. Each of the components is measured separately with a likert type scale. Subsequently, a weighted average method is adopted to arrive at the store presentation score.

Table 5

Serial number	Parameters
1.	Staff adequacy
2.	Staff grooming and presentability
3.	Staff knowledge and skills
4.	Adherence to standards (30 minutes for alteration; 3 minutes for check out etc.)
5.	Customer interaction
6.	Safety (prevention of terrorist attack, fire, vehicle burglary etc.)

Here it would prudent to reiterate the output factor considered for retail productivity: "the availability of items / merchandise on the shelf" of the retail stores measured in terms of number of units or cost. The same consideration could also be there for the traditional measures of output in retail productivity viz., sales, profit or value added etc. as availability of the items on the shelf is a necessary precondition for either of the factors above (sales, profit or value added etc.) and on occasions the relationship between them could also be monotonic (Ingene, 1982).

Determination of input factors

Research methodology for determination of input parameters

As per Mishra (2011), the input factors to estimate retail productivity would be multiple and hence, an empirical survey is needed to identify them in the Indian context. A list of all the potential input factors was created from the literature (Finne and Sivonen 2009, Porter 1985 etc.) and expert opinion survey (retail consultants and trainers). After ascertaining content validity, the list was converted to a likert type questionnaire. The reliability of the questionnaire was duly ensured (Chronbach alpha .79). The questionnaire was administered to the same 29[1] retail managers of medium sized stores. A factor analysis was conducted on the response data and the output revealed the potential input parameters for the retail productivity model. The result was again discussed with the experts (retail consultants and trainers) and modified. Table 6 summarizes the final input factors and the confounding variables.

Table 6

Serial Number	Input Factors	Confounding variables
1.	Labor	Type of retail store
2.	Capital (infrastructure)	Size of retail store
3.	Retail merchandise	Characteristics of the consumers
4.	Store interiors	Income level of the consumers
5.	Systems and processes	
6.	IT and point of sales	

[1] These retail stores were identified for study during the discussion on research methodology for determination of output factors

Measures for input factors

After identifying the input factors, it is needed to develop a standardized method for measurement of these input factors so that they are easy to determine / compute (on-field usability of the model subsequently), compatible and commensurating with each other as far as possible. It was decided to treat the items at monetary level (as the retailers use monetary measures most of the time rather than physical numbers). As per Reardon and Vida (1998), for determination of input parameters of retail productivity, both monetary measures and physical measures show equivalent results.

Let it be reemphasized here that one of the primary objectives of this study is to apply the retail productivity model at the field level (individual store level) and help the retailers formulate strategy to improve their productivity. Therefore, the source of data, in most cases, has been observation and determination of store operations. For developing measures of input factors of retail productivity, the systems of the stores were studied and data was collected from the stores regarding their regular operations. Therefore, for this study the same data depository was used as the retailers and most often treated the data same way as the retailers. This would eventually help in external validity of the model. All the subsequent models in this study and input measures are driven by this philosophy.

Labor input

Traditionally labor input is measured with physical units (number per sales / number per sq.ft. etc.) or cost (wages / wages per sales / wages per man hour etc.). Ingene (1982) provides constituents for determination of labor productivity. The significant constituents are given below.

Sales = 0.156(Capital intensity) + 0.690(Retail wage rate) + 0.186(average household income) + 0.181(Household size) + 0.222(availability of private transportation)

However, a field survey with 29 managers (and few employees) of medium sized stores (selection process of the stores has been already described earlier) revealed some differences in the operations on field. The major differences from the traditional method of treatment of labor input are as follows:

i) There are different types of employees in any store, namely sales, managerial / supervisory, Support, housekeeping and security.
ii) The salary / wages, job descriptions as well as job specifications are different.
iii) Their demographic as well as psychographic profiles are also different.

iv) Consequently, the employees in any retail store require differential amount of training and experiential (on-the-job) learning to achieve their desired levels of performance.

v) Therefore, at any point of time every employee of any retail store does not perform at the optimal level of effectiveness (performance)

Considering all these issues, it was decided to develop a measure for labor input factor as follows. A survey was carried out in each of 29 stores identified earlier. Each type of employee working in the store was identified; their demographic details (education, occupation, income, family size, and family life cycle) were collected along with the store manager's opinion regarding their effectiveness in the store. Based on the profile and performance of the employees in the store, an aggregate effectiveness index was developed for the employees (between 0 to 2) and decided to treat it exponentially with the employee data of the store. This is based on the simple logic that a well-trained and effective employee could perform equivalent to more than one man where as an ineffective employee could simply be a draw on organization resources without being too productive.

During the final data collection stage (details in the sampling plan), each employee data based on cost to the company (from their store audit data) was collected. Their profile and performance data was also collected from the internal store audit report and an effectiveness index for the employee was developed. As cost to the company is used as the identifier of labor, the effectiveness score was made reverse i.e., better the performance lower is the effectiveness score. Finally, the median of the cost – effectiveness score for the store was computed. The manager / owner's opinion regarding the significance of the quality labor for the store under consideration was also collected in a 5 point scale for each type of employee. Based on the above, the labor input factor was computed.

$$L_I = L_{SS} + L_{MS} + L_{ST} + L_{HKS} \quad \ldots\ldots (3)$$

Where

L_I = Labor input factor

L_{SS} = Contribution of sales staff in the store to labor input factor

L_{MS} = Contribution of managerial and supervisory staff to labor input factor

L_{ST} = Contribution of support staff to labor input factor

L_{HKS} = Contribution of housekeeping and security staff to labor input factor

$$L_{SS} = l_{css}^{e} \times S_{Lss} \quad \ldots\ldots (4)$$

Where

L_{SS} = Contribution of sales staff in the store to labor input factor

l_{css} = Cost of sales staff in labor force

e = Effectiveness of labor force (varies between 0 to 2)

S_{Lss} = Significance of the sales staff in labor force (varies between 1 to 5)

Capital input

Traditionally capital input is measured with physical units (number of establishments / floor space in sq.ft. etc.) or cost (sales per sq.ft. etc.). However, a field survey with 29 managers (and few employees) of medium sized stores revealed some differences in the operations on field. The major differences from the traditional method of treatment of labor input are as follows:

Location of the store influences the contribution of capital input significantly. Retail being a store based business (in India) and every store attracts customers from its primary trading area, the locality of the store influences the turn over and consequently the availability of items on shelves. A superior location would ensure better clientele, higher turnover and high margin purchases and hence higher return on investment (for the store rental or lease).

Considering all these issues, it was decided to develop a measure for capital input factor as follows. A survey in each of 29 stores identified earlier was carried out. The floor area in the stores and the associated cost (rentals / lease etc.) was identified. Subsequently, a business propensity score of the location was determined (between 0 to 2) based on local expertise. This is based on the logic that a 500 sq.ft store in a superior location gives 3 times better returns (local expertise) than a 2500 sq.ft store in an inferior location. Therefore, the effective cost of the superior location store is lesser than the inferior location store. The location scores were reversed (in the previous case .33) for superior compatibility. Subsequently, the type of clientele (based on SEC classification of consumers in the trading area) was identified and a clientele score (score varies between 1 to 5; SEC A+ closer to 5, SEC D closer to 1) was developed. Based on the above, the capital input is determined as follows:

$$K_I = K_c^{\,l} \times Cl \quad \ldots\ldots (5)$$

Where

K_I = Capital input factor

K_c = Cost of capital
l = Location factor (varies between 0 to 2)
Cl = Clientele score (varies between 1 to 5)

Merchandise input

Retail merchandise has not been included in input factors for retail productivity in the earlier studies. However, retail merchandise is the raw stock which constitutes the backbone of any retail business. Subsequently, the retailer adds varieties of values to the stock and the resultant merchandise is available for sales. Intuitively it makes sense and the retailer survey for identification of input variables (Table 6) also revealed the same. Therefore it was decided to include the raw stock at cost value in the merchandise input. However, the cost of the stock is not just market driven; it also depends upon the economies of scale and organizational buying process. There are a series of steps / processes involved in the procurement function and development of an appropriate process for procurement significantly reduces the cost of stocks. Some of the steps / processes are highlighted below.

Table 7

Serial No.	Buying process	Constituents
1.	Buying policy development	Supplier selection, customer analysis, assortment plan
2.	Budget allocation	Sales growth plan, Sales phasing, stock phasing, planned margin, achieved margin, markdowns, open to buy
3.	Range structure planning	Buying cycle, planning process, range structure plan, range profile
4.	Sources of supply	Supplier policy, vendor selection, supplier relationship, negotiation, terms and conditions
5.	Range planning and product development	Range needs, Range boards, competitors, Market information, different ranges and product sourcing vs. product development
6.	Brand development	Input to overall product brand and store brand, managing brand

If any retailer follows these processes, he is more likely to get a good bargain with a lower cost of merchandise and chances of superior productivity. The pre-sampled 29 stores were studied and their cost of stock was gathered. Subsequently, their buying process was investigated and compared with the standard buying process as described in table 7. The score again varies between 0 to 2 and the scores are reversed as earlier input variables for comparative parity. Personal interviews with the managers of

the sampled stored were also carried out to gather Information regarding the supply chain significance as well as procurement ease. Information was also gathered regarding their warehousing, storage and transportation facilities. Based on the above, a facilities score (between 1 to 5) was devised. The merchandise input score is modeled as below.

$$M_I = {M_c}^p \times F \quad \ldots\ldots (6)$$

Where

M_I = Merchandise input factor

M_c = Cost of merchandise

p = Process factor (varies between 0 to 2)

F = Facilities score (varies between 1 to 5)

Store interiors input

While the significance of store interiors is undeniable, it has never been part of input factors for retail productivity. A dip stick survey of consumers as well as retailers indicates store interiors to be one of most influencing factors of retail productivity. The input factors determination survey identified the following factors as constituents of store interiors.

a) Fittings
b) Fixtures
c) Equipment
d) Design collaterals

While individually each one of them can be measured in physical numbers, the retailers measure them as cost per square feet. Therefore, it was decided to measure them in cost rather than physical numbers. However, there are some other complications involved. Increase in the amount of store interiors does not necessarily increase retail productivity. The ideal sequence starts with the configuration of store interiors in the design brief of the store during opening of the store and its subsequent implementation. An appropriate store interior helps create a pleasurable experience for the target consumer and a happy consumer would invariably be a repeat consumer. This would help improving the turnover and hence the availability of item on the shelf. However, many times the retailers try to reduce the expenses by deviating significantly from the design brief and keeping the store

interior to a bare minimum. Some other occasions, the retailers again deviate from the design brief by going overboard with store interiors to create a competitive difference. Both these extremes have negative repercussions on retail productivity. Therefore an exponential term is introduced to cost of store interiors in terms of its appropriateness. The design briefs of the retail stores sampled was checked and mapped with the store interiors. In case 90% or more match the score would be 1. An inferior match would reduce the score subsequently. In case of inferior match, the number is reversed with the interpretation that such arrangements are actually a draw on organizational resources without serving its purpose significantly. The other term in the store interior model is the significance the retailers assign to the store interior parameter. This is measured in 5 point rating scale as reported by the store managers. The resultant model is as follows:

$$SI_I = F_c^a \times S \quad \ldots\ldots (7)$$

Where

SI_I = Store Interior input factor

F_c = Cost of fittings, fixtures, equipment and design collaterals

a = Appropriateness factor (varies between 0 to 2)

S = Significance score (varies between 1 to 5)

Systems and Processes input

There are various systems and processes in any retail store that help its smooth functioning. The input factors identification survey revealed about 11 major processes in any retail store. The processes are identified below.

1 –Sales Planning Process

2 – Sales Management Process

3 – Inventory Planning Process

4 – Inventory management Process

5 – Security management Process

6 – Cash desk management Process

7 –Customer Interaction

8 - Maintenance and Housekeeping

9 – HR Processes

10 – VM Processes

11 – Back office administration

Each of these processes is rather significant and unavoidable for each and every retail store. Therefore, there are different hardware, software and human ware requirements for carrying out these processes successfully. The presence of each of these processes in the sampled stores was identified and the cost commitments for these processes were determined. The implementation of these processes in the stores was also observed and it was compared against the SOP (standard operating procedures). Based on the mapping, the appropriateness score (exponential allocation) was assigned between 0 to 2 where stronger map gives a lower appropriateness score and a weaker maps gives higher score. The system and processes significance score was determined as opined by the store managers. The resultant systems and processes model is given below.

$$SP = \sum_{i=1}^{k} P_i^{g_i} Q_i \quad \ldots\ldots (8)$$

Where

SP = Systems and processes input factor

I = Different systems and processes as described earlier

P_i = Cost of systems and processes

g_i = Systems and processes appropriateness factor (0 – 2)

Q_i = Significance factor for systems and processes

IT input

Even though information technology has significant usage (Point-of-sales, inventory management, computer terminals / laptops, fax machines, printers, varieties of software etc.) in the retail business at the store level, there are not many studies regarding IT in retail productivity. One of the significant studies involves Reardon et.al. (1996) where IT is considered as an input variable in the determination of retail productivity. In this study, IT was treated in two different ways viz., physical measure (number of different devices, dummy variables for software) and monetary measure (total investment for IT). As the monetary measure gives better results, it was decided to use monetary measures too for our study.

However, it was decided to make the IT input value a little more descriptive due to the following reasons.

a) There are software and hardware involved in IT input and the investment pattern for each of them is different (fixed and recurring)
b) Like any other input parameter, IT also has necessary and sufficient clauses of usage. For example, a 500 sq.ft. apparel and lifestyle based store might use 2 POS systems and 5 computer terminals to improve performance. However, usage of 5 POS and 10 terminals would surely be a draw on the store's resources; performance might not increase accordingly. Therefore, the opinion of industry experts was taken (consultants and owners) and developed into a necessary and sufficient table for a store (floor space and type). This is called appropriateness parameter, used exponentially and the value ranged from 0 to 1.
c) Apart from that, different retailers attach differential significance to the IT dimension. A retailer survey indicated the IT significance which was included in the model.

The final IT input factor is represented as follows:

$$IT = (SIT_c^{as} \times S_s) + (HIT_c^{ah} \times S_h) \quad \ldots\ldots (9)$$

Where

IT = Information technology input factor

SIT_c = Cost of Software elements in information technology

HIT_c = Cost of Hardware elements in information technology

as = Software appropriateness factor (0 – 1)

ah = Hardware appropriateness factor (0 – 1)

Ss = Significance factor for Software

Sh = Significance factor for Hardware

Proposed Model

Finally the proposed model is developed as follows:

$$Y_{ivc} = A_{ivc} L_{ivc}^{\propto} K_{ivc}^{\beta} M_{ivc}^{\gamma} SI_{ivc}^{\delta} SP_{ivc}^{\theta} IT_{ivc}^{\emptyset} \quad \forall\, i, v, c \quad \ldots\ldots(10)$$

Where

Y = Output factor

A = Total factor productivity

L = Labor input to retail productivity

K = Capital input to retail productivity

M = Retail merchandise input to retail productivity

SI = Store Interior input to retail productivity

SP = Systems and processes input to retail productivity

IT = IT input to retail productivity

α = Elasticity of labor

β = Elasticity of capital

γ = Elasticity of retail merchandise

δ = Elasticity of store interiors

θ = Elasticity of Systems and processes

ϕ = Elasticity of IT

i = Store type

v = Store size

c = Customer characteristics

This leads us to a few hypotheses that can be verified along with the model fit with empirical data. The hypotheses are given below.

H_3: *Labor has a positive and significant effect on the output of retail stores.*

H_4: *Capital has a positive and significant effect on the output of retail stores.*

H_5: *Merchandise has a positive and significant effect on the output of retail stores.*

H_6: *Store interiors have a positive and significant effect on the output of retail stores.*

H_7: *Systems and processes have a positive and significant effect on the output of retail stores.*

H_8: *IT has a positive and significant effect on the output of retail stores.*

H_9: Most of the retailers operate at constant returns to scale.

Research Methodology for model fit

Empirical data were required to validate the proposed retail productivity model. As described earlier the scope of study was small (less than 3000 sq.ft.) and medium (less than 25,000 sq.ft.) stores in apparel as well as lifestyle vertical. There was no existing database available in India for retail stores and hence, it was needed to develop a database before choosing a sample. For ease of accessibility and data availability, three metros of India were considered for our study (Mumbai, Delhi and Bangalore). The list and the number of stores were collected from some websites which provide store level data (viz., retailangle.com etc.). As the website data did not contain the store size, one had to physically crosscheck (legwork and interviewing members of regional trading association) the stores to put them in the said categories. Subsequently, store level data (name, type and telephone number) was also collected from the regional trading associations. The areas not covered by either of the modes (websites as well as regional trading associations) were covered physically (to find out the name of the stores that matches our profile). The names of the said stores were searched in the telephone directory and yellow pages. The telephone numbered stores were taken as the primary sample frame. The next level of elimination was based on the type of customers patronizing the store. The target was SEC (Socio economic classification) B+ and all stores that cater to customers below B+ were removed from our list. The store managers were contacted over telephone and support for the study was asked for. About 40% dropped out. This database constituted the secondary sample frame which was used for the research purpose. It consisted of 682 medium stores and 995 small stores. From the database, systematic random sample were drawn for each store type. After data collection through telephonic and personal interview, there were 207 valid responses for medium type stores and 353 for small stores. The model was applied to the collected data and the results are given below.

Results and Interpretation for medium sized stores

Retailer opinion survey revealed three distinct category of merchandise in apparel and lifestyle stores (Table 1) that needs differential decision making and resource allocation from their side. Therefore, it is likely that it would draw differential input variables in terms of their significance. It was decided to treat the above mentioned three categories separately in the model and therefore there are three different results for fashion category merchandise, core category merchandise and accessory category merchandise.

Table 8a (Result for medium stores -Fashion)

Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of Estimate	Change Statistics				
					R^2 change	F Change	df1	df2	Sig. F Change
1	.824[a]	.678	.673	.9329875	.678	138.061	6	393	.000

a. Predictors: (Constant), Log IT, Log Capital, Log FFED, Log Merchandise, Log SP, Log Labor

Table 8b

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	721.065	6	120.177	138.061	.000[a]
	Residual	342.093	393	.870		
	Total	1063.158	399			

a. Predictors: (Constant), Log IT, Log Capital, Log FFED, Log Merchandise, Log SP, Log Labor

b. Dependent Variable: Log Fashion

Table 8c

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	7.028	.459		15.296	.000		
	Log Labor	-.357	.067	-.184	-5.370	.000	.696	1.437
	Log Capital	.523	.022	.692	24.132	.000	.997	1.003
	Log Merchandise	-.581	.093	-.199	-6.218	.000	.800	1.249
	Log FFED	.197	.022	.268	8.937	.000	.911	1.098
	Log SP	-.298	.057	-.173	-5.215	.000	.743	1.345
	Log IT	.157	.040	.118	3.958	.000	.925	1.082

a. Dependent Variable: Log Fashion

The model shows a good fit (R2 = .678, standard error below 1; Table 8a) for the fashion category items (output variable) in medium sized apparel and lifestyle based stores with labor, capital, merchandise, store interiors (FFED – Fittings, Fixtures, Equipment and Design collaterals), systems and

processes and IT as predictor variables. Results from table 8b indicates identification all possible input variables for estimating the output variable (residual not significant). This is according to the concept of total factor productivity determination in the proposed model. However, table 8c which identifies the significant predictors for determination of retail productivity of fashion items in medium sized stores throws quite a few surprises. Capital, store interiors and IT have demonstrated significant and positive influence on the output variable whereas labor, merchandise, systems and processes have shown negative influence. Therefore, the results support H_4, H_6 and H_8; however, there is no support for H_3, H_5 and H_7. H_9 has not been supported by the model as the results indicate diminishing returns to scale (sum = .52).

Table 9a (Result for medium stores -Core)

Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of Estimate	Change Statistics				
					R^2 change	F Change	df1	df2	Sig. F Change
1	.810[a]	.656	.651	1.1598508	.656	125.016	6	393	.000

a. Predictors: (Constant), Log IT, Log Capital, Log FFED, Log Merchandise, Log SP, Log Labor

Table 9b

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1009.067	6	168.178	125.016	.000[a]
	Residual	528.685	393	1.345		
	Total	1537.752	399			

a. Predictors: (Constant), Log IT, Log Capital, Log FFED, Log Merchandise, Log SP, Log Labor

b. Dependent Variable: Log Core

Table 9c

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	10.514	.571		18.407	.000		

	Log Labor	-.599	.083	-.257	-7.238	.000	.696	1.437
	Log Capital	.536	.027	.589	19.882	.000	.997	1.003
	Log Merchandise	-.886	.116	-.252	-7.633	.000	.800	1.249
	Log FFED	.169	.027	.191	6.174	.000	.911	1.098
	Log SP	-.510	.071	-.246	-7.169	.000	.743	1.345
	Log IT	.153	.049	.095	3.094	.002	.925	1.082

a. Dependent Variable: Log Core

The model for core items display characteristics similar to the fashion items discussed earlier. Table 9a highlights a good fit for the model (R^2 = .656; low standard error) and table 9b signifies the determination of all the significant input variables (labor, capital, merchandise, store interiors, systems and processes and IT as predictor variables) for the estimation of core value output (residual not significant). Table 9c helps identifying the direction and significance of predictor variables and the observations are similar to the observations for fashion variable. Capital, store interiors and IT display positive significance whereas labor, merchandise and systems and processes display negative significance. Consequently, H_4, H_6 and H_8 are validated and there is no support for H_3, H_5, H_7 as well as H_9 (sum = .12)

Table 10a (Result for medium stores -Accessories)

Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of Estimate	Change Statistics				
					R^2 change	F Change	df1	df2	Sig. F Change
1	.837[a]	.701	.696	.9781523	.701	153.468	6	393	.000

a. Predictors: (Constant), Log IT, Log Capital, Log FFED, Log Merchandise, Log SP, Log Labor

Table 10b

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	881.013	6	146.835	153.468	.000[a]
	Residual	376.015	393	.957		
	Total	1257.028	399			

a. Predictors: (Constant), Log IT, Log Capital, Log FFED, Log Merchandise, Log SP, Log Labor

b. Dependent Variable: Log Acc

Table 10c

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	7.583	.482		15.741	.000		
	Log Labor	-.446	.070	-.211	-6.389	.000	.696	1.437
	Log Capital	.572	.023	.695	25.166	.000	.997	1.003
	Log Merchandise	-.618	.098	-.195	-6.314	.000	.800	1.249
	Log FFED	.197	.023	.247	8.553	.000	.911	1.098
	Log SP	-.364	.060	-.194	-6.061	.000	.743	1.345
	Log IT	.101	.042	.070	2.428	.016	.925	1.082

a. Dependent Variable: Log Acc

Table 10 (a, b, c) display the model fit for accessories as output variable (dependent variable) and labor, capital, merchandise, store interiors, systems and processes as well as IT as input (predictor variables). The result corroborates the findings of the retail productivity model for fashion variables and core variables as outputs. The model has a good fit (R^2 = .701; table 13a) and it identifies all the significant predictor variables (residual not significant; table 10b). The positively significant input variables are capital, store interiors and to a small extent IT. The negatively significant variables are labor, merchandise and systems as well as processes. There is support for H_4, H_6 and there is not enough support for H_3, H_5, H_7, H_8 and H_9 (sum .41). So far as H_1 is concerned, there is partial support for it in midsized store segment. For each category of merchandise (fashion, core and accessories), the selection of input variables are the same. But, allocation of the variables is not equivalent in all the categories.

Discussion

Analysis of the retail productivity results provides quite interesting results which is quite different from the earlier studies. As the empirical study was carried out with control for external (confounding) variables, there are two distinct sets of results. Apart from that, there have been multiple output variables (fashion, core and accessories; for small stores only fashion and core as accessories are

not a separate category in these stores) and they are supposed to show similar pattern as they belong to the same store. Most often, the fashion, core and accessories do show similarity in trends. The following section discusses the same results from store implementation point of view along with the possible reasons for their significance in the model.

In case of medium stores, out of the six input variables, five are quite significant whereas IT is partially significant. This could be due to relatively lesser importance associated with IT by majority of the midsized apparel and lifestyle based retailers (and consequently less investment on IT). A further study of the sample stores indicated only the international brands (franchisee / licensee / JV etc.) such as NIKE, Reebok, and Levi's etc. trust IT to be an absolute necessary part of their store and consequently they believe IT improves store productivity. However, majority of the apparel and lifestyle based stores (includes Indian wear stores) relay on manual systems and even when they have IT usage, there is the presence of a manual backup system. Therefore, this empirical part being based on self-reporting technique (with various store managers), it is quite possible to get a low significance / non – significance for IT factor in the input variables. From a different point of view, there is huge potential for IT and related applications for midsized apparel and lifestyle based retail stores in India.

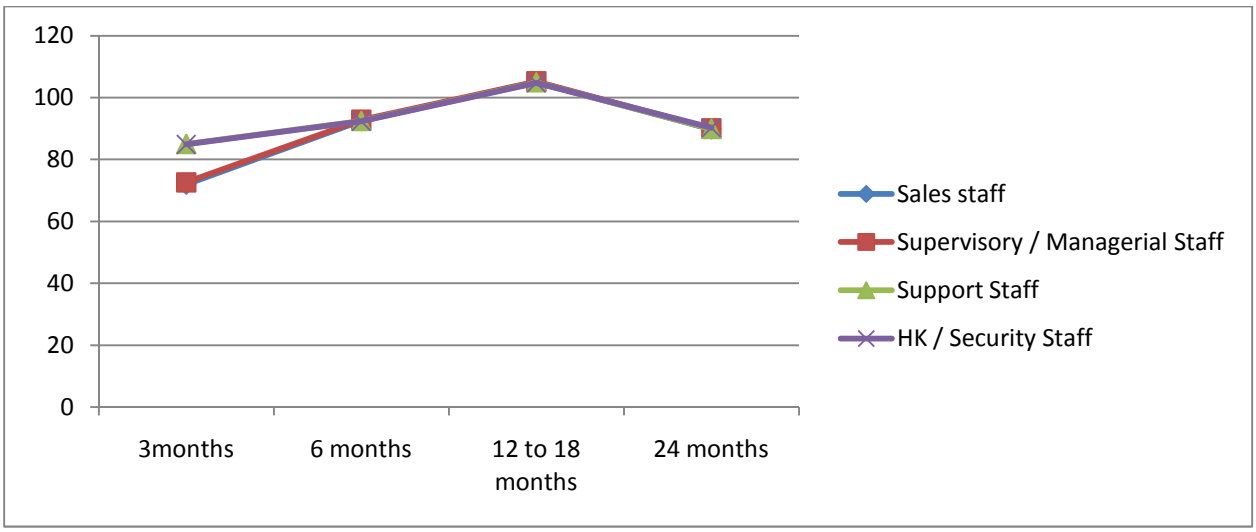
Apart from IT as input variable, all others (labor, capital, merchandise, store interiors and systems as well as processes) show significant weights as input variable of retail productivity. Out of them, capital and merchandise are positive whereas labor, merchandise and systems and processes are negatively related to retail productivity output. Capital (retail space) is the most important input variable that contributes to output (always more than 50% weight) and this is quite understandable too. In a place like India where availability of good retail space is at a premium and where retail consumers do not prefer travelling too long distance for their purchases, retail space could make or break the retail business. Even the previous studies confirm the significance of capital (may not be the same extent). However, store interior is a surprise selection for retail productivity input variable. For each category of merchandise (fashion, core, accessories) store interiors have a significant weight (almost 20%). Considering the developing Indian retail sector and organized retail at about 6.5% of the total retail industry only, the extra seriousness (attaching more importance and investing significant resources on it) of retailers towards the fittings, fixtures, equipment as well as design collaterals etc. needed further validation.

A survey of 50 random retailers and 100 random consumers from our sample frame was conducted and group interview was carried out regarding the significance of store interiors. The

retailer's opinion reaffirmed the model finding. Their views highlighted the accessibility of global retail market (physically or virtually) by the target consumer (SEC B+ and above) and hence, they have become more conscious of the in store environment and consequently more demanding. Of course price of the merchandise and its quality still remains the most sought after parameters for the target consumers while choosing the store. However, other parameters remaining similar, store interior is the most desirable parameter for the target consumer. As in highly competitive market for apparels and lifestyle products, most of the retailers follow similar business model (no private brands, middlemen in procurement), there is very limited opportunity to differentiate the offerings based on price or quality. Therefore, it makes more business sense to sensitize store interiors to the requirements of the consumers and consequently, make a case for higher turnover (and improved retail productivity). A dip stick survey of the consumers validated the opinion of the retailers regarding the significance of store interiors in estimating retail productivity.

Now one needs to look at negatively significant variables. Labor is probably the most important negative weight for retail productivity estimation. It shows a constant negative value for all three estimations viz., fashion, core and accessories categories ranging from 18% to 25%. All of the previous studies have found labor to be significant positive influence on retail productivity. In order to understand this phenomenon, a manpower survey in 100 randomly chosen stores from our sample frame was undertaken. The effort was to find out the desired skill set and level of employees in midsized retail stores (in apparel and lifestyle vertical) and the time frame needed to achieve the satisfactory level. This has added significance as academic background / prior experience was not a pre-requisite for retailers while recruiting employees in three out of four positions (sales, support, housekeeping and security; sometimes supervisory too); only for managerial level academic background or prior experience is a pre-requisite. The resultant plot is given below.

Figure 1



Here the time period spent in the retail store is the X axis and performance level as rated by the employer / manager is the Y axis. The figure reveals similar performance pattern for each of the four categories of employees. This indicates most of the employees join retail business with almost non-existent skill set and it is their on-the-job training that improves their performance. The peak performance is reached within 12 to 18 months. However, the survey also revealed the average turnover period for the employees is within 6 months to 12 months. Therefore, essentially the retail stores carry some sub-optimal manpower without much significant returns. This phenomenon might be the reason for the negative weight of labor force in retail productivity estimation.

Merchandise is the second negative variable within the retail productivity input. Merchandise as an input variable consists of the SKUs (stock keeping units) after being manufactured by the manufacturer / brand owner. After procurement of the retailer, the service components are added and it is made available in the retail store for the prospective consumers. Therefore, the contribution of merchandise parameter to retail productivity output depends upon the following two factors.

a) Ability of the retailer to order the right merchandise
b) Efficacy of the procurement process

In order to determine the above two factors, a survey with 100 random retailers from our sample frame was conducted. Secondary store level data, personal interview and projective techniques

were used with the store owners, managers and / or employees to generate required database. The hypotheses under consideration were as below:

H_{10}: Majority of the medium sized retailers in the apparel and lifestyle segment follow an optimal store development process (while opening the store)

This hypothesis could not be proved from the available data. While most of the retailers follow a standard store development process while opening the store (probably the same set of professionals are used), it can hardly be called optimal. The competitor store model and the desired store positioning of the retail store owner are most often the key drivers for store development process. Therefore, rarely scientific approach is followed and the investments in the key portfolios become erratic. Therefore in most cases, the retailers start with sub-optimal store model (procurement and delivery to customers)

H_{11}: Majority of the medium sized retailers in the apparel and lifestyle segment follow a structured scientific procurement process.

No evidence of the above is found in this study. Even though SOP is available for most of the activities, 70% of the cases it is not followed. 38% of the employees are not aware of the SOP for their own stores. There are no designated positions available in the stores for buying, negotiations or supply chain management. About 58% of the retailers are still reliant on the middlemen for their supply chain. However, majority (80%) of the medium sized retailers in the apparel and lifestyle segment follow a structured scientific process for ordering / reordering items. In 30% of the cases, it the desire of the retailers to stick to the SOP and avoid unnecessary complications propel them to follow the available process. However, if the initial model itself is flawed (as found in H_{10}), following a structured scientific process for ordering / reordering items may not be of much avail. Apart from that, this is partially due to the inability of the retailers to appreciate the dynamic retail scenario and partially due to the unskilled labor force at their disposal. In many cases, the owner assumer the manager's role and he may not possess the necessary skill set to dynamically induct any changes to the existing model.

H_{12}: Majority of the medium sized retailers in the apparel and lifestyle segment have a long term vision of supply chain efficiency and procurement effectiveness in mind while designing and implementing the procurement process.

There is absolutely no support for this hypothesis and this is the major reason for the inefficiency of the merchandising as well as procurement process in most of the stores. Retailers are rather short sighted so far as their strategic planning is concerned and they are rarely interested for long term relationships with their suppliers / business partners. Sales, profit and current returns are most important measures for the retailers.

The findings of the hypotheses testing are quite enough to explain the negative contribution of merchandise parameter to retail productivity. There are inherent deficiencies in the merchandising, procurement and supply chain process in the mid-sized apparel and life style based retail stores in India and therefore the turnover of the merchandise in the retail stores are affected. The retailers often find themselves with over stocking or under stocking; poor turnover or stock out scenario. Consequently, the contribution of merchandise component as an input variable to retail productivity is rather obvious.

The third significant negative input variable to retail productivity is systems and processes. Presence of appropriate systems and processes directly affect store operations and ineffective operations do affect store performance. Therefore, it is no wonder that poor operational efficiency affects retail productivity. Survey of 100 randomly chosen stores from our sample frame clearly showed the lack of focus of the retail stores towards systems and processes. While most of the retail store owners / managers are aware of the systems and processes that go into efficient store operations and they do carry out store audit from time to time to determine effectiveness of the store operations, they do precious little to modify / change / develop the same. They cite lack of enough resources / technology knowhow or competitive parity as the reasons to carry on the business the way they do. That is the predominant reason for the negative weight for systems and processes in spite of their significance.

Results and Interpretation for small sized stores

Table 11a (Result for small stores -Fashion)

Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of Estimate	Change Statistics				
					R^2 change	F Change	df1	df2	Sig. F Change

1	.882[a]	.779	.777	.5109232	.779	376.878	6	643	.000

a. Predictors: (Constant), Log IT, Log Merchandise, Log Capital, Log Labor, Log FFED, Log SP

Table 11b

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	590.287	6	98.381	376.878	.000[a]
	Residual	167.850	643	.261		
	Total	758.137	649			

a. Predictors: (Constant), Log IT, Log Merchandise, Log Capital, Log Labor, Log FFED, Log SP

b. Dependent Variable: Log Fashion

Table 11c

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	3.444	.145		23.825	.000		
	Log Labor	.089	.031	.062	2.855	.004	.732	1.367
	Log Capital	.546	.014	.866	39.941	.000	.733	1.364
	Log Merchandise	-.122	.040	-.065	-3.065	.002	.758	1.319
	Log FFED	.059	.010	.126	5.736	.000	.717	1.396
	Log SP	-.082	.025	-.078	-3.321	.001	.617	1.619
	Log IT	-.015	.021	-.016	-.713	.476	.692	1.446

a. Dependent Variable: Log Fashion

The results for small stores differ significantly for their counterparts in medium stores even though there are some similarities in the retail productivity model. There is a good fit for the model (R^2 = .77; Table 11a) and all the significant input variables have been identified (Table 11b; residual not significant) for fashion category merchandise. However, the differences are quite remarkable in the direction and significance of the predictor variables. The only significant predictor variables are capital and store interiors and hence H_4 as well as H_6 are validated. However, none of the other predictor variables (labor, merchandise, systems as well as processes and IT) are significant and consequently, there is no support for H_3, H_5, H_7 and H_8. H_9 is almost validated with the sum of coefficients being equal to .99.

Table 12a (Result for small stores -Core)

Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of Estimate	Change Statistics				
					R^2 change	F Change	df1	df2	Sig. F Change
1	.929[a]	.864	.863	.4469841	.864	679.852	6	643	.000

a. Predictors: (Constant), Log IT, Log Merchandise, Log Capital, Log Labor, Log FFED, Log SP

Table 12b

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	814.985	6	135.831	679.852	.000[a]
	Residual	128.468	643	.200		
	Total	943.453	649			

a. Predictors: (Constant), Log IT, Log Merchandise, Log Capital, Log Labor, Log FFED, Log SP

b. Dependent Variable: Log Core

Table 12c

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.165	.126		17.121	.000		
	Log Labor	.130	.027	.082	4.798	.000	.732	1.367
	Log Capital	.570	.012	.810	47.624	.000	.733	1.364
	Log Merchandise	-.039	.035	-.019	-1.131	.258	.758	1.319
	Log FFED	.069	.009	.132	7.677	.000	.717	1.396
	Log SP	-.022	.022	-.019	-1.006	.315	.617	1.619
	Log IT	.106	.018	.010	5.726	.000	.692	1.446

a. Dependent Variable: Log Core

The results for the core variable (as output) show similar trends as the fashion variables. There is a good fit for the model (R^2 = .86) as evident from table 12a. The determination of all significant

predictor variables are highlighted in the results of table 12b. Table 12c delivers the significant input variables which are capital and store interiors. All other input variables are rendered insignificant (labor, merchandise, systems and processes). Therefore, H_4 and H_6 are supported by the model and H_3, H_5, H_7 as well as H_8 have found no takers empirically. There is support for H_9 with the sum of coefficients being 1.034. So far as H_1 is concerned, there is partial support for it in small store segment. For each category of merchandise (fashion and core), the selection of input variables are the same. But, allocation of the variables is not equivalent in all the categories. There is complete support for H_2 as the selection of input variables are not the same for small and medium stores.

Discussion

The result of the small stores follows the same trend as the medium stores. However, it does show some uniqueness of its own. This observation is quite important from Indian retail sector point of view as majority of the retail stores in India fall into this category. For both fashion as well as core category of the small stores in the apparel and lifestyle segment the retail productivity model displays similar pattern: capital and store interiors being positive and important; all other input variables being insignificant. The reasons for the significance of capital and store interiors are similar to those highlighted during the discussion for medium sized stores. However, the lack of significance of all other input variables needed further probing.

Interview with store managers / owners for 100 stores from our sample frame was conducted and the reasons for the above result were investigated. So far as labor is concerned, the reason is quite interesting. For most of the small stores, either there are no additional employees or the employees are from the family only. Therefore, even though the skill level is rather limited, the turnover rate is not worrisome and resource commitments negligible. Majority of the small sized retailers do not consider recruiting any additional labor and they do not consider it to be significant. The merchandising and procurement process in these stores are more based on intuition and experience rather than any scientific and process driven decision making. However, these stores carry limited stock and most often they cater to a niche market. These retailers have a fair idea of their customer base and their requirements and they carry items accordingly in their stores. Most often they do not have any permanent supply chain. They source the merchandise from the regional wholesale market or factory seconds market and bargain aggressively for price benefits. As all their competitors also follow the same model, the small sized stores in apparel and lifestyle segments in the study area have relatively decent

turnover. They neither have any significant benefit from the procurement process nor any crippling disadvantage. Hence, they do not give much importance to the merchandise parameter. Finally, let us discuss the systems and processes as well as IT parameters of the retail productivity model. Most of these stores are individual driven (owner / manager / franchisor) and he / she takes all the major decisions regarding store operations. Rarely there is any SOP and retailers rely on experience or competitive parity for most of the operations. There is complete absence of any IT systems in store (other than brand outlets / franchise models) and retailers rely on manual systems and ledger posting for maintaining their records. In some cases there is use of point of sales systems and desktops / laptops for merchandising as well as inventory management. But, the retailers use assembled computer systems and pirated / outdated software to minimize expenses. These systems become unstable and software unreliable for obvious reasons and cumulatively, it add on the distrust of the retailer on technology in general. Apart from that, most of the small scale retailers are quite content with running one store and there no real plan of expansion or scaling up. Therefore, it is really no surprise that systems, processes and IT carry no significance for these retailers.

Conclusion

The most significant findings of this study are twofold. The first one is to identify all the possible input variables that contribute to retail productivity in Indian context. The second one is the ability of the study to visualize the issues from an individual retailer's point of view (micro focus rather than macro level), develop a model that can eventually be applied at the field and suggest solutions to improve productivity at the individual retailer level. Apart from determining the variables in a self-reporting type personal survey, the input variables have been validated using empirical models. Apart from that, the determination of output factor has been suitably modified to accommodate the merchandise component as well as the service component. For the first time, the service component in retail business has been quantified and measured. Again for the first time, the empirical study controlled for store size as a confounding variable and two different models were developed for different sizes of stores. It is quite interesting to find that apparel and lifestyle stores of different sizes in the same area can have potentially different productivity due to emphasis on different input factors and hence, it could help taking appropriate corrective measures for the store productivity. Even different categories of items in the store has been identified and treated separately with different models which also tests the parity of the models for the same store (and hence creates another level of validation for the model).

On a theoretical level, clarity has been provided on different levels of measuring retail performance and productivity has been methodologically differentiated from efficiency and effectiveness. It also provides some unique insight into a developing retail sector like India and its major drivers about which not much study has been done till now. Overall this study provides the unorganized retail sector with lots of options to look at their performance measurement differently and try to improve productivity at an individual store level.

Study Limitations and further research

Like any other study, this study also suffers from many limitations. The major limitation is the lack of availability of credible secondary data for retail stores. Therefore, one had to spend lots of time trying to develop a database with sufficient number of cases for appropriate model fit. Even while developing the database, in many cases one had to rely on observations and calculated assumptions as not enough cooperation is forthcoming from the retailers. Hence, even though internal validity was achieved by controlling for store size and location (clientele) and external validity was achieved by randomizing retailer selection for the study (from the sample frame), there is surely a tradeoff between the two. Ideally, one would have preferred a complete list of all the retailers (in the small and medium segment) in any city along with their telephone numbers for complete randomization.

The second limitation would involve the scope of the study. While working on the retail productivity issue, the need for a complete retail performance measurement methodology was realized. However the productivity issue was discussed in this study and that involves only the operational part of the performance measurement. Work on the other two significant issues like efficiency and effectiveness is needed to complete the retail performance measurement framework.

The third limitation would be the inability of the study to include the large format retailers in the study (even though that was the initial plan). However, lack of enough number of large format stores (more than 80,000 sq.ft.) led us to drop the idea. Probably, in future, including the data from a few similar cities (metros / tier 1 / tier 2 etc) could help us to generate a database for large format stores.

Apart from these limitations, there are a couple of things in mind for studies in future. Even though some of the input parameters have been insignificant / negatively significant for the retail productivity determination, they are by no means avoidable. These variables have significant impact on the retail business and its performance. Hence, there is a scope to study each of those input variables

separately and try to integrate them in the retail productivity / performance measurement model. The model of retail productivity is based on current data and data is collected through self-reporting technique. Therefore, this information cannot be used for long range planning or strategic productivity development processes. A methodology could be developed using historical data or some independent third party observation / innovative measurement to bridge this gap.

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