Technological Integration and Sustainable Initiatives to bring in Efficiency in Supply Chain in Indian Multi-Brand Retail

Aditya Bhushan*, Amit Zanwar, Nishant Jain***, Purba H. Rao******

Great Lakes Institute of Management, Chennai, Tamil Nadu, India.

Email: 99.bhushan@gmail.com

***Great Lakes Institute of Management, Chennai, Tamil Nadu, India.*

Email: amit.zanwar18@gmail.com

****Great Lakes Institute of Management, Chennai, Tamil Nadu, India.*

Email: nishant.infy@gmail.com

*****Great Lakes Institute of Management, Chennai, Tamil Nadu, India.*

Email: purba.h.rao@gmail.com

Abstract

In retail industry where the performance of supply chain is of paramount importance, any initiative which would help in making it more efficient would go a long way in getting a competitive edge over others. The objective of this paper is to study the supply chain of Indian multi brand retail and find out how technological integration and green initiatives taken by a retailer can make its supply chain more efficient. For our study, data was gathered from the employees of a retail firm to see their perception of the supply chain in their organization. After analyzing the data, it was found that technological integration and green initiatives do indeed makes a supply chain more efficient.

Keywords: Technological Integration, Sustainable Initiatives, Multi-Brand Retail

Introduction

With the government's approval of FDI in retail, Indian Multi-brand Retail sector is poised to grow significantly in India. It has paved the way for retail innovation and competition with many global multi-brand retailers such as Wal-Mart, IKEA etc. The retail market in India will be more competitive than ever before and hence Indian retailers have to look for new ways to compete with the best of the world. The Indian retail industry is still in its nascent stage and though many of the firms have efficiency as one of their corporate goals, sustainability is still not looked upon as an immediate objective. Only the big players like Shopper's Stop, Lifestyle, Bharati Wal-Mart etc have taken sustainability as part of their corporate goals.

One of the foundation stones of retail business is having a strong and efficient supply chain. Many researchers have endeavoured to study the supply chain of one of the biggest retail brands in the world – Walmart, and see how it is giving them a completive edge over the others. This paper aims to look at how the multi-brand retails in India can fine-tune their Supply Chain Management and use technology as a resource to make it more efficient and sustainable.

Having a sustainable supply chain can go a long way in providing the right kind of impetus to the Indian retail industry. As per the Retail Sustainability report 2012 published by Retail Industry Leaders Association, RILA, which is a group of top US retailers like Walmart, Best Buy, IKEA etc., sustainability is one factor which has become a key consideration for retailers worldwide. Also, the report highlights the fact that in future the retailer-supplier relationship will use sustainability as a means to generate value. In a paper on Supply Chain Management, Sherer (2005) pointed out along with sustainability,

improved management of supply chains in general, can be a source of competitive advantage. An optimized supply chain is a result of truly synchronized operations which happens if supply chain behave as a single linked entity – from end customer delivery to raw material procurements. Technology plays a critical role in automating various operational processes and bringing consistency and timeliness in operations.

The different factors which are expected to help Indian multi-brand retail to compete with the Wal-marts of the world may be summarized as Efficiency, Technological Integration and Sustainability initiatives, as pointed out by Sherer (2005).

Efficiency of Supply Chain

Efficiency is perhaps the most important aspect required in a supply chain. There are different aspects to Efficiency. Efficiency could be retailers ability to face some of the biggest challenges for supply chain management comprising too many product variants, strict traceability requirements, short shelf-life of the products, the need for temperature control in the supply chain, and the large volume of goods handled. For efficient operation these would need to be integrated.

This makes efficiency in supply chain as one of the differentiating factors for the multi-brand retailers competing on global grounds. Efficiency in multi-brand retail supply chains also has an Efficiency advantage which relates into pricing and resource management. Efficiency also relates to increased information sharing, product visibility and real-time information significantly helping to increase the throughput and working condition of supply chain.

The reasons which affect Efficiency are (a) Installation of technologies - allowing sales data to be collected and analyzed daily which enables managers to learn what merchandise is moving slowly, and thus avoiding overstocking and deep discounting and (b) Training Employees – which implies acquainting employees with the newly implemented supply chain practices which determines the efficiency with which the benefits can be reaped out of the system.

As a result of lack of Efficiency the supply chain suffers in profit margin and shrinkage.

Profit Margins decreases if there is an increase in cost in running the supply chain. Thus. improving the efficiency directly affect the profit margins.

Lack of efficiency also brings in Shrinkage , which is an euphemism for pilferage and shoplifting. This can be reduced drastically if efficiency is enhanced.

Efficiency in supply chain also affects Replenishment cycle time. This happens because efficiency invariably reduces the cycle time and increase the output (Danese and Romano, 2011).

The Efficiency in Supply Chain especially in Retail Industry, is an outcome of Technological Integration and Sustainability, because sustainability invariably leads to conservation and streamlining of resources (Rao & Holt, 2005).

Technological Integration

Managers are often overwhelmed by the abundance of technologies which promise significant performance improvements for manufacturing and service supply chains. This happens because the selection of technology can be complicated. Also, once selected, its subsequent integration with existing technological infrastructure requires a lot of attention. This determines level of Technological Integration required in the company..

The factors which lead to and enhance Technological Integration are varied. They may include (a) Increasing Scales of operations which relates to determine the size of operations. The need for technological integration is felt more as the scale of operations increase in terms of retails stores and number of suppliers and customers.

Another factor which lead to enhancing Technological Integration is (b) extent of competition faced by the company. The intense competition for margins in retail industry makes companies looking for value for money in their IT investments and hence move towards technological integration.

Technological Integration brings in tremendous benefits such as Improved Performance of Supply Chain - building a seamless supply chain which brings agility, responsiveness and reliability.

It also brings in Improved Customer Satisfaction – In stores, technological integration can help in less waiting time in billing queues, price verification and prompt assistance from store personnel which will enhance customer satisfaction.

In leads to Increased sales – Since data is synchronized, it helps in better stock replenishment and hence sales are not lost because of stock out (Horscroft, and Braithwaite, 1990).

Sustainability Initiatives

Sustainability initiatives, which invariably brings in resource conservation, energy conservation etc. have become extremely important in Indian Supply Chain. Because of conservation and streamlining, they lead to greater efficiency.

Ever since the 1992 Earth Summit in Rio, (where "Sustainable Development" was a key concept and governments had pledged to protect environment and consider it as part of their long-term economic development strategy) there has been an increasing focus on Sustainability. Indian retailers are cognizant of the fact that global standards have to be followed in order to stay in the game. They have started considering sustainability as part of their core strategy, but they still lag way behind the international standards. An article published in Live Mint on April 12, 2012 states that an average Indian shopping mall consumes 30% to 40% more power and water than they should ideally be consuming.

Sustainability initiatives are generally measured in terms of reduction in the usage of water resources & power supply, increasing recyclability etc.

Sustainability, however suffers from a perceived cost factor, which acts as deterrent to firms having budget constraints. Cost factor is one of the major reasons that Indian retail industry is lagging behind the implementation of sustainability.. For many of the small players, this works as a barrier for entry. Being sustainable involves a lot of capital which proves a hindrance for the smaller firms.

The implementation of Sustainability brings in many tangible and intangible consequences such as (a) Risk Mitigation. By decreasing the dependency on fossil fuels, the organization becomes less affected by the market volatility and price fluctuations. As a result it mitigates risk. It also brings in (b) Industry Reputation – With the increased emphasis on Go-Green, having a green supply chain improves the reputation of the firm in the entire industry. Another very significant benefit is that (c) it Encourages Innovation. Having sustainability as one of the corporate strategies fosters innovation. It drives innovative business strategies and leads to development of new technologies and processes.

Literature Review

Trying to integrate new technology into existing supply chain operations can help significantly increase customer service, reduce costs, and streamline the working of supply chains. However, the new technology must be fully synthesized with existing policies, practices, and people, without which it would be impossible to tap its full power. (http://www.inboundlogistics.com/cms/article/supply-chain-technology-integrating-the-old-and-new).

Integrating technology to existing supply chain operations often involves the following steps.

Reengineering Processes

This involves adding new technology with full reengineering of related processes to reap maximum results. The volume of the reengineering initiative often depends on the type of technology being implemented.

Plan the Implementation Timing

This involves planning the integration at a time which does not class with peak timing. Companies should also consider carefully the pros and cons of a one time approach versus phasing in the new technology.

Change Management

Integrating new technology that affects multiple aspects of the supply chain often requires change management people for each function or place where the technology is being implemented. For this the employees should be involved in the early stages of the change. Otherwise staff members may feel burdened and dictated upon. Then they would resent the change, having to make the new technology work despite the fact that they weren't involved in its development. (Leslie Hansen Harps, 2005, Supply Chain Technology, Integrating Old & the New)

Retail stores have always existed to connect people with products, and new technology doesn't change that. The maturation of technologies such as radio frequency identification (RFID) and near field communication (NFC) along with the broad penetration of smart-phones, tablets and e-readers have the capability to lead the revolution in customer experience and improved supply chain. Also during market retreats, innovation is seen as a tool for sustained growth (Pfeiffer, 2007).

A plethora of technologies having information-intensive and customer centric features are available today for supply chains and promise enormous benefits including increased flexibility, reduced costs and enhanced coordination (Moody 2006, Kearns and Lederer 2003). Today Managers are overwhelmed by the abundance of

these technologies and find it difficult to select the right technology for their company which will integrate well with the existing infrastructure and give optimum cost-benefit (McAfee 2006). The relationship of information technologies and performance are mixed as shown by several empirical studies and it can be attributed to the failure to consider the integration aspects between different technologies (Bharadwaj 2010).

Impact of technology on the performance of a firm has been a topic of research since long (Earl, 1993; Kearns and Lederer, 2003).Technology integration is the choice of various technologies with different functionalities to deliver a unique application that provides a new service, process, or product. The proliferation of technologies and technology vendors has made it more important and relevant than ever before (Iansiti & West 1997). Also, many retailers are still concerned whether the usage of radio frequency identification (RFID) devices gives them the desired return on investment (ROI) (Osyk, Vijayaraman & Srinivasan 2012). This is in spite of various findings which suggest that use of RFID can help retailers and distributors to realize better efficiency (Sabbaghi and Vaidyanathan, 2008). The various information systems create a higher degree of interoperability than what is achieved by standalone, componentized systems. The integrated system enables process automation, disseminate timely and accurate information which results in improved managerial and employee decision-making (Hitt et al. 2002). Technologies like Point-of-sale (POS), Electronic Data Interchange (EDI) have assisted the retailers and helped them build customer relationship through better understanding of the customer also known as Customer Relationship Management 9CRM) (Fiorito, Gable & Conseur 2010).

As part of having technological integration, a fully integrated cross-channel retailer operates integrated information systems for all sales channels that communicate and operate together. It enables the customer to buy in one sales channel and pick up/return in another. The retailer has lot of operational and strategic reasons to move towards fully integrated enterprise and this paper aims to test its effect on the efficiency and sustainability of retail supply chain. But a key factor in determining how efficient a technology will be for an organization is dependent upon its proper implementation and utilization (Sanders, 2008).

In addition to technological integration, another aspect leading to performance will be sustainability as one of the key factors for retailers worldwide (Retail Sustainability Report 2012). Companies have realized that management of supply chain can be a critical aspect for competitive advantage (Preuss L. Rhetoric, 2005). The emphasis on supply chain management is coming directly from the top management (Lambert DM, 2000). Considering both technological integration and sustainability initiatives, this paper tries to explore supply chain performance for a retailer in India.

Supply chain covers all the aspects of business right from the manufacturer to the end consumer. It is defined as all the activities associated with the flow of goods from the raw material to the consumer (Handfield & Nichols, 1999). A well performing supply chain ensures competitive advantage too, which can be achieved in several ways – innovation, production & market management, as part of performance. (Rangone, 1999). All the same, even more than innovation, production etc., competitive advantage can mostly be achieved by improving the efficiency (Rao & Holt, 2005). Thus efficiency is one single aspect which supply chains must acquire. It is proposed in this paper that in order to achieve efficiency, retail firms, like many other firms, must achieve technological integration and sustainability which lead to performance.

Sustainability is defined in this research as the capacity to include the long term maintenance of environmental dimensions. A sustainable supply chain would be one which would reduce wastes, water consumption energy consumption etc. Also, when we are talking about supply chain, the role of suppliers becomes very important. For retail outlet to have a green supply chain, support of the suppliers is of paramount importance. We have tried to look at the green aspect of supply chain and that is what has been called as sustainable supply chain in this paper.

Any company will manage their Supply chain based on what is best for their own company. Collaboration with other companies in the Supply chain will present win-win situations for the own company and for other companies in the Supply chain (Christopher, 1998). Providing the right degree of responsiveness and having an efficient supply chain at the same time is a goal that is hard to achieve and that typically involves trade-off decisions by management, since increased responsiveness can be perceived to come at the expense of reduced efficiency, and vice versa. However, there may be strategies, such as revised planning approaches, that restructure supply chain processes to achieve both goals at the same time and enable a supply chain to be responsive and efficient simultaneously.

Supply Chain Management (SCM) has received an increased amount of interest both from researchers and in the industry. The SCM concept came up just before

the 1960s according to Huan et al. (2004). The study of SCM efficiency increased in the 1980s and had a dramatic increase in the 1990s (cf. Huan et al. (2004)). More and more companies had to focus on their Supply chain in order to be successful in their business. Already in 1997 top managers had recognized the importance of having effective Supply chains to create competitive advantage according to Higginson and Alam (1997) and Cooper et al (1997).

Efficiency in broad terms is defined here as output produced per resources utilized. A supply chain is considered efficient if the focus is on cost reduction and waste reduction (Naylor, Naim and Berry, 1999, p. 108). In an efficient supply chain the entities involved i.e. suppliers, manufacturers and retailers manage all the processes such that they are able to meet demand at a lower cost. They manage - implicitly through independent ordering processes between tiers or through explicit coordination of ordering decisions of the different supply chain elements - their activities in order to meet predictable demand at the lowest cost (Petterson, 2008) 51|ISSN:1402-1757).

A company needs to have performance measurements to be able to evaluate the efficiency of the Supply chain. According to Sink and Tuttle (1989), 'you can't manage if you can't measure'. Christopher (1998) claimed that companies have to achieve both cost leadership and service leadership to have an efficient Supply chain. Thus in our research question we use constructs to measure Efficiency, Technological Integration and Sustainability and propose a conceptual model as given below.

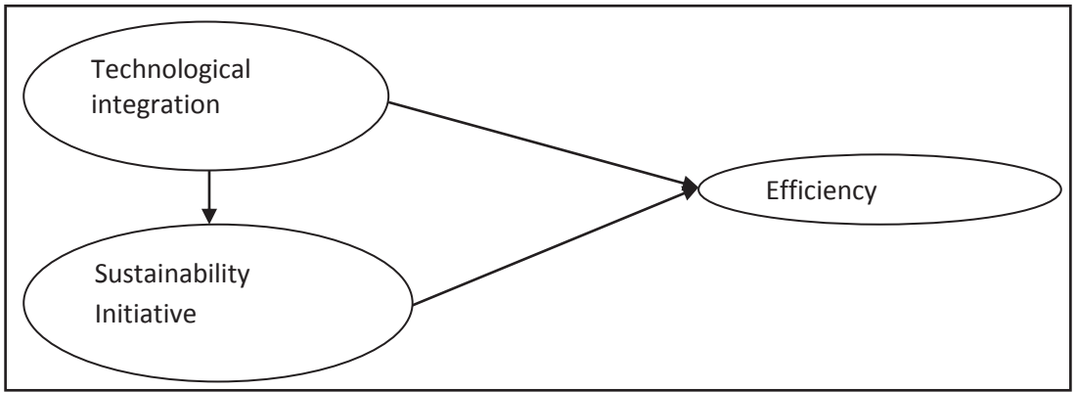

Fig. 1: Hypothesis proposed: Technological Integration and Sustainability Initiatives lead to Efficiency in Retail Supply Chains

Defining Constructs

In the current research we have studied three constructs, Technological Integration, Sustainability Initiatives and Efficiency. In addition there are three sub constructs viz. Financial Efficiency, Marketing Efficiency and Operational Efficiency to make up Efficiency construct. Further, there are two more sub-constructs, Technological integration in Sales & Marketing (TI in SM) and Technological Integration in Operations (TI in operations). Then we see how efficiency constructs are impacted upon by Technological Integration constructs and Sustainability. Understanding how to make the best use of a complex array of marketing technologies is becoming an increasingly difficult challenge. Does technological integration and sustainability across supply chain really help in improving marketing efficiency that we have tried to study? Then there is a growing demand for financially efficient supply chains, with companies and their suppliers under conflicting pressures to improve payment terms reduce prices and improve cash flow efficiencies. Also achieving the highest level of operational efficiency will require manufacturers to collaborate to a much greater degree than before with their partners and their competitors throughout the supply chain. They will need to seek those within their chain that specialize in functions that complement their own. Device companies that share customers can ally themselves to share warehousing or transportation to save costs. More flexible relationships will allow companies to tailor products or consolidate operations to meet customer needs.

As part of the overall model (Figure 1) we set up the following hypotheses.

Hypothesis 1 – Technology integration has significant effect on Efficiency.

Justification

Technological integration leads to a seamless supply chain and as a result there is an improvement in many of the processes which were done manually. It also leads to less wastage, errors and reduces lead time. Since the data is synchronized, suppliers get an instant update of the status of an SKU. As a result suppliers tend to supply more. Also it also makes sure that an item is not out stock because of information delay and hence sales are not lost. This shows that integration leads to an increase in revenue and better supply chain, although it is to be seen whether the cost of technological integration is superseded by its benefits.

Sub Construct 1 – Technology Integration in Sales & Marketing (TI in S & M)

Sub Construct 2 – Technology Integration in Operations (TI in Ops)

Hypothesis 2 –Technological Integration has significant effect on Sustainability.

Justification

Technological Integration helps in tracking entities across supply chain and as a result there is less wastage and spillage. Also greener initiatives are supported by technology in tracking their effect and it can be further used to enhance sustainable processes and operations. Therefore technology integration should lead to a greener supply chain.

Sub Construct 3 – Efficiency in Finance related function. (Financial Efficiency)

Sub Construct 4 – Efficiency in Marketing related functions. (Marketing Efficiency)

Sub Construct 5 – Efficiency in Operations related functions (Operational Efficiency)

Hypothesis 3 –Sustainability has significant effect on Efficiency.

Justification:

With fluctuating cost of fossil fuels, move towards environment friendly technologies help in reducing costs and creating efficient supply chain. The benefits of green initiatives are usually long term although they require heavy initial investments. But we believe that adopting green initiatives has a positive effect on efficiency of supply chain and gives company a competitive advantage.

Hypothesis 4 – Technological Integration and Sustainability have a significant effect on Efficiency.

Justification

It is already shown that separately technological integration and green supply chain leads to efficient supply chain. Their combination should also have significant effect on efficiency.

The three constructs – Efficiency of Supply Chain, Technological Integration and Sustainability were divided into sub-constructs to give a more precise measurable component. These sub-constructs are as follows –

Main Construct – Technological Integration

Sub Construct 1 – Technology Integration in Sales & Marketing (TI in S & M)

Sub Construct 2 – Technology Integration in Operations (TI in Ops)

Main Construct – Efficiency in Supply Chain

Sub Construct 3 – Efficiency in Finance related function. (Financial Efficiency)

Sub Construct 4 – Efficiency in Marketing related functions. (Marketing Efficiency)

Sub Construct 5 – Efficiency in Operations related functions (Operational Efficiency)

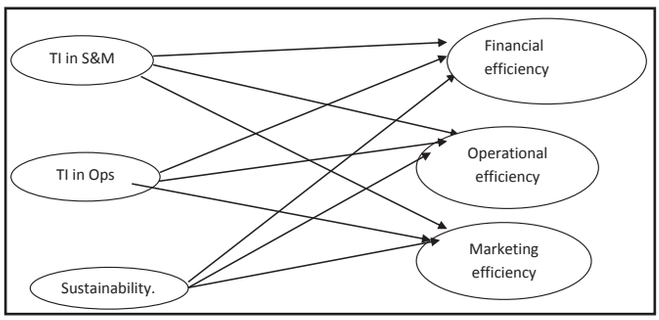

Fig. 2: Detailed Diagram Depicting Hypothesis 1, 2, 3 and 4

METHODOLOGY

Efficiency of Supply Chain

Efficiency in broad terms is defined as output produced per resources utilized. A supply chain is considered efficient if the focus is on cost reduction and waste

reduction (Naylor, Naim and Berry, 1999, p. 108). In an efficient supply chain the entities involved i.e. suppliers, manufacturers and retailers manage all the processes such that they are able to meet demand at a lower cost. Technology and Sustainability are two factors which can help in making a supply chain sufficient. Today, visionary companies are adopting innovative technologies as well as implementing green solutions in order to make their supply chain more efficient and hence have a cutting edge over its competitors.

Technological Integration

There are several information-intensive and customer-centric technologies available today that provide significant performance improvements for retail supply chains. It is a challenge for managers to choose which technology to invest in and how to integrate the technologies so that the promised performance benefits of the technologies can be realized. The level of technological integration can be measured based on the presence or absence of different information technologies adopted by the retailer. Technological Integration is a challenging and costly affair and should be carried with exhaustive pre-analysis.

Sustainability

Increasingly companies are realizing in order to effectively manage their sustainability impacts, which comprise economic as well as environmental impacts, they must ensure their suppliers are doing the same. Due to this more and more companies are engaging suppliers on providing green solutions to the conventional ones. This has led to a proliferation of initiatives aimed at assessing and improving supply chain sustainability performance. Although the term "environment" or "greening" has an ambiguous meaning in various fields, the term indicates not only harmonizing corporate environmental performance with stockholders' expectations but also developing a critical new source of competitive advantage in terms of management perspective (Gupta, 1994). According to Gupta (1995), environmental management relieves environmental destruction and improves environmental performance by institutionalizing various greening practices and initiating new measures and developing technologies, processes and products.

Data Collection

The industry chosen for this study is the Indian multi brand retail industry. Within Indian multi-brand industry the company in which we have pursued our study is "Shopper's Stop".

An executive who handles the Supply Chain of Shopper's Stop has functioned as our industry guide for this project and is our point of contact for any communication with the company.

Evaluation Methodology

The criterions mentioned above have been scored on a scale of 1 (weak) to 5 (strong) by the respondents. To get the effective size of 120+ samples after allowing for loss of data on account of missing values, we collected data from 149 respondents.

All the criterions within three variables have a weight/ percentage attached and the combined weight of the criterion within an individual equal one.

To validate the hypothesis framed in relation to the variables, the respondents rated the questions, and indicated their organization's status of green supply chain practice, effect of technological integration and efficiency on a scale of 1 (weak) to 5 (strong) as perceived by them.

After getting the responses, we ran Factor analysis to reduce the number of attributes within the three main variables and clubbed them into factors. Factor Analysis also helped to find the underlying dimensions within the three basic variables – technological integration, sustainability & efficiency of supply chain.

Then we further analysed the data with Structural Equation Model. Using SEM, we ran a series of separate but interdependent multiple regression equations simultaneously. For each dependent variable, the proposed relationship was translated into a series of structural equations. A structure model was established which has expressed the relationships among independent and dependent variables.

(*Structural Equation Modelling is an analytical method that provides parameter estimates of the direct and indirect links between observed and unobserved variables. This method is similar to regression in that there is a quantification of relationship between dependent and independent variables. One of the unique features of SEM is its ability to provide parameter estimates for relationships among unobserved variables or latent constructs [Sroufe et al, 1999] which are measured using indicator or manifest variables. These variables again are obtained from respondents in response to questions in the questionnaire.*

The convergence of the model is evaluated by Chi Square, associated degrees of freedom and the significance level, p-value, which should be greater than .05 for acceptance of the model. For individual links to be significant, the Critical ratio > 1.96 and the p-value for that link must be < .05.)

In order to check the validity of multi-item constructs that we created in the questionnaire to measure the variables, we calculated the Cronbach Alpha. We crosschecked the reliability of questionnaire and responses received by comparing it with minimum cronbach value of 0.6.

Calculated Cronbach Alpha of various constructs:

Technological Integration in S & M , alpha = .790.

Technological Integration in Operations, alpha = .713

Efficiency in Finance related function, alpha = .777

Efficiency in Marketing related function, alpha = .636

Efficiency in Operations related function, alpha = .404/

Results

This section describes the results of the study based on the evaluation methodology used.

Sample Size – Total sample size is of 149 which is a good number for doing the Structural Equation Modelling Analysis.

Margin of Error – We are testing our results at 95% level of confidence. For this level, the margin of error comes out to be approximately 8.02%.

Demography of the Sample – Respondents are of age 18 and above, mainly belonging to either tier-1 or tier-2 cities of India.

Regression Results of the Response Received

The Cronbach alpha for Operations efficiency was less than 0.6. Thus this sub construct was not included in the structural equation modeling in the data analysis. Please find below the Cronbach alpha of different sub-constructs:

Sub construct	Cronbach alpha
Technology integration in Sales & Marketing	0.79
Technology integration in operations	0.713
Efficiency in Finance related function	0.777
Efficiency in Marketing related function	0.636
Efficiency in operations related functions	0.404
Sustainability	0.653

Upon running Structural Equation Modeling, Using the Figure2 the following Indicators of Model Fit were obtained:

Chi-square/ degrees of Freedom = 1.994

Overall p-value for the model = .082

CFI = .996
GFI= .848
AGFI= .767
NFI= .834 l

Regression coefficients, critical ratios and associated p-values.

Construct	regression coefficient	standard error	Critical ratio	p-value
FE < -- TISM	.687	.151	4.539	***
ME < -- TISM	.178	.122	1.457	.145
OE < -- TISM	.015	.023	.647	.518
FE < -- TIO	.448	.110	4.058	***
ME < -- TIO	.380	.114	3.331	***
OE < -- TIO	.412	.160	2.584	.010
FE < -- S	.388	.135	2.882	.004
ME < -- S	.216	.189	1.139	.045
OE < -- S	.933	.152	6.155	***

Discussion on Results

Effect of Technological Integration on Efficiency

Technological Integration in Sales & Marketing had a significant link to Financial Efficiency but not that much to Marketing efficiency and to operations efficiency. On the other hand, technological integration in operations had a significant linkage to all financial, operations & marketing efficiency. The implications are that operations department of a retail store should be technologically integrated and more strongly linked with the supply chain of the whole system which would lead to overall efficiency.

Effect of Sustainability on Efficiency

From the results, sustainability initiatives significantly lead to operations, financial as well as to marketing efficiency in the supply chain. This is a very encouraging result. Individually sustainability invariably leads to conservation of resources which lead to operations and subsequently to financial efficiency. Further Sustainability

helps a retail company market itself to its world class customers who want to do business with company suppliers who maintain sustainability across its supply chain. This is what leads to an increase in the marketing efficiency of supply chain as has been seen in the previous results.

Conclusion

Multi-brand retail is on the rising phase in India and retailers need to follow the best practice to stay competitive in the game. Supply Chain is an important competitive advantage and technology plays an important part in determining the green component and efficiency of supply chain. Technological integration is the choice by managers of a retail firm to choose technology in a way that it integrates with the existing infrastructure instead of creating silos. We obtained some insightful results from our survey. The effort on integrating technology with sales and marketing systems leads to financial efficiency and not marketing or operations efficiency. That means it leads to significant cost savings. However it does not lead to better operations, better marketing plan or better sales. At the same time, integrating technology with operation systems lead to significant improvement in financial, operations and marketing efficiency. Therefore a company on the starting point of technological integration should focus on operation systems first so as to reap maximum advantage.

Retail businesses vary in scale and they have their own goals. So their requirements for technological integration vary. These findings are more applicable for large retailers as integration is advantageous for large scale. Therefore small players should not take these findings at the face value. However these findings will help management of large retail players in taking strategic decisions for designing the supply chain.

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