# Supply Chain Management Of Perishable Food Products : A Strategy To Achieve Competitive Advantage Through Knowledge Management

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## INTRODUCTION

Knowledge Management (KM) comprises of a range of strategies and practices used in an organization to identify, create, represent, distribute, and enable adoption of insights and experiences. Such insights and experiences comprise of knowledge, either embodied in individuals or embedded in organizational processes or practice.

Knowledge Management efforts typically focus on organizational objectives such as improved performance, competitive advantage, innovation, the sharing of lessons learned, integration and continuous improvement of the organization. KM efforts overlap with organizational learning, and may be distinguished from that by a greater focus on the management of knowledge as a strategic asset and a focus on encouraging the sharing of knowledge. KM efforts can help individuals and groups to share valuable organizational insights, to reduce redundant work, to avoid reinventing the wheel per se, to reduce training time for new employees, to retain intellectual capital as employees turnover in an organization, and to adapt to changing environments and markets.

The current economic downturn has brought significant changes in the way business is done today. Profit margins have squeezed, top line has got impacted, and the key challenge for a retailer today is to have the ability to monitor the health of the business such as sales revenue, profit margins, Inventory turn across stores. Managers in the rapidly changing high-tech and competitive environment of business face tough questions every day. Software technology can be deployed to the right people in the right parts of the organization in a form that is easy for them to use and understand. As the management guru, **Peter Drucker** advised that the management decision should be made at lowest possible level, adequate technology blend of hardware, and software provides a necessary platform for effective decision-making and their control. Supply chain solution, when properly deployed, may provide high-quality business information to many different types of employees throughout the enterprise as well as to business partners and customers.

Information is the driving force behind effective decisions, making it the single most strategic asset an organization possesses. By extending business intelligence to the employees throughout the enterprise as well to the constituents up and down the supply chain, the retailers can enhance communication and gain a competitive edge. Managing supply chains requires retailers to perform a delicate *"balancing act"* that simultaneously meets multiple needs. While delivering high service levels, as they manage global supply chains, retailers must keep costs low in order to remain competitive. Other pressures come from more demanding consumers as well as from the increasingly global nature of the industry, which has retailers both sourcing and selling products in more places around the world.

By better connecting product information, processes, systems, and people, any company with its partners, can address both current and future complexity in this area with cost-effective, integrated solutions that help retailers drive enhanced supply chain efficiency and trading partner collaboration. These solutions address key retail business issues such as making order and replenishment processes more effective; lowering inventory levels in warehouses and distribution centers; improving out-of-stock levels; reducing paperwork; and improving data accuracy.

## EVOLUTIONARY REVIEW OF SCM

**Tom Devis**, in his article *"Effective supply chain management"* (Sloan management Review/Summer 1993) says, *"In a time of shortening product life cycle, complex corporate joint ventures and stiffening requirement for customer*

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*service, it is necessary to consider the complete scope of supply chain management, from supplier of raw materials, through factories and warehouses, to demand in a store for a finished product".*

**Demeter & Gelei**, in their article advocates about the extension of coordination and integration of value creating processes. They also define that there are three types of SCM models: **1)** Transaction dominated **2)** Internally integrated & **3)** Externally integrated. After analyzing these models in the Indian perspective, it can be said that Un-organised retail is coming under the first model, whereas, organized retail is fulfilling the criteria mentioned in the second model(i.e. Internally Integrated) and in some cases i.e. partially, it also fulfills few criteria of the third model (i.e. Externally integrated). Here, it is quite relevant to mention that very small numbers of organized retail companies are Externally integrated (for e.g. Wall Mart), whose automatic replenishment system is highly shared by their supplier/manufacturers.

The authors also opine that although there is a historical development path from transaction dominated to externally integrated companies- all the three models are equally viable operating models in an appropriate environment. The second and third tier companies will never reach and never should reach the level of externally integrated companies, since the huge investment in information system or in relation will never return.

**S. Sudeesh & Rama Rao** in his research titled, *" Managing supply chain performance with collaborative knowledge sharing between supply chain partners"* suggest that the concept of SCM emerged as manufacturers experimented with strategic partnerships with immediate suppliers. The short term objective of SCM is to increase productivity and reduce inventory & cycle time; its long run strategic goal is to increase customer satisfaction and profits for all members of an organization.

Retailing industry focuses on a different aspect of SCM, that is location and logistics issues are more often than a transformation. A supply chain can reduce its inventory efficiently, redistributing its stock within the supply chain **(Davis 1993)**.

The role of supply chain management is seen as important element in the strategy **(Fuller et.al. 1993)**. The IT enabled logistics management not only enhances the quality of product & services, but also reduces operating costs, eliminates wastage, results in optimum utilization of available resources, and also provides a mechanism to collect and store huge amount of data for decision making. **Professor N. Vishwanadham**[1], discussed in his research paper that two important problems with the Indian rural economy has been inability to manage the complexities involved in transition of the food and agriculture sector from a supply driven value chain, to a more market oriented, demand-led value chain, and the failure to ensure growth with equity or inclusion of all stakeholders in the growth process in agriculture.

The Indian Retail Report 2007 released by Kamal Nath on January, 09, 2007 mentioned the key aspects about the Indian retail industry by emphasizing on contribution of IT in retail as, *" After leading the IT bandwagon, India is poised to grow as a Retail hub. It is imperative to sustain the modernization of the retail sector and dispel the myth that the game is big Vs small or traditional Vs modern or organized Vs unorganized or local Vs foreign. What is needed is to create an appropriate environment to propel retail, where all benefit."*

The Maharashtra State Road Development Corporation (MSRDC) plans to provide radio-frequency identification (RFID) tags on all commercial vehicles crossing 22 inter-state border check posts. The tags will be mandatory for all the commercial vehicles passing though the check posts. It will be free for the first time, while the replacement cost is ₹ 500. The staff who sit at the check post will make an entry of the information with respect to the vehicle owner and nature of the cargo on a computer system. According to MSRDC, it will detain vehicles only for 75 seconds in the first check post and 10 seconds in the second barrier and if the papers are in ready mode, the vehicle will be allowed to move in less than 3 minutes. The financing for the tag services to the commercial vehicles will be given under the project for modernization and integration of the check posts with a cost of ₹ 1, 571 crores (Refer CII Newsletter, dated 22 Apr 2009).

## OBJECTIVE OF THE RESEARCH

The objectives of this study is to examine the use of IT enabled services, level of education and linkage of professional knowledge among the retailers for supply chain management in order to enhance profitability, providing more value to consumer and producer by reducing wastage.

[1] Food And Retail Chains In India, ISAS working Paper No. 15- 06 Oct. 2006

## RESEARCH QUESTIONS

**1.** Is there any impact of supply chain management on sale of perishable food products at organized and un-organized retail?
**2.** Is effect of education significant on SCM practices of organized and un-organized retailers?
**3.** Whether the use of ITES will be helpful for better integration of supply chain systems or not?
**4.** Is there any threat to unorganized retail by adaption of integrated supply chain management by organized retailers?
The answer of above-mentioned questions are expected from this research study.

## WHY REQUIREMENT OF SCM IS INTEGRATED WITH INFORMATION TECHNOLOGY ?

Effective supply chain system combines technology with human efforts to identify trends, perform comparisons and highlight opportunities in the supply chain function, even when large amount of data are involved. The technology helps decision makers in supply chain area such as sourcing, inventory management, manufacturing, quality, sales and logistics. It leverage investment made in enterprise applications, web technologies, data warehouses and information obtained from various sources to locate patterns among transactional, demographic and behavioral data.
The approach of ITES in supply chain management involves creating data marts organized by function such as customer, procurement, finance, planning and quality. Business intelligence tools are used to extract the data through standard queries, ad-hoc reports and online analytical processing tools, sometimes via a managed reporting environment or executive dashboard interface.

## COST AND PROFITABILITY

Cost and profitability drivers are the utmost important factors in the retail industry. With wafer thin margins, managing cost is an ongoing challenge. Integrated supply chain solution with the help of ITES, enables managers in sales, marketing, customer support, supply chain planning, and for financial understanding and responding to various key issues.

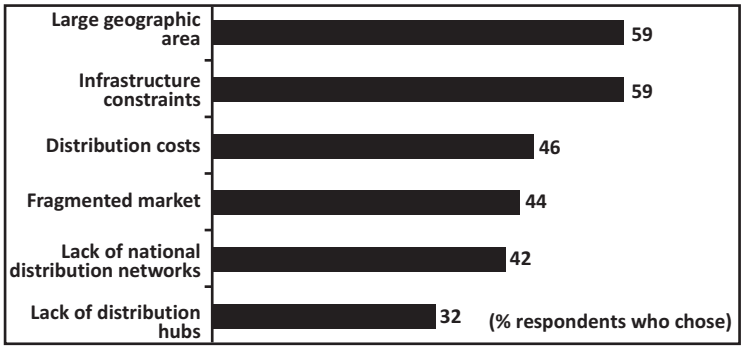
## DIMENSIONS OF SCM IN RETAILING

Accurate and timely information can provide ways to deliver effectiveness in supply chain management of perishable goods in retail :
**a.** Executive information system at retail outlets;**b.** Online analysis and processing;**c.** Standard Reports;
**d.** Ad-hoc reports; **e.** Advanced analysis

## HOW TO IMPLEMENT INTEGRATED SCM IN RETAIL

IT enabled SCM can be applied to diverse area like sales, marketing, sourcing, Inventory management and auditing. The various stages of implementation can be defined as follows:
**a)** Evaluation of customer experience/expectation.
**b)** Quality and price control.

**Figure 1: Key Challenges In The Indian Retail Market**




**Source: KPMG International consumer markets in India Survey 2005**

**c)** Optimum inventory management.
**d)** Wastage reduction.

**Table 1 : Level Of IT Usage Among Indian Retailers**

| Functional Area | Uses Of IT Among Indian Retailers | | |
|---|---|---|---|
| | No IT System | Partial IT Support | Fully Automated |
| HR | 40 | 40 | 20 |
| Finance & accounting | 30 | 70 | 0 |
| Business Intelligence | 22 | 67 | 11 |
| Vendor development & Management | 40 | 50 | 10 |
| Supply Chain Management | 20 | 50 | 30 |
| Merchandise & inventory Management | 60 | 40 | 0 |
| Facility management | 70 | 30 | 0 |
| Stores Management | 10 | 30 | 60 |
| Customer relationship Management | 20 | 70 | 10 |
| Branding, Marketing & Promotion | 56 | 44 | 0 |

Source: KPMG Retail Survey In India, 2006

Managing supply chains requires retailers to perform a delicate *"balancing act"* that simultaneously meets multiple needs. While delivering high service levels, as they manage global or local supply chains, retailers must keep costs low in order to remain competitive. Other pressures come from more demanding consumers as well as from the increasingly global nature of the industry, which has retailers both sourcing and selling products in more places around the world.

By better connecting product information, processes, systems, and people, any company can address both current and future complexity in this area with cost-effective, integrated solutions that helps retailers drive enhanced supply chain efficiency and trading partner collaboration. These solutions address key retail business issues such as making order and replenishment processes more effective; lowering inventory levels in warehouses and distribution centers; improving out-of-stock levels; reducing paperwork; and improving data accuracy.

## BENEFITS OF IT USES IN RETAILING

Supply chain management (SCM) solutions offer the following benefits to retail enterprises:

**1.** Gain real-time visibility of their own operations and of product movement through their supply chain partners, helping to make order and replenishment processes more effective and lower inventory levels in warehouses and distribution centers.

**2.** Provide a single, consolidated view of product information whenever and wherever it is needed, allowing retailers and their trading partners to quickly share, view, and analyze documents and data to make more informed, accurate business decisions in a collaborative environment.

**3.** Integrate with legacy applications, data warehouses, and enterprise resource planning (ERP) systems to create both internal and external vendor collaboration solutions through standards-based, open, scalable technology that enables information to be held centrally and be accessed by a wide range of devices.

**4.** Improve collaboration by allowing suppliers to access appropriate pre-determined information, such as sales data, forecasts and production information, to help speed up replenishment and anticipate stock-outs. Exchanges of documents such as purchase orders, Advance Shipment Notifications (ASNs), invoices, and credit notes can also boost collaboration.

**5.** Facilitate product development, fast fashion, or speed sourcing projects with supplier portals.

## HOW RETAIL TECHNOLOGY PROVIDES REAL TIME SOLUTIONS

**a) Retail Operational Intelligence** : Since the customer has become more cost conscious and demanding in terms of *"value for money"*, it has become very important for the retailer to have an idea of the customer needs, trends, etc. at

the lowest possible levels (stores) and to create a framework, whereby the operational managers are empowered to act on them. So retailers today have realized the importance of business agility and visibility of transactions on a real time basis to manage and improve their top line and bottom line. Non-availability of store level transactional data for decision making at any point of time has reduced the flexibility of retailers.

**b) Understanding Real Time Solutions :** Real time solution gives visibility and transactional transparency to the top level management at any retail organization through Executive Dashboards and provides business agility through real time operational analysis. Through real time monitoring of business processes and activities, the retailers can improve their top line and bottom line and can identify and detect situations that correspond to interactions and bottlenecks.

**c) Uniqueness Of ITES In Retailing:** Display health across stores through Executive Dashboard and real time transactional details at the store level through Store Management Dashboard. In one click, it is possible to seamlessly integrate with a huge set of external systems, and hence, lower the total cost of ownership due to light infrastructure, putting technology to optimum use.

## RESEARCH METHODOLOGY

The descriptive research study was carried out, which was concerned with describing the characteristics of a particular individual or group i.e. group of organized and un-organized retailers in terms of education level, uses of IT in supply chain management and uses of advance technology/method to enhance supply chain. The Sampling Design of the study is purposive sampling, which is applied for organized and Un-organized retailers. The stratified random sampling method was applied for the collection of primary data from the un-organized retailers. In this case, the data were collected from different strata i.e. mandi / bazaar at different places. The data were collected by two methods i.e. Primary and Secondary. The primary data were collected from direct communication with respondents through pre-tested structured questionnaire, direct interview and by personal observation from various sampling units like *mand*i, daily *shetkari bazar*, APMC yard etc. The sample size is sixty consisting of equal participation from organized and un-organized retail. The secondary data were collected from the information published in various research reports on relevant topics, technical journals, books, magazines, newspapers, publications of trade associations and industries etc.

## DATA COLLECTION AND OBSERVATION

The following facts were observed during the study in Pune area during the research in 2009-2010 :

**1.** It was observed that there are three segments of un-organized retail for perishable food products :

**a.** Fruits; **b.** Vegetables ; **c.** Other products like bread, milk, eggs

**2.** The products like tinned chicken, tinned fish, ready to eat product are generally not holding in stock of un-organized retailers, whereas, these products are an integral part of organized retail stores.

**3.** The language of the questionnaire also created some problems and was required to be explained in detail to the respondents, therefore, extra ordinary care was required to avoid biasness.

**4.** Most of the Un-organized retailers in segment (b) were doing the business with turnover of ₹1000 to ₹ 20,000 on per day basis. They tried to recover the cost or intended to acquire maximum profits on the first day and further tried to sell the product at a reduced price on subsequent days.

**5.** In both system of retail, the inventory management works on *"push"* theory, which creates overstocking, bullwhip effect and finally contributes to wastage.

## UNORGANIZED RETAIL IN *MANDIS* OF PUNE

The various retail markets at Pune were visited by the researchers during the process of data collection. In chandannagar mandi, which starts at 2000-2100 Hrs, it was observed that on an average, almost 125-150 vehicles arrived within 3-4 hours i.e. up to 11:30 PM accompanied by farmers. These vehicles were tempo, Tata Ace, small trucks and Tata carriers of varying capacities. The vegetables were purchased by wholesaler agents on the basis of complete vehicle load. Some of the farmers had not sold their produce to the middlemen, but they themselves occupied the place in the market. Transactions took place the whole night, and purchases were made by retailers/ restaurant owners/ other small vendors/ push cart vendors. Early in the morning, the business was on its peak. After 0630 hrs

(Next morning), large numbers of consumers were also seen. At 0800 hrs, all the retailers were trying to sell their produce at throw-away prices. For some retailers, whose quality of produce was comparatively good, could sell their produce further, and they busied themselves in arranging their produce in respective gunny- bags. At the end, approximately more than 10-12 quintals of produce were collected by the garbage vehicle.

In other mandis like Yerwada, Mahatma phule mandi, Shivajinagar etc.,100-150 retailers are generally present in the market on an average. Some markets operate in an open place, without any platform or covered shade, and start at night, after 2000 hrs and end-up next day in the morning by 0800 hrs. Their daily business ranging from ₹ 3000 to ₹ 20,000 depending on the capacity of the retailers. Their profit margins are not certain and make a loss on various occasions. Some of the retailers had disclosed that their average profit lies between 10-15% of their investment. The researchers had interviewed 50 retailers and 42 of the retailers informed the researchers that they are not doing business more than 20 days in a month due to various reasons. Further, they accepted that generally, it takes two days to sell their products, i.e. average purchase are performed on the alternate day. All the respondents accepted that the business is highly volatile and uncertain.

During the discussion with the farmers, it was revealed that price of their produce was fully decided on the basis of supply of produce on that particular date. There is no minimum or maximum price. Sometimes, the farmers have to sell their produce at throwaway prices, as even the cost of transport is difficult to recover. As the supply increases in mandis, the prices go down. The profit is totally uncertain and prices depend upon the luck factor in the absence of any forecasting. Since, there is no forecasting system available to them, they become the victim of oversupply and are unable to recover the cost of their produce. Sometimes, early entrants in the market can sell the produce at lower prices and feel dissatisfied. There is no price mechanism in the market, which assures that the farmers are paid the minimum possible price for their produce. Therefore, efforts put in for higher production of crops go in vain, as the price level of produce goes down due to good production.

## SCM AT ORGANIZED RETAIL IN PUNE

The monthly gross sales of organized retailers are high in monetary value. The floor areas used for selling of perishable food product are 5 to 6 percent of total space provided for commodities and food stuff. The sale value of perishable food products is approximately 6 to 7 percent of the total gross sale of organized retail. Therefore, it can be said that the sale value of organized retail is proportionate to the floor area earmarked for selling of perishable food products at organized retail.

In unorganized retail, the floor areas deployed for perishable products ranging from 20 Sq ft to 200 Sq ft. The small retailers using area of 20 Sq ft is generally investing ₹ 2000 on a daily average, with one or two bags of products generally ranging from 100-200 Kg. As the floor area increases, the variety of products as well as investments also increase. However, it also depends on various factors like season, type of product, nature and quality of product, forecasting of consumer taste and purchasing pattern, etc. The range of profit earned is generally 20% to 30% of the investment. It is also observed that there is no exact loss to the retailer, as he earns by keeping the higher margin by segmenting the product as *' first-class quality product'*, *'second class quality product'* and so on and charges higher price for premium quality. The selling price is also lowered/ reduced gradually as quality of produce goes down. The retailers try to sell out the even lowest quality product at throw-away prices, if possible, which is even lower than the purchase price.

The pure wastage, which is either thrown to dust bin/garbage, or given to street cattle is very small in amount and quantity. But ofcourse, the quality losses are the major concern due to ineffectiveness in the supply chain of these products. Here, it is evident that the retailers are not making any loss, but they are able to maintain their profit by extracting either from the consumer, i.e. by selling the products on high prices, or paying lower prices to producers/ farmers. This is the reason why the price paid by the consumers are four times higher than the price paid to farmers as a cost of production.

## DATA ANALYSIS AND INTERPRETATION

The Hypothesis 1 was formulated with reference to the question where the effectiveness of supply chain management was compared with respect to gross sale in organized and un-organized retail stores.

## HYPOTHESIS-I

**❁Null hypothesis H0: μ1=μ2 ie Effective SCM practices are independent of sale value of organized and un-organized retail.**

**❁Alternate hypothesis Ha: μ1 ≠μ2 i.e. Effective SCM practices are dependent on the sale value of organized and un-organized retail.**

**Table 2: Frequency Distribution : Monthly Sales Of Retailers**

| Monthly Gross sales in ₹ | Frequency of Respondents in Unorganized Retail | Frequency of Respondents in Organized Retail |
|---|---|---|
| >50000 | 3 | 0 |
| 50k to 1L | 5 | 0 |
| 1-3 L | 12 | 0 |
| <3 L | 10 | 30 |
| **Total** | **30** | **30** |

**Table 3 : Student's T-Test For Comparative Gross Sales Of Organized Vis-À-Vis Unorganized Retailers**

| t-Test: Paired Two Sample for Means | Organized Retail | Un-Organized Retail |
|---|---|---|
| Mean | 7.5 | 7.5 |
| Variance | 17.66666667 | 225 |
| Observations | 4 | 4 |
| Pearson Correlation | 0.396525793 | |
| Hypothesized Mean Difference | 0 | |
| DF | 3 | |
| t Stat | 0 | |
| P(T<=t) one-tail | 0.5 | |
| t Critical one-tail | 2.353363435 | |
| P(T<=t) two-tail | 1 | |
| t Critical two-tail | 3.182446305 | |

In Table 3, monthly gross sales of organized and un-organized retail system are compared.
μ0 -μ1= 0, hypothesized mean difference is considered as zero.
The value of t stat is 0, which is less than the value of t critical one tail as well as t critical two tail. Therefore, it can be said that μ0≠μ1.

**Therefore, μ0 is rejected, which clearly denotes that the good SCM practices certainly have an impact on the sale value of organized as well un-organized retailers.**

The second hypothesis was formulated with reference to the question, where the impact of qualification on

**Table 4 : Frequency Distribution For Education Level Of Retailers**

| Education Level | Frequency of Respondents | |
|---|---|---|
| | un-organized retail | Organized retail |
| Non-matric | 17 | 0 |
| Matric | 8 | 0 |
| Graduate | 4 | 3 |
| Post grad. | 1 | 7 |
| Professionally educated | 0 | 20 |
| **Total** | **30** | **30** |

effectiveness and understanding of supply-chain management among the retailers of organized and unorganized retail are compared.

## HYPOTHESIS- II

**❁ Null hypothesis H0: μ1=μ2 i.e. Effective SCM practices are independent of educational level of organized and un-organized retailers.**

**❁ Alternate hypothesis Ha: μ1 ≠μ2 i.e. Effective SCM practices are dependent on the educational level of organized and un-organized retailers.**

μ0 -μ1= 0, hypothesized mean difference is considered as zero.

**Table 5 : Student's T-Test For Impact of Educational Level Among Retailers On SCM Of Perishable Food Products**

| t-Test: Paired Two Sample for Means | Ed. Level of un-org. retailer | Education Level of Org. retailer |
|---|---|---|
| Mean | 6 | 6 |
| Variance | 47.5 | 69.5 |
| Observations | 5 | 5 |
| Pearson Correlation | -0.700529902 | |
| Hypothesized Mean Difference | 0 | |
| df | 4 | |
| t Stat | 0 | |
| P(T<=t) one-tail | 0.5 | |
| t Critical one-tail | 2.131846782 | |
| P(T<=t) two-tail | 1 | |
| t Critical two-tail | 2.776445105 | |

In Table 5, the educational level of organized and un-organized retailers is tested for their impact on SCM. The value of t stat is 0, which is less than the value of t critical one tail, as well as t critical two tail. Therefore, it can be said that μ0≠μ1.

**Therefore, μ0 is rejected, which clearly denotes that the educational levels of retailers certainly have an impact on good SCM practices of organized as well un-organized retailers.**

It is also significant to mention that Pearson's correlation is -0.7, which shows the highly negative correlation between the educational levels of un-organized vis-à-vis organized retailers. It is observed that in un-organized retail, the majority of vendors are non- matric and their scale of operations is also small. They are aware of the problems of supply-chain management, but are unable to understand ( due to low educational qualification) the linkage between the wastage and its impact on the economy in totality as well as prospects/ opportunities for their own development/ enhancement of quality of life. Therefore, the need of the hour is to impart some training, which will help them out to understand the impact of quality and quantity loss in a broader phenomena, and how to contribute in the reduction of wastage at the micro level and how this will save the crores of rupees at the national level.

The next hypothesis was formulated with reference to question where the researchers analyzed the integration of supply chain system with help of IT enabled services like mobile, internet, computer, Bar coding, ground positioning system (GPS) and high end ERP packages, including its utility and awareness among the operators.

## HYPOTHESIS-III

**❁ Two Way ANOVA TEST:** The basic principle of ANOVA is to test for the differences among the means of populations by examining the amount of variation within each of these samples, relative to the amount of variation between the samples. The researchers analyzed the collected data by using Two way ANOVA. The rationale behind using this method is to check the validity in broader terms i.e. on the basis of two factors.

The question regarding the integration of supply chain system was put up to organized and un-organized retailers - that

whether the use of computer and internet will improve the system and your profit?

**H0: Integration of the supply chain system with the use of computer and the internet will improve the system and increase the profit.**

**Ha: Integration of the supply chain system with the use of computer and the internet will not improve the system and decrease the profit.**

**Table 6 : Will Integration Of SCM Improve Profits For Retailers ?**

| | INTEGRATION OF SCM WILL IMPROVE PROFIT? | |
|---|---|---|
| | ORGANIZED RETAIL | UN-ORGANIZED RETAIL |
| YES | 30 | 22 |
| NO | 0 | 8 |

**Table 7 : Two Way ANOVA - Significance Of Integration For Enhancement In Profit**

| Anova: Two-Factor Without Replication | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| SUMMARY | Count | Sum | Average | Variance | | |
| Row 1 | 2 | 52 | 26 | 32 | | |
| Row 2 | 2 | 8 | 4 | 32 | | |
| Column 1 | 2 | 30 | 15 | 450 | | |
| Column 2 | 2 | 30 | 15 | 98 | | |
| ANOVA | | | | | | |
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Rows | 484 | 1 | 484 | 7.5625 | 0.222035 | 161.4476 |
| Columns | 0 | 1 | 0 | 0 | 1 | 161.4476 |
| Error | 64 | 1 | 64 | | | |
| Total | 548 | 3 | | | | |

**❁Result: Here, the calculated value of F in row as well as in column is far lesser than the tabulated value, which accepts the Null hypothesis. This infers that the integration of supply chain system with the use of the computer and the internet will improve the system and increase the profit.**

The analysis of this question is quite interesting. As the hypothesis is proved true, therefore, it is inferred that the use of the computer and the internet will improve the profit level of organized as well un-organized retailers.

But the ground reality is different. During the survey, none of the respondents from the un-organized retail were possessing a PC/Laptop. They held a firm believe that the use of a computer will increase/improve their business prospects. When they were asked about their willingness to purchase a computer/ or invest some amount for integrated SCM, their reply was negative. The reason for this contradiction was the scale of operations on which they were operating. This scale of operation includes the basic infrastructure and capital constraints i.e. lower turnover of business. The term *basic infrastructure* implies the environment of the mandis and feasibility of using personal computers along with the internet in mandis. There is awareness among the un-organized retailers about its uses and benefits, that is why they use mobile phones for coordination of supply, checking of rates, inward and outward logistics, coordination, forecasting and sale order including realization of sales.The next hypothesis was formulated with reference to the question, where the researchers analyzed the threat to un-organized retail from organized retail by adaption of good supply chain practices.

## HYPOTHESIS-IV

The question regarding the threat to un-organized retail from organized retail was responded by both- organized and unorganized retailers in following manner and is analyzed with the help of Two way ANOVA.

**Table 8 : Threat From Organized To Un-Organized Retailers Due To SCM Practices**

| THREAT FROM ORGANIZED TO UN-ORGANIZED RETAIL | | |
|---|---|---|
| | ORGANIZED | UN-ORGANIZED |
| YES | 28 | 20 |
| NO | 2 | 10 |

**H0: Threat exists to un-organized retailers from organized retailers due to effective supply chain practices. i.e. H0:μ1=μ2**

**Ha: Threat does not exist to un-organized retailers from organized retailers due to effective supply chain practices. ie Ha : μ1≠ μ2**

Here, μ1 represents the SCM practices of organized retailers and μ2 represents the SCM practices of un-organized retailers.

**Table 9 : Two Way Anova- Significance Of Threat Due To SCM Practices**

| Anova: Two-Factor Without Replication | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| SUMMARY | Count | Sum | Average | Variance | | |
| Row 1 | 2 | 48 | 24 | 32 | | |
| Row 2 | 2 | 12 | 6 | 32 | | |
| Column 1 | 2 | 30 | 15 | 338 | | |
| Column 2 | 2 | 30 | 15 | 50 | | |
| ANOVA | | | | | | |
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Rows | 324 | 1 | 324 | 5.0625 | 0.26625 | 161.4476 |
| Columns | 0 | 1 | 0 | 0 | 1 | 161.4476 |
| Error | 64 | 1 | 64 | | | |
| Total | 388 | 3 | | | | |

From the Table 9, we can see that the calculated F value (column 5) is less than the Table value (Column 7). **Hence, the Null Hypothesis H0 is true at 95% confidence level**. Therefore, it can be said that the effective SCM practices adopted by organized retailers posed a threat to un-organized retailers.

## HYPOTHESIS-V

In further analysis, the researchers aimed to measure the performance of organized and un-organized retail based on various parameters considered as appropriate practices for effective SCM, shown in column 1 of Table 10. The column 2 & 3 represent the value, which is calculated on the basis of frequency multiplied with weightage. The weightage given for different parameters are shown in Table10 and Table 11, where calculation of value assigned to each parameter of organized and un-organized retail and weightage assigned to different options selected for each parameter are depicted.

In regression analysis, the null hypothesis is absence of any relationship between X and Y, whereas alternate hypothesis is that wherein, some relationship exists between x and y.

**❁Result: The table value of F is 4.84, which is lesser than calculated value 10.265 as shown in Table 12 (Summary Output Of Regression Statistics).**

ie Fo > F crit (Refer column-5, row-12 of Table-12 where Fo is 10.265 and F crit is 4.84 as per table value)

Or 10.265> 4.84

**Therefore Null hypothesis is rejected.**

**Table 10 : Calculation Of Value Assigned To Each Parameter Of Organized And Un-Organized Retail**

| | Organized Retail | Unorganized Retail | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| **Parameters** | **Freq X Wt.= Value** | **Freq X Wt.= Value** | **Organized** | **Unorganized** |
| Education Level | 150 | 49 | 30 X 5=150 | 17+16+12+4+0=49 |
| Years Of Experience | 60 | 84 | | 4+20+30+30 |
| Av. Period For Selling | 30 | 30 | | |
| Use Of Computer/ Advance Tech. | 150 | 60 | | |
| Collection Center | 30 | 0 | | |
| Vehicle For Collection | 30 | 0 | | |
| Use Of Refrigerated Vehicle | 30 | 0 | | |
| Processing Facility | 30 | 0 | | |
| Contract Farming | 30 | 0 | | |
| Help To Farmers | 30 | 0 | | |
| Selling Of Product At Reduced Prices | 30 | 30 | | |
| Wastage | 120 | 40 | 50+40+30 | 20+20 |
| Disposal Procedure | 120 | 60 | 30 X 4 | 30+20+10 |

**Inference:** This shows that there exists a relationship between organized and un-organized retail on the basis of the above mentioned parameters. In other words, all the eleven parameters ( see Table 10) are having an impact on the performance of supply chain efficiency of the organized and un-organized retailers.

**Table 11: Weightage Assigned To Different Options Selected For Each Parameter**

| | Weightage | | | | | |
|---|---|---|---|---|---|---|
| **Parameters** | **1** | **2** | **3** | **4** | **5** | **0** |
| **Education Level** | **Non-matric** | **Matric** | **Graduate** | **Post Graduate** | **Professionally Educated** | |
| Years Of Experience | > 5 | > 10 | > 15 | > 20 | < 21 | |
| Av. Period For Selling | Daily | > 3 Day | 3-5 Days | 5-10 Days | < 10 Days | |
| Use Of Computer/ Advance Tech. | No Use Of Comp | Billing Only | Bar Code | E-demand | Erp Package | Any Other |
| Collection Center | Yes | | | | | No |
| Vehicle For Collection | Yes | | | | | No |
| Use Of Refrigerated Vehicle | Yes | | | | | No |
| Processing Facility | Yes | | | | | No |
| Contract Farming | Yes | | | | | No |
| Help To Farmers | Yes | | | | | No |
| Selling Of Product At Reduced Price | Yes | | | | | No |
| Wastage | 5 Product | 4 Product | 3 Product | 2 Product | 1 Product | |
| Disposal Procedure | Any Other | Throw On Street | Open Space | Dust Bin | | |

# FINDINGS

**1.** True supply-chain management does not exist in any of the retail systems.

**2.** Since organized retailers are also procuring the items from the wholesale markets of the APMC market yard, so there

**Table 12 : Summary Output Of Regression Statistics**

| SUMMARY OUTPUT | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Regression Statistics | | | | | | |
| Multiple R | 0.694788399 | | | | | |
| R Square | 0.48273092 | | | | | |
| Adjusted R Square | 0.435706458 | | | | | |
| Standard Error | 37.7614403 | | | | | |
| Observations | 13 | | | | | |
| ANOVA | | | | | | |
| | **df** | **SS** | **MS** | **F** | **Significance F** | |
| Regression | 1 | 14637.89 | 14637.88681 | 10.26552779 | 0.008394901 | |
| Residual | 11 | 15685.19 | 1425.926374 | | | |
| **Total** | **12** | **30323.08** | | | | |
| | **Coefficients** | **Standard Error** | **t Stat** | **P-value** | **Lower 95%** | **Upper 95%** |
| Intercept | 32.51116563 | 14.49444 | 2.243009511 | 0.046455648 | 0.60911943 | 64.41321184 |
| X Variable 1 | 1.182308348 | 0.369012 | 3.203986234 | 0.008394901 | 0.370119113 | 1.994497582 |

is an absence of linkage between farmers and organized retailers.

**3.** There is no pricing policy for the produce, which really ensures the minimum price for the farmers. A lot of things were said to increase the productivity and production (Refer to the statement of PM Manmohan Singh on 01 Feb 2010 in the meeting of CII), but in the absence of proper marketing and SCM policies, the farmers feel cheated as after they arrive at the mandi to sell their produce, they come to know that due to oversupply, they are hardly able to recover even the cost of transportation.

**4.** The farmers' decision to move to mandis are based on pure anticipation rather than any forecasting technique, which results in oversupply for a particular day or short supply on another day, creating price fluctuation in the retail market. This requires effective marketing information systems as well as cold storage facilities at the market yard for short terms.

**5.** The trading takes place in an open space, which contributes to further deterioration in the quality, and life of produce becomes shorter.

**6.** There are no definite standards regarding the quality and variety of produce, which leads to a high level of bargaining, longer time period requires to settle the transaction costs, exposes the product to sun light, reducing the life of produce due to drying of moisture content in the produce.

**7.** Handling of produce at the time of loading and off-loading is quite rough, which contributes in wastage. The produce is dumped at mandis or markets, till the transactions are not completed, and this rough handling of produce, which leads to the produce getting squashed, is also a significant reason for wastage.

## RECOMMENDATIONS

**1.** The Government should establish small cyber cafés to provide information to small retailers on sale data, price, total incoming produce in mandis etc. These data should be linked with different mandis of area/ city.

**2.** The Government should establish small warehouses/ cold store to keep the unsold items of the day, which are carried forward. In the absence of these amenities, the retailer has to wind up their items in bags. Due to this multi-handling, the quality of the produce deteriorates very soon. The normal high temperature is also contributing significantly in fast spoiling of produce.

**3.** The Government should provide permanent selling space in mandis, which can be locked. This will reduce the transshipment of produce, which are carried forward to the next day. The packing and re-opening of the bags of the produce is one of the major causes of loss due to improper handling.

**4.** The covered selling space will help in maintaining the moisture content of perishable products, which will enhance the shelf- life of the produce.

## CONCLUSION

After detailed analysis, it is concluded that there is a huge gap in application of knowledge management to make the retail sector more competitive. There is a lot of scope for IT enabled service providers and other knowledge providers to work in conjunction with retail organizations for enhancement of the supply-chain system. This will not only enhance the profitability for retail and ITES solution providers, but will also generate value for consumers as well as producers, including farmers, by reducing the wastage. In this era, poor people are struggling to make ends meet and wastage on such a large scale is beyond the tolerance level. The benefits accrued from the waste reduction can be shared by farmers as well as the consumers, and the cost of investment in ITES will also be recovered in the long run. The only critical thing is the initial investment, which can be promoted/ supported by the government and/ or can be achieved through PPP (public-private- partnership). This will also be helpful in control of inflation as well as fluctuation in the market for the prices of perishable products.

## LIMITATIONS OF THE STUDY AND SCOPE FOR FUTURE RESEARCH

Financial constraint is the major limitation, as it requires extensive information gathering from different sources. The respondents from the organized retail sector are refraining in providing information to their counterparts in the unorganized sector due to stiff competition. The mindset of un-organized retailers is also a major problematic area, where they feel that the researchers are working for organized retailers and big corporate houses. The scope for future research is available for more extended geographical area, which may give some more useful information on the macro level.

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