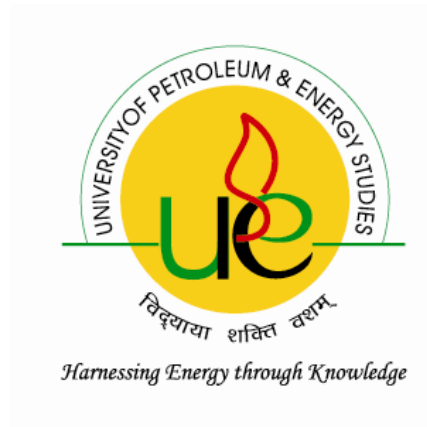# UNIVERSITY OF PETROLEUM & ENERGY STUDIES

DEHRADUN

Dissertation Report

On

"The integrated supply chain in white goods industries"

Under the Guidance of:

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CoMES, UPES

Submitted by:

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Declaration

I, Aditya Vats, MBA-L&SCM (SEM 4), College of Management & Economic Studies, University of Petroleum & Energy Studies, hereby declare that the Dissertation Report titled "The Integrated supply chain in White goods Industries" is a thesis report submitted in partial fulfillment of Maters of Business Administration (Logistics & Supply Chain), and an original work carried out by me availing the guidance of my mentor.

This report has no resemblance with any other report to any University or Institute published Earlier.

Certificate of Originality

This is to hereby state that this report is very original in every sense of terms and conditions and it carries a sense of credibility and belief and that no shortcuts have been taken and I remained both rigorous and attentive during the research work. I have put in my level best to keep this work as informative and precise as possible.

It may also state here that during the preparation of this report some information has been taken from a gamut of professionally shared information and knowledge, a detailed description of which has been mentioned in the references chapter of this report.

Dated:

Signature:

Aditya Vats
MBA (Logistics & Supply Chain Management)
CoMES, UPES

Acknowledgement

On the very outset of this report, I would like to extend my sincere & heartfelt obligation towards all the personages who have helped me in this endeavor.
Without their active guidance, help, cooperation & encouragement, I would not have made headway in the project.
I am ineffably indebted to **Mr. Vikas Kumar** for conscientious guidance and encouragement to accomplish this assignment.

I extend my gratitude to College of Management & Economic Studies, University of Petroleum & Energy Studies (UPES), Dehradun for giving me this opportunity.
I also acknowledge with a deep sense of reverence, my gratitude towards my parents and member of my family, who has always supported me morally as well as economically.
At last but not least gratitude goes to all of my friends who directly or indirectly helped me to complete this project report.

Any omission in this brief acknowledgement does not mean lack of gratitude

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Contents

Executive Summary

Today's highly competitive environment put pressures on companies to continually looking for new ways of doing business. Supply chain management is one of the areas which can provide the companies with an effective tool to build an advantage no longer resides with the company's own capabilities, but with the relationships that the firm can forge with their external partners – the customers, the suppliers and other service providers, forming a network called the supply chain. If the supply chain is not managed properly then the delivery gets affected resulting in customer dissatisfaction and hence loss of business. In recent years, supply chain performance measurement and metrics have received much attention from industry and researchers. The role of these metrics and measures in the success of a company cannot be overstated because they affect operational planning and control, tactical and strategic decisions. Performance measurement and metrics have an important role to play in setting objectives, evaluating performance, and determining future courses of actions. The process of choosing appropriate supply chain performance measures is difficult due to the complexity of these supply chains. The paper presents an overview and evaluation of the performance measured in supply chain models and also presents a bench marking study in selected White Goods Industries. Four category of SCOR level-I metrics such as cycle time, cost, assets and quality are identified for measuring supply chain performance measurements. The study was conducted in 5 companies in White Goods segment who have already implemented some of the SCM initiatives in their organization. Further, statistical analysis was carried out and the industry best-in- class results were compared for bench marking. Using the current literature and the results of an empirical study conducted by earlier authors were compared and discussed. Based on key findings, recommendations were made for implementation.

Introduction

The SCM is the integration of key business process from goods end user through original suppliers, which provides products, services and information that add value for customers and other stakeholders. The SCM initiatives could be considered as Competitive tool and a cost reduction approach. It is also seen from the literature that Indian companies are yet to leverage the SCM for competitive advantage.

Current Situation of Indian white goods industries

White goods markets are right now predicted for a boon with most of the companies devising strategies to build a large customer base in the coming years. Experts predict that the markets for white goods like refrigerators, televisions, home appliances and air conditioners are to be dominated by the Indian manufacturers like Godrej, Onida, Voltas, Whirl Pool,and Videocon etc. The estimated Indian white goods market is Rs.35000 Cr. The Indian consumption pattern is slowly converging with global standards. This has been an impressive growth of the middle class. Around 70% of the total households in India reside in the rural areas. Rural areas represent a huge potential market in the 153 million households (Census, 2009-10). The size of domestic consumer durables or white goods, market may touch Rs.52000 Crore by 2015 on account of rising demand for these goods, particularly among youngsters (The Economic Times, April, 27 2012). The consumer durables and electronic market in rural and semi-urban areas account for about 40% of the overall market and is growing at about 30% CAGR, The country's consumer electronics and durable market is divided into 3 segments viz white goods, brown goods and consumer electronics. The white goods include Air conditioners and refrigerators). The brown goods include microwave ovens, juices and Iron boxes and consumer electronics include TV sets, laptops, cell phones and other electronic accessories. The spike and growth in the market is mostly due to the increase in disposable income amongst the young consumers and the relative popularity for the products. The demand is further spiked due to the options of easy availability of loans as well as the increasing penetration of consumer electronics retail stores. Presently, the rural and suburban demand comprises of about 40% of the total demand.

Growth prospects

India is likely to emerge as the world's largest middle class consumer market with an aggregated consumer spend of nearly US$ 13 trillion by 2030, as per a report by Deloitte titled 'India matters: Winning in growth markets'.

Fuelled by rising incomes and growing affordability, the consumer durables market is expected to expand at a compound annual growth rate (CAGR) of 14.8 per cent to US$ 12.5 billion in FY 2015 from US$ 7.3 billion in FY 2012. Urban markets account for the major share (65 per cent) of total revenues in the Indian consumer durables sector. In rural markets, durables, such as refrigerators, and consumer electronic goods are likely to witness growing demand in the coming years. From US$ 2.1 billion in FY 2010, the rural market is expected to grow at a CAGR of 25 per cent to touch US$ 6.4 billion in FY 2015.

Some of the top consumer durables brands in India are:

- LG
- Nokia
- Philips
- Samsung
- Sony
- Whirlpool
- Blue Star
- Carrier
- Godrej India
- Hitachi India Limited
- Sharp India Limited
- Tata
- Toshiba India Private Limited
- Videocon

About Consumer Durables

Consumer durables refer to those consumer goods that do not quickly wear out and yields utility over a long period of time. Some of the popular and common examples of these kinds of items are electronic goods, kitchen appliances, home furnishings and leisure equipments etc. Consumer durables can be broadly categorized into the following 3 heads:

White Goods: White goods mainly include air conditioners, refrigerators, washing machines, audio equipments and speakers.

Brown Goods: This kind of consumer durables mostly include kitchen appliances like chimneys, electric fans, grinders, iron, microwave ovens, mixers and varied other cooking ranges.

Consumer Electronics: Some of the mostly used consumer electronic goods are DVD players, MP3 players, mobile telephones, telephones, VCD players etc.

Size of the consumer durable market(USD billion)
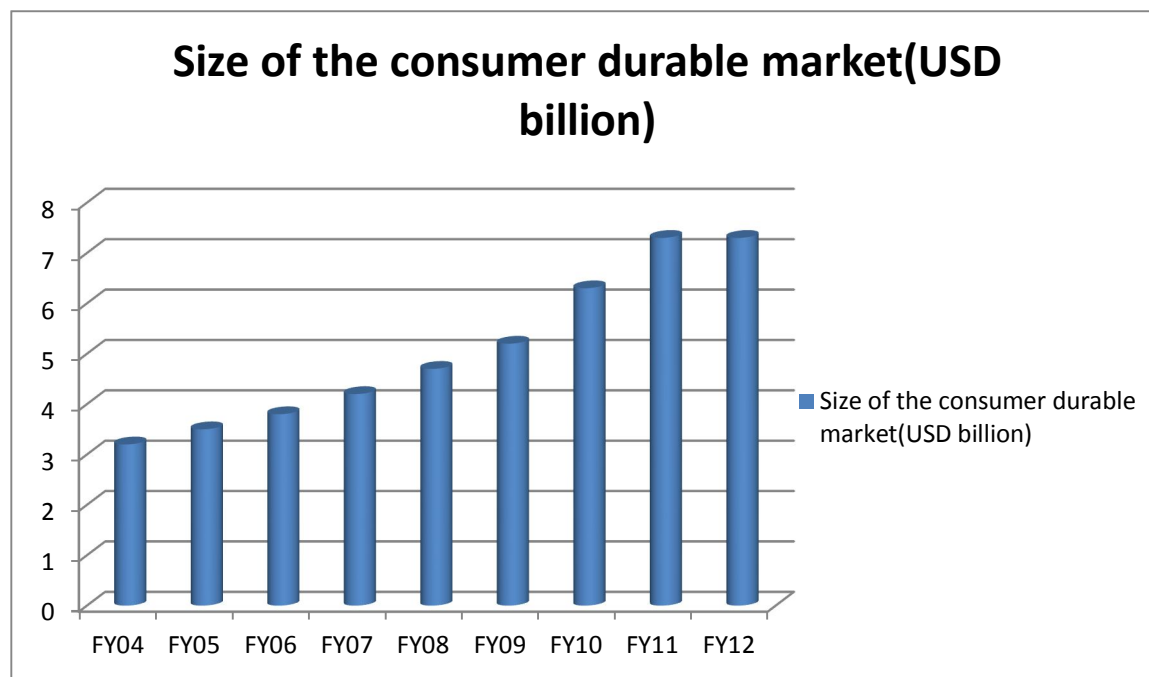
MAJOR PLAYERS

Samsung India

Samsung india commenced its operations in India in December 1995, today enjoys a sales turnover of over US$ 1 billion in just a decade of operations in the country. Samsung design centres are located in London, Los Angeles, Sanfransisco, Tokyo, Shanghai and Roman. Samsung India has its headquartered in New Delhi and has a network of 19 Branches offices located all over the country. Samsung 'Made in India' products like Colour Television, Colour Monitors and Refrigerators are being exported to Middle East, CIS and SAARC countries from its Noida manufacturing complex.

Whirlpool India

Whirlphool was established in 1911 as first commercial manufacturer of motorized washers to the current market position of being world's number one manufacturer and marketer of major home appliances. The Parent company is headquartered at Benton Harbor, Michigan, USA with a global presence in over 170 countries and manufacturing operation in 13 countries with 11 major brand names such as Whirlphool, KitchenAid, Roper,Estate, Bauknecht,Laden and Ignis.

LG India

LG Electronics was established on October 1, 1958 (As a private Company) and in 1959, Lge started manufacturing radios, operating 77 subsidiaris around the world with over 72000 employees worldwide it is one of the major giants in the consumer durable domain worldwide.

Godrej India

Godrej India was established in 1897. The company was incorporated with limited liability on march 3, 1932, under the Indian Companies Act, 1913. The Company is one of the largest privately-held diversified industrial corporations in India.

Sony India

Sony Corporation, Japan, establishes its India operations in nOvember 1994. In India, Sony has its distribution network comprising of over 7000 chaneel partners, 215 Sony World and Sony Exclusive outlet and 21 direct branch locations.

Shopper Classes

Notwithstanding reducing the buy power equality component, wage characterizations don't serve as an

powerful pointer of possession and utilization slants in the economy. As needs be, the National

Board for Applied Economic Research (NCAER), India's chief monetary exploration establishment,

has discharged an option characterization framework taking into account utilization pointers, which is more

significant for discovering utilization examples of different classes of products.

There are five classes of shopper families, extending from the down and out to the exceedingly rich,

which contrast extensively in their utilization conduct and possession designs crosswise over different

classes of merchandise. These classes exist in urban and country family units both, and utilization

patterns may vary fundamentally between comparable wage family units in urban and country zones.

The quick financial development is expanding and improving livelihood and business opportunities

also, thus expanding expendable earnings. Working class, characterized as family units with expendable

salaries from Rs 200,000 to 1,000,000 a year involves around 50 million individuals, approximately 5% of the

populace at present. By 2025 the extent of working class will increment to around 583 million individuals, or

41% of the populace. Compelling rustic destitution has declined from 94% in 1985 to 61% in 2005 and is

anticipated to drop to 26% by 2025.

Rich class, characterized as gaining above Rs 1,000,000 a year will increment from 0.2% of the

populace at present to 2% of the populace by 2025. Rich class' offer of national private

utilization will increment from 7% at present to 20% in 2025.

Review of India's Consumer Durables Market

The Indian Consumer Durables portion can be sectioned into three gatherings:

White merchandise Brown products Consumer hardware

· Air conditioners

· Refrigerators

· Washing Machines

· Sewing Machines

· Watches and timekeepers

· Cleaning gear

· Other residential machines

· Microwave Ovens

· Cooking Range

· Chimneys

· Mixers

· Grinders

· Electronic fans

· Irons

· TVs

· Audio and feature

frameworks

· Electronic extras

· PCs

· Mobile telephones

· Digital cams

· DVDs

· Camcorders

The majority of the portions in this area are portrayed by exceptional rivalry, development of new

organizations (particularly MNCs) and presentation of cutting edge models, value rebates and

trade plans. MNCs keep on ruling the Indian shopper tough section, which is clear from the way that these organizations order more than 65 every penny piece of the pie in the

shading TV (CTV) section.

In consonance with the worldwide pattern, throughout the years, interest for buyer durables has expanded

with rising salary levels, twofold wage families, evolving ways of life, accessibility of credit, expanding

customer mindfulness and presentation of new models. Items like aeration and cooling systems are no more seen **.**

Growth of Consumer Electronics Production in India

The biggest attraction for MNCs is the growing Indian middle class. This market is characterized

with low penetration levels. MNCs hold an edge over their Indian counterparts in terms of superior technology combined with a steady flow of capital, while domestic companies compete on the basis of their well-acknowledged brands, an extensive distribution network and an insight in local market conditions.

One of the critical factors those influences durable demand is the government spending on infrastructure, especially the rural electrification programme. Given the government's inclination to cut back spending, rural electrification programmes have always lagged behind schedule. This has not favored durable companies till now. Any incremental spending in infrastructure and electrification programmes could spur growth of the industry. The digital revolution is shaking

up the consumer durables industry. With the advent of MP3 music files, personal video recorders, game machines, digital cameras, appliances with embedded devices, and a host of other media and services, it is no longer clear who controls which part of home entertainment. This has set off a battle for dominance, and the shakeup is spanning the entire technology spectrum. Microsoft Corp. is spending billions on entertainment initiatives such as its Xbox video game console. Compaq and HP sell MP3 music players that plug into home-stereo systems. Apple Computer is positioning its new iMac as a digital-entertainment device. Sony is building Vaio computers that focus on integrating multimedia applications.

Philips sells stereos that hook into a high-speed Internet connection to play music from the Web.

More startups are trying to carve out profitable niches in digital music, video, and home networking.

The industry is witnessing a number of strategic alliances, to develop a range of capabilities - electronic hardware, software and entertainment content. As more consumers grow comfortable with technology, companies need to build simpler devices that offer more entertainment and convenience. These new machines need to work together readily, and should be as easy to set up and use as a telephone or a television. Consumerization of technology could be a major phenomenon over the next 5 to 10 years. This could hasten industry consolidation, as healthy companies gain market share by buying out weaker ones at attractive prices.

Apart from steady income gains, consumer financing has become a major driver in the consumer durables industry. In the case of more expensive consumer goods, such as refrigerators, washing machines, color televisions and personal computers, retailers are joining forces with banks and finance companies to market their goods more aggressively. Among department stores, other factors that will support rising sales include a strong emphasis on retail technology, loyalty schemes, private labels and the subletting of floor space in larger stores to smaller retailers selling a variety of

products and services, such as music and coffee.

REVIEW OF LITERATURE

The metrics that are used in performance measurement and improvement should be those that truly capture the essence of organizational performance. A measurement system should facilitate the assignment of metrics to where they would be most appropriate. For effective performance measurement and improvement, measurement goals must represent organizational goals and metrics selected should reflect a balance between financial and non-financial measures that can be related to strategic, tactical and operational level of decision making and control. (Krajesowski & Ritzman,2000). Since, "what gets measured, gets managed" it is inevitable that once such measures are put in place, management attention will be directed to these key issues *(Lapide, 1998)*. Studies conducted by researchers / groups earlier viz, Korgaonkar, Shah, IIMM etc, on supply chain performance were compared and discussed.

Performance measurements and metrics

in SCM

A variety of measurement approaches have been developed, including the following important approaches as reported in the AMR Research Report (2000). The following approaches are considered as important for performance measurements:

The Balanced Score Card

Activity Based Costing (ABC) and

Economic Value Added (EVA)

Very limited literature exists on the measurements specific to the industries, more specifically, in the Indian context. The studies conducted by performance measurement group (1999); Korgaonkar (2000); Gunasekaran, et al., (2001); and Shah (2003) were reported in the literature review. The main research findings from these studies were comparison of metrics of delivery performance, total logistics cost, cash-to-cash cycle time, assets turns, inventory days of supply, production flexibility inventory carrying cost and cost due losses in general. In the present study efforts have been made to measure cycle time, cost, quality, and assets metrics from various segments of white goods industries. The review of literature ranges from the year 1990 to 2008.

RESEARCH OBJECTIVES

The overall purpose of this research was to measure the supply chain performance in selected industries in white goods segments, which included refrigerators, air conditioners, washing machines, consumer electronics, home appliances, and accessories.

The objectives are:

To determine and measure performance metrics in the supply chain of white goods segments.

To study and bench mark the supply chain performance metrics

To assess the current supply chain metrics those are followed across various industries in India and compare the same with best practices in the respective industries.

To compare the Indian practices with that followed globally, wherever possible.

RESEARCH METHODOLOGY

Research Methodology includes research design and the research procedures followed for conducting the study. Specifically, this includes the instrument development process, pilot study and pre-testing, data collection and analysis procedures.

RESEARCH INSTRUMENT

The research instrument consisted of a questionnaire that was specially designed for the study. The questionnaire consisted of 23 statements related to the performance measurement metrics, business profile of the company, better practices and systems that are followed in the company. The questionnaire was designed with the inputs from previous studies (Korgaonkar, 2001; Eicher Research group, 2002; Rajashekariah, 2006; Shah, 2003; Gunasekaran et al., 2001; and Lapide, 2004, 2006).

SAMPLING PROCEDURE

The population of interest was the entire database of Indian Institute of Materials Management (IIMM), which is the largest of its kind membership professional body in India. The IIMM database consists of companies of repute spread all across the country. More than 500 companies registered with them formed the sample frame for the study. The IIMM database is itself segregated into broad industry type's i.e. discrete manufacturing, process industries and FMCG. Of these, companies representing white goods segments were selected for the study. This resulted in a sample of 5 companies.

DATA COLLECTION PROCEDURE

The researcher then collected the data in various stages through email, personal visits and continuous follow up. In stage one about 30% and stage two about 50% and the remaining 20% in stage three after repeated reminders and follow up. Thus, there were 19 usable responses obtained from the selected companies through census method. Statistical Package for Social Studies (SPSS) was used for conducting statistical analysis.

METHOD OF ANALYSIS

Descriptive statistics: Descriptive statistics such as minimum, mean and maximum were computed for analysis.

Analysis and interpretation of Descriptive statistics

Preliminary analysis of data collected are tabulated and further analysis carried out Table1 shows that the percentage of sample coverage. The coverage of sample is 63%.

Profile of the supply chains

It includes

a) air conditioners and refrigerators

b) consumer electronics

c) washing machines

d) home appliances and
e) accessories.

These figures show the findings durings the actual visits of the Places.

SI No.	Particulars	Diesel (Warehouse)	Amit associates appliances(Dealer)	Sheetal refrigeration(Dealer)	Pal Refrigerator(Dealer)	Bhushan Refrigerator(Dealer)
1	Deliveries performance (%)	98	97	99	97	98
2	Total logistics costs (% of sales)	2-5%	1-2	3-5	7-9	4-7
3	Cash to cash cycle	45 days	40	40	55	48
4	Assets Turns	3	10-15	12-14	7-9	11-15
5	Inventory days of supply	15-20	18-25	35	25-28	17-22
6	Production flexibilities	NA	NA	NA	NA	NA
7	Inventory carrying cost	Rs. 70 per sq ft	15%	12 %	18%	16%
8	Cost due to losses	0.45%	NA	0.71%	NA	NA
9	Finished goods Inventory holding(Days)	40	55	48	35	42
10	Inventory Turnover (No. of Turns)	30-45	45-50	45-50	32-37	40-50

Analysis and interpretation of

descriptive statistics

Summary of performance measurements of white goods segment with regard to cycle time, cost, quality and assets metrics are shown in table 3, 4, 5 and 6. The best-in-class, industry average and maximum values were computed for analysis.

Cycle time metrics

Procurement time

Of the companies contacted, around 74% of them revealed that the procurement time is usually less than 15 days, with 16% saying it ranges between 30 and more days. On the other hand, some of the companies have reported that the procurement time is less than a week Procurement time also varies across companies mainly due to the geographical proximity of the vendor. For instance, it takes 1-2 weeks for companies procure its raw material within India and up to 2 months in case of imports.

Production cycle time

It was found that production cycle time of more than 79% of the companies is less than 10 days, of which production cycle time of around 58% of the companies is less than 7 days.

Delivery time

Of the companies contacted, over 78% of them revealed that the delivery time is usually between 4-10 days. For some companies (26%) delivery seems to be lesser than 5 days.

Total cycle time

Total cycle time for almost 21% of the companies contacted during the study seems to be less than 10 days, another 21% have reported it ranges from 10 – 30 days and remaining 58% delivery seems to be more than 30 days. However for very few companies it is over 60 days.

Cash to cash cycle time

Cash to cash cycle time of 42 % of the companies contacted seems to be in the range of 7-30 days. However, some of the companies have reported cash to cash cycle time is over 60 days. Interestingly, in a few cases, it was found that the cash to cash cycle time reported ranges from 7-12 days.

Supply chain flexibility (%)

Around 84% of the companies revealed that they could meet up to 10% of the demand surge when there is an unexpected increase in demand. However, some of companies (15%) are capable of meeting up to 15% increase in demand.

Cost metrics

Total supply chain (% of sales)

The supply chain costs of around 21% of the companies contacted are over 10% and the remaining 79% of the companies have reported ranges between 12 -18%. Out bound transportation chain cost followed by in bound transportation and ware housing cost, which contributes 31%, 21% and 9% of the total supply chain cost respectively.

Quality metrics % of on time deliveries

Around 16% of them revealed that every time they deliver the goods to their customer by the promised time is 100% on time delivery. However for 26% of the companies on time delivery seems to be happening above 90% but below 100% and 58 % of companies the delivery ranges from 75-85%. **% of supplies made as per the quantity ordered** % of supplies made as per the qty ordered around 26% of the companies contacted indicated that it ships 100% of the total order in the initial shipment itself. However, in 74% of the cases, the initial shipment carries 80-95% of the total order.

% of supply on desired quality

32% of the companies responded that it delivers at 100% desired quality level and 68 % of the companies responded that their supply on desired quality ranges between90-99%.

Assets metrics

Inventory holding (Raw Material, Work in-Progress and Finished Goods inventory)

While in most of the cases, raw material inventories are held for 10-45 days and work in progress inventories are held for less than 10 days of 68% cases and above 10days of 32% cases. However, finished -goods inventories, in 47% of the cases, are held for less than 7 days. Also, in some cases (53%) it appears to be ranges from 8-40 days.

Inventory turnover

84% of the companies maintain an inventory turnover of 10-25 turns in the supply chain followed by of 16% of the companies maintains above 25 turns. In the global white goods industries, bench marking has become an important tool to help companies compare and contrast their performance with others, identify performance gaps share best practices. Faced with the necessity of operating a cost-effective supply chain manufacturers know what they must do to compete reduce inventory carrying costs, improve operational efficiency, reduce stock outs, forge tighter relationships with 3PL service provides and shorten order-to cash cycles with their channel partners. In the case of total cycle time metrics, there is ample scope for reducing the total cycle time and cash to cash cycle time. The difference between a best in class figure (which stands at around 7-8 days) and the industry average (seem to be around 33-37 days) is quite significant. There is a lot of scope for improvement in the existing way of working of the white goods industries especially with regard to cycle time, cost and quality management. Hence, it can be said that there is a very good potential for improving the supply chain efficiencies in the white goods sector.
Overall, it is the companies in the branded segment that are performed well across the matrices when compared with non-branded segments.

Comparison of previous research findings

Supply chain performance measurements conducted by previous researchers, and their major findings were compared with the present study. Performance measurement group(1999) reported the following findings. Delivery performance 85-95%, total logistics cost 3-13%, cash –to-cash cycle time 28-80 days, and asset turns 8-19 turns.
Korgaonkar (2001) has reported his findings as under: Total logistics in the country is estimated at 4.5% of sales. The average inventory turns is 4.5 per year. Over 50% of the inventories are of raw materials. Nearly, 60% of logistics cost is in transportation (35%) and inventory carrying cost (25%), ware house cost (9%) and cost due to losses (14%) Shah (2003) has reported the following findings: Delivery performance to committed date 95%

best, total logistics cost 3-8%, warranty and return processing costs not available. Cash to-cash cycle time 28-46 days, and net asset turns 12-19 turns. The previous research major findings were compared with the present study as shown in Table 7.

CONCLUSIONS

In the global consumer durable / white goods industry, bench marking has become an important tool to help companies compare and contrast their performance with others, identify performance gaps and share best practices. It is clear that the companies are taking a strategic interest in issues of supply chain managements. Organizations are seeking to achieve competitive advantage through closer and more collaborative relations that enhance and support existing formal contracts. Faced with the necessity of operating a cost effective supply chain, manufactures know what they must do to compete :

reduce inventory carrying costs, improve operational efficiency, reduce stock outs, forge tighter relationships with third-party service providers and shorten order-to-cash cycle with their channel partners.

KEY RECOMMENDATIONS

It is seen from the findings that the companies' sourced inputs from suppliers nearby their operations could perform better. Their supply chain efficiency is higher compared to others. The companies that are implemented e-Initiatives like Electronic Data Interchange, e-Procurement, &Process integration initiatives such as Enterprise Resource Planning have achieved superior supply chain performance. The companies used IT tools such as Global Positioning Systems; Radio Frequency Identification (RFID), Bar Codes, Universal Product Code (UPC) etc in their supply chain could achieve superior performance compared to others. The companies adopted forward and backward integration as business strategy could perform better than others in terms of cycle time, cost, assets management, supply chain flexibility etc., Linking the supply chain metrics to financial Key Performance Indicators (KPI) is essentially important to improve the supply chain efficiency.

Charts

Table 1 Percentage of sample coverage

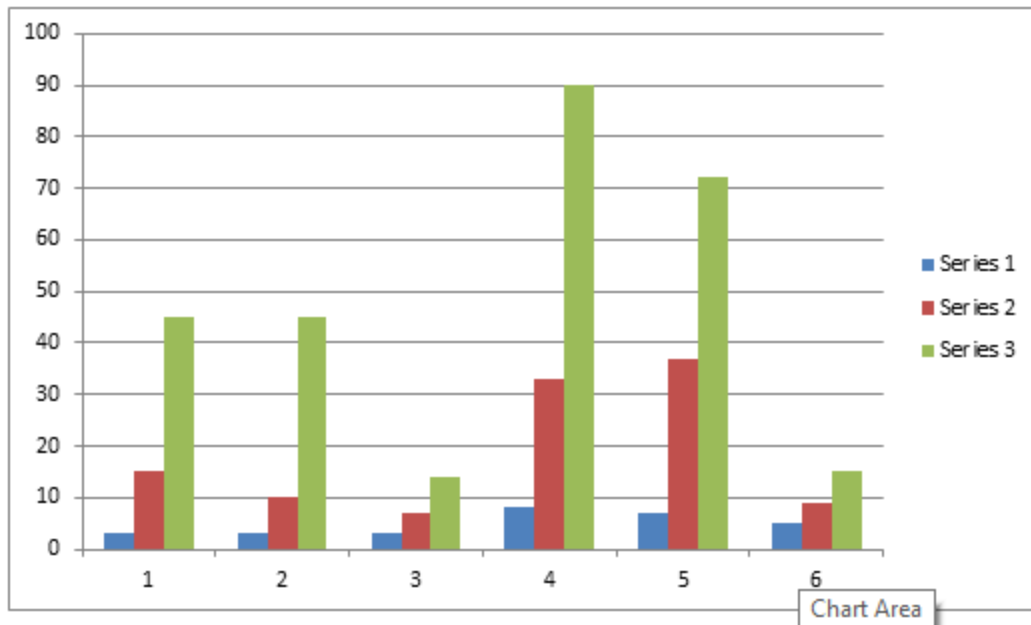| Sl.No	Segment	Samples (Planned)	Samples (Collected)
1.	White goods	8	5

Table 3 Best-in-class vs industry average-sum up

1. Cycle time metrics – Minimum, Mean and Maximum

Sl.No.	Metrics	Minimum	Mean	Maximum
1.	Procurement time (Days)	3	15	45
2.	Production cycle time (Days)	3	10.26	45
3.	Delivery time (Days)	3	7	14
4.	Total cycle time (Days)	8	33	90
5.	Cash to cash cycle time (Days)	7	37	72
6.	Supply chain flexibility (%)	5	9	15

Figure 1 Bar chart of descriptive statistics – Cycle time metrics
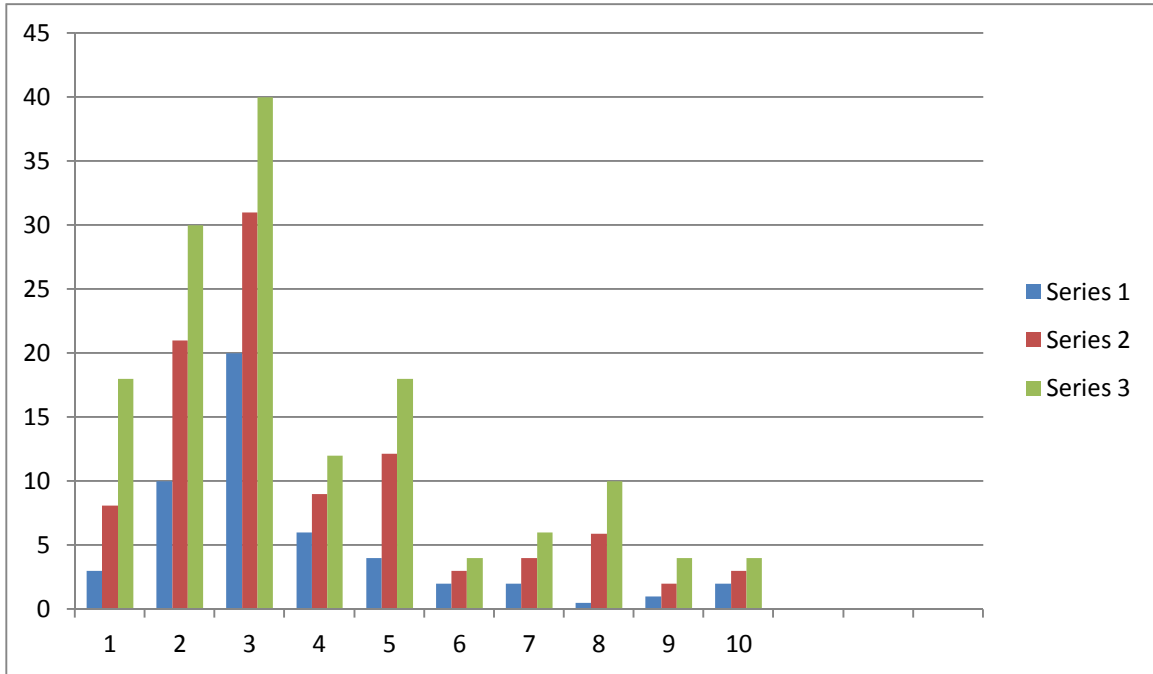
Bar chart of Cycle time metrics

Cycle time metrics

Minimum

Mean

Maximum

Table 4 Best-in-class vs industry average sum up

1. Cost metrics – Minimum, Mean and Maximum

Sl.NO	Metrics	Minimum	Mean	Maximum
1	Total supply chain cost(% of sale)	3	8.10	18
2	Inbound Transportation Cost (% of TSCC)	10	21	30
3	Outbond Transportation Cost (% of TSCC)	20	31	40
4	Warehouseing cost (% of TSCC)	6	9	12
5	Inventory carrying cost (% of TSCC)	4	12.15	18
6	Cost of transit losses (% of TSCC)	2	3	4
7	Cost of damages (% of TSCC)	2	4	6
8	Other costs (Insurance Freight & clearance)	0.50	5.9	10
9	Return Inventory cost	1	2	4
10	Return Processing cost	2	3	4

Figure 2 Bar chart of descriptive statistics- cost metrics

Cost metrics
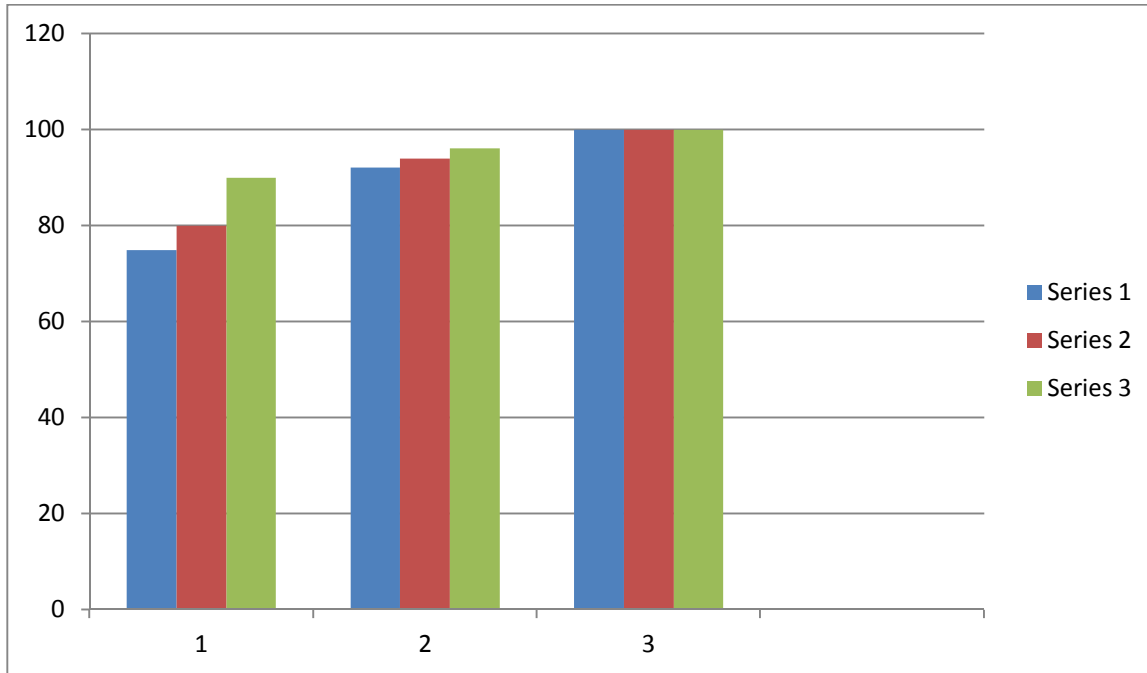
Table 5 Best- in- class vs Industry average-sum up

1. Quality metrics – Minimum, Mean and Maximum

Sl.NO	Metrics	Minimum	Mean	Maximum
1	% of time deliveries	75	92.1	100
2	% of supplies made as per the quantity ordered	80	94	100
3	% of supplies made as per the desired quality	90	96.1	100

Figure 3 Bar chart of descriptive statistics – Quality metrics

## Bar chart of Quality Metrics

Quality Metrics

Table 6 Best- in- class vs Industry average-sum up

2. Asset metrics – Minimum, Mean and Maximum

Sl.NO	Metrics	Minimum	Mean	Maximum
1	Raw material inventory holding(Days)	4	18	45
2	Work-in-progress inventory holding (Days)	2	7	24
3	Finished goods Inventory holding(Days)	2	16	40
4	Inventory Turnover (No. of Turns)	12	18.84	30

Figure 6 Bar chart of descriptive statistics – Assets Metrics

Bar chart of descriptive metrics
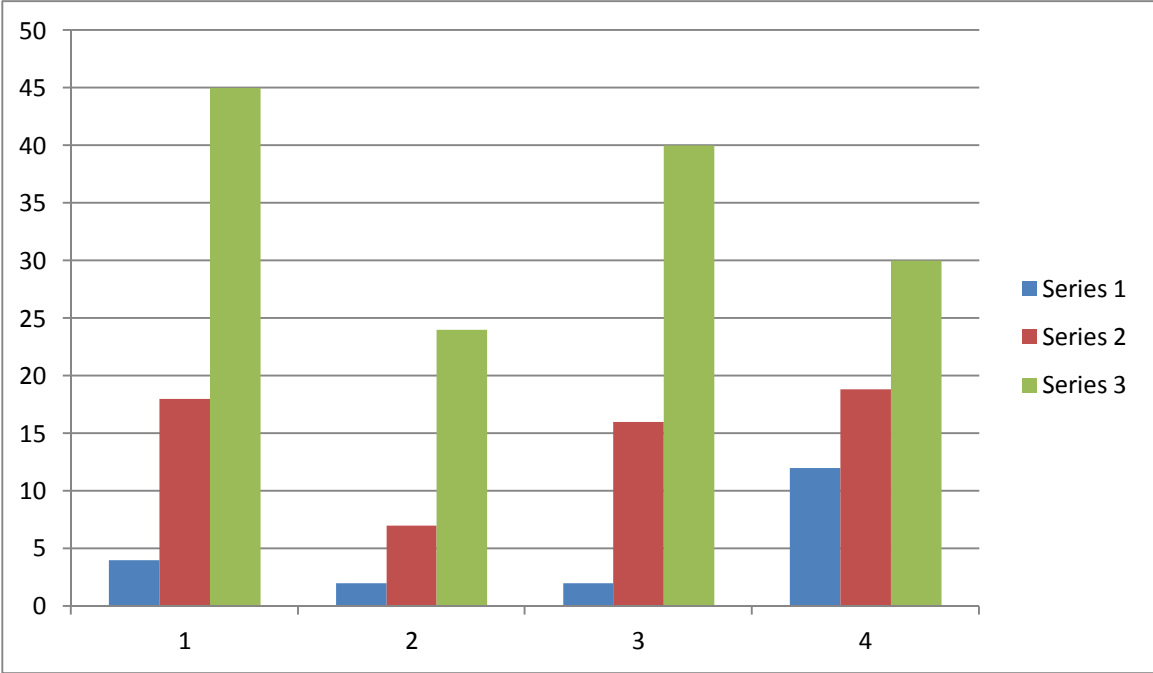
Table 7 Summary of major findings of previous and present studies

Metrics	Performance Measurement Group (1999)	Korgaonkar, (2001)	Shah (2003)	Sengottuvelu (2008)
Delivery performance (%)	85-95%	81 – 97%	90-95%	97 - 100%
Total logistics cost (% of sales)	3-13%	4-50%	3-8%	3 – 6.5%
Cash-to-cash cycle time (days)	28-80	24-66	28-46	7 – 72
Assets turns	8-19	4-5	12-19	12 – 30
Inventory days of supply	22-55	81	22-38	2-40
Production flexibility (%) / Supply Chain flexibility (%)	20-30	NA	NA	5 – 15%
Inventory carrying cost(% of TSCC)	NA	25%	NA	4-18%
Cost due to losses	NA	14%	NA	2-4%

REFERENCES

Ballou, R.H (1992). *Business logistics management*. Prentice – Hall, Inc., Engle wood cliffs, N.J.

Chopra, S., & Meindl, P. (2002). *Supply chain management – strategy, planning and operation* (2nd ed) New Delhi. Pearson Education Asia.

Eicher research group report (2002).

Fisher, L.M., (1997). What is the right supply chain for your product? *Harvard Business Review 75(2), 105-116*.

Gunasekaran, A., Patel, C., & Tirtiroglu, E. (2001). Performance Measure and metrics in a Supply Chain Environment.

International Journal of operations & Production Management21 1(2), 71 – 87.

Indian Institute of Materials Management (2003 July) *Bench marking practices in supply chain managem*ent. Navi Mumbai.

Korgaonkar, M.G (2001). *Logistics and supply chain*. Indian Institute of Technology.Bombay.

Krajesowski, L.J., & Ritzman, L.P. (2000). *Operations management and analysis(5th ed)*. Singapore: Addison – Wesley.

Levi, D.S., Philip Kaminsky, & Levi, E.S. (2004).

Designing & managing the supply chain – concepts, Strategies and case studies (2nd ed). New Delhi : Tata McGraw – Hill.

Rajashekaraiah, R.J. (2006, July), Supply chain performance measures – Trends and issues. *Materials managementreview. 2(9), 18-20*.