Two-Wheeler Industry's Internal Supply Chain Performance through Benchmarking, a study of selected companies

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Abstract

Purpose – In global scenario, many organizations own supply chains, which operate in different countries. The performance of these supply chains, owned by the same organization must be same if they operate in countries with similar economical, political, and social conditions. In this paper, an effort has been made to propose a methodology for the internal financial benchmarking to reduce the variability in performance among supply chains of same focal firm. The proposed methodology of internal benchmarking for assessment of supply chain performance demonstrated through a three companies from Paint Industry.

Design/methodology/approach – Three listed firms from the industry viz Hero Honda, Bajaj Auto and TVS Motor were selected for the benchmarking study. The relevant financial data for the last five financial years (2005-2009) for the above companies were collected. The electronic database Capital Line and Business Beacon were used to collect data. Data are analyzed by applying Two way ANOVA.

Findings – This paper develops performance measures that can be computed through publicly available information. The total supply chain length of TVS Motors is higher compare to Bajaj Auto and Hero Honda. Supply chain inefficiency ratio of TVS Motors is higher compare to Hero Honda and Bajaj Auto. Supply chain working capital productivity of TVS is lower compare to Bajaj auto and Hero Honda.

Originality/value – According to the authors' knowledge, there is no paper in the literature, which discusses analysis for internal benchmarking in supply chain management and it is believed that it will be useful for supply chain managers to apply such tools to lead global development in their supply chains.

Key words: Benchmarking, Supply Chain, Chain Length, Supply Chain Inefficiency Ratio, Supply Chain Working Capital Productivity.

I. INTRODUCTION

In today's environment, there are pressures to be socially and environmentally responsible and there are risks which need to be mitigated and managed. Then, there is the complexity created by ever increasing customer requirements and expectations, globalization, the pressure on cost, and the availability and access to resources. On top of this, management is expected to improve profitability, increase revenue growth and capture and protect larger market share. In order to succeed, management must recognize that the ultimate success of an organization depends on the ability to integrate the company's network of business relationships in a mutually beneficial way. The management of this network of relationships is known as supply chain management. Successful supply chain management requires cross-functional integration within the firm and across the network of firms that comprise the supply chain. It is focused the improvements in performance that result from better management of key relationships.

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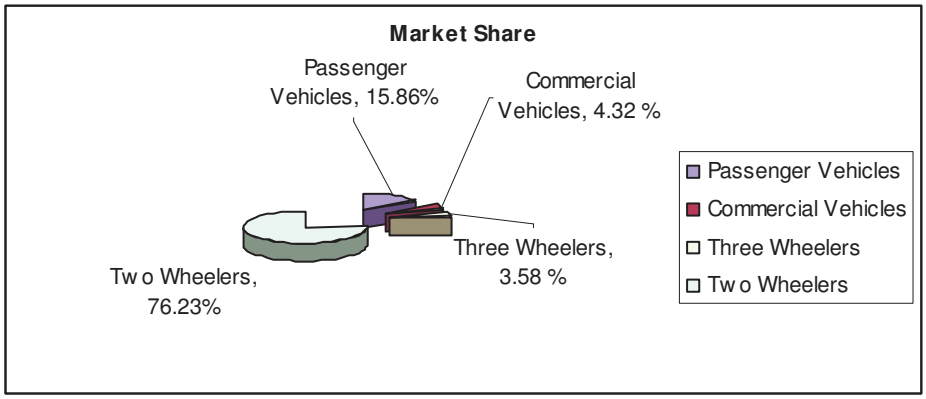
Thus, there has been an increased awareness in recent years regarding the role and potential of supply chain management in supporting corporate goals. Management theorists as well as practitioners have addressed the problem of how to improve supply chain processes. This article is confined to a discussion of the internal supply chain, defined as the flow of materials from the procurement of raw materials to the delivery of finished goods to the customers of an organization (Krajewski 1990).
For an improvement to take place, it is essential that a firm use performance measures appropriate to its business. Subsequently, it may carry out a benchmarking exercise to identify "best-performance" firms and its own relative position. At the next level, the firm may probe further to identify avenues for improvement.

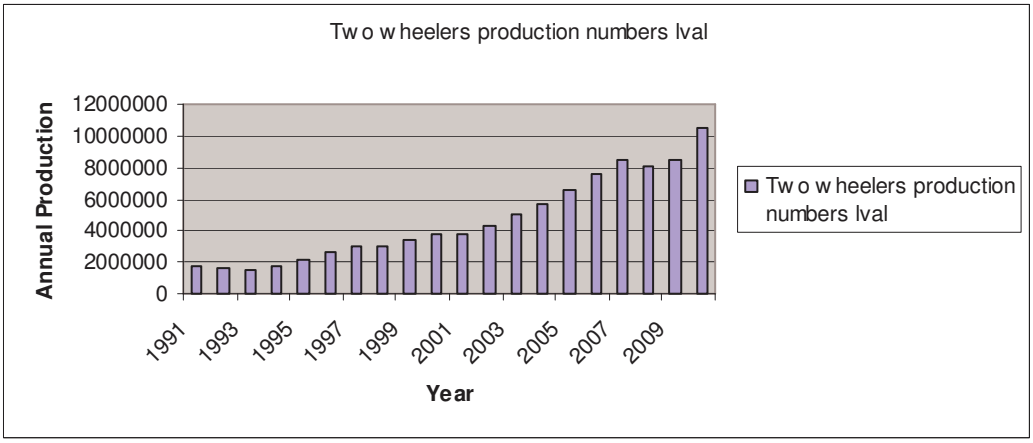
With a respectable gross production of 10.5 million units in 2009-10 and a compounded annual growth rate (CAGR) of 11% during 2002-2009, the Indian two wheeler industry has become one of the stars of the country's economy. The future of this sector is also bight as it might witness a higher level of production, innovation, and competition, each benefiting the aam admi of India. Gloating of a decorated past and viewing a bright future, the two wheeler industry has proved that it would become a strong pillar of the economy.

Figure1: Current Market Share of Vehicles, two wheelers, three wheelers



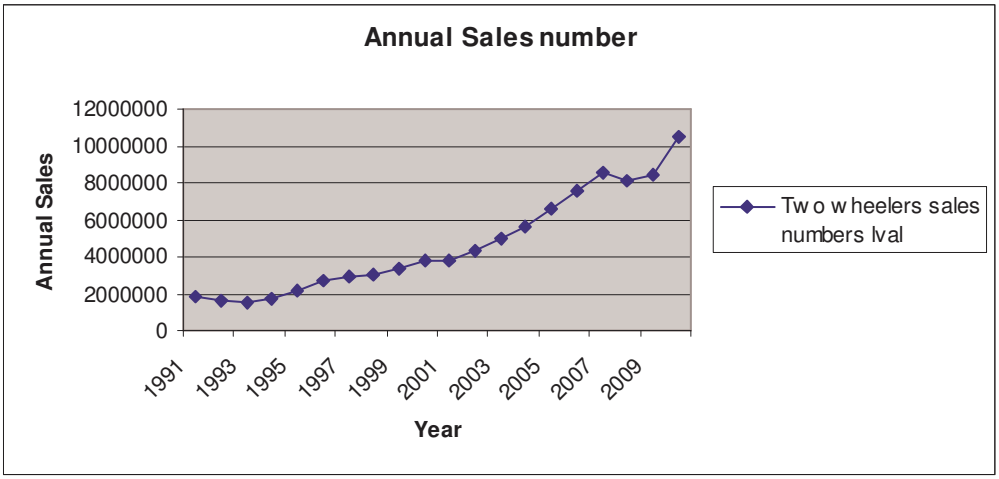
Source: SIAM Statistical Profile 2010

Figure 2: Two Wheelers Production



Source: Business Beacon

Figure 3: Two Wheelers annual sales



Source: Business Beacon

II. LETARATURE REVIEW

Performance measurement is an essential and powerful management tool, but its power relies on the ability to identify those measures that drive supply chain success. Benchmarking is one way of assessing performance based on these measures (Bogan and English 1994). Smeltzer and Carr (1999) tested the relationships among benchmarking, strategic purchasing, and firms' performance and found that benchmarking is positively related to firms' performance and strategic purchasing. According to this study, firms do obtain valuable comparison information and have the opportunity to learn if they use the benchmarking information. This study also emphasizes that future research should help to identify specific practices that enable better performance.

A firm can compare its own performance with that of its competitors and the industry aggregate in order to ascertain where it stands in terms of supply chain performance. Using benchmarking data, a firm can also map a supply chain profile that allows it to effectively capture both the dimensions of time and cost in one diagram. Further, a firm can also compare its own profile with that of its competitors in order to ascertain where it stands in terms of costs and length of time in the chain. Benchmarking is a useful tool for comparing the performance of competing firms so as to identify areas of improvement for further detailed investigation, which may lead to process improvements.

The literature has emphasized the importance of cooperative relationships with suppliers and distributors. One such study examined the development of suppliers using a process-oriented approach (Hartley and Jones 1997). Another study in this area investigated the linkage of sourcing strategies with specific business units (Narasimhan and Carter 1998). These studies have suggested that the firms need to objectively determine avenues for improvement in the transactions processes with their suppliers and distributors.

In a business setting, most transactions are carried out on credit. In a competitive economy, firms have to allow credit to attract sufficient business. This, in turn, forces them to delay their payments in order to finance their operations. Consider the case when

the products are sold on credit. This depletes inventories and increases accounts receivable. To replenish the inventories, the firm commences production, for which it buys raw materials. If the raw materials are bought on credit, accounts payable increase. Under these circumstances, the working capital components affect the procurement, production, and collection activities and are, in turn, affected by them (Mehta 1974). For the purpose of analysis, the interaction of accounts receivable, inventories, and accounts payable should be considered simultaneously.

Large firms need to consider that their suppliers and distributors incur different costs of capital. Normally, small firms incur high costs of capital. Long credit periods for them are very costly and these costs are ultimately passed on to the customers, Therefore, it is mutually beneficial for the suppliers, producers, and distributors to ensure better integration and increase cost efficiency (Jensen and Meckling 1976). For instance, a firm that delays paying invoices for an extended period of time is receiving an interest-free loan from the supplier. In such cases, quicker payments must be negotiated (Lewellen and Johnson 1972; Smolen 1997).

The study of (Shah 2009: 35-37) identified the three performance measures: Total length of the chain, Supply chain inefficiency ratio and Supply chain working capital productivity.

This article develops performance measures that can be computed through publicly available information and demonstrates how benchmarking these measures may be useful to a firm. The performance measures are based on the material flow and proportionate cost addition at various stages within the internal supply chain.

This article presents a framework for financial benchmarking using these performance measures and demonstrates how meaningful results may be derived from this exercise. The results of using performance measures in the two-wheeler industry are presented. Three companies are chosen for the study.

III. OBJECTIVE OF THE STUDY

The objective of the study is to carry out a supply chain benchmarking study for a selected industry here it is Two-Wheeler Industry. Thus in this study the objectives are

- To know the total length of the chain.
- To find out the supply chain inefficiency ratio.
- To calculate the supply chain working capital productivity.

IV. HYPOTHESES

Based on the review of available literature, the following research hypotheses have been framed for the purpose of the study :

Research Hypothesis:

- There is no significance difference between the total length of the chain in three companies.
- There is no significance difference between the five years in terms of length of the chain.
- There is no significance difference between the supply chain inefficiency ratio in three companies.
- There is no significance difference between the five years in terms of supply chain inefficiency ratio.
- There is no significance difference between the supply chain working capital productivity in three companies.
- There is no significance difference between the five years in terms of supply chain working capital productivity.

V.METHODOLOGY & DATA

Three listed firms from the industry are selected for the benchmarking study. As in the two wheeler market Hero Honda is having highest market share in 2010 of 48%, followed by Bajaj Auto and TVS Motors (SIAM Statistical Profile 2010).Hence Hero Honda, Bajaj Auto and TVS Motor are chosen for the study. The relevant financial data for the last five financial years (2005-2009) for the above companies were collected. The electronic database Capital Line and Business Beacon were used as source of data. Data are analyzed by applying statistical test ANOVA: Two way classification.

VI.BENCHMARKING FRAMEWORK

The framework for benchmarking using the techniques developed in this article is shown below

Stage 1 -- Performance Measures

The performance measures fall into two categories:

1. Opportunity analysis tool. This tool allows firms to identify avenues for improvement in their internal supply chain processes.
2. Diagnostic tool. This tool helps firms to focus on specific areas of the internal supply chain that require attention.

The performance measures composing these tools serve as the tests to analyze core internal supply chain processes and policies and to identify decision alternatives that

could lead to improvements in performance. These tools and the related performance measures are described later in the article.

Given the above considerations, specific industry types are initially identified based on the product homogeneity. This is followed by identifying the firms that fall into each industry type.

Stage 2 -- Computing Performance

In the next stage, the firm should select performance measures depending on its competitive focus and market niche. For instance, a firm competing on cost efficiency would select a measure that would allow it to capture the internal supply chain costs. Likewise, a firm competing on speed of customer responsiveness would select measures related to materials flow. The central concern is that the strategic imperatives of the firm drive the selection of an appropriate performance measure for benchmarking. The benchmarking exercise may be carried out at this stage on the set of firms in the industry using this performance measure. This would enable the identification of firms with "best performance" in terms of the selected measure.

Stage 3 -- Best Practices

At the next stage, one may probe further for identifying the practices and policies of the firms that enable them to perform better. For this purpose, the analysis using the performance measures may be combined with qualitative information on these firms. The qualitative information on the "best-performance" firms is obtainable from business periodicals and other sources in public domain.

Stage 4 -- Performance Improvement

After examining the qualitative information, it can be related to the specific performance measures of the firms. Such an exercise would allow one to discover what bearing the performance measures have on specific practices and policies. In this way, management can identify practices and policies that drive superior performance. This insight itself is quite important since it provides concrete evidence of a practice or a policy enabling higher performance. Efforts may then be made to study such practices further and implement them with appropriate adaptation.

Benchmarking Supply Chain Performance Using Financial Data

Though supply chain benchmarking has received much attention, it has found that firms face multiple sets of problems while carrying out this exercise. Unlike Western countries, most countries in Asia suffer from the problem of data availability. Even if the relevant data are available one is not sure of the validity and reliability of the data. In most countries, it is not difficult to get financial databases that are reliable. All the listed companies maintain their data on their Web sites and most countries have an agency that compiles these data and makes it available to interested parties at a nominal price. For example, India has the “Prowess”, “Business Beacon” maintained by the Centre for Monitoring Indian Economy (CMIE), “Capital Line”, compiled using publicly disclosed financial performance data.

Table 1: Terms directly obtained from the financial statements.

Terms from the income and expenditure statement	Symbol	Terms from the balance sheet	Symbol
		Inventories (inclusive of raw materials, semi-finished goods	
Cost of raw materials *	CRM	and finished goods)	INV
Cost of production *	CP	Raw materials inventory	RM
Cost of distribution *	DC	Semi-finished goods inventory	SFG
Cost of sales *	CS	Finished goods inventory	FG
		Account receivables (excluding	
Net sales*	NS	loans and advances)	AR
		Account Payables	AP

* Data for one financial year
Source: Shah(2009)

Using the data in the Table 1, the following three performance measures were calculated (Shah 2009: 35-37):

- Total length of the chain: The total length of the chain is arrived at by adding up the days of inventory for raw materials, work in progress and finished goods. The firm that has the minimum total length of the chain is said to have the best performance.
- Supply chain inefficiency ratio: This ratio measures the relative efficiency of internal supply chain management. The ratio will be low for the firms with better performance.
- Supply chain working capital productivity: The analysis of firms on this metric will also be based on the levels of inventory accounts receivable and accounts payable. Firms with efficient supply chains will usually have high supply chain working capital productivity.

Calculating the length of various stages of the chain

The following formulae (from terms defined in table 1.) are used to calculate the length of the various stages in the supply chain.
DRM, DWIP, DFG = Days of raw material, work in process and finished goods, respectively.

DRM= RM x 365/ CRM
DWIP= SFG x 365/CP
DFG = FG x 365/CS

Total length of chain in days = DRM+DWIP+DFG

A major part of inventory carrying cost rate comprises the cost of capital for the firm, though other costs (costs of obsolescence, deterioration, warehousing, insurance, stock

losses, and so on) may also be included. In this study, the cost of capital for a firm is used as its inventory carrying cost rate for two major reasons. First, a major part of inventory carrying cost rate consists of cost of capital, and second, the cost of capital can be estimated from financial statements and other reports available in public domain. In this article, a standard methodology is used for computing cost of capital that uses the return on equity and debt (Brealey and Myers 1991).

Evaluating the efficiency of Supply Chain Management.

The internal supply chain inefficiency ratio is a measure of the efficiency of internal supply chain management. To calculate this ratio, it is taken that total inventory carrying costs and the distribution costs to be components of the internal supply chain management costs. We calculate the internal supply chain inefficiency ratio as follows:

$$SCC = DC + INV \times ICC$$

and $$SCI = SCC / NS$$

where SCC is the supply chain management costs, ICC is the inventory carrying cost and SCI is the supply chain inefficiency ratio.

The inventory carrying costs for most firms is estimated to be in the range of 0.15-0.25. In absence of any data, we can work with an inventory carrying cost of 0.2 (Shah 2009: 36).

The supply chain inefficiency ratio (the lower the better) provides an insight into the internal supply chain management efficiency of the firm. This measure is termed the supply chain inefficiency ratio since the supply chain cost will be higher if there are inefficiencies in the system. Firms with efficient supply chain systems will have relatively lower scores on this performance measure.

Supply Chain Working Capital Productivity

The supply chain working capital productivity is calculated using the following formula:

$$SWC = INV + AR - AP$$

Where SWC is the supply chain working capital.

$$SWCP = NS / SWC$$

Where SWCP is the supply chain working capital productivity.

VII.ANALYSIS OF DATA

Comparing the Total Length of the chain in days in the above three Companies

Table 2. Total length of Supply Chain for three companies.
(CF as cited in Annexure in table A1,A2,B1,B2,C1,C2)

Year	Length of Chain in days for Bajaj	Length of Chain in days for Hero Honda	Length of Chain in days
2005	15.17501801	12.14410192	27.69470929
2006	12.72579928	11.37708917	35.71681925
2007	11.14154642	11.86212162	29.21408684
2008	16.7188807	13.49633612	34.5476189
2009	16.61965289	11.43299168	26.90660281

Source: Capital Line

Fig 4. Total length of the chain.

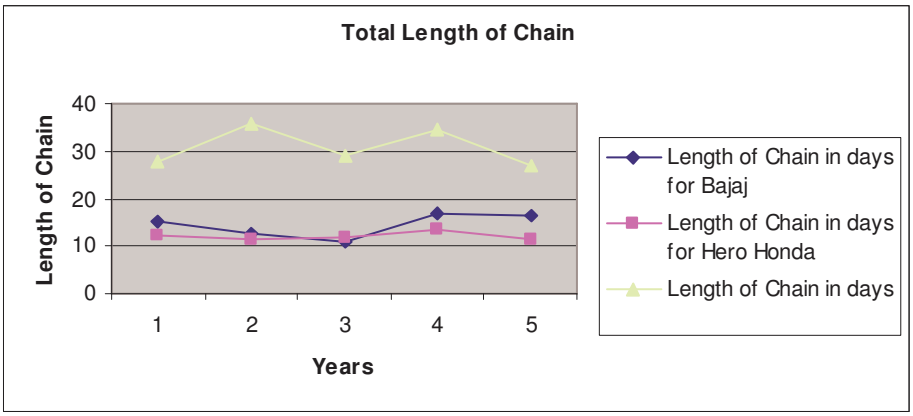


Table 3. Coefficient of Variance computation

	Bajaj	Hero Honda	TVS
Average	14.47617946	12.0625281	30.815967
Standard Deviation	2.204367066	0.770553713	3.6203585
Coefficient of Variance	15.22754724	6.387995177	11.74832

It is clearly seen from the above trend line that total supply chain length of TVS Motors is higher compare to Bajaj Auto and Hero Honda. The Coefficient of Variance in Total length of Supply Chain of Bajaj Auto is higher. But for Hero Honda and Bajaj Auto total Chain length is lower. The coefficient of variance in Total length of Supply Chain for Hero Honda is lesser compare to the other two companies.

Table 4: ANOVA Table for total chain length

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows (years)	32.854	4	8.213567698	1.096135422	0.420688996	3.837853355
Columns (companies)	1040.8	2	520.421558	69.4524627	8.79457E-06	4.458970108
Error	59.946	8	7.493205247			
Total	1133.6	14				

From the above ANOVA table it is seen that the P-value is 0.00008, which indicates that there is a significance difference between companies. There by it is clear that there is significance difference between the total length of the chain in three companies.

Also in ANOVA table it is seen that P-value for rows is 0.42, which indicates that there is no significance difference between the five years in terms of length of the chain.

Comparing the Supply chain inefficiency ratio in the above three Companies

Table 5: Supply chain inefficiency ratio computation
(CF as cited in Annexure in table A3,B3,C3)

Year	SCI for Bajaj	SCI for Hero Honda	SCI for TVS
2005	0.0699	0.08137	0.15195
2006	0.05634	0.08916	0.16029
2007	0.0629	0.09401	0.15093
2008	0.06011	0.09358	0.14563
2009	0.06207	0.09035	0.11966

Source: Capital Line.

Figure 5. Trend line of the supply chain inefficiency ratio

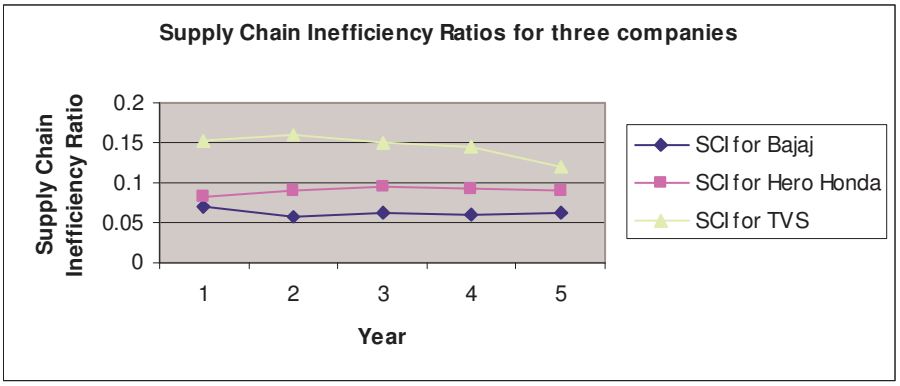


Table 6: Coefficient of Variance computation

	Bajaj	Hero Honda	TVS
Average	0.062264	0.089694	0.145692
Standard Deviation	0.00443811	0.004554851	0.0138374
Coefficient of Variance	7.127891573	5.07821103	9.4977149

It is clearly seen from the above trend line that supply chain inefficiency ratio of TVS Motors is higher compare to Hero Honda and Bajaj Auto. Also from Coefficient of

Variance in Supply Chain inefficiency ratio it is seen that for TVS Motors is higher. But for Hero Honda the supply chain inefficiency ratio is much more lesser compare to the other two. The coefficient of variance in Supply Chain inefficiency ratio for Hero Honda is also lesser compare to the other two companies.

Table 7: ANOVA Table for supply chain inefficiency ratio

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows (years)	0.000285911	4	7.14779E-05	0.654502539	0.640061775	3.837853355
Columns (Companies)	0.018080687	2	0.009040343	82.77985884	4.51403E-06	4.458970108
Error	0.000873676	8	0.000109209			
Total	0.019240274	14				

From the above ANOVA table it is seen that the P value is 0.00004, which indicates that there is a significance difference between companies. There by it is clear that there is significance difference between the supply chain inefficiency ratios in three companies.

Also in ANOVA table it is seen that P-value for rows is 0.64 which indicates that there is no significance difference between the five years in terms of supply chain inefficiency ratio.

Comparing the Supply chain working capital productivity in the above three Companies

Table 8: Supply chain working capital productivity Computation
(CF as cited in Annexure in table A4,B4,C4)

Year	SWCP for Bajaj	SWCP for Hero Honda	SWCP for TVS
2005	-14.8771	-20.8031	-16.1124
2006	-12.8485	-34.3979	-30.0787
2007	-17.3692	176.6563	-56.5575
2008	-34.119	-73.0251	-273.5344
2009	-82.3196	-54.4296	-77.3803

Source: Capital Line

Figure 6. Trend line of the supply chain working capital productivity computation

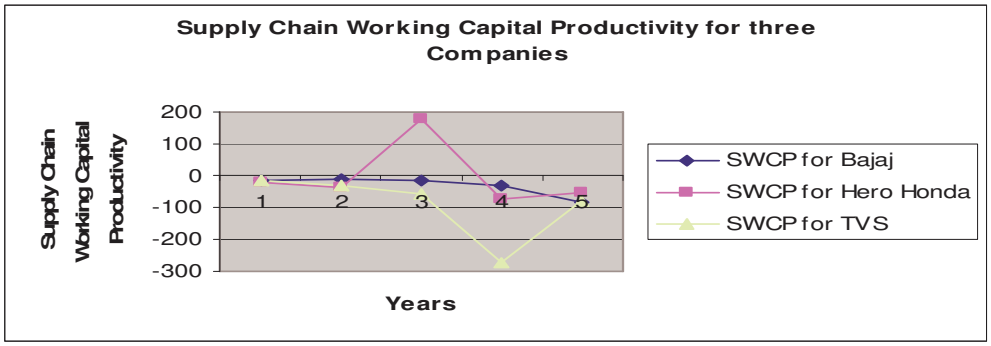


Table 9: Coefficient of Variance computation

	Bajaj	Hero Honda	TVS
Average	-32.30668	-1.19988	-90.73266
Standard Deviation	26.115574	90.67687781	93.81875
Coefficient of Variation	-80.836452	-7557.162201	-103.4013

It is clearly seen from the above trend line that supply chain working capital productivity of TVS is lower compare to Bajaj auto and Hero Honda. Also from Coefficient of Variance in Supply Chain working capital productivity is seen that Hero Honda coefficient of variance is higher.

Table 10: ANOVA Table for supply chain working capital productivity

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	44268.55314	4	11067.13829	2.000258462	0.187459621	3.8378534
Columns	20662.24473	2	10331.12237	1.867232016	0.216026443	4.4589701
Error	44262.83301	8	5532.854126			
Total	109193.6309	14				

From the above ANOVA table it is seen that the P-value is 0.21 which indicates there is no significant difference between companies. There by it is clear that there is no significance difference between the supply chain working capital productivity in three companies.

Also in ANOVA table it is seen that P-value for rows is 0.18, which indicates that there is no significance difference between the five years in terms of supply chain working capital productivity.

VIII LIMITATION OF THE STUDY

Since only information available in the public domain is used in these measures, some internal cost data, such as ordering costs, are not included. This is a limitation of the study. Also only three companies are chosen from the Two-Wheeler Industry and that to only last three years data were taken. More over only three parameters are chosen for internal benchmarking. The Future study can be done on other sectors.

IX. CONCLUSION

This article develops performance measures that can be computed through publicly available information. The article describes an approach for benchmarking using these performance measures and demonstrates how meaningful results may be derived from this exercise. By following this, a firm can identify areas of opportunity for improvement in its internal supply chain. Further, it can help to identify specific reasons behind the performance levels in the internal supply chain and stimulate performance improvement. To illustrate, it is applied to the paint industry. The article provides meaningful results for the firms in the industry.

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ANNEXURE

Bajaj Auto. Table A1

For Inventory, Raw materials, Semi Finished goods, Finished goods, Accounts receivables, Accounts payables in different years.

Year	INV	RM	SFG	FG	AR	AP
2005	224.17	84.14	23.43	75.92	176.15	785.07
2006	272.93	69.63	43.4	87.92	301.55	1155.82
2007	309.7	93.85	19.58	112.32	529.83	1374.51
2008	349.61	92.44	17.94	219.95	275.31	878.75
2009	338.84	107.75	12.03	201.37	358.65	799.98

Source: Capital Line

Table A2 for Cost of (Raw materials, Production, Distribution, Sales), Net Sales, Days of Raw Materials, Days of WIP, Days of Finished Goods in different years.

Year	CRM	CP	DC	NS	CS	DRM	DWIP	DFG	Length of Chain in days
2005	4069.9	4629	355.3	5724	4792.9	7.54591	1.847472456	5.781635336	15.17501801
2006	5299.8	5932.6	366.3	7469.4	6100.7	4.795455	2.670161481	5.260183258	12.72579928
2007	6869	7576.2	522.6	9292.2	7866.9	4.986934	0.943309311	5.211303055	11.14154642
2008	6685.37	8693.37	450.69	8660.4	7352.67	5.046931	0.753229185	10.91872068	16.7188807
2009	6441.63	8450.63	455.97	8436.9	7353.94	6.105403	0.519600314	9.994649127	16.61965289

Source: Capital Line

Table A3 for Supply Chain Cost, Supply Chain Inefficiency Ratios in different years.

Year	SCC	SCI
2005	400.134	0.0699
2006	420.886	0.05635
2007	584.54	0.06291
2008	520.612	0.06011
2009	523.738	0.06208

Source: Capital Line

Table A4 for supply chain working capital, supply chain working capital productivity in different years.

Year	SWC	SWCP
2005	-384.75	-14.8771
2006	-581.34	-12.8485
2007	-534.98	-17.36924
2008	-253.83	-34.11905
2009	-102.49	-82.31964

Source: Capital Line

Hero Honda

Table B1 For Inventory, Raw materials, Semi Finished goods, Finished goods, Accounts receivables, Accounts payables in different years.

Year	INV	RM	SFG	FG	AR	AP
2005	204.26	123.27	12.56	45.01	89.55	650.42
2006	226.55	126.55	13.95	58.59	158.66	638.46
2007	275.58	167.59	17.97	57.77	335.25	554.82
2008	317.1	219.77	16.6	45	297.44	756.07
2009	326.83	201.44	22.68	61.01	149.94	703.03

Source: Capital Line

Table B2 for Cost of (Raw materials, Production, Distribution, Sales), Net Sales, Days of Raw Materials, Days of WIP, Days of Finished Goods in different years.

Year	CRM	CP	DC	NS	CS	DRM	DWIP	DFG	Length of Chain in days
2005	5214.57	5538.58	562.81	7418.6	6111.96	8.6284296	0.8277212	2.6879512	12.14410192
2006	6067.27	6466.95	731.4	8711.3	7184.4	7.6131028	0.7873495	2.9766369	11.37708917
2007	7176.47	7625.11	875.02	9894.5	8508.64	8.523738	0.8601909	2.4781928	11.86212162
2008	7391.84	7865.2	903.74	10335	8764.64	10.851973	0.7703555	1.8740074	13.49633612
2009	8760.22	9312.26	1047.27	12315	10353.12	8.3931225	0.8889571	2.150912	11.43299168

Source: Capital Line

Table B3 for Supply Chain Cost, Supply Chain Inefficiency Ratios in different years.

Year	SCC	SCI
2005	603.662	0.0813715
2006	776.71	0.0891616
2007	930.136	0.0940052
2008	967.16	0.0935789
2009	1112.64	0.0903463

Source: Capital Line

Table B4 for supply chain working capital, supply chain working capital productivity in different years.

Year	SWC	SWCP
2005	-356.61	-20.8030
2006	-253.25	-34.3978
2007	56.01	176.6563
2008	-141.53	-73.02508
2009	-226.26	-54.4295

Source: Capital Line

TVS Motors

Table C1 For Inventory, Raw materials, Semi Finished goods, Finished goods, Accounts receivables, Accounts payables in different years.

Year	INV	RM	SFG	FG	AR	AP
2005	233.23	55.78	19.18	101.15	39.56	451.28
2006	357.9	86.12	18.62	162.41	58.19	523.64
2007	396.56	114.74	22.52	120.79	111.4	576.12
2008	405.38	96.09	23.82	145.56	87.86	505.01
2009	320.55	114.25	21.34	87.48	181.56	549.55

Source: Capital Line

Table C2 for Cost of (Raw materials, Production, Distribution, Sales), Net Sales, Days of Raw Materials, Days of WIP, Days of Finished Goods in different years.

Year	CRM	CP	DC	NS	CS	DRM	DWIP	DFG	Length of Chain in days
2005	1984.6	2216.71	390.35	2875.91	2585.83	10.258843	3.1581488	14.277717	27.69470929
2006	2381.79	2637.04	446.94	3234.96	2972.6	13.197553	2.5772457	19.94202	35.71681925
2007	2865.65	3152.17	502.53	3854.96	3676.51	14.61452	2.6076639	11.991903	29.21408684
2008	2471.58	2750.82	387.77	3219.5	3089.54	14.190457	3.1606212	17.196541	34.5476189
2009	2722.83	3038.39	375.14	3670.92	3536.94	15.315407	2.5635616	9.0276341	26.90660281

Source: Capital Line

Table C3 for Supply Chain Cost, Supply Chain Inefficiency Ratios in different years.

Year	SCC	SCI
2005	436.996	0.1519505
2006	518.52	0.1602864
2007	581.842	0.1509333
2008	468.846	0.145627
2009	439.25	0.1196567

Source: Capital Line

Table C4 for supply chain working capital, supply chain working capital productivity in different years.

Year	SWC	SWCP
2005	-178.49	-16.1124
2006	-107.55	-30.0786
2007	-68.16	-56.5575
2008	-11.77	-273.5344
2009	-47.44	-77.38027

Source: Capital Line

To
The Editor
BJMR
Bharati Vidyapeeth's Institute of Management Studies & Research

Subject: Modified Article

Sir,
I have modified my article no 199, as per the instruction from your end.

Looking forward your kind cooperation.

With regards

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