BENCHMARKING FOR SUPPLY CHAIN COLLABORATION A CASE STUDY

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Benchmarking is used to identify what management practices are worthy to be applied in a particular unit in order to achieve performance goals. Most importantly, it is a very popular technique adopted by organisations for understanding their performance in relation to their competitors. First generation benchmarking concentrated towards realization of a breakthrough in performance through the identification of best practices that contribute to performance improvement. It was like learning quickly from others in order to keep ahead of the competition and create a new performance standard (Gravin, 1993). Companies have applied the benchmarking approach for improving specific business processes that transforms profitability. Xerox Corporation, Kodak, AT&T, American Express, 3M, etc. have successfully used the technique in their respective companies. The second generation of benchmarking included descriptions of the best practices employed by the leading firms. The advanced application of benchmarking can be in the areas of strategic planning, change management, process reengineering, knowledge management, advanced problem solving, (Bogan and Callahan, 2001) etc.

Supply chain management is an exploding field, both in research and in practice. Major international consulting firms have developed large practices in the supply chain field, and the number of research papers in the field is growing rapidly. Supply chain management (SCM) is the term used to describe the management of the flow of materials, information, and funds across the entire supply chain, from suppliers to component producers to final assemblers to distribution (warehouses and retailers), and ultimately to the consumer. In fact, it often includes after-sales service and returns or recycling. In contrast to multi-channel inventory management, which coordinates inventories at multiple locations, SCM typically involves coordination of information and materials among multiple firms. Supply chain management has generated much interest in recent years for a number of reasons. Many managers now realize that actions taken by one member of the chain can influence the profitability of all others in the chain. Firms are increasingly thinking in terms of competing as part of a supply chain against other supply chains, rather than as a single firm against other individual firms. Also, as firms successfully streamline their own operations, the next opportunity for improvement is through better coordination with their suppliers and customers.

It seems that integration, long the dream of management gurus, has finally been sinking into the minds of western managers. Some would argue that managers have long been interested in integration, but the lack of information technology made it impossible to implement a more "systems-oriented" approach. Researchers dating back to the 1950's (Forrester, 1958; Forrester, 1961) have maintained that supply chains should be viewed as an integrated system. With the recent explosion of inexpensive information technology, it seems only natural that business would become more supply chain focused. However, while technology is clearly an enabler of integration, it alone can not explain the radical organizational changes in both individual firms and whole industries. Changes in both technology and management theory set the stage for integrated supply chain management. One reason for the change in management theory is the power shift from manufacturers to retailers. While integration, information technology and retail power may be key catalysts in the surge of interest surrounding supply chains, e-business is fueling even stronger excitement. E-Business facilitates the virtual supply chain, and as companies manage these virtual networks, the importance of integration is magnified. Supply chain management is an enormous topic covering multiple disciplines and employing many quantitative and qualitative tools. Supply chain management can involve different areas, where each area represents a supply chain issue facing the firm and for any particular problem or issue, managers may apply analysis or decision support tools. Twelve such areas have been

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identified (Johnson and Pyke, 2000): location, transportation and logistics, inventory and forecasting, marketing and channel restructuring, sourcing and supplier management, information and electronic mediated environments, product design and new product introduction, service and after sales support, reverse logistics and green issues, outsourcing and strategic alliances, metrics and incentives and global issues. The paper concentrates in the area of *Metrics and incentives* which examine measurement and other organizational and economic issues. This category includes both measurement within the supply chain and industry benchmarking.

Previous research on benchmarking often emphasizes on internal performance metrics. It has paid little attention to the importance of collaboration metrics that span inter-companies. It is limited to an individual company as a part of supply chain. A new relationship amongst independent and related members of the supply chain members, by which a new type of benchmarking emerges that involves more than one company (Cox et al, 1997).

DATA ENVELOPMENT ANALYSIS AND BENCHMARKING

Data Envelopment Analysis (DEA) can be used to find out benchmarking units based on various parameters having effect on performance of companies, also known as Decision Making Units (DMUs), at the inter-company level. DEA is a multi-factor productivity analysis model for measuring the relative efficiencies of a homogenous set of DMUs (Talluri, 2000). In the present study, fifteen mango-retailers from Malda region of West Bengal were selected on convenience sampling basis. The parameters selected for the study are:

a. Output variables: There are three variables which have been considered – i. Number of deliveries made to exporters; ii. Number of receipts in bulk from suppliers; and iii. Number of requisitions on suppliers; b. Input variables: There are two variables which have been considered – i. Value of stock; and ii. Average monthly wages paid. The data collected has been presented in Table 1.

The efficiency score of individual DMUs have been computed using Data Envelopment Analysis Program (DEAP) software by Tim Coelli. The technical efficiencies (TE) have been calculated by using both the DEA models – Constant Returns to Scale (CRS) as well as Variable Returns to Scale (VRS). The DEAP version 1.2 has been used fir the present study. The efficiency scores of all the DMUs were computed but the inefficient DMUs results are presented in Table 2. The above summary indicates the nature of inefficiencies and where the individual DMUs are presently operating. For the purpose of benchmarking, the peers were also identified as in Table 3 along with their peer weights. The other DMUs did not have any peer(s). The DMUs 2,8 and 11 have been identified to benchmark the peers and the weights have also been calculated. The benchmarking has been so done that the DMUs are to improve themselves according to revised targets – on the basis of projections. On the basis of the results, projections were made for the above DMUs and the projections have been presented in Table 4, as below. Thus, DEA handles input as well as output variables; considers individual observations, provides improvement targets and identifies sources of inefficiencies. The inefficient DMUs are now to revise their plans and design strategies to improve to achieve the target as identified in the form projections. On achievement of the targets the inefficient DMUs are surely to gain as a result of which all the DMUs together will gain, in a sense the performance of the whole supply chain will increase.

CONCLUSIONS-In the present paper, an extension of benchmarking in the form of collaborative benchmarking or it be supply chain collaboration has been attempted. With the given limitations of DEA, which is deterministic and particularly sensitive to measurement errors, it can guide the collaborators to benchmark collaborating units, as well as competitors and world-class practices to enhance performance throughout the supply chain.

Table 1: DATA SET OF FIFTEEN MANGO-RETAILERS

DMUs	Output variables		Input variables		
	No. of deliveries made to exporters	No. of receipts in bulk from suppliers	No. of requisitions on suppliers	Value of stock	Average monthly wages paid
	Output 1 (Nos.)	Output 2 (Nos.)	Input1 (Nos.)	Input 2 (Rs.)	Input 3 (Rs.)
1	47	161	80	30000	2500
2	47	60	15	60000	1700
3	62	82	75	60000	1600
4	62	114	50	80000	1400
5	47	121	65	99000	1400
6	47	114	25	40000	1300
7	62	82	50	40000	1300
8	12	68	30	50000	1200
9	62	70	33	40000	1200
10	31	101	80	30000	1100
11	19	77	33	60000	1000
12	31	113	26	50000	900
13	31	86	50	40000	900
14	37	100	6	80000	800
15	6	30	70	70000	800

Table 2: EFFICIENCY SUMMARY OF INEFFICIENT DMUs

DMUs	TECHNICAL EFFICIENCY		SCALE EFFICIENCY	
	CRS DEA (CRSTE)	VRS DEA (VRSTE)	SCALE = (CRSTE/VRSTE)	NATURE OF SCALE INEFFICIENCIES (RETURNS TO SCALE)
2	0.551	0.640	0.861	INCREASING
8	0.520	0.773	0.673	INCREASING
11	0.693	0.865	0.801	INCREASING
MEAN*	**0.908**	**0.952**	**0.946**	

*The mean is computed taking into consideration the entire sample.

Table 3: SUMMARY OF PEERS AND PEER WEIGHTS

DMUs	PEER 1	WEIGHTS	PEER 2	WEIGHTS	PEER 3	WEIGHTS
2	9	0.516	13	0.321	10	0.162
8	13	0.864	10	0.136		
11	13	0.653	15	0.198	14	0.149

Table 4: OUTPUT AND INPUT ORIGINAL AND PROJECTED FIGURES OF INEFICIENT DMUs

	Output variables		Input variables		
	No. of deliveries made to exporters	No. of receipts in bulk from suppliers	No. of requisitions on suppliers	Value of stock	Average monthly wages paid
	Output 1 (Nos.)	Output 2 (Nos.)	Output 3 (Nos.)	Input 1 (Rs.)	Input 2 (Rs.)
DMU 2					
Original	47	60	15	60000	1700
Projected	47	80	46	38000	1100
DMU 8					
Original	12	68	30	50000	1200
Projected	31	88	54	39000	900
DMU 11					
Original	19	77	33	60000	1000
Projected	27	77	47	52000	900

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