IMPORTANCE OF SUPPLY CHAIN INTEGRATION IN AUTO INDUSTRY

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ABSTRACT

The Auto Industry plays an significant role in the Indian Economy. The current challenges in manufacturing of Automobile involves the role of Supply Chain Management. The effectiveness of the function could be enhanced by the Integration of SCM especially in Auto industry wherein the research is undertaken. The detailed description of the process, The study deals with integration is given an approach of explanatory design and questionnaire are used as an instrument to capture the main data furthermore the study also uses descriptive statistics with the help of SPSS for quantitative data analysis. To link the dependant and independent variables, a conceptual framework is developed, to stress the needs and importance of integration of SCM. The study reveals the importance of supplies innovatives

Key words: Performance Measurement, Higher Educational Institutions (HEIs), Quality in higher Education, Digitization, National Academic Depository (NAD)

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1. INTRODUCTION

The evolution of SCM since 1980, lead to the importance in the firm's business objectives as profit center activity. The management experts also started to focus on the SCM Function. The field of procurement and material control expanded into strategic sourcing, Logistics Management and on time delivery to the end customer. The need for End to End connectivity gave riste to the concept of integration in the field of supply chain management.

The author Tan Crood implies the evolution of SCM From Purchasing and Logistics angles. The seamless manner in which the various wings of SCM activities synergised will result in profitability to the firm This will eliminate the departmental compartment or silos, practised in the 1970s.
The evolution of the integrated approach would eliminate the conservative and fragmented approach. The same is true in Auto Industry across the geography as also other industries at large.

The Normal attitude of Production Department is to throw the blame on purchase / materials / to hide their inefficiency, which can be averted through integrated approach. The supply short falls could be identified and trouble shooting is feasible. We will have similar situation with the material controller.

In conflict with production and engineering wing. With respect to the issue of bill of materials etc., further the advances in technology have obliged changes to the SCM concept as per Ross (1998). Thus to configure a more integrated approach in SCM has become a necessity. To practise the profit center approach and activity based costing. Thus the aim of the research as per is to identify the factors and offer feasible solutions in the supply chain integration.

In Auto Industry with a focus in commercial vehicle segment This could enable the firms aim at an integrated business paradigm and innovative solutions. Let us propose the research direction and arrive at conclusions to the concept of supply chain integrations.

2. HERALDING OF A CHANGED ENVIRONMENT IN SCM

The Landscape of supply chain and logistics are transforming based on key factors as

- Vertical Integration
- Globalised trade leading to Globalised supply chain
- Using the SCM as a strategic leverage in business operations. Stoery et al (2006) infer that their work converged with the literature in focussing on outsourcing globalisation and fragmentation as drivers to the concept of SCI. The work of Sweeney 2007 also leads us to the above 3 drivers. The approach and solution of vertical disintegration is a consequence of outsourcing and the fragmentation due to product forfolios and product differentiation. The need of the market is to offer customised products contracting life cycles and managing stock keeping units (SKU), are the outcomes of fragmentation.
- the automobile business depends on largely on effective SCM considering the fact that 65 to 70% of value of business in auto industry is spent on the SCM and in particular on the materials (Inputs - the current business scenario with global players in the field as competitors, are setting up manufacturing bases in India. The competitive nature obliges the firm to scale up their effectiveness in SCM through the integration process. The huge investments in dealer network in auto industry also implies the philosophy of ontime delivery and On time after sales service. The result is sharpening of supplier relationship management to the SCM Integration. The digital revolution synergised with advances in communication equipments and E-commerce, have practically transformed the Vendor management practices in Auto Industry. The computerized research on stocks, movement of materials also plays a significant aspect of the Integration in supply chain. The commercial vehicle manufacturers in India compete in reaching out to the Vendors to meet their targets. The vendors are common to the Manufacturers with an eye on cost control, optimisation of Inventory Management Dictates the activities in Supply Chain Management. The on time delivery pressure on the Management of Manufacturer.

3. THE PROCESS OF INTEGRATION

The process of Integration is the core of the SCM philosophy by Christopher (1992), New (1996), Lambert (2004), Cooper Etal (1997). They attribute SCM itself as an Icon of integration philosophy. The entire concept of SCM is predicted on the integration according to Pagell (2004). In the event SCM is attributed as philosophy in Management.
Then as per Metzer et al (2001) it is concerned with integration in the work on Magnan and Fawelt (2002), They identified four level of integration in practice

- Forward Integration with Tier I Customers
- Backward Integration with Tier I Suppliers
- Internal Cross functional Integration
- Total Backward and Forward integration from suppliers Supplier to the Customers

The Integration between Supply Chain Activities could be classified into 4 levels as per Harland et al (1999) as

- Activities which are internal to the focal company
- Dyadic level which consists of single, two party relationship. EG Supplier and Manufacturer or Manufacturer and Distributor / Retailer
- Chain Level which encompasses a set of Dyadic Relationship
- Network level which focuses on wider network of operations.

Thus as per Magnant and Faweet (2002) we could group as Internal or Micro or Intra Firm Integration.

The other group is External or Macro or Intern Firm Supply Chain Integration process. The framework in the Internal Integration process. Viz Buy-make-move-sell model would include the fifth activity viz store. Herein the importance of ware house, stores have been included.

Thus the importance of storage locations is specified in the internal integration as this will lead to the supply chain orientation approach (SCO) as

Buy Make Store Move Sell

External Integration involves the activity of every product of service delivered to the final consumer. Thus the integration in SCM would avert any inefficiency in servicing the end customer.

The approach in the external integration will be as

Thus the 3 Dimensional representation as horizontal structure, vertical structure and horizontal position, would enable the network of reinforce business relationship in the path towards integration.

The Authors Fabre-Costes and Jahre (2007) Have developed a differentiated approach in the SCM integration, which can be company specific factors on integration. If need be we need to realign the activities and processes to meet the demands of the customers the focal firm is dealing with.

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4. METHODOLOGY
The study deals with an approach of explanatory design and the questionnaire used as instrument to capture the main data. Furthermore the study uses descriptive statistics with SPSS package for Quantitative data analysis.

The respondents are professional in the field of SCM, auto industry. The reason being they can visualise and perceive the need for integration.

Thus We have addressed the issue in an optimal manner, the study uses the likert scale form and the responses were captured in scale 1 to 5, from strongly agree to disagree.

5. CONCEPTUAL FRAMEWORK
To link the dependant and independent variables a frame work has to be developed, with an outcome of the study, thus to convert study into practise we utilise the methodology.

The conceptual framework depicts - technology factors, relationship with vendors competitive forces coordination discrepancy vendor commitment fluctuation in demand / Schedule, Market Trends Consumer Attitude Choices on time delivery

The dependant variable is the effective supply chain integration process.

Independent Variables

| Technology Factors |
|--------------------|
| Relationship with Vendors |
| Competitive Forces |
| Coordination Discrepancy |
| Vendor Commitment |
| Demand / Fluctuation Schedule |
| Market Trends |
| Consumer Choices |
| On Time Delivery |

6. HYPOTHESIS OF STUDY
H1 - Technology Factors
H2 - Vendor Relation
H3 - Coordination Deficiency
H4 - Competition

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H5 - VENDOR COMMITMENT
H6 - SCHEDULE VARIANCES
H7 - MARKET TRENDS
H8 - CONSUMER CHOICES
H9 - ON TIME DELIVERY

All these have impact on the integration effectiveness in SCM.

7. DISCUSSION
Skills Enhancement, Training, Changed process are continuously developed to ensure effectiveness of the integration, thus the importance of integration is to ensure fulfilment of ontime delivery to the end customer, thereby sharpening the customer focus approach by the firm. The Integration process would enable identification of supplier needs in training.

Technology update, quality requirements and the seamless integration to the end objectives of the firm. Thus the importance of integration is a tremendous value addition to the firm

8. CONCLUSIONS
The conclusion of the study reveals that the hypothesis set is confirmed to be true with the data collected, discussed and analysed the challenges in implementing the integration in SCM. Thus the approach adds to the strategic intent and profit centre objectives in the firm. It also paves clear cut ways to adopt activity in the firm

9. FUTURE RESEARCH DIRECTION
The effectiveness in integration could be sustained through research in supplier relationship management, which would enable, ease of importance flows across the levels of SCM in any firm. The increased focus on time delivery imperatives, product life cycle study, innovations in technology and communication revolution will lead to lasting reforms in the area of Supply Chain Integration.

REFERENCES
[1] A.T. Kearney (2000), Building the B2B Foundation: Positioning Net Market Makers for Success, A.T Kearney, New York, NY.

[2] Akkermans, H., Bogerd, P. and Vos, B. (1999), "Virtuous and vicious cycles on the road towards international supply chain management", *International Journal of Operations & Production Management*, Vol. 19 Nos 5/6, pp. 565-81. Allnoch, A. (1997), "Efficient supply chain practices mean big savings to leading manufacturers", *HE Solutions*, Vol. 29 No. 7, pp. 8-9.

[3] Anderson Consulting (1994), "The mass merchant distribution channel: challenges and opportunities", report prepared by Anderson Consulting for the Warehouse Education and Research Council, Oak Brook, IL, July. Arntzen, B.C., Brown, G.G., Harrison, T.P. and Trafton, L.L. (1995), "Global supply chain management at Digital Equipment Corporation", *Interfaces*, Vol. 21 No. 5, pp. 69-93.

[4] Aron, L.J. (1998), "Duck Head: the process is the product", *Apparel Industry Magazine*, Vol. 59 No. 1, pp. 16-19.Volume 10 Number 4 2005 252-263

[5] Asgekar, V. (1998), "RSS manages growth with SCOR", *Automatic I.D. News*, September, p. 58.
[6] Australian Industry Group (1999), "Improving supply chain management", Australian Industry Group, October/November, p. 5.

[7] Ballou, R.H., Gilbert, S.M. and Mukherjee, A. (2000), "New managerial challenges from supply chain opportunities", Industrial Marketing Management, Vol. 29 No. 1, pp. 7-18.

[8] Barratt, M. (1999), "Exploring supply chain relationships and information exchange in UK grocery supply chains: some preliminary findings", in Muffatto, M. and Pawar, K.S. (Eds), Logistics in the Information Age, Proceedings of 4th International Symposium on Logistics, Florence, Italy, Servizi Grafici Editoriali, Padova, pp. 267-72.

[9] Baum, D. (1997), "Transcending EDI", Info World, Vol. 19 No. 12, pp. 67-8.

[10] Belyea, K. (2000), "How Electrolux takes cost out of the chain", Purchasing, Vol. 128 No. 5, pp. 59-65.

[11] Bensaou, M. (1999), "Portfolios of buyer-supplier relationships", Sloan Management Review, Vol. 40 No. 4, pp. 35-44.

[12] Bovel, D. and Martha, J. (2000), "From supply chain to value net", Journal of Strategic Management, July/August, pp. 24-8.

[13] Bowersox, D.J. and Calantone, R.J. (1998), "Executive insights: global logistics", Journal of International Marketing, Vol. 6 No. 4, pp. 83-93.

[14] Bowman, R.J. (1997), "The state of the supply chain", Distribution, Vol. 96 No. 1, p. 28.

[15] Braue, D. (1999), "E-mail features that make every post a winner", Sydney Morning Herald, 28 September, p. 32.

[16] Brennan, C.D. (1998), "Integrating the healthcare supply chain", Healthcare Financial Management, Vol. 52 No. 1, pp. 31-4.

[17] Carter, C.R. (2000), "Ethical issues in international buyer-supplier relationships: a dyadic examination", Journal of Operations Management, Vol. 18 No. 2, pp. 191-208.

[18] Carter, C.R. and Ellram, L.M. (1998), "Reverse logistics: a review of the literature and a framework for future investigation", Journal of Business Logistics, Vol. 19 No. 1, pp. 85-102.

[19] Chen, F., Ryan, J.K. and Simchi-Levi, D. (2000), "The impact of exponential smoothing forecasts on the bullwhip effect", Naval Research Logistics, Vol. 47 No. 4, pp. 269-86.

[20] Christopher, M. (2000), "The agile supply chain - competing in volatile markets", Industrial Marketing Management, Vol. 29 No. 1, pp. 37-44.

[21] Coleman, P.V.B.B. and Austrian, B. (2000), "E-logistics: the back office of the new economy", Banc of America Securities Equity Research, available at: www.bofasecurities.com/featuredresearch/content/research.asp (accessed 17 October).

[22] Cottrill, K. (1997), "The supply chain of the future", Distribution, Vol. 96 No. 11, pp. 52-4.

[23] Cunningham, M. (1999), "XML - the adoption curve", The Harvard Computing Group, available at: www.harvardcomputing.com (accessed 14 August 2000).

[24] Dyer, J.H., Cho, D.S. and Chu, W.J. (1998), "Strategic supplier segmentation: the next best practice in supply chain management", California Management Review, Vol. 40 No. 2, p. 57.

[25] Fein, A.J. and Jap, S.D. (1999), "Manage consolidation in the distribution channel", Sloan Management Review, Vol. 41 No. 1, pp. 61-72.

[26] Fernie, J. (1995), "International comparisons of supply chain management in grocery retailing", Service Industries Journal, Vol. 15 No. 4, pp. 134-47.
Importance of Supply Chain Integration in Auto Industry

[27] Forrester, J.W. (1958), "Industrial dynamics, a major breakthrough for decision makers", *Harvard Business Review*, July/August, pp. 37-66.

[28] Forrester, J.W. (1961), *Industrial Dynamics*, MIT Press, Cambridge, MA.

[29] Froehlich, G., Hoover, H.J., Liew, W. and Sorenson, P.G. (1999), "Application framework issues when evolving business applications for electronic commerce", *Information Systems*, Vol. 24 No. 6, pp. 457-73.

[30] Gobadian, A., Gallear, D. and Li, R. (2000), "A review of supply chain purchasing strategies", in Katayama, H. (Ed.), *Global Logistics for the New Millennium - Proceedings of the 5th International Symposium on Logistics*, Izvate, Japan, Waseda UP Ltd, Tokyo, pp. 454-60.

[31] Gourley, C. (1998), "What's driving the automotive supply chain?", *Warehousing Management*, Vol. 5 No. 10, pp. 44-8.

[32] Gunasekaran, A. (1999), "Agile manufacturing: a framework for research and development", *International Journal of Production Economics*, Vol. 62 Nos 1/2, pp. 87-105.

[33] Hammant, J. (1997), "Implementing a European supply chain strategy: turning vision into reality", *Proceedings of the International Conference on Logistics and the Management of the Supply Chain*, Sydney, Australia, AIMM/LMA/APICS/ AIPMM, pp. 95-100.

[34] Handfield, R. and Pannesi, R. (1992), "An empirical study of delivery speed and reliability", *International Journal of Operations &’ Production Management*, Vol. 12 No. 2, pp. 60-74.

[35] Handfield, R.B. and Nichols, E.L. (1999), *Introduction to Supply Chain Management*, Prentice-Hall, Englewood Cliffs, NJ.

[36] Harrington, L.H. (1997), "New tools to automate your supply chain", *Transport and Distribution*, Vol. 38 No. 12, pp. 39-42.

[37] Hicks, D.A. (1999), "The state of supply chain strategy", *HE Solutions*, Vol. 31 No. 8, pp. 24-9.

[38] Hill, C.A. (2000), "Information technology and supply chain management: a study of the food industry", *Hospital and Material Management Quarterly*, Vol. 22 No. 1, pp. 53-8.

[39] Huang, G.Q. and Mak, K.L. (2000), "WeBid: a web-based framework to support early supplier involvement in new product development", *Robotics & Computer-Integrated Manufacturing*, Vol. 16 Nos 2/3, pp. 169-79.

[40] Huson, M. and Owens, V. (2000), "The supply chain technology evolution", available at: www.electroneconomy.com (accessed 4 June).

[41] Kaufman, A., Wood, C.H. and Theyel, G. (2000), "Collaboration and technology linkages: a strategic supplier typology", *Strategic Management Journal*, Vol. 21 No. 6, pp. 649-63.

[42] Kaufman, R. (1997), "Nobody wins until the consumer says, 'I'll take it'", *Apparel Industry Magazine*, Vol. 58 No. 3, pp. 14-16.

[43] Kilgore, S.M. (2000), "Delivering the global goods", Forrester Research, available at: www.forrester.com (accessed 17 October).

[44] Kulwiec, R. (2000), "Elements of supply chain success", *Target - Journal of the Association for Manufacturing Excellence*, Vol. 16 No. 4, pp. 16-21. Volume 10 ■ Number 4 ■ 2005 ■ 252-263

[45] Lambert, D.M. and Cooper, M.C. (2000), "Issues in supply chain management", *Industrial Marketing Management*, Vol. 29 No. 1, pp. 65-83.
[46] Lancioni, R.A., Smith, M.F. and Oliva, T.A. (2000), "The role of the internet in supply chain management", Industrial Marketing Management, Vol. 29 No. 1, pp. 45-56.

[47] Landry, J.T. (1998a), "Supply chain management - the case for alliances", Harvard Business Review, Vol. 76, November/ December, pp. 24-5.

[48] Landry, J.T. (1998b), "Supply chain management - the value of trust", Harvard Business Review, Vol. 76, January/ February, pp. 18-19.

[49] Larkins, M. and Luce, K. (2000), "Business and IT work together to plan and support supply chain management initiatives - implementing a supply chain management process does not need to be difficult or complicated", Pulp & Paper - Canada, Vol. 101 No. 4, pp. 12-14.

[50] Lawrence, A. (1997), "Customer power forces supply chain integration", Works Management, April, pp. 43-7.

[51] Lee, H.L., Padmanabhan, V. and Whang, S.J. (1997), "The bullwhip effect in supply chains", Sloan Management Review, Vol. 38 No. 3, pp. 93-102.

[52] Levary, R.R. (2000), "Better supply chains through information technology", Industrial Management, Vol. 42 No. 3, pp. 24-30.

[53] Lummus, R.R., Vokurka, R.J. and Alber, K.L. (1998), "Strategic supply chain planning", Production and Inventory Management Journal, Vol. 39 No. 3, pp. 49-58.

[54] Lumsden, P. (1999), "Proceedings of the International Conference on Logistics and the Management of the Supply Chain", LAA/APICS/MHD Magazine, pp. 191-4.

[55] McGrath, M.E. (1997), "Improving supply chain management", Transportation and Distribution, Vol. 38 No. 2, pp. 78-80.

[56] Magretta, J. and Dell, M. (1998), "The power of virtual integration: an interview with Dell Computers' Michael Dell", Harvard Business Review, Vol. 76, March/April, pp. 72-84.

[57] Magretta, J. and Fung, V. (1998), "Fast, global, and entrepreneurial - supply chain management, Hong Kong style: an interview with Fung, Victor", Harvard Business Review, Vol. 76, September/October, pp. 102-14.

[58] Malhotra, Y. (2000), "Knowledge management for e-business performance: advancing information strategy to 'internet time'", Information Strategy: The Executive's Journal, Vol. 16 No. 4, pp. 5-16.

[59] Marshak, R.T. (1999), "Creating a common e-commerce strategy", Patricia Seybold Group, Boston, MA, www.psgroup.com (accessed 13 October 2000).

[60] Meade, L. (1998), "Strategic analysis of logistics and supply chain management systems using the analytical network process", Transportation Research Part E — Logistics & Transportation Review, Vol. 34 No. 3, pp. 201-15.

[61] Modern Materials Handling (1998), "Survey spotlights need to improve capabilities", Modern Materials Handling, April, pp. 17-19.

[62] Moller, C. (2000), "SCM in the extended enterprise: implementation of APS systems", The Journal of Enterprise Resource Management, Vol. 4, 4th quarter, pp. 29-35.

[63] Morton, R. (1997), "Learning from the past to shape the future", Transportation and Distribution, Vol. 38 No. 1, pp. 84-5.

[64] Narasimhan, R. and Das, A. (2000), "Manufacturing agility and supply chain management practices", The Journal of Enterprise Resource Management, Vol. 3 No. 3, pp. 11-17.

[65] Natarajan, R.N. (1999), "Logistics, strategy and supply chain: making the right connections in the information age", in Muffatto, M. and Pawar, K.S. (Eds), Logistics in
The importance of supply chain integration in auto industry.

[66] Naylor, J.B., Nairn, M.M. and Berry, D. (1999), "Leagility: integrating the lean and agile manufacturing paradigms in the total supply chain", International Journal of Production Economics, Vol. 62 Nos 1/2, pp. 107-18.

[67] New South Wales Department of State and Regional Development and Microsoft Australia (2001), "Brief on electronic commerce - glossary of terms", available at: www.smallbiz.nsw.gov.au/issues/ecommerce/Brief7Glossary.html (accessed 4 January 2001).

[68] Parnell, C. (1998), "Supply chain management in the soft goods industry", Apparel Industry Magazine, Vol. 59 No. 6, p. 60.

[69] Philip, G. and Pedersen, P. (1997), "Inter-organizational information systems: are organizations in Ireland deriving strategic benefits from EDI?", International Journal of Information Management, Vol. 17 No. 5, pp. 337-57.

[70] Pine, B.J. (1993), Mass Customization: The New Frontier in Business Competition, Harvard Business School Press, Boston, MA.

[71] Porter, M. (1980), Competitive Strategy, The Free Press, New York, NY.

[72] Porter, M. (2001), "Strategy and the internet", Harvard Business Review, March, pp. 63-78.

[73] Porter, M.E. and Millar, V.E. (1985), "How information gives you competitive advantage", Harvard Business Review, July/August, pp. 149-60.

[74] Putzger, I. (1998), "All the ducks in a row", World Trade, Vol. 11 No. 9, pp. 54-6.

[75] Rishel, T.D., Stenger, A.J. and Scott, J.P. (1999), in Despotis, D.K. and Zopounidis, C. (Eds), Proceedings of the 5th International Conference of the Decision Sciences Institute, Technologies Publications, Athens, pp. 946-8.

[76] Saccomano, A. (1998), "Keeping SCOR", Traffic World, Vol. 255 No. 13, pp. 27-8.

[77] Schonsleben, P. (2000), "With agility and adequate partnership strategies towards effective logistics networks", Computers in Industry, Vol. 42 No. 1, pp. 33-42.

[78] Senge, P.M. (1990), The Fifth Discipline: The Art and Practice of the Learning Organization, Century Business, London.

[79] Sheather, G. and Hanna, D. (2000), "Towards an integrated supply network model", The Journal of Enterprise Resource Management, Vol. 3 No. 3, pp. 5-10. Volume 10 Number 4 • 2005 • 252-263

[80] Stalk, G. and Hout, T.M. (1990), Competing Against Time: How Time-based Competition is Reshaping Global Markets, The Free Press, New York, NY.

[81] Stedman, C. (2000), "Few takers for benchmarks from supply chain council", Computerworld, 24 April, p. 46.

[82] Sterman, J. (1989), "Modelling managerial behaviour: misperception of feedback in a dynamic decision making environment", Management Science, Vol. 35 No. 3, pp. 321-39.

[83] Stuart, F.I. (1997), "Supplier alliance success and failure - a longitudinal dyadic perspective", International Journal of Operations & Production Management, Vol. 17 Nos 5/6, pp. 539-57.

[84] Tait, D. (1998), "Make strong relationships a priority", Canadian Manager, Vol. 23 No. 1, p. 21, 28.
[85] Thomas, D. and Griffin, P.M. (1996), "Coordinated supply chain management [review]", European Journal of Operational Research, Vol. 94 No. 1, pp. 1-15.

[86] Tolhurst, C. (2001), "It all gets down to saving the bottom line", The Australian Financial Review, special report on supply chain management, 2 May, p. 10.

[87] Towill, D.R. (1997), "The seamless supply chain: the predator's strategic advantage", International Journal of the Techniques of Manufacturing, Vol. 13 No. 1, pp. 37-56.

[88] Transportation and Distribution (1998), "Overcoming communication barriers", Transportation and Distribution, Vol. 39 No. 10, pp. 91-4.

[89] Tyndal, G., Gopal, C., Partsch, W. and Kamauff, J. (2000), "Making it happen: the value producing supply chain", Ernst & Young, available at: www.ey.com/global/gcr.nsf/US/Supercharging_Supply_Chains__Think_Tank__Ernst_%26_Young_ LLP (accessed 10 January 2001).

[90] Upin, E.B., Beckwith, M.J., Jennings, C.L., Chen, B.Y. and Schaeffer, K.B. (2000), B2B: Building Technology Bridges Outside the Four Walls of the Enterprise, Vol. 20, Robertson Stephens Research, available at: www.rsco.com (accessed 20 September).

[91] Vokurka, R.J. (2000), "Supplier relationships: a case study", The Journal of Enterprise Resource Management, Vol. 2, 2nd quarter, pp. 78-83.

[92] Westhead, K., Mortenson, C., Moore, J. and Rice, A.W. (2000), "New economy: forget the WEB, make way for the GRID", Deutsche Bank Global Technology Research, available at: www.db.com (accessed 15 August).

[93] Wheatley, M. (1996), "IT drives the chain", Management Today, November, pp. 102-4.

[94] Wood, A. (1997), "Extending the supply chain: strengthening links with IT", Chemical Week, Vol. 159 No. 25, p. 26.

[95] Zhang, Z. and Sharifi, H. (2000), "A methodology for achieving agility in manufacturing organizations", International Journal of Operations & Production Management, Vol. 20 No. 4, pp. 496-512.