DEVELOPMENT OF EVALUATION MAP TO ASSES THE SUPPLY CHAIN MANAGEMENT SOFTWARE SOLUTION FOR VOLUME DRIVEN MANUFACTURING NETWORK

A.Mahamani[*][a]**, K. Prahlada Rao**[b] **and V. Pandurangadu**[c]

[a]*Sri Venkateswara College of Engineering and Technology, Chittoor-517127 (A.P), India*
[b]*JNTU College of Engineering, Anantapur-515002 (A.P), India*
[c]*JNTU College of Engineering, Pulivandula (A.P) , India*

Abstract

The major challenges to implement supply chain software solution are more cost, lack of suitability, lack of training facility, lack of consulting facility, unclear cost-benefit ratio. It may be reason for denying to implement the supply chain management software solution. The supply chain management can improve quality, increase productivity and provide better customer service of the business. The volume driven manufacturing enterprises are struggling to manage the inventory, order management and at what extent the supply chain management solution support the business. The objective of this work is to develop evaluation map to refer the task of supply chain management software solution .The author attempt to give the visibility over the challenges. The evaluation map is developed for supplier relationship management, demand management, inventory management, transportation management, customer relationship management, finance management. This frame work may be guide to select the suitable software solution for their business.

Keywords: supply chain management, challenges, software solution, scm vendor rating model, evaluation map, event visibility

1. INTRODUCTION

The major issues in the volume driven manufacturing enterprises to manage the inventory, manage the orders and the same time they are denying implementing the supply chain management software solution to overcome this problem. The reasons for not implementing the supply chain management software solution are more expensive, unclear cost-benefit ratio and lack of visibility. The supply chain management

---

* *Corresponding author:mahamani_sudhan@yahoo.co.in*

supports the business in way of reduction in inventory cost, reduction in transportation cost, reduction in purchasing cost, reduction in manufacturing cost, improvement in quality, improvement in customer service. This frame work aid to refer the performance of software solution and to evaluate the suitability of supply chain management solution for their business process. This task reference model covers the entire event visibility issues in the volume driven manufacturing network.

2. LITERATURE REVIEW

The demand for supply chain management software focused easy to install, easy to manage, quick return on investment and proven solution [5]. An empirical study in European industries [2] shows 65.8 % of sampled companies neither use nor do implements supply chain management software. Installing the SCM software will reduce inventory and shortfall

by 14.3 %, reduction in lead time 13.7 % , transportation cost is reduced up to 8.8 % ,reduction in production cost 9.4 % ,reduction in purchasing cost 8.5 %,and improvement in service level is 15.6%.Lack of good supplier performance tool, 60% of companies questioned were less than satisfied with their ability to manage the supplier performance [9].Few more frame works are available to evaluate supply chain software solution in the view of IT related issues [7,8]. This is the extension work of [4] , this frame work is developed specifically for volume driven manufacturing enterprise , to improve visibility over the above mentioned issues and evaluate the suitability of supply chain software solution for their business process.

3. SUPPLY CHAIN MANAGEMENT

A supply Chain is the network of facilities to procure the raw material transforms them

- S - Supplier
- M- Manufacturer
- W- Warehouse
- D – Distributor
- R – Retailer
- C – Customer

- ➝ Materials flow
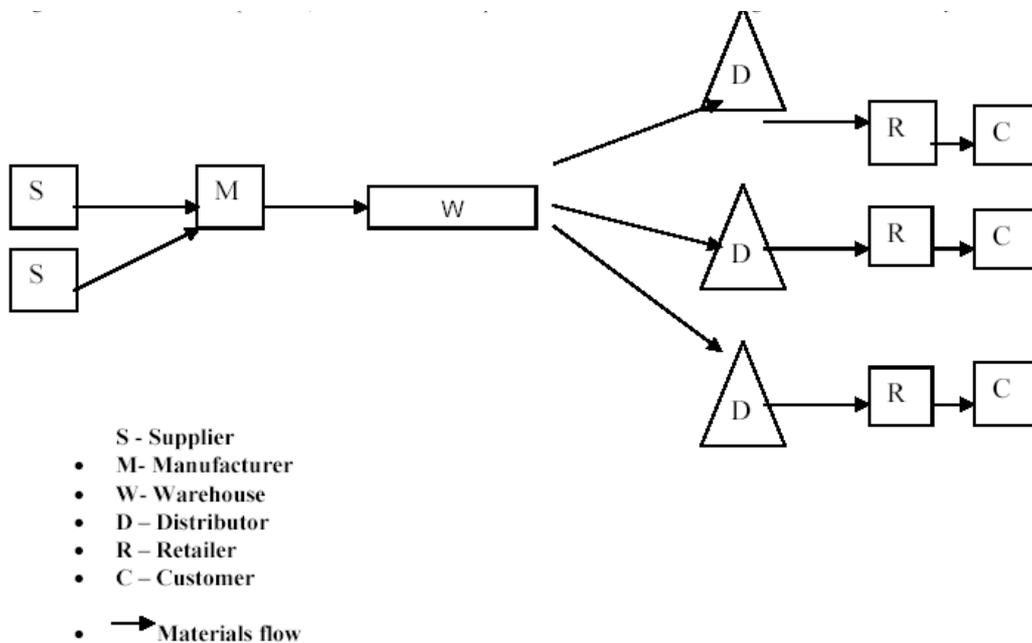
Fig.1. Volume driven manufacturing Net work

in to intermediate goods and then final product, and delivers the product the customers through the distribution system within the promised time.

3. EVLUATION MAP FOR SUPPLIER MANAGEMENT

The failure for most supply chain management vendor is lack of suitability in supplier management .In this evaluation map having supplier performance menu, which consists of 20 performance measures .Based on the nature of the business process ,the suitable measures are selected .The weight age of each selected measure are entered in the vendor rating sheet. The vendor rating model evaluate supplier performance and create the ranking list of supplier.

4. EVALUATION MAP FOR INVENTORY MANAGEMENT

Managing the inventory is very big issue in volume driven manufacturing network. The evaluation map is developed in three modules namely, excessive stock, low stock in the warehouse and inventory replenishment in the warehouse. If excessive stock the software collect information from the retailer and customer service regarding the reason for lack of movement. If low stock in warehouse the software modify the scheduling with maximum utilization of resources. The software should posses the ability to register the available stock with specific stock attributes lot and best before date. The software should capable to generate the order based on the availability of the stock, customer requirements and also allocate the stock based on the order priority.

Table.1. Supplier performance menu

SUPPLIER PERFORMANCE MEASUERS MENU	
1) Price	11) Reliability
2) Capacity	12) Convenience
3) Delivery performance	13) Facility location
4) Damages	14) Stock out frequency
5) On time delivery	15) Training resources
6) Quality	16) IT resources
7) Warranties	17) Order-delivery time
8) Information sharing	18) Quality control
9) Company reputation	19) Product availability
10) Flexibility	20) Credit availability
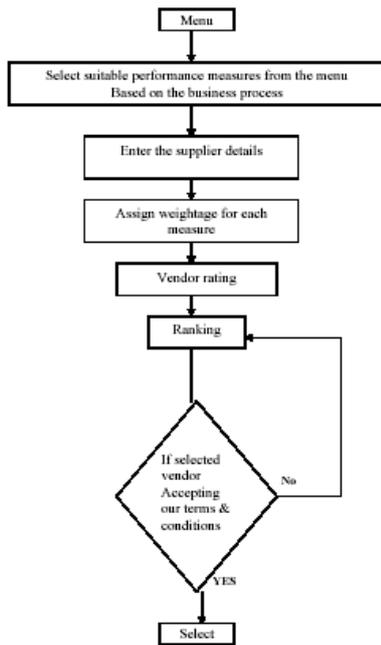
Fig. 2. evaluation map supplier management

4.1. Task reference model for excessive inventory in the warehouse
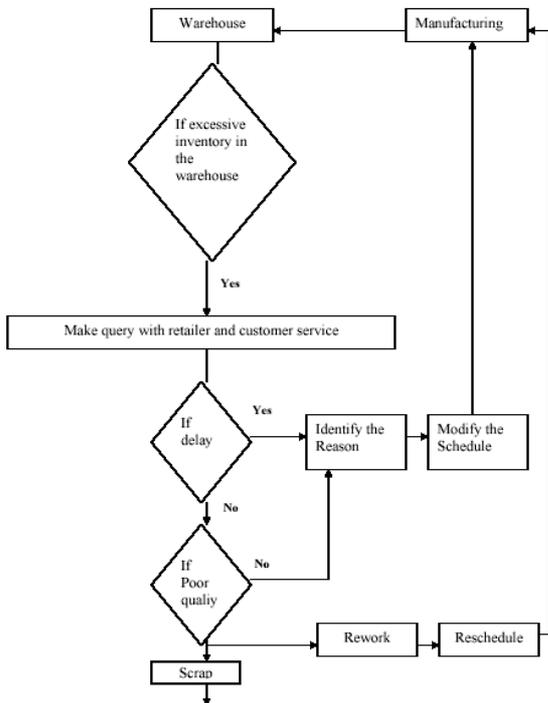
Fig. 3. Task reference model for excessive inventory in the warehouse

4.2. Task reference model for low inventory in the warehouse
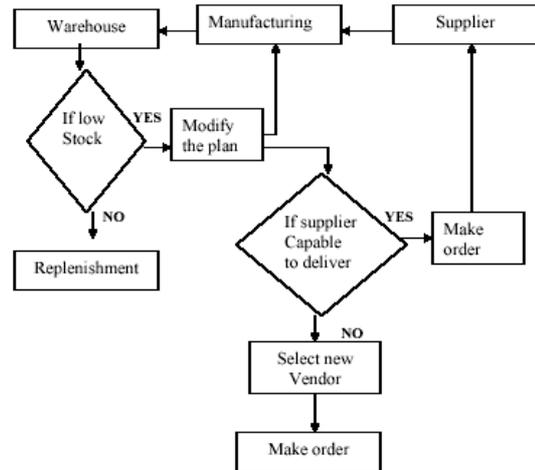

Fig. 4. Task reference model for low inventory in the warehouse

4.3. Task reference model for inventory replenishment (Order management)in the warehouse
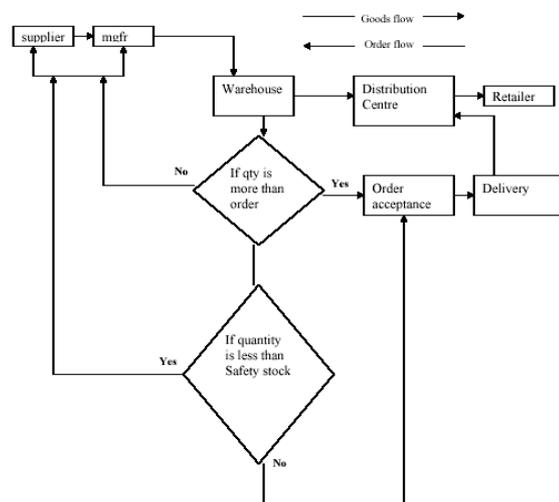

Fig. 5. Task reference model for inventory replenishment (Order management)in the warehouse

5. EVALUATION MAP FOR TRANSPORT VISIBILITY

The software should possess the ability to assign the loading to the truck with considering order from the customer, availability of the truck, carrier selection, loading capacity of the truck, optimize the vehicle routing and delivery composition if time allows.

*Fig. 6. Evaluation Map for Transport Visibility*
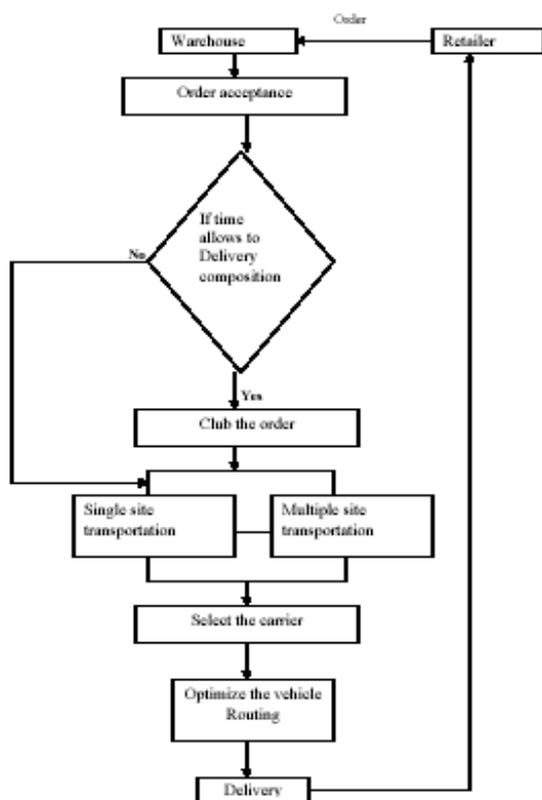
6.EVALUATION MAP FOR CUSTOMER RELATIONSHIP MANAGEMENT

Customer relationship management includes the monitoring order to delivery time, delivery performance and customer back log. If customer backlog, the software make query with retailer and customer service and find the reason for product failure. If the product is out of trend or poor quality the software decides either scrap or rework and modify schedule along with rework. If delay in service the software collect the reason for delay and modify the schedule in manufacturing, procurement, transportation.

Fig. 7. Evaluation Map for Customer Relationship Management
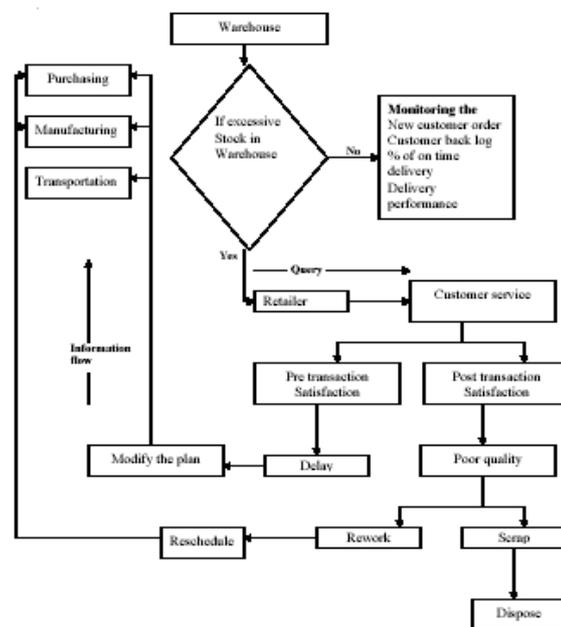
7. EVALUATION MAP FOR HUMAN RESOURCE MANAGEMENT

The software solution supports the effective utilization of human resources to achieve the goals of supply chain management. The personals are trained that ,how to react by collecting the alert message from the software in unplanned event .The software should posses the ability to balance the load to the personals and periodic work

rotation to avoid the human error and work fatigue.
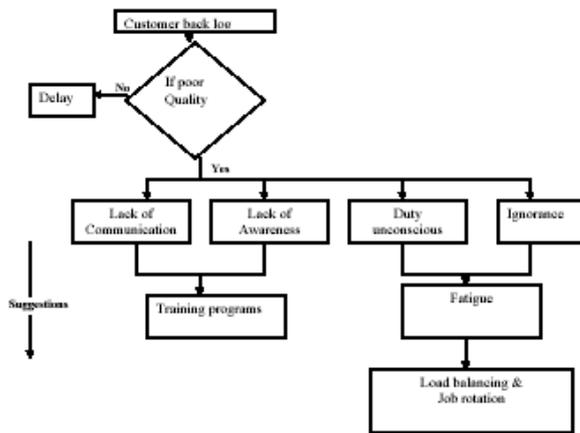
Fig. 8. Evaluation Map for Human Resource Management

8. EVALUATION MAP FOR FINANCIAL MANAGEMENT

The software should capable to maintain the invoice for cash flow in all entities of the supply chain and estimate the sales, net income, asset turn over rate, profit margin and return on investment

9. EVALUATION MAP FOR PERFORMANCE MANAGEMENT

The success and survival of supply chain management based on the continuous monitoring the following key performance indicators. The performance management solutions collect the information about key performance indicators from the various entities of the supply chain. This information should be accessible through the web .The performance management system system also ensures the trading partnership, sending the alert message to the concern personal if

unplanned event occurs, work flow decision support system, visibility of the order and shipment until the delivery and invoicing the inbound and outbound logistics.
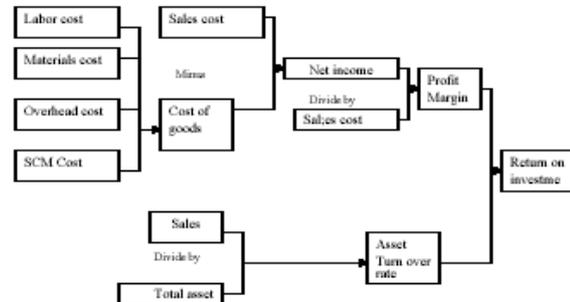
Fig. 9. Evaluation Map for Financial Management

Information flow
Cash flow
Material flow
Lead time
Order to delivery time
Sales revenue
Number of orders
Customer back log
Quality
Warranty cost
Warehouse management cost
Delivery performance
Rejection cost
Rework cost
Return on investment

Fig. 10. Evaluation Map for Performance Management

10. VARIOUS FUNCTIONS OF SUPPLY CHAIN MANAGEMENT SOLUTIONS

10.1. Demand forecasting
Demand forecast models
Evaluation model for demand forecast

10.2. Procurement

E-procurement
Modeling for selecting multiple supplier
Performance measures menu
Vendor rating

10.3.Warehouse management

Inventory registration
Replenishment
Vendor managed inventory
Ability to manage low or excessive inventory

9.4 Order management

Order entry
Order acceptance
Order allocation
Delivery composition
Ability to handle the return goods

9.5 Manufacturing

Product development
Scheduling for complex problems
Quality control
Dispatching

9.6 Transportation

Single site transportation
Multi site transportation
Cross docking
Carrier selection
Route optimization
Simulation

9.6 Supply chain event management

Track and tracing
Visibility
Alert and messages for unplanned activity
Work flow decision

9.7 Financial management

Invoicing the all services
Sales monitoring

Monitoring the net income
Monitoring the profit margin
Monitoring the return on investment

9.8Customer relationship management

Customer back log
Per transaction satisfaction
Post transaction satisfaction
No of new customer
On time delivery
Delivery performance

9.10 Human resource management

Load balancing
Job rotation
Training
Information sharing

9.11 Quality management

Monitoring quality
Right job right machine
Assembly error

10. VENDOR RATING MODEL FOR ESTIMATING THE SOFTWARE SOLUTION SUITABILITY

The vendor rating model was developed with vendor rating menu, which consists 20 standard solution suits .There are 21 supply chain vendors are identified for volume driven manufacturing network. The solution suit for each vendor is identified through internet search, and entered in the vendor rating model. All the 21 supply chain management solution suits cover the basic elements of the supply chain. Some specific solution suit also available with supply chain management vendor.

Based on the nature of the business process the specific solution suit will be selected. There are 6 specific solution suits

were identified from the vendor rating menu and some analysis are made with pi- chat. There are around 50% of supply chain management vendor having order management solution suit and event management .8 out of 21 supply chain management vendors having event management solution suit. 7 out of 21supply chain management vendors having financial management solution suit. It is difficult to blame the supply chain management vendor with less number of solution suits, it may be specifically suited for some business process. The vendor rating models aid to measure suitability supply chain management solutions quantitatively
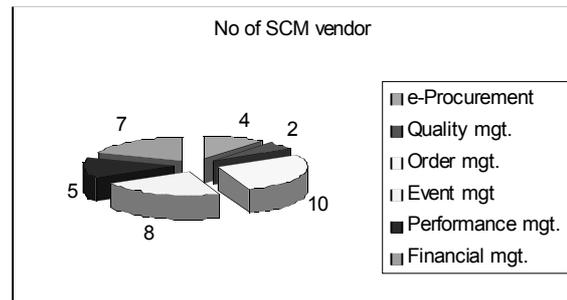

Fig. 11. specific task analysis of the SCM vendor

Table 2. vendor rating model for estimate suitability

S.No	Solution suit	SAP	Oracle	i2 technologies	People soft	JDEdwards	Baan	Quintiq	IMI	Manhattan assoc.	Marcglobal	Cal-consult	LIS	Cubi-corp.	Inter chain	4-soft	Axway	Accp int.	iws	motc	AXI	G-log
1	Customer relationship management	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Demand planning	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Supply planning	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Production planning& scheduling	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Networking management	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	Supplier relationship management	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	Warehousing management	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	Supply chain execution	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	Product development		✓		✓		✓								✓							
10	e-procurement		✓		✓							✓			✓							
11	Quality management				✓	✓																
12	Product data management		✓		✓		✓					✓				✓					✓	
13	Order management	✓	✓		✓	✓		✓					✓				✓	✓	✓	✓		
14	Order promising	✓	✓		✓	✓	✓	✓							✓		✓		✓	✓	✓	
15	Event management	✓						✓				✓	✓			✓	✓			✓	✓	
16	Performance management				✓			✓	✓			✓				✓						
17	Invoice management				✓			✓		✓		✓				✓		✓			✓	✓
18	Financial management	✓	✓		✓			✓										✓			✓	✓
19	Manufacturing accounting					✓		✓				✓	✓	✓		✓	✓	✓			✓	✓
20	Shop floor control		✓		✓	✓		✓	✓				✓				✓		✓			

11. ANALYSIS OF ISSUES AND CHALLENGES VERSUS SOLUTIONS

management, human resource management can be referred by using evaluation map.

Table. 3. Analysis of Issues and Challenges versus Solutions

S.No	Issues & challenges	Corresponding solution suits
1	Cost-benefit ratio	Financial management solution suit & evaluation maps to refer their activities
2	Inventory management	Inventory and order management suit & evaluation maps to refer their activities
3	Suitability	Vendor rating model aid to measure quantitatively
4	Visibility for the business support	Evaluation map for all solution suits

12. CONCLUSIONS

The key issues and challenges to implement supply chain management software solution are focused and the methods to over come these issues are addressed. The primary issue is the software solutions are more expensive, what extent software solutions supporting the business process and how best it is economic as compared with the total revenue. The evaluation map aids to refer the task of supply chain management solution, and it will give the clear idea about the business support. The financial management solution suit supports the invoicing the all records to calculate the net income, profit margin and return on investment. The other issue in the volume driven manufacturing network is managing the inventory for better customer service. This issue is addressed with task reference model in three different points of view, what is activity of the software solution, if low stock in warehouse, more stock in warehouse and inventory replenishment. The software solution task for order management, transport management, quality management, customer relationship

References

1. S. Chopra, P. Meindl, (2001) SCM: Strategy , planning and operation PHI Publication
2. P. Buxmann, Usage and evaluation of supply chain management software results of an empirical study in European automotive industry, Info system j, 14 (2004) Pp295-309
3. S. Bansal, Theory and practice of advanced planner and optimizer in supply chain management, Proceedings of winter simulation conference, 2003. pp 1424-1432.
4. P.R. Mahamani, Reviewing the challenges to implement supply chain management software solution, Research publication, 2006.
5. J. Yang, M. Whitfield, Supply chain management software development: an empirical examination, Research publication, 2003.
6. C. Wartha, M. Peev, Decision support tool-supply chain, Proceedings of winter simulation conference, 2002. pp 1297-1301.
7. S. Guenther, F. Laakmann, Efficient evaluation and selection of IT-support based on the SCM Task Reference model, Research publication, 2002.
8. B.S.Sahay, A.K.Gupta,(2003) Development of software selection criteria for supply chain management solutions, Industrial management and data system journal 103(2003)(2), pp 97-110.
9) www.scm-etc.de
10) www.scc.cc
11) www.rifluxyss.com
12) www.sap.com
13) www.jdedwards.com
14) www.bann.com

15) www.axi.nl
16) www.cal-consult.com
17) www.glog.com
18) www.interchain.nl
19) www.manh.com
20) www.quintiq.com
21) www.oracle.com
22) www.i2.com
23) www.peoplesoft.com
24) www.axway.com
25) www.dcstrans.com
26) www.im.se
27) www.lis-online.com
28) www.marcglobal.com
29) www.quris.nl
30) www.cubicorp.com