The current issue and full text archive of this journal is available at
www.emeraldinsight.com/0143-7720.htm

Human resource practices, supply chain performance, and wellbeing

Sanjay T. Menon
School of Applied Psychology, Department of Management and Marketing, Louisiana State University Shreveport, Shreveport, Louisiana, USA

Abstract

Purpose – The purpose of the paper is to identify management and human resource (HR) practices that lead to satisfaction with the performance of an organization's supply chain as well as employee wellbeing, and to develop recommendations for practicing managers.

Design/methodology/approach – Adopting an empirical approach, a Delphi expert panel study was first carried out to identify the possible impact of supply chain integration, particularly with regard to human resource management (HRM) policies and practices. Then, using a survey of 228 supply chain professionals, hypotheses linking satisfaction with supply chain performance to non-traditional HR practices, training, and team organization were tested.

Findings – The Delphi study identified specific HR practices, such as flexible job descriptions and teamwork training that would need to accompany successful supply chain integration. Regression results indicate that flexible job descriptions, team organization, teamwork training, and the use of performance metrics to determine rewards, are significantly related to satisfaction with supply chain performance.

Research limitations/implications – The Delphi results are subjective by nature and the cross-sectional survey design limits inferences of causality.

Practical implications – This paper identifies management and HR practices that lead to satisfaction with supply chain performance, which is particularly relevant to modern industrial organizations where the trend is toward inter-organizational networks in the form of integrated supply chains. Implications for employee wellbeing are also discussed.

Originality/value – This paper adopts an interdisciplinary approach and links HRM practice with supply chain management; two separate fields with their own research traditions.

Keywords Human resource management, Supply chain management, Supply chain integration, Supply chain performance satisfaction, Employee wellbeing, Training, Teamwork, Delphi panel

Paper type Research paper

Introduction

Traditional inter-firm links were contractual in nature with little interest in mutual gains or information sharing. With the increasing integration necessitated by competitive pressures, dyadic relationships slowly gave way to longer term relationships based on trust and information sharing. The dominant organization in the chain started actively managing the chain and the relationships. Doing so not only reduced costs, but also added value for customers by increasing performance on delivery and quality. This doubly attractive feature of supply-chain management (SCM) resulted in its being considered a source of competitive advantage (Tracey and Tan, 2001). Dominant firms in all industries have adopted SCM practices and as a result, in practice, it is no longer individual firms, but supply chains (SCs) that compete with each other in a given product market (Hwang and Rau, 2007).

The author would like to thank Scott Stephens of Business Forerunners for facilitating data collection and for serving as a technical expert on supply chain management.

International Journal of Manpower
Vol. 33 No. 7, 2012
pp. 769-785

0143-7720
DOI 10.1108/01437721211268311

Research in SCM has predominantly been the purview of researchers in the areas of operations management, logistics, and information technology systems. Naturally, these researchers focussed on the operations aspect of SCs with limited reference to human resource (HR) aspects or employee well-being. The present research attempts to partially fill this void in the management, OB, and human resource management (HRM) literature by exploring the following research questions:

(1) What type of management and HRM practices are associated with the successful integration of SCs?
(2) What type of management and HRM practices are associated with SC performance satisfaction?
(3) Are the HRM practices identified in (a) and (b) above conducive to employee well-being?

While the first two questions typically deal with the business case for HRM, it is increasingly recognized that an exclusive focus on business results could have a deleterious effect on employee well-being, which in turn might eventually lead to reduced performance and profitability (Baptiste, 2008). Thus, it is important to investigate if the HR practices associated with successful SC integration and performance are also those that promote employee well-being.

Study 1: expert panel

Given the dearth of previous HRM research in the SCM area, it was necessary to initially adopt an exploratory approach to data collection and analysis. Given the difficulty in conducting cross-organizational studies to study SCM issues, it is not surprising that a number of SC researchers have used the Delphi approach (e.g. Akkermans *et al.*, 2003). The current study, which was part of a larger study, followed procedures recommended by Mitchell (1991). A total of 13 panelists – seven faculty and six practitioners – were asked to respond by e-mail to questions regarding the role of HR in SC integration and performance.

Results

In response to the general question on the type of organizational changes required for successful implementation of integrated SCs (Question 1), one of the panel's main recommendations was that of internal integration. Integrating the work of different departments seamlessly was considered a prerequisite for external integration across organizations. Specific recommendations to achieve this included use of cross-functional teams and organizational level measures of performance. The organization as a whole would have to develop a culture that emphasizes horizontal workflows as opposed to traditional functional hierarchies. With regard to managing relationships with partners, the panel stressed the need for collaboration, which in turn requires a high level of trust as sensitive information would need to be shared. These recommendations are summarized in Table I.

In response to the specific question on the HR function, the panelists suggested a number of potential changes to HRM practice as detailed in Table II. Overall, the HR function will have to become flexible. Rigid jobs descriptions will have to give way to flexible job descriptions. People would need to be hired for competencies such as problem solving rather than for specific jobs. HR can also look to SC partners as a source of manpower. Partners can provide employees and the organization can send its own employees on assignment to partner organizations. HR as a whole would become

Theme	General recommendation	Implementation ideas
Internal integration	Procurement, manufacturing, and customer order fulfillment within the organization must be seamlessly integrated	Structure around process or customers rather than on functions and geographic regions Departmental teams to coordinate with other departments Cross-functional teams and matrix management Integration in stages, rather than radical change to the entire organization
External integration	Focal organization and supply-chain partners must be integrated through network structures Must overcome legal, cultural, and communication challenges inherent to global networks Requires high levels of trust and cooperation	Teams to coordinate activities with SC partners Network teams with people from partner companies working on network goals Technological infrastructure to facilitate network collaboration Service level agreements to establish roles and responsibilities in the network Share resources (R&D, personnel, technology) with network partners Partner involvement in new product development External resources such as consultants for educating staff and putting new systems in place
Culture change	Reorientation from hierarchical perspective to horizontal perspective View organization as part of a collaborative network Leadership commitment to joint optimization of network, rather than local or firm level sub-optimization	Organize around critical workflows Focus on organizational rather than departmental outcomes Emphasize interdependency and collaboration with network partners Develop willingness to share forecast demand and other proprietary information with suppliers

Table I.
Delphi results – organizational level changes

more strategic, thinking of human capital requirements of the network as a whole. The traditional technical aspects of HR (e.g. benefits administration) would increasingly be outsourced.

Study 2: Industry survey

Theory and hypotheses

Ketchen and Hult (2007) outlined a number of ways in which major organizational theories could be linked to SC performance and management. Of particular significance to the present research which focusses on the role of HR practices are perspectives provided by resource dependency theory, transaction cost economics, agency theory, resource-based view, knowledge management perspective, and social capital theory.

According to the resource dependency theory (Pfeffer and Salancik, 1978), firms become dependent on providers of resources (e.g. suppliers) and need to manage these relationships in order to reduce vulnerability and strengthen their own position. This is

HR issue/activity	Recommendations
Knowledge and skills for supply-chain managers and employees	Complete understanding of business, not just functional area Multi-disciplinary skills such as financial, IT Knowledge of supply chain (SC) concepts and total system cost Decision making in a dynamic context, flexibility, adaptability Learning ability, problem solving, and creativity Communication, teamwork, and interpersonal skills Leadership, negotiation, and influence skills Understanding diverse cultures; cultural sensitivity
Staffing (personnel planning, recruitment, and selection	More rigorous looking for right mix of skills and experience Employees could be supplied by SC partners (implants) May hire for partner's needs (e.g. quality engineer hired and sent to supplier)
Job design	Enriched and enlarged jobs requiring higher cognitive ability Flexible job descriptions, change as needed More customer focussed and service oriented; exposure to whole SC More ambiguity, less definition, and more boundary spanning
Training for SC managers and employees	SC concepts, objectives, and strategy appropriate to level Process analysis, ISO 9002, and Six Sigma Legal issues, anti-trust regulations regarding information sharing, OSHA, safety, and pollution regulations Team building and leadership Job rotation to increase cross-functional skills/awareness Specific training suggested by SC partners Cross-cultural communication and negotiations Language training as needed Joint orientation program for new employees across firms
Compensation and reward systems	Incentives tied to SC-wide goals (e.g. total system cost) rather than narrow functional goals (e.g. material cost per unit) Adjustments for overseas tax laws and labor markets Portable financial benefits (e.g. pension), cafeteria benefits
Performance appraisal	Should include inter-firm aspects, flexible Multi-rater feedback, joint appraisal by partners
Development and career planning/ pathing	Employee exchange programs with SC partners Should consider portability of benefits, seniority, etc. for employees on assignment Should consider retention issues – employees joining partners
Labor relations	Needs monitoring if any partner in chain is unionized Actions need to be coordinated with partners Worker participation in management, especially in Europe
Workplace law/legal issues	Periodic audits of SC partners to ensure compliance International, multi-firm team members may be subject to home country laws that may differ, including on vacations and holidays
Workplace diversity	Increased diversity, specific hires to match partner Special assistants/cultural experts available for consultation with line managers dealing with global SCs

Table II.
Delphi results – human resource function

particularly true in modern integrated SCs characterized by long-term relationships with limited number of suppliers and distributors. The Delphi study identified one such vulnerability, namely, that of labor action in one of the partner organizations. According to Lund and Wright (2003), increased integration of the SC increases the power of unions upstream and downstream and provides an opportunity for organized labor to exercise joint influence up and down the SC. Firms can also be opportunistic with regard to contract terms.

One way to counter the above vulnerability and potential for opportunistic behavior is to develop long-term trusting relationships. According to the transaction cost perspective, such an approach can lower overall costs as building trust-based relationships can reduce the tendency for opportunistic behavior and can lower monitoring costs. HR practices, such as those identified under "external integration" in Table I can build these trust-based relationships among partner organizations. Similarly from an agency theory perspective, opportunistic behavior is explained by fact that managers belonging to different firms in the chain may act to benefit their own firm rather than benefit the chain as a whole. This can be countered by reward structures that encourage behavior that benefits the chain and by fostering a culture of collaboration and trust. Such a collaborative approach is also suggested by coordination theory (Crowston, 1997), which posits that ways to deal with dependency include the use of coordination mechanisms such as information sharing, joint decision making, and proactive planning with partner organizations (Jayaram *et al.*, 2010). This tenet applies equally to intra-firm relationships, where internal integration and team-based structures would serve to discourage functional silos and sub-optimal maximization of departmental objectives over organization-wide goals. From an agency theory perspective, team-based approaches promote informal governance that is relationship and norm based; that results from increased trust and information sharing (Farndale *et al.*, 2010).

From a resource-based view (Barney, 1991), trust-based collaborative relationships with SC partners lead to enhanced capabilities that can be a source of competitive advantage (Miles and Snow, 2007). This can occur in two principal ways. First, from a knowledge management perspective, knowledge sharing enhances innovative capability, problem solving, and entrepreneurship. Second, from a social capital perspective (Nahapiet and Ghoshal, 1998), the social interaction with partners can produce social capital in the form of tacit knowledge, shared understanding, and personal relationships that are unique to network actors. The resulting human capital becomes a difficult to imitate resource that can be source of sustained competitive advantage.

According to Becker and Huselid (1998), appropriate HR practices are responsible for developing this human capital that results in improved productivity and profitability. McAfee *et al.* (2002) suggest that a firm desiring business ties that are relationship oriented, i.e. characterized by trust, information exchange, sharing of costs and benefits, and a win-win culture, an appropriate HRM policy would be correspondingly relationship oriented, i.e. treating employees as long-term investments and thus emphasizing high-level skills, training, ongoing performance feedback, and above average compensation. High-caliber human capital can provide organizations the flexibility they need by being highly adaptive to changes in the environment, both internal and external (Jin *et al.*, 2010). Thus, in addition to traditional functional skills, employees would need strategic skills, process management skills, team skills, decision-making skills, behavioral skills, negotiation skills, and quantitative

skills (Giunipero and Pearcy, 2000). In general, the trend is toward requiring soft skills such as teamwork and leadership in addition to technical skills, as was the findings of the Delphi study.

Organizations that consider collaborative and integrated SCM to be a strategic competitive tool can be expected to invest in significant associated training. In addition to SCM-related technical training, organizations also provided non-context-specific training in areas such as problem solving, teamwork, and leadership. Gowen and Tallon (2002) in their survey of manufacturing and service corporation executives found training (in problem solving, leadership, team building, and job skills) to be statistically related to the success of SCM best practices. Again, as can be seen in Table II, these findings are in line with the recommendations of the Delphi study.

Overall, SC integration may require relatively innovative HRM practices such flexible job descriptions, emphasis on competencies and higher order cognitive abilities rather than job specific skills, and a focus on the whole system, rather than traditional, hierarchically oriented HR practices characterized by narrow, functional job descriptions, and individual evaluation and rewards. It may require a shift in orientation to egalitarian team-based structures (see Table I). In addition to training in such traditional SCM staples as process analysis, training in "soft" skills such as teamwork, leadership, problem solving, negotiation, and relationship management may also be required.

To recapitulate, organizational theory suggests that external and internal integration in the form of trust-based relationships, common goals, and system-based rewards are necessary conditions for successful firms in the SC, especially to reduce vulnerability and to minimize transaction costs and opportunistic behavior. These trust-based relationships create specialized forms of human capital that can be a source of competitive advantage. HR practices, especially of the non-traditional kind such as team-based structures, soft skills training, employee exchanges with partners, and system-performance-based evaluations would be the main organizational mechanism that facilitate the creation of specialized human capital that would lead to enhanced performance and profitability.

SC performance and measurement. Given the practical difficulties of directly measuring performance and other outcome variables, SCM researchers often use indirect measures of performance. For example, Carr and Smeltzer (2000) asked executives to judge performance on financial and market measures as lower or higher over the past three years. The executives were also asked to rate supplier responsiveness with regard to issues such as quality, delivery, and flexibility on a scale ranging from extremely low to extremely high.

In the present research, given the emphasis on HR practice, satisfaction with one's organization's SC was adopted as a proxy for SC performance. Specifically, SC performance was operationalized as satisfaction with the following four major aspects of their SC performance: delivery, responsiveness, cost, and supplier performance. These facets correspond to the dimensions of SC effectiveness identified by Hugos (2002) and Carr and Smeltzer (2000).

Based on the above discussion one can propose the following hypotheses:

H1. Adoption of "non-traditional" HRM practices will be positively related to satisfaction with SC performance with regard to delivery, responsiveness, cost, and supplier performance.

H2. Adoption of "non-traditional" training will be positively related to satisfaction with SC performance with regard to delivery, responsiveness, cost, and supplier performance.

H3. Adoption of teams in the work environment will be positively related to satisfaction with SC performance with regard to delivery, responsiveness, cost, and supplier performance.

In the above hypotheses, the phrase "non-traditional" was used to succinctly denote a wide range of practices as listed in Table II. Each practice actually merits its own separate hypothesis, but a general term such as "non-traditional" was used here in the interest of brevity. In the data analysis, however, each practice is analyzed separately. The actual list of HR practices and training used in the study is available in Tables IV and V.

Control variables. In the normal course of SC integration, organizations often employ technological solutions, such as establishing real-time data links with partner organizations or implementing Vendor Managed Inventory (VMI). They also utilize contractual devices, such as penalties for late deliveries, to influence partner behavior. It is possible therefore, that effective SC performance and the resulting satisfaction derive from these technological and contractual coordinating mechanisms, rather than from the variables named in the hypotheses above. To explore the extent to which these coordinating mechanisms were influential, the relationship between these variables and the satisfaction dimensions would also have to be assessed as described below.

Method

In order to test the hypotheses a questionnaire survey was administered to SC practitioners. As with the Delphi study, the survey included a number of questions related to the SCM area which are not of interest in the present study. Only those aspects of the study directly related to the present research endeavor are described below.

Sample and procedure. The questionnaire was prepared online using an online survey services company and e-mails were sent out to approximately 1,100 industry professionals by the two trade associations resulting in 228 responses, corresponding to a response rate of around 20 percent. The average age of respondents who completed the survey was 47 years, with an average of 17 years of SC experience. In all, 21 percent of the respondents were women. In terms of sector, 47 percent of the respondents were from manufacturing organizations in a variety of industries. In terms of size, 49 percent of the organizations represented had 1,000 employees or less, 28 percent had between 1,000 and 10,000 employees, and the rest had over 10,000 employees. Most of the respondents (64 percent) were from the USA and a total of 20 countries were represented.

Variables and measures. HR practices: based on the recommendations from the panel study, respondents were asked to rate the extent to which their organizations had adopted the various HR practices listed in Table IV. A five-point – "not at all" (1), "to a small extent" (2), "to a moderate extent" (3), "to a large extent" (4), "standard practice" (5) – response format was used.

Training: respondents were asked the extent to which their organization provided the various types of training listed in Table IV. Most of these were suggested by the

Delphi panel in Study 1. A five-point, "not at all" (1) to "mandatory/across the board" (5), response format was used.

Teams: based on the Delphi panel's recommendations for increased use of teams, respondents were asked to rate the extent to which their organizations employed the following types of teams: teams to coordinate activities internally with other departments; teams to coordinate activities externally with SC partners; cross-functional teams organized around natural workflows from source to customer for critical processes. A five-point, "not at all" (1) to "standard practice" (5), response format was used.

Control variables: two broad classes of control variables were identified: technological integration and coordinating mechanisms listed in Table III. These were the practices suggested by the Delphi panel as possible integration and coordinating mechanisms. A five-point, "not at all" (1) to "standard practice" (5), response format was used.

SC performance satisfaction: satisfaction with delivery (SATdel) was measured with four items – "customer orders delivered in full," "customer orders delivered on time," "proper documents (e.g. accurate invoices) provided with delivery to customers," and "customer order tracking." The α reliability for this variable was 0.92.

Satisfaction with responsiveness (SATresp) was measured with five items – "time to deliver new products to market," "time to reach required volume on new products," "customer order fulfillment lead time," "ability to respond to unexpected variations in demand," and "ability to respond to unexpected disruptions in supply." The α reliability for this variable was 0.88.

Satisfaction with cost (SATcost) performance was measured with six items – "cost per unit of production," "total logistics cost," "warranty costs," "new product introduction (NPI) costs," "cash to cash cycle," and "inventory days of supply." The α reliability for this variable was 0.85.

Satisfaction with supplier (SATsup) performance was measured with five items – "supplier reliability," "supplier responsiveness to demand fluctuations," "supplier adoption of standardized systems and technology," "supplier adoption of standards (e.g. ISO)," and "supplier willingness to share cost information." The α reliability for this variable was 0.92.

A seven-point, very dissatisfied (1) to very satisfied (7), response format was used for all 20 satisfaction items. Recognizing the fact that respondents may not be aware of all the aspects of the organization covered by the above range of variables, a "don't know" option was provided for each item on the survey.

Analysis and results. The 20 satisfaction items were first subject to a principal component factor analysis with varimax rotation. Four factors corresponding to the four dimensions of SATdel, SATresp, SATcost, and SATsup performance emerged. The corresponding eigenvalues were 9.27, 2.21, 1.43, and 1.33 explaining 71.2 percent of the variance. The items constituting each dimension were averaged to form composite variables, corresponding to each satisfaction sub-scale.

Correlations were first computed between the four satisfaction dimensions and the control variables. As can be seen in Table III, with regard to technological integration, using standardized systems throughout the SC seems to be significantly related to SATcost and SATsup performance. Other integrating mechanisms were not significantly related to the satisfaction variables with the exception of small, significant relationships between "systems for real-time information sharing" and SATcost as well as between "specialized systems such as VMI" and SATresp.

Technological integration practices (1-5)	Mean	SD	SATdel	SATresp	SATcost	SATsup
1. Standardized systems and system interface that must be used by all SC partners	2.48	1.40	0.12	0.18	0.31**	0.30**
2. Systems for complete and real-time sharing of information (planned production, inventories, intransit materials, etc.) between SC partners, upstream and downstream	2.41	1.35	0.02	0.19	0.25*	0.17
3. Real-time data link with foreign partners	1.95	1.32	−0.01	0.04	0.06	0.10
4. Specialized systems such as Vendor Managed Inventory (VMI)	2.72	1.31	0.00	0.23*	0.18	0.16
5. Specialized tools such as radio frequency ID (RFID)	1.84	1.20	−0.08	0.05	0.03	0.13
Coordination mechanisms (1 to 5)						
1. Regular joint meetings with SC partners at strategic/senior levels to review supply-chain performance and needed improvements	2.90	1.23	0.14	0.18	0.25*	0.31**
2. Using performance metrics that co-opt partners into total system optimization, such as total SC days inventory, or total landed cost	2.42	1.35	0.03	0.21	0.19	0.23*
3. Incentives for better service such as on time deliveries or short lead times	2.25	1.26	−0.05	0.08	0.12	0.14
4. Penalties for shortages, damages, or other non-performance/failures	2.50	1.41	0.00	0.18	0.16	0.13
5. Develop ISO (or other) standards and require partners to do the same	3.21	1.42	0.16	0.13	0.08	0.36***
6. Regular joint meetings with SC partners at operational levels to review supply-chain performance and needed improvements	2.99	1.28	0.11	0.16	0.22	0.26*
7. Transferring (implanting) and rotating personnel from partner organizations to your organization	1.64	1.02	−0.18	−0.10	−0.02	−0.05
8. Sending (and rotating) your employees to partner's location	1.77	0.99	−0.06	0.08	0.01	−0.13
9. Dedicated alliance managers who are responsible for monitoring the partnership and initiating corrective actions when necessary	2.37	1.31	0.10	0.23*	0.20	0.17
10. Provide technical and managerial help to partners to reduce their costs	2.36	1.15	0.06	0.18	0.24*	0.31**

Notes: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table III.
Descriptive statistics and correlations: control variables and SC performance satisfaction

Table III also shows the relationships between coordinating mechanisms and the satisfaction variables. As can be seen, none of the coordinating mechanisms were related to SATdel. Only one practice – having dedicated alliance managers to coordinate the network – was significantly related to SATresp. Requiring SC partners to develop ISO standards was substantially and significantly related to SATsup as were practices such as providing technical and managerial assistance, use of integrative performance metrics, and regular meetings between partner organizations at senior and operational levels. Senior level meetings and providing technical and managerial assistance also was related to SATcost.

To assess *H1*, bivariate correlations between HRM practices and the four satisfaction variables were calculated. As can be seen in Table IV, with the exception of one practice, all non-traditional HRM practices were significantly related to one or more dimension of satisfaction. In particular, "flexible job descriptions," "emphasizing problem solving skills in hiring," and "use of system-wide metrics to determine rewards" were significantly related to all four dimensions of SC performance satisfaction. Thus there was tentative support for *H1*. Table IV also shows the bivariate correlations between training practices and the satisfaction variables. As can be seen, all non-traditional practices were significantly related to one or more of the satisfaction dimensions. In particular, "training in teamwork skills" was significantly related to all four satisfaction dimensions. Thus, there was tentative support for *H2* as well. In order to assess *H3*, bivariate correlations between the "team" items and the satisfaction variables were examined. As can be seen from Table IV, all three "team" variables were significantly correlated to two or more satisfaction variables, thus lending some support for *H3*.

Given the significant correlations between some of the control variables and the satisfaction variables (see Table III), a more rigorous test of the hypotheses was undertaken. First two control variables, technological integration and coordinating mechanisms, were created by summing up the corresponding items. The greater the score on these two variables, the greater the integration and coordination in the organization, respectively, which in turn could potentially correspond to greater satisfaction with SC performance. Technological integration had a range of 5-23 with a mean 11.16 (SD = 5. 21). Coordinating mechanism had a range of 10-48 with a mean 23.87 (SD = 9.08). The satisfaction variables were regressed on each of the variables shown to have significant correlations in Table IV with technological integration and coordination mechanisms first entered as control variables. Table V shows the regression results.

As can be seen from Table V, the coefficient of the HRM practice "flexible job descriptions" was significant for SATdel as well as SATresp. "Use of system wide metrics to determine rewards" was significantly related to SATresp as well as SATsup performance. In addition, "Develop ethical standards and require partners to do the same" was significantly related to SATsup performance. Thus, there is enough evidence to support *H1*. Table V also shows the regression coefficients for the training variables. "Training in teamwork skills" was significantly and substantially related to SATsup performance. It was also significantly related to SATdel and SATcost. In addition, "Training in process analysis, ISO 9002, Six Sigma, and other quality initiatives" was related to SATsup performance. Thus, there was some support for *H2*. The regression coefficients for the team variables are also available in Table V. As can be seen, "Teams to coordinate activities internally with other departments" was significantly related to SATdel, while "Teams to coordinate activities externally

HRM practices (1 to 5)	Mean	SD	SATdel	SATresp	SATcost	SATsup
1. Flexible job descriptions	2.71	1.34	0.33***	0.35***	0.33***	0.30**
2. Emphasizing problem-solving skills rather than just job relevant skills in hiring	3.00	1.42	0.27**	0.29**	0.37***	0.32***
3. Emphasizing financial, IT, and business knowledge (e.g. total system cost) in the competency set for purchasers	2.87	1.47	0.14	0.25*	0.23*	0.21*
4. Emphasizing ability to learn in hiring decisions	2.99	1.51	0.17	0.28**	0.30**	0.24*
5. Joint manpower planning with SC partners when appropriate	2.34	1.64	0.20	0.29**	0.33***	0.26*
6. Career pathing to include experiences with SC partners	2.09	1.44	0.10	0.17	0.26*	0.21*
7. Policy for dealing with "implants"(e.g. supplier's personnel who work in your facility)	2.20	1.56	−0.06	0.13	0.15	0.14
8. Policy for dealing with employees "loaned" to SC partners (e.g. employee sent to help supplier get ISO certification)	2.15	1.47	0.00	0.24*	0.25*	0.19
9. Use of system wide metrics (e.g. total system cost) to determine rewards (e.g. bonus)	2.82	1.52	0.21*	0.25*	0.29**	0.31**
10. SC partner participation in performance appraisals (e.g. supplier input in evaluation of purchasing personnel)	2.08	1.55	0.08	0.16	0.30**	0.22*
11. Develop ethical standards and require partners to do the same	3.28	1.49	0.19	0.27*	0.30**	0.38***
Training practices (1–5)						
1. Training in process analysis, ISO 9002, Six Sigma, and other quality initiatives	2.93	1.40	0.17	0.23*	0.15	0.22*
2. Training in anti-terrorism laws and security regulations including new inspection regime	2.30	1.49	0.07	0.15	0.13	0.20*
3. Training in international business operations, transportation, and logistics	2.38	1.31	0.07	0.08	0.14	0.23*
4. Training in cross-cultural management and inter-cultural communication	2.44	1.40	0.09	0.20*	0.16	0.23*
5. Training in teamwork skills	2.81	1.28	0.21*	0.28**	0.40***	0.45***
6. Training in negotiations	2.27	1.24	−0.01	0.10	0.21*	0.22*
7. Training in supply-chain metrics	2.42	1.24	0.04	0.24*	0.22*	0.23*
8. Training in SC partner selection	2.23	1.27	0.09	0.24*	0.20*	0.19
9. Training in SC partner evaluation	2.24	1.30	0.09	0.27**	0.22*	0.23*
10. Training in managing supply-chain relationships.	2.24	1.31	0.10	0.26*	0.19	0.19
Team practices (1–5)						
1. Teams to coordinate activities internally with other departments	3.18	1.38	0.28*	0.23*	0.27*	0.21
2. Teams to coordinate activities externally with SC partners	2.88	1.50	0.20	0.23*	0.34***	0.30**
3. Cross-functional teams organized around natural workflows from source to customer for critical processes	2.82	1.43	0.16	0.15	0.22*	0.32**

Notes: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table IV.
Descriptive statistics and correlations: HRM practices, training, teams, and SC performance satisfaction

	SATdel	SATresp	SATcost	SATsup
Control variables				
Technological integration	0.03	0.17	0.18	0.14
Coordinating mechanisms	0.02	0.07	0.01	0.09
HRM practices				
1. Flexible job descriptions	0.31**	0.28*	0.20	0.22****
2. Emphasizing problem solving skills rather than just job relevant skills in hiring	0.30***	0.24	0.30***	0.27****
3. Emphasizing financial, IT, and business knowledge (e.g. total system cost) in the competency set for purchasers	–	0.14	0.22	0.03
4. Emphasizing ability to learn in hiring decisions	–	0.19	0.29***	0.21
5. Joint manpower planning with SC partners when appropriate	–	0.21	0.19	0.11
6. Career pathing to include experiences with SC partners	–	–	0.05	−0.02
8. Policy for dealing with employees "loaned" to SC partners (e.g. employee sent to help supplier get ISO certification)	–	0.19	0.06	–
9. Use of system wide metrics (e.g. total system cost) to determine rewards (e.g. bonus)	0.24	0.39**	0.26****	0.33*
10. SC partner participation in performance appraisals (e.g. supplier input in evaluation of purchasing personnel)	–	–	0.12	0.00
11. Develop ethical standards and require partners to do the same	–	0.27	0.29****	0.37*
Training practices				
1. Training in process analysis, ISO 9002, six-sigma, and other quality initiatives	–	0.14	–	0.28*
2. Training in anti-terrorism laws and security regulations including new inspection regime	–	–	–	0.15
3. Training in international business operations, transportation, and logistics	–	–	–	0.24
4. Training in cross-cultural management and intercultural communication	–	0.10	–	0.19
5. Training in teamwork skills	0.33*	0.23	0.33*	0.45****
6. Training in negotiations	–	–	0.08	0.11
7. Training in SC metrics	–	0.23	0.18	0.19
8. Training in SC partner selection	–	0.24	0.13	–
9. Training in SC partner evaluation	–	0.30****	0.16	0.20
10. Training in managing SC relationships	–	0.29	–	–
Team practices				
1. Teams to coordinate activities internally with other departments	0.37**	0.24	0.29****	–
2. Teams to coordinate activities externally with SC partners	–	0.16	0.35*	0.20
3. Cross-functional teams organized around natural workflows from source to customer for critical processes	–	–	0.14	0.24

Notes: Standardized (β) coefficients reported. "–", not tested. *$p < 0.05$; **$p < 0.01$; ***$p < 0.06$; ****$p < 0.10$

Table V.
Regression coefficients: HRM practices, training, teams, and SC performance satisfaction

with SC partners" was significantly related to SATcost, providing some support for *H3*.

Discussion

This paper has taken a broad brush preliminary look at the HRM issues that are associated with the implementation of integrated SCM. While integration of the SC is externally focussed in terms of inter-organizational linkages, the results of the Delphi study underscore the need for internal integration as a prerequisite for successful external integration. The success of the entire chain depends on each unit in the chain delivering optimal performance. This, in turn, requires that the internal work process that converts inputs, including information, to output for consumption to the next unit, must be seamlessly integrated and synchronized for optimum performance. The Delphi recommends structuring around process and the use of departmental and cross-functional teams, accompanied by a culture that emphasizes organizational rather than departmental goals, as the primary means of achieving this internal integration. This is in line with the more than two decade old general recommendation for the use of teams to achieve organizational effectiveness. It is also in line with the empirical evidence (e.g. Scarbrough, 2000) that SC integration is accompanied by pressures to "horizontalize" the organization, i.e. to breakdown functional barriers, flatten hierarchies, and to work in teams. More recently, Koulikoff-Souviron and Harrison (2010) studying a large European pharmaceutical company found the need to align HR practices to enhance internal integration.

With regard to traditional HR functions, the Delphi panel recommendations are in line with the above general recommendations for internal and external integration. If employees are to work in cross-functional teams and interact more with others outside the organization in order to achieve organizational and network goals, then it follows that the skill requirements would broaden to include broad SC and business knowledge, financial and IT skills, teamwork and negotiation skills, leadership and influence skills, cultural sensitivity, and so forth. Similarly training requirements would broaden to include not only technical aspects of quality and SCM, but also team building and leadership. This is line with recent Chinese research that found positive relationship between training and development and SC flexibility (Kam *et al.*, 2010). Job design would tend to be enriched with flexible, rather than rigid job descriptions. The integration with partners allows additional opportunities not normally possible for HR practice such as employee exchange with partners and the involvement of partners in selection, training, and performance appraisal.

The results of the industry survey seem to validate many of the findings of the Delphi study. There are, however, some surprising findings. While the Delphi identified a number of mechanisms for technological integration and coordination, the number of significant correlations between these mechanisms and the performance satisfaction measures were relatively low (see Table III). This would suggest that technological integration (e.g. standardized integrated systems) and structural coordination (e.g. dedicated network managers and personnel) alone are insufficient for satisfactory SC performance. The correlations and regression results imply that HR practices such as flexible job descriptions and teamwork are required. This is in line with recent findings linking human capital to organizational flexibility and in turn to competitive advantage (Jin *et al.*, 2010).

Upon reflection, this apparent disconnect between technological integration and coordination, and SC performance satisfaction can be logically explained. Integration

deals with the nature of the relatively stable ongoing relationship among the partners rather than day-to-day performance with regard to sourcing, production, and delivery. Technological integration and coordination mechanisms strengthen these relationships and facilitate communication and interaction among the SC partners. In similar vein, practices such as career experiences with SC partners and training in managing SC relationships also promote integration. On the other hand, a performance satisfaction measure like SATdel performance, captures the ebb and flow of day-to-day operations dealing with issues such as order tracking, shipping documentation, and deliveries reaching the customer as required, from the perspective of the focal organization. Thus, it is not surprising that flexible job descriptions, the use of teams to coordinate activities internally with other departments, and training in teamwork skills are significant drivers of satisfaction with regard to delivery performance. While practices such as training in partner selection and training in partner evaluation help with integration by the inclusion of desirable partners, it is training in teamwork skills that help employees in their day-to-day interactions within the organization and with partners to positively influence SC performance satisfaction with regard to cost and suppliers.

Limitations. The first limitation deals with the methods adopted. The Delphi panel is by nature subjective and the results depend on the composition of the panel. The industry survey was cross-sectional in nature, limiting causal inferences. Also, as the same employee assessed both dependent and independent variables, there is a possibility that the results were influenced by same source bias. With regard to the latter, the lack of a systematic pattern of correlations in Tables III and IV implies that same source bias may not be a major factor. For example, in Table III, the variable SATdel is unrelated to any of the control variables, while in Table IV, it is related to select variables. The other satisfaction variables have their own unique pattern of correlations. The fact that significant regression coefficients were obtained only for select variables also points to a limited role for same source bias.

Despite the above limitations, the present research has contributed to the as yet nascent body of research linking HR practices and SCM. The satisfaction measures used to capture SC performance is another unique contribution that can be utilized by future researchers.

Implications for HRM practice. The present research has many implications for HRM practice in organizations, both at strategic and operational levels. At a strategic level, HR executives should participate in the decision to move toward greater integration of the SC. At an operational level, many of the traditional HR functions will be affected by the switch to integrated SCM. Specifically:

(1) Job descriptions would need to be flexible, broad, and process oriented. Job specifications would include higher order cognitive ability and the ability to work under conditions of ambiguity and uncertainty.

(2) Work organization will increasingly reflect a source to customer process focus. Teams for internal coordination, cross-functional teams, and teams for external coordination with SC partners would need to be set up.

(3) Skill requirements for all managers, and for logistics and purchasing personnel in particular, will broaden to include general business, financial, and IT skills, team work, problem-solving, and negotiation skills, leadership and influence skills, adaptability and flexibility. Internal labor pool could be expanded to include SC partners' personnel for short to medium-term assignments.

(4) Training will need to include technical aspects such as SCM-related content, process analysis, ISO 9002, Six Sigma, etc. and non-technical or behavioral aspects, such as teamwork, leadership, negotiations, partner selection and evaluation, relationship management, cross-cultural management, anti-terrorism laws, and the new inspection regime. Job rotation could potentially include stints at partner organizations.

(5) HR policies will have to be developed to deal with personnel on exchange from partner organizations (implants) and employees on assignment to partner organizations. Mechanisms would have to be set up for partner participation in performance appraisals.

(6) Internal and system-wide performance metrics used for managing SC performance would need to be identified and associated with specific offices or roles. These metrics would need to be translated to key performance indicators (KPIs) for executives, managers, and employees as appropriate for each level. The performance management plan should include these KPIs and evaluations can include input from SC partners as appropriate. Reward systems should be tied to these KPIs, taking care to include some organizational and SC wide goals for each individual.

(7) The labor situation at partner organizations should be monitored on an ongoing basis, both upstream and downstream.

Implications for employee well-being. The non-traditional HR practices, training, and team structures identified as being associated with successful integration and performance of SCs have been previously identified as high-commitment practices that lead to employee well-being (Baptiste, 2008). Organizations that adopt practices such as information sharing signal to employees that the organization trusts its employees. Other such practices include non-traditional hiring criteria, extensive training, and greater employee involvement in decision making (Guest, 2002; Pfeffer, 2005). All these practices promote well-being at work through increased commitment and job satisfaction (Currie, 2001). Improved SC performance also contributes to employee well-being, both with extrinsic rewards based on system-wide metrics, but also the intrinsic rewards of achievement and the sense of belonging to a successful enterprise. In the process of developing human capital, the organization invests considerable resources in its employees which signals to employees that they are valued, which in turn contributes to employee well-being.

The responsibility for promoting employee well-being ultimately falls on management as they implement the above high commitment and trust HR practices. This is in line with Baptiste's (2008) finding that active involvement and support of management as they go about implementing the HR practices has a positive impact on employee well-being. In its zeal to promote SC performance, management should take care not to give short shrift to employee well-being. Otherwise, any performance and profitability gains would be short lived.

References

Akkermans, H.A., Bogerd, P., Yucesan, E and van Wassenhove, L. (2003), "The impact of ERP on supply chain management: exploratory findings from a European Delphi study", *European Journal of Operational Research*, Vol. 146 No. 2, pp. 284-301.

Baptiste, N.R. (2008), "Tightening the link between employee wellbeing at work and performance: a new dimension for HRM", *Management Decision*, Vol. 46 No. 2, pp. 284-309.

Barney, J.B. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No. 1, pp. 99-120.

Becker, B.E. and Huselid, M.A. (1998), "High-performance work systems and firm performance: a synthesis of research and managerial implications", in Ferris, G. R, (Ed.), *Research in Personnel and Human Resource Management*, JAI Press, Greenwich, CT, pp. 53-101.

Carr, A.S. and Smeltzer, L.R. (2000), "An empirical study of the relationships among purchasing skills and strategic purchasing, financial performance, and supplier responsiveness", *The Journal of Supply Chain Management*, Vol. 36 No. 3, pp. 40-54.

Crowston, K. (1997), "A coordination theory approach to organizational process design", *Organisation Science*, Vol. 8 No. 2, pp. 157-75.

Currie, D. (2001), *Managing Employee Well-Being*, Chandos Publishing (Oxford) Limited, Oxford.

Farndale, E., Paauwe, J. and Boselie, P. (2010), "An exploratory study of governance in the intra-firm human resources supply chain", *Human Resource Management*, Vol. 49 No. 5, pp. 849-68.

Giunipero, L.C. and Pearcy, D.H. (2000), "World-class purchasing skills: an empirical investigation", *The Journal of Supply Chain Management*, Vol. 36 No. 4, pp. 4-13.

Gowen, C.R. III and Tallon, W.J. (2002), "Enhancing supply chain practices through human resource management", *Journal of Management Development*, Vol. 22 No. 1, pp. 32-44.

Guest, D. (2002), "Human resource management, corporate performance and employee well-being: building the worker into HRM", *The Journal of Industrial Relations*, Vol. 44 No. 3, pp. 335-58.

Hugos, M. (2002), *Essentials of Supply Chain Management*, John Wiley, Hoboken, NJ.

Hwang, M. and Rau, H. (2007), "Establishment of a customer-oriented model for demand chain management", *Human Systems Management*, Vol. 26 No. 1, pp. 23-33.

Jayaram, J., Tan, K. and Nachiappan, S.P. (2010), "Examining the interrelationships between supply chain integration scope and supply chain management efforts", *International Journal of Production Research*, Vol. 48 No. 22, pp. 6837-57.

Jin, Y., Hopkins, M.M. and Wittmer, J.L.S. (2010), "Linking human capital to competitive advantages: flexibility in a manufacturing firm's supply chain", *Human Resource Management*, Vol. 49 No. 5, pp. 939-63.

Kam, B.H., Tsahuridu, E.E. and Ming, J.D. (2010), "Does human resource management contribute to the development of logistics and supply chain capabilities? An empirical study of logistics service providers in China", *Research and Practice in Human Resource Management*, Vol. 18 No. 2, pp. 15-34.

Ketchen, D.J. and Hult, T.M. (2007), "Bridging organization theory and supply chain management: the case of best value supply chains", *Journal of Operations Management*, Vol. 25 No. 2, pp. 573-80.

Koulikoff-Souviron, M. and Harrison, A. (2010), "Evolving HR practices in a strategic intra-firm supply chain", *Human Resource Mangement*, Vol. 49 No. 2, pp. 913-38.

Lund, J. and Wright, C. (2003), "Building union power through the supply chain: mapping opportunities and jurisdictional boundaries in grocery distribution", *Labor Studies Journal*, Vol. 27 No. 4, pp. 59-75.

McAfee, R.B., Glassman, M. and Honeycutt, E.D. Jr (2002), "The effects of culture and human resource management policies on supply chain management strategy", *Journal of Business Logistics*, Vol. 23 No. 1, pp. 1-18.

Miles, R.R. and Snow, C. (2007), "Organization theory and supply chain management: an evolving research perspective", *Journal of Operations Management*, Vol. 25 No. 2, pp. 459-63.

Mitchell, V.W. (1991), "The Delphi technique: an exposition and application", *Technology Analysis and Strategic Management*, Vol. 3 No. 4, pp. 333-58.

Nahapiet, J. and Ghoshal, S. (1998), "Social capital, intellectual capital, and the organizational advantage", *Academy of Management Review*, Vol. 23 No. 2, pp. 242-66.

Pfeffer, J. (2005), "Producing sustainable competitive advantage through effective management of people", *Academy of Management Executive*, Vol. 19 No. 4, pp. 95-108.

Pfeffer, J. and Salancik, G. (1978), *The External Control of Organizations: A Resource Dependence Perspective*, Harper and Row, New York, NY.

Scarbrough, H. (2000), "The HR implications of supply chain relationships", *Human Resource Management Journal*, Vol. 10 No. 1, pp. 5-17.

Tracey, M. and Tan, C.L. (2001), "Empirical analysis of supplier selection and involvement, customer satisfaction, and firm performance", *Supply Chain Management: an International Journal*, Vol. 6 Nos 3/4, pp. 174-88.

About the author:

Sanjay T. Menon is an Associate Professor of Management in the Department of Management and Marketing at Louisiana State University Shreveport. His current research interests include employee empowerment, leadership, and supply chain management. Sanjay T. Menon can be contacted at: sanjay.menon@lsus.edu