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## **People**

### **Where ERP Systems and Supply Chain Management Converge**

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#### **INTRODUCTION**

The value of human capital, business process management and organisational design is being rapidly transformed by the increasing adoption of company-wide computer-based business management software. Not only is this changing the skills set of employees, requiring of them to have more knowledge of Web-based technology, but it is also putting pressure on developing countries to rapidly embrace electronic communication. Although this economic revolution is dominated by the implementation of Web-based technology, it is increasingly being recognised that competitiveness is contingent on human capital relationship management combined with the adoption of advanced technology, specifically in realising the value-adding potential of supply-chains.

The purpose of this paper is to examine how HR management is changing as it merges with electronic business software. Against this background the paper then describes how supply-chain management<sup>1</sup> and its traditional focus on logistics and product demand and supply, is incorporating important HR considerations because of an emphasis on relationship management in order to optimise the chain. Finally, some considerations of the relationship between electronic HR management, supply-chain management and sustainable development are outlined.

#### **THE TRANSFORMATION OF HUMAN RESOURCE MANAGEMENT**

As with all aspects of business, HR has not been able to evade the beat of the company drum to become more globally competitive. This call has paralleled a demand to adapt HR to comply with a new world dominated by computer-driven information technology. These events have breathed fresh life into HR as it transforms itself into a value-adding strategic function that is congruent with the prerequisites of a computer-based economy. Traditionally, HR functions included forecasting personnel requirements; recruitment; orienting and training employees; management and organisational development; appraising performance; career plans; compensation systems; serving as an intermediary between an organisation and its union(s); discipline and grievance systems; health and safety; providing assistance to employees with personal problems that influence their work performance, and employee communication systems (Byars and Rue, 1991:6).

During the past two decades, the ever-evolving and expanding role of HRs has been the subject of much debate. There is general consensus that the 'new' HR practitioner, in order to add value to an organisation, must be a person who is innovative and has substantial knowledge of business processes. As business partners involved in strategic decision-making, HR staff are increasingly required to manage an enterprise's intellectual capital, act as transformation facilitators and change managers, and manage an increasingly culturally diverse workforce. Although still requiring that HR ensure organisational administrative efficiency, a company looks upon the HR department as a consultant in employee relations management and business-process re-alignment, in order to meet the demands of a competitive economy. Consequently, 'being an effective HR professional does not mean simply moving from operational to strategic work as the new challenges demand; it means learning to master both operational and strategic processes and people. For today's HR professionals to deliver value, they must fulfil multiple – not only single – roles' (Brewster et al., 2003:5). This implies a strategic partnership role

through the alignment of the HR strategy with the company's broader strategic vision. It requires that HR broaden the base of their competencies to include knowledge not only of people, but also of the economy, business, and information technology. In this process they can become active participants in cross-functional teams, thereby reducing the functional silos.

*Drives to embrace an Electronic Human Resource Management solution.*

What are the features of the new human capital management?

**Table 1** The New Human Resource Management

<b>CHANGE DRIVERS</b>	<b>EMERGING HR</b>
<p><b>Economic</b></p> <ul style="list-style-type: none"> <li>• Increasing global competition</li> <li>• Business downsizing</li> <li>• Global networking of management, workers, and customers</li> <li>• Employees need to contribute in a quantifiable way</li> <li>• Further integration of technology into all business functions</li> <li>• Automatisation of HR-related processes and utilisation of portals</li> <li>• Increase in transformational leadership</li> <li>• Need to retain quality employees</li> <li>• Growth of electronic business</li> <li>• Growing competition and cost cutting, especially labour cost</li> <li>• Increase in HR-outsourcing</li> <li>• Need for real-time information</li> </ul> <p><b>Organisational</b></p> <ul style="list-style-type: none"> <li>• Increase in virtual organisations</li> <li>• Decline in regional offices</li> <li>• Growth of remote worker or mobile worker<sup>ii</sup></li> <li>• Pressure to tabulate vast amounts of information about large workforces – this is complicated by the growing numbers of transnational or multinational companies</li> <li>• A data-save mentality with more pressure to back-up information and provide mobility of data and people.</li> <li>• Increased laptop use and email communication</li> </ul> <p><b>Individual</b></p> <ul style="list-style-type: none"> <li>• Growth of new psychological contracts between employers and employees, with less job security, and less corporate loyalty</li> <li>• Movement to a people orientation combined with a production/process/profit orientation</li> <li>• Demand for employee self-responsibility</li> </ul>	<ul style="list-style-type: none"> <li>• Elimination of duplication</li> <li>• Streamlining of personnel administration</li> <li>• Increase in integration of HR functions</li> <li>• Increasing integration of HR into all business functions</li> <li>• Forecasting employee performance</li> <li>• Forecasting personnel needs of an organisation</li> <li>• Business partners in decision-making</li> <li>• Pressure to plan, monitor, control</li> <li>• Track all HR processes and procedures to ensure RoI and value creation</li> <li>• Managing of virtual teams in a virtual structure</li> <li>• Client/customer focus with a service orientation</li> <li>• Bridging the digital divide</li> <li>• Strategic leadership role</li> <li>• Collaborative thinking</li> <li>• Internal HR consultants</li> </ul>

*Electronic Human Resource Management as a Facilitator.*

The current business environment offers HR a number of opportunities that are more realisable than was the case previously in a paper-driven environment through the implementation of a computer-based HR system. Despite the fact that any technology remains a tool and can never replace good HR practices and policy, the implementation of an e-HR system can enhance the status and productivity of HR staff.

In what ways is e-HR facilitating HR to become a business partner and add more value? With HR moving away from a paper-intensive system to an electronic-based activity, HR staff are released to play a more consultant or advisory support role, rather than performing only an administrative function. This move enables HR to assume a more business-orientated focus by aligning itself more closely with the core of an enterprise's primary activity. For example, with products such as SAP's Strategic Enterprise Management, which enables real-time monitoring of all key performance indicators, like overtime and leave, HR strategy can align itself more flexibly with the strategic objectives of the business. Such computer-based balanced scorecard systems enable HR policy and procedures to be more adaptable to changing business needs and economic conditions.

The change brought about by the introduction of integrated and other stand-alone business software programmes to facilitate the execution of HR-functions is not restricted to large private-sector enterprises, but is increasingly characteristic of the public sector. This process of adoption of computer-based management technology is concomitant with the global move by governments to adopt various forms of electronic government in order to enhance their efficiency and improve service delivery. Further, with the introduction of products such as SAP's All-in-One and Business One, the next five years will witness the role out-of-management information systems into small and medium companies. Facilitated by ease of access and technological standardisation through the use of Internet-based enterprise portals, HR will form an integral part of the global business network.

With the introduction of enterprise resource planning (ERP) systems and the enhanced integration of software to manage functions such as the Supply Chain and Customer Relations, HR has the potential to move from the periphery of a company to becoming a core business-solution function. This process is facilitated by an ever-increasing acceptance of the fact that the harnessing of an enterprise's intellectual capital is a primary competitive resource. Computer-based management systems facilitate this process by providing analytical tools that enable HR to push to decision makers HR-related information that is mission-critical to a company's economic success. An example is the generation of reports that capture and interpret employee qualification profiles, labour availability, and compensation statistics on a national and global level. This enables a company to make more informed decisions regarding relocation, investment, and better utilisation of existing and potential employees.

Even more importantly, HR-computer-based systems enable the generation of alternative scenarios for the restructuring of an organisation. This means that the practice of business process realignment and consequent work and organisation restructuring can be more closely assessed in terms of economic benefits and implications. With technology changing faster than organisations and individuals, the implementation of business software programmes is rapidly transforming outmoded organisational structures, and driving changes in business processes. With the development of data-warehousing solutions, which enable HR and other data to be extracted from multiple systems at a local and inter-organisational level, business decision making is even better informed.

E-HR has the potential to make a company more agile, flexible, adaptable, and responsive to today's rapidly changing and uncertain economic environment. The adoption of an electronic HR system enables employees to become more self-responsible and self-reliant. In a paper-based system or a computer-based system without Internet connectivity, HR staff is responsible for maintaining an employee's personal data. Furthermore, a vast amount of time is spent answering employee queries relating to leave and salary. With the introduction of either an Internet or intranet-based portal which is accessible to employees, employees are able to assume greater ownership of their own personal information, and to access data such as ordinary and sick-leave entitlement. In addition,

through the instituting of workflow, employees are able to manage their own requests for such things as taking vacation. The saving of time spent on the administration of employee data frees HR staff to be more production and focus more on their core responsibilities. Because of these benefits, e-HR systems continue to gain popularity (Liebs, 2002).

Although HR is responsible for assisting employees to move to the 'techno-age', accessing and maintaining of personal records requires a minimum knowledge of computer literacy and infrastructure. Because of mobile technology, the benefits are enhanced in the case of a globally dispersed workforce or multi-plant enterprise, because personal information can be accessed anywhere and at any time. It therefore makes the self-managed team, and the virtual team and organisation more of a reality.

Central to becoming competitive in today's knowledge-based economy is the sourcing, training, and retaining of the most competent employees. An e-HR system allows for better human capital utilisation by enabling employers to manage their recruitment process more effectively. Not only does this improve the image of the company, but it also enables employers to match employee skills or competencies to the requirements of a position in a more systematic and objective manner. By storing a pool of potential applicants, both internal and external to the company, HR can very rapidly run a report that not only profiles the most suitable applicant, but also, if need be, can suggest possible training needs. In this way, the full potential of applicants and current employees can be realised and harnessed. Furthermore, the image of the recruitment function is improved by the more effective monitoring of the process in terms of those who have been rejected, are in process, or are to be hired. In all these cases, correspondence is automatically generated, keeping both applicants and management informed.

In an e-HR environment, employee training and development are better managed. The computer enables the accessing, in a fast and effective manner, of employees who require retraining or who need to be reassigned to ensure that their capabilities are fully utilised. By storing employee qualifications and training, a company can very rapidly identify current and future skills requirements. The success of training can also be more effectively analysed. In this way, HR can embark on a more coherent succession-planning policy, and manage career development in a way that meets the ever-changing skills demands of an enterprise. This is important to a fast-changing competitive company which must be agile in product development and labour utilisation.

Furthermore, the implementation of business software management systems gives more focus to HR's goals of empowering employees, retaining quality employees, and ensuring that a company is constantly acquiring new competencies to remain globally competitive in terms of its skills profile. From the perspective of both the company and the individual, there must be a commitment to life-long learning, to remain abreast of the rapid changes in technology and the demands of the economy.

An enterprise's intellectual capital is an important source of competitive advantage. However, to realise this objective, intellectual capital needs to be effectively managed in such a way that an employee's knowledge is optimally harnessed, accessed, and utilised. An e-HR system has the capacity to serve as a repository of such knowledge, specifically in terms of policies and procedures. It also allows for the storage of data, and facilitates better accessibility of such data. By providing access to such data, the former paper-based HR department moves away from being a gatekeeper of data to a facilitator of data distribution company-wide. In this way a culture of innovation and creativity can be encouraged, and horizontal and vertical communication and collaboration stimulated. In addition, managers who have access to the data are in a better position to make decisions in real time.

As computers become part of everyday business, the introduction of computer-based technology into the HR function allows for an opportunity to measure HR's contribution to the bottom line. Although the contribution of an e-HR solution is the subject of debate and research, a number of tangible quantifiable benefits can be identified: for example, the introduction an employee self-service, which allows for the automation of record-keeping, thereby reducing the number of questions to the HR department. The electronic management of benefits, enrolment, and payroll can cut costs and improve employee and management access to information (Greengard, 2000). Furthermore,

electronic-based training can make employee training considerably less expensive, by being available any time and anywhere, thereby removing the need for employees to travel. In addition, through the introduction of an e-HR system, HR can become more efficient and cost-effective (Liebs, 2002).

The current emphasis on value creation has meant that HR is moving away from an exclusive people orientation to a combined focus that brings together production, process, and people-relationship management. The first and most obvious change is a change in the name itself – from human resource management to human capital management. In addition to a change in language, there is a more materialistic instrumental economic concept of people, because of an emphasis on quantifiable value. Even qualitative aspects are becoming the subject of evaluation in terms of RoI, for example, an attempt to place a value on leadership style, innovation, and tacit knowledge.

This process of HR change is facilitated by HR professionals who are trying to leverage the savings from e-HR to make senior managers take HR more seriously (Liebs, 2002), and to change many managers' historical negative image of HR. In addition to improving on HR functional processes, business software systems, by integrating HR more deeply into the business process, afford HR an opportunity to improve on service delivery. A tangible advantage is time saving through the introduction of an electronic time-management system that is integrated into the HR system. Such systems allow for the use of 'biometric clocks that are triggered by an employee's eyeprint or thumbprint' to track hours worked. In this way, key performance indicators that are central to the company's central mission can be more accurately monitored and assessed.

However, despite the potential of e-HR to enhance the image of HR through its contribution to the bottom line, a number of problems still need to be addressed. It is often difficult to determine the value of a skill; gaps remain in the value chain because of a fracturing of the business process; the gap is widening between those who are computer-literate and those who are not; there is a perception by employees that technology will displace them; and technology sometimes has a negative impact on employees. The latter has evoked considerable debate as to the implications of a loss of face-to-face interaction between employees; the dehumanising influence technology may have on the workplace, and a disregard for employee privacy with the implementation of technology to monitor employee computer-based activity. Furthermore, employees whose jobs are substantially changed (or deemed obsolete) through technology may experience subsequent economic hardship (Milkovich and Baureau, 1988). The increased number of e-learning opportunities may cause employees to become overloaded with opportunities to learn, but unable to make the time commitment needed to take advantage of these opportunities (Gilster, 2000).

In this process of leveraging HR's value in an e-HR environment, HR is more able to become client- or customer-focused. This means that employees and potential employees can be better serviced. There is also more opportunity for HR to fulfil the role of internal consultant to both management and employees to ensure that maximum advantage is obtained in the utilisation of labour, the extraction and management of intellectual capital, and the realisation of an enterprise's competitive advantage. For example, before and during negotiation, various scenarios can be developed and financially assessed, using an HR information system. Likewise, during the contractual bidding process, project viability can be more easily assessed by doing an electronic match-up of production output, human cost and expected profit. In addition, allowing for both vertical and horizontal costing – meaning both intra- and inter-enterprise costing – management is in a better position to make decisions. For example, using integrated business systems such as SAP's Management Self-Service or Management Cockpit, such decisions can include pertinent environmental variables.

The introduction of an e-HR system often presents management with an opportunity to outsource various HR functions, such as pay administration and training. For example, benefit administration can be conducted via the Web. There is evidence of substantial saving as a consequence of this strategy (Liebs, 2002).

Finally, an e-HR system allows for the generation of reports or queries in real time at a national and trans-national level. This is advantageous in companies that need to tabulate information about

a large workforce. It enables the analysis of, for example, personnel record, employee benefits, and the recruitment process. The latter is important, as staff who are involved in recruitment are able to source and track applicants on an ongoing basis, and report on headcount and potential future skills shortages or over-staffing. It is therefore important for 'employee relationship management'. The latter refers to the streamlining of the 'life cycle' of employees – how they are hired, trained, managed, and retrained (Siegele, 2002).

## **RELATIONSHIP BETWEEN E-HR MANAGEMENT & SUPPLY-CHAIN MANAGEMENT (SCM)**

In this process of HR transformation, one of the most significant changes is the permeability of the boundaries of various business functions. Individuals, especially those at a senior level, are expected to have a more holistic concept of multiple business functions; this is being promoted by the formation of collaborative teams, knowledge management, and information sharing. As functional silos in the traditional approach to business are eroded by the implementation of cross-application functionality of enterprise-wide planning business systems, there is a merging of terminology used by various functionaries (Grossman, 2004). Furthermore, an enterprise's competitive success increasingly depends on an integrated business strategy and a broad vision of business, combined with a process view of tasks and activities (Trent, 2004: 58).

However, a parallel contradiction is a move, supported by the emergence of increasing process technology, to a neo-Taylorism with an increasing demand for specialisation, to ensure greater accuracy, efficiency and productivity. In many industries – from educational institutions to manufacturing – structures are becoming more managerial with a centralisation of control and with work processes from factory to clerical work being de-skilled despite the requirement for a more knowledgeable and skilled workforce. One justification given by senior management for this approach is to expedite decision-making. With the adoption of Web-based technology, ERP systems are centralising decision-making in company head offices, making regional and local offices redundant; alternatively, they are being downsized, coupled with less decision-making power and administrative responsibility.

In all these processes of change accelerated by the implementation of computer-based business technology, the value of people or human capital is enhanced, and organisations are increasingly functioning in a network-based economy<sup>iii</sup>. The latter networks are not only intra-organisational but also inter-organisational systems. Going beyond two-way communication to encompass multiple customers and suppliers, such networks have come to dominate the nature and structure of the supply-chain, and highlight the significance of the human element in SCM (Grossman, 2004). Consequently, SCM is no longer only the province of logistics, product distribution and supply-chain managers, but is also part of 'the integration of key business processes' (Lambert, 2004:19) incorporating significant human and organisational elements. All employees have a role in achieving supply-chain excellence (Trent, 2004).

Central to ERP systems and the Internet-enabled SCM are individuals who make decisions, manage risks, relationships and processes, negotiate with suppliers, and communicate with customers (Smock, 2003; Trent, 2004). Increasingly, executives are recognising SCM as the management of relationships across the chain. Consequently, SCM is viewed in terms of business process excellence and as a new way of co-operatively managing and controlling a business and the relationships between members (Kanji and Wong, 1999: 1148; Lambert, 2004:19). SCM is not restricted only to managing the flow of goods and information, but extends to the management of the entire value-adding activity (Kanji and Wong, 1999: 1148). This move from a technology or production focus to a more inclusive conception which takes people into account, is enhanced by the formation of collaborative Web-based computer-based information systems which are a major trend



more synchronized supply chain, which yields better customer service, higher quality, lower inventory, and faster delivery'.

For Ince (nd) 'Collaboration commerce is more inclusive than e-commerce. It includes opportunities for cooperation even when the cash register is not ringing'. This situation is increasing because of a global economy based more and more on the interdependence of specialised organisations, increasing use of Internet-based business process technology, tighter co-ordination of suppliers and customers (Håkansson, and Persson, 2004) and the need for better utilisation of scarce human capital. As the skills set of supply-chain professionals expands to include relationship and financial management, in addition to highly advanced computer literacy, business process and retail skills, acquiring suitably qualified employees to ensure supply-chain excellence requires a sound HR recruitment, training and retention strategy.

With the increasing overlap of the two strategies, non-supply-chain-related employees need to be trained in supply-chain principles to work on supply-chain-related teams (Trent, 2004: 58). In this process, supply-chain excellence is achieved through good HR practices and procedures, the correct organisational design, the implementation of advanced computer-based technology, and sound organisational design [refer Figure 2].

**Figure 2** Four pillars of supply-chain excellence

Human Resources	Organizational design	Information Technology	Measurement
<p>SC professionals who can:</p> <ul style="list-style-type: none"> <li>• View the SC holistically in terms of linked processes</li> <li>• Manage critical relationships</li> <li>• Understand the business model</li> <li>• Engage in statistical analysis &amp; fact-based decision making</li> <li>• Practice advanced cost management</li> <li>• Understand electronic business systems</li> </ul>	<p>Organizational design includes:</p> <ul style="list-style-type: none"> <li>• Centrally coordinated supply teams</li> <li>• Executive responsibility for coordinating SC activities</li> <li>• Co-location of SC personnel with internal customers</li> <li>• Cross-functional teams to manage SC processes</li> <li>• SC strategy coordination sessions between business units</li> <li>• Executive buyer-supplier council to coordinate SC</li> </ul>	<p>Real time &amp; shared ITS that support:</p> <ul style="list-style-type: none"> <li>• Demand planning order commitment &amp; scheduling</li> <li>• Distribution &amp; transportation planning</li> <li>• Order Management</li> <li>• Material replenishment</li> <li>• Production management</li> </ul>	<p>SC measures that:</p> <ul style="list-style-type: none"> <li>• Use data from sources visible throughout the organization</li> <li>• Quantity what creates SC value</li> <li>• Use targets that change over</li> <li>• Rely in benchmarking to establish performance goals</li> <li>• Link to business goals &amp; objectives</li> <li>• Feature efficiency &amp; effectiveness</li> <li>• Include assigned ownership &amp; accountability</li> </ul>

Source: Adapted from Trent, 2004:57

## E-HR MANAGEMENT, SCM AND SUSTAINABLE DEVELOPMENT

How does the need for advanced computer-based technology, professional managed supply-chains and an adequate supply of skilled labour impact on the competitiveness and sustainability of developing economies such as those in Africa?

A review by the Economic Commission for Africa (ECA) Economic Report on Africa (2003) of the economic and social indicators of Africa reflects a critical need for concern. At the turn of the century it was estimated that: '81% of the world's AIDS-related deaths, 90% of the malaria deaths, and 23% of the tuberculosis deaths occurred in Africa' (ECA Economic Report 2003:46). This social devastation of human capital is compounded by regional conflict, slow adoption by African governments of ITC, and limited economic growth. In 2002, of the 53 countries in Africa, only five achieved the 7% growth rate required to meet the Millennium Development Goals, 43 had growth below 7%, and five registered negative growth (ECA Economic Report 2003:30). Despite the highest rate on Rol in the world, the continent since the mid-1990s has had difficulty in attracting foreign investment: for example, in 2002, foreign investment dropped 27% or \$6-billion. Poverty is also fuelled by rising foreign debt. For the period 1970-96, real capital flight was almost \$250-billion. The following succinctly highlights Africa's economic plight.

*External borrowing appears to be the single most important determinant of capital flight (Ndikumana & Boyce 2002). In 1970-96 roughly 80 cents of every dollar that flowed into the region from foreign loans flowed back out as capital flight in the same year, suggesting widespread debt-fuelled capital flight (ECA Economic Report 2003:45-6).*

In addition to the need to increase intra-African (Africa-to-Africa) trade, trade in the global market place is vital<sup>vi</sup>. However, with the near absence of e-banking and the infrastructure to integrate into the global e-business network, the short-term prospects of African companies becoming first-tier suppliers in trans-continental supply-chains remains bleak. This is compounded by the near absence of the implementation of functional or integrated ERP systems and HR development policies.

## CONCLUSION

The need for change in HR and SCM parallels the need for new business models that enhance a company's competitiveness, deal with an increase in mergers, and the growth of a knowledge-based real-time economy. Technological change means that positions are constantly evolving, as well as the required skills sets. In its attempt to ensure value, HR needs to constantly adapt to new economic demands. HR involves new responsibilities and relationships, a shift in activities and objectives, and increased pressure to align business with employee goals and development needs. Such change is often compounded in environments where there are different integrated enterprise-wide business systems, combined with independent best-of-breed systems and legacy-based home-grown systems.

While critical to competitiveness, the introduction of e-HR is no panacea to all business or HR problems. Technology has a multiple impact. As computer-based technology becomes more affordable, telematic and digital technology is becoming a common feature not only of large companies, but also small and medium-size enterprises. The adoption of computer technology and associated features such as teleconferencing, voice mail, and telecommunicating, is influencing the way organisations are changing and being managed. Likewise, managing a competitive supply-chain takes the requirement of computer-based technology even further, because of the need to integrate on a global scale multiple enterprises that can respond quickly to company capability and market demand. This co-revolution of technology and business process management is premised on global enterprise integration, collaboration, and reliability of product supply and delivery.

For developing countries to become competitive, and move towards a self-sustaining level of development, requires a reciprocal adjustment of their technology and economic policy, business practices, and development policy. As long as countries, notably African countries, fail to formulate comprehensive development strategies to ensure the provision of skilled knowledge workers, are slow to change their traditional business practices, and create barriers in the transformation to advanced forms of technology, they will be unable to compete in the global Web-integrated economy. If Africa does not speed up its adoption of computer technology, current Web-based supply-chains based on e-sourcing and e-auctions will deepen the digital divide between developed and developing countries. Although developed and developing countries face a number of challenges in their adoption of computer-based technology, with the emerging global electronic culture, no country or organisation will be able to avoid implementing an electronic HR management and supply-chain management systems. This means that 'unless businesses quickly embrace this new paradigm [of sharing information via the Internet] they will not be able to compete in the emerging digital economy' (Grossman, 2004:391). However, it is critical that HR should ensure that computer-based management information systems are used in an ethical and socially responsible manner. A big part of running a real-time enterprise will continue to be managing relationships (Siegele, 2002).

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May 20, 2005.

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## NOTES

<sup>i</sup> The phrase 'supply-chain management' originated in the early 1980s (Oliver & Webber, 1982; in Harland, 1996) and is attributed to Tom Stallkamp, of Chrysler Corporation (Smock, 2003:47). Various definitions have been proposed, SCM in this paper is used to refer to 'the flows of material, information, and finance in a network consisting of customers, suppliers, manufacturers, and distributors. Material flows include both physical product flows from supplier to customers through the chain and reverse flows via product returns, servicing, recycling, and disposal. Information flows involve order transmission and delivery status. Financial flows include credit terms, payment schedules, and consignment and title ownership arrangement. These flows cut across multiple functions and areas both within a company and across companies (and sometimes industries)' (Lee, 2000).

<sup>ii</sup> In July 2001 a US report noted that the number of workers telecommuting had increased 20% per year during the past decade. Today some 16.5 million people work from home at least once a month, and 9.3 million do so at least once a week (Radigan, 2001).

<sup>iii</sup> For a detailed discussion of different types of organisational systems and electronic data interchange (EDI) refer to Cash (1985), Johnston & Vitale (1988), Senn (1999), Swatman & Swatman (1992) and Allen, Colligan, Finnie & Kern (2000) in Grossman (2004).

<sup>iv</sup> Varghese (2003) proposes that an 'enterprise should identify a subset of partners as part of its "strategic supply network' or joint family'. In this case 'the enterprise aims to build irreplaceable and meaningful relationships that involve sharing proprietary information and making joint decisions'.

<sup>v</sup> Covisint, that includes Ford GM, Daimler-Chrysler, Renault and Nissan. (Varghese, 2003).

<sup>vi</sup> In 2002, trade among Sub-Saharan African counties accounted for 12% of Sub-Saharan exports (ECA Economic Report on Africa, 2003:40)