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HRM and Knowledge Management: Responding to the Challenge

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Abstract

Knowledge is increasingly claimed to be a key critical resource and source of competitive advantage in the modern global economy, especially with the rise of the service economy, the growth in the number of 'knowledge workers', the increasingly rapid flow of global information, and the growing recognition of the importance of intellectual capital and intellectual property rights. It is also increasingly claimed that all organisations will have to excel at creating, exploiting, applying and mobilising knowledge to create and maintain sustainable competitive advantage. The resource-based view of the firm suggests that organisations will need to be able combine distinctive, sustainable and superior assets, including sources of knowledge and information, with complementary competencies in leadership and human resource management and development to fully realise the value of their knowledge. Issues for HRM include how organisations should be structured to promote knowledge creation and mobilisation, and how to develop a culture and set of HRM policies and practices that harness knowledge and leverage it to meet strategic objectives. This paper outlines the challenges posed by knowledge management for HRM, and presents a model of knowledge creation, knowledge migration and knowledge profiles as a key agenda item for HRM research and practice.

Introduction

Knowledge is increasingly recognised as a key organisational asset and its creation, dissemination and application as a critical source of competitive advantage (e.g. Lester, 1996; Lloyd, 1996; Marshall, Prusak and Sphillberg, 1996; Aliaga, 2000; Sveiby, 1997). This process is often seen as requiring the deployment of a combination of core skills and competencies in information as well as in human resource management, including the creation and maintenance of organisational structures and cultures that facilitate organisational, team and individual learning and the sharing of knowledge and information. Much recent work on knowledge management (KM) has come from information management (IM) perspectives, with the appointment of Chief Knowledge officers with IT backgrounds (e.g. Lank, 1997) but a need to integrate this work with perspectives drawn from human resource management, leadership, and organisational learning theory and research is often asserted; as Mayo (1997, p33) says "it is the creation and transfer of knowledge between people that causes the other components to grow and which increases value". If HRM is to set the agenda for KM and adequately respond to the challenges KM sets for it, a more robust model of KM and HRM needs to be developed to guide research and practice in this area. This paper develops such a model, drawing on viable systems theory and IM perspectives as well as HRM theory, research and practice. Since knowledge is a complex and intangible asset involving both technical and cultural dimensions, it is unlikely that it can be adequately theorised or managed without involving perspectives drawn from both IM and HRM (Iles and Yolles, 2000).

What is KM?

For Davenport and Prusak (1998, p5), knowledge is 'a fluid mix of framed experience, values, contextual information, and expert insight'. Within psychology and educational research on expertise, researchers have often distinguished formal or declarative knowledge (knowing that) from procedural knowledge (knowing how) and conditional knowledge (knowing when and where, or under what conditions). Further dimensions have been added to the basic distinctions, such as the meta cognitive or meta knowledge dimension (knowing about knowing, or knowing that one knows) and the skills dimension (e.g. Boerligst, van der Heijden and Verte, 1996). In addition, motivational aspects, self-insight, social skills, social recognition and growth and flexibility capacities seem

important moderators of professional development and growth of expertise in knowledge workers. Though there has been much attention given to issues of employee and organizational competences (e.g. Prahalad and Hamel, 1990), there has been less theorising about expertise and its links with competence and performance, especially the development of superior domain-specific skills and knowledge. Organizations often lack the means to measure expertise and manage and develop human capital effectively to shape business strategy. Most theories of expertise have traditionally come from cognitive psychology's attempts to identify the distinctive characteristics of experts in information processing and problem-solving; more recently, knowledge engineering and artificial intelligence theorists have attempted to model expertise (Herling, 2000) through neuristic, structural and competence models. However, we also need to attend to the importance of the social recognition of knowledge; for example, how and by whom knowledge is recognised, and how reputation and credibility are built in knowledge creation and transfer.

For Bassi (1997), Knowledge Management (KM) is the process of creating, capturing, and using knowledge to enhance organisational performance, such as documenting and codifying knowledge and disseminating it through databases and other communication channels. Any comprehensive theory of KM must address issues of knowledge assessment, creation, storage, distribution, and its application to business operations and organizational strategy (Herling and Provo, 2000). The concept of intellectual capital has also become increasingly important for KM; for Stewart (1997, p68), 'success goes to those who manage their intellectual capital wisely', whilst for Edvinsson and Malone (1997, p40) it is 'the possession of the knowledge, applied experience, organizational technology, customer relationships and professional skills that provide a competitive advantage'. The distinctions often made between human, structural and customer capital draw attention to issues of vital importance to HRM. Human capital refers to the skills, knowledge and abilities of personnel, focussing on the importance of investments in skill by both organizations and people themselves, again emphasising issues of motivation and commitment. Structural capital refers to the ways individuals and organizations are connected with knowledge, data and expertise through technologies and processes (e.g. patenting, copyrighting or shielding), as well as to organizational structures, cultures, systems and procedures, especially communication flows and channels. HR practices are therefore central in protecting intellectual capital and in enhancing contributions to collaborative activity. For example, Hamel (1990, p54), argues that "management must effectively locate the interface points, staff and train appropriately, develop sound reward systems, and monitor the exchange of information". Customer capital, the value of the franchise and its ongoing relationships with those to which it sells, is often the most poorly managed intangible asset; one strategy is often advocated to engage customers in such HR areas as recruitment, selection or training to enhance their commitment. Corporate value then arises from the interaction of these three components of intellectual capital, especially the transformation of tacit (unspoken, residing in people and teams, cultures and rituals) to explicit (formalised, accessible) knowledge, a distinction we shall develop later in this article (e.g. Nonaka and Takeuchi, 1995).

However, this rather static model of intellectual capital will be developed further here in favour of a more dynamic, systems-based approach that emphasises the connections, feedback and flows of knowledge that enable HR to become 'a natural partner of and the strategic link in creating, developing and supporting an intellectual capital environment' (Harris, 2000, p34).

There is increasing evidence that focusing on HR adds financial value, whether using accounting or perceptual measures of performance (e.g. Delaney and Huselid, 1996). However, traditional financial valuation systems often fail to recognise the value of investments in HR, highlighting only their costs (e.g. Provo, 2000; Aliaga, 2000). Responding to the challenges posed by KM may help HR overcome this problem, as KM involves the recognition, documentation, and distribution of both explicit and tacit knowledge residing in organisations' employees, customers and other stakeholders for business advantage (Rossett and Marshall, 1999). It is often asserted that this requires new ways of thinking and acting, new policies and practices, new technologies and new skills and job requirements (Davenport and Prusak, 1998; Stewart, 1997), and thus new roles for HRM (Nijhof, 1999). However, there is less agreement over what specific changes are necessary in organizational structure, culture and behaviour to facilitate KM, or what new roles are required for HRM. One of the purposes of this paper is to develop a conceptual model of knowledge migration, seen as a key dimension of KM, drawing on perspectives drawn from both IM (especially systems perspectives) and HRM. First, however, we need to explore some of the implications of KM for HRM theory, research and practice, and explore ways in which HRM needs to be transformed in ways that can help leverage the value of knowledge.

The growing importance of KM and its implications for HRM

There has been much recent discussion in both the USA and UK in particular of knowledge workers, knowledge-intensive firms and the critical role of organisational competencies. The demand for knowledge intensive services is growing rapidly as companies are increasingly involved in services rather than goods (Nijhof, 1999). In the USA the percentage of people who work with things or deliver non-professional services has fallen from 83% of the workforce in 1900 to around 41% by 2000, whilst the percentage of those who primarily work with information has risen from 17% to around 59% (Stewart, 1997). The distinction between goods and services is growing less clear as manual and craft work increasingly incorporate intellectual work and intelligent products are increasingly developed. The growing importance of KM is often seen as a consequence of the move from an industrialised to an information based economy and the rise of 'knowledge workers' and 'symbolic analysts' in advanced (post) industrial societies, with knowledge and expertise focused to solve organizational problems. However, not only has insufficient attention been given to the role of HRM in KM (e.g. Scarbrough et al, 1999) but the implications of KM for HRM and the challenges it poses for its status, role identity and *raison d'être* have not been fully appreciated.

In the UK, Scarbrough (1999) and Scarbrough et al (1999), surveying HRM and KM for the IPD, identify knowledge formation and acquisition, knowledge absorption, and knowledge retention as key processes. They argue that technology alone cannot fully capture and manage innovative thinking in an organisation, and that HR needs greater attention in promoting information sharing. A technology-driven view, focusing on flows of information and groupware, intranets and IT tools, is becoming dominant, losing sight of people and sidelining HR. KM, however, is a process, not a technology, and is linked to changes in the ways people work. A supportive culture is seen as necessary, supported by for example performance management systems that link rewards to individual contribution to projects, creating an internal market for knowledge. Encouraging people to use their expertise, and making specific reference in appraisal and reward management to passing on skills and knowledge to others may also be necessary. There may also need to be appropriate HR mechanisms, such as good practice in selection, training and reward, and an appropriate HR role in managing change and overcoming resistance to sharing information. However, rewarding knowledge sharing may reinforce notions of individual property, undermining teamwork - opportunities to work on challenging projects or be innovative may be rewards in themselves, generating professional recognition or influence on future projects. Short-term financial incentives may also undermine longer-term learning. Basing KM on IT may therefore place too much emphasis on the supply of knowledge, and too little on how we use it.

There have been attempts to develop models of KM that acknowledge the importance of HRM. For example, Toracco (2000) outlines a model of KM and HRD that identifies four basic units: creating a culture for KM; developing a model for codifying knowledge; addressing the accessibility of knowledge; and focussing on methods and systems for KM, with emphasis on individual knowledge. Drawing on theorising on expertise and tacit/explicit knowledge, Toracco (2000) refers to distinctions between knowledge scope (e.g. job role Vs sectoral knowledge), type (e.g. explicit Vs tacit knowledge), level (basic Vs expert) and specificity (domain generality). In terms of accessibility, Toracco (2000) refers to the availability of knowledge in terms of its source, its half life, and its degree of exposure; in terms of methods and systems for KM, to strategies and techniques for identifying knowledge and making it available to others. He distinguishes between depth (the extent knowledge is made explicit), time constraints, structure (e.g. methods for archiving quantitative and qualitative data) and roles (ways people are allocated to capturing and disseminating knowledge). Only KM initiatives grounded the organizational culture are likely to succeed; otherwise, users may be reluctant to share knowledge. KM needs to be integrated with HRM, IM and competitive strategy. KM is seen as involving three phases, learning, knowledge creation and knowledge use.

However, HR may not yet be ready to respond to the KM challenge. Rossett and Marshall (1999) reported that US HR professionals considered that organisational culture and policies, access to information, developing enabling technologies and the need to learn about KM were key KM issues for HR. A need to encourage employees to put their knowledge products on shelves was also emphasised (Davenport and Prusak, 1998). Employees however may be reluctant to give away that which is seen as vital to their identity and job security. People will increasingly need to be connected to data, experts and expertise (Stewart, 1997). HR staff themselves may also need training in terms of their roles in KM. The survey indicated that KM is not generally pervasive in the perspectives of HR respondents, but some positive movement was detected. 70% of respondents worked in organisations that captured some knowledge, such as best practices or lessons learned, mostly by paper based formats. Only 16% worked in organisations using technology based systems to capture and access knowledge, mostly those in consultancy firms. These respondents appeared also to be more likely to have access to formal KM systems comprised of people and technology dedicated to capturing, distributing and maintaining knowledge (as well as being more likely to report unrestricted access to information, supportive knowledge systems, encouragement for communities of practice, being knowledge workers, and working in reduced command and control environments). HR professionals rated their units more highly (in terms of being customer focused, finding resources, linking resources to needs, and being knowledge workers who share ideas) than the larger organisations in which they resided. Problems were reported over information overload, restricted access to information, and managerial command and control systems.

In addition, KM poses additional challenges for specific dimensions of HRM, such as employee resourcing and career development, HRD, HRM in creativity and innovation and HRM in SMEs. The next sections discuss the challenges posed by KM to HRM in each of these areas.

Implications of KM for employee resourcing

Knowledge Management (KM) as a concept has attracted much attention as the global economy becomes increasingly knowledge-driven (e.g. Leadbeater, 1999; Scarbrough et al, 1999), but only scant attention has been given to the implications of this for employee resourcing and career management. As organizations espouse developing new sources of competitive advantage based around knowledge creation and development, they will seek knowledge external to the company through networking. Hence, management of the knowledge supply chain may become more important than labour supply (Leadbeater, 1999). The implications for employment are profound, as contracting, performance assessment and reward management processes used to secure knowledge may need to be very different from those used to secure labour. Self-employment and portfolio careers may become increasingly common, with organizations increasingly 'cellular' coalitions of self-employed knowledge workers (Allred et al, 1996). The increasingly self-managed nature of work, with more entrepreneurial workers increasingly recognising knowledge as a form of personal 'equity', may lead to training being seen as an investment in knowledge creation, and knowledge workers being offered a direct stake in the organization through equity pay and share options. The management of careers may then become an HR platform for integrating and sharing knowledge

as people transfer between jobs, functions and organizations.

We predict that different organization clusters will pursue different strategies (Table 1). In **baseball team** organizations (Miles and Snow, 1978; Sonnenfeld and Peiperl, 1988) HR's role in KM may be seen predominantly as servicing the knowledge needs of star performers and co-ordinating changing knowledge specialisms. In **clubs**, there may be a greater emphasis on group contribution, the development of systems for codifying and disseminating collective knowledge, and translating knowledge into collective assets. In **academies**, there may be a mixture of KM policies, differentiated according to employment position. In **fortresses** there is likely to be an absence of a policy, or only a weak policy, or a constantly fluctuating policy.

Table 1

Psychological contract types, organizational strategies, knowledge management policy and career type (adapted from Miles and Snow, 1978; Sonnenfeld and Peiperl, 1988; Rousseau, 1995; Baruch and Peiperl, 2000)

Type	Business Strategy	HR Strategy	Career Type	Contract	Anchor	Cluster	Focus	K
Defender	Small no of stable products	Make: promote and develop from internal labour market	Club	Relational	Security/stability lifestyle general managerial service/dedication	Basic, formal active planning	Career Management	Col
Prospector	First to market	Buy: hire expertise as needed from external labour market	Baseball Team	Transactional entrepreneurial/creativity challenge autonomy independence	technical/funational directional	Multi-Planning	Career services	Ind
Analyser	Blend of above	Blend of above	Academy	Both, differentiated	general managerial technical/funational challenge	Active management active planning Multidirectional	Mutual	Dif
Reactor	Inconsistent Hybrid	Inconsistent Hybrid	Fortress	Inconsistent Hybrid	challenge	Formal basic	Unclear	We

Managerial careers, and the careers of knowledge workers in general, may thus increasingly come to resemble those of performing artists, where individuals with distinctive contributions come together to work on short-term projects. Parties will share an interest in effective collaboration, the long-term management of reputation, image, and visibility, and the development of distinctive portfolios. Perhaps concepts like trust, teamwork and professional commitment will grow in importance as organizational commitment and loyalty decline, with organizations coming to resemble collections of ad-hoc, transient projects. There are signs that, though organizational tenure is declining, occupational/professional tenure is growing (Sparrow, 2000) and that occupational/professional identity and commitment are replacing organizational commitment and loyalty, becoming increasingly important foci for research in HRM (e.g. Sparrow, 2000; Pitt, Ties, Sands and Rouncefield, 2000). For example, Pitt et al (2000) have shown that professional commitment (especially affective professional commitment) is a stronger predictor of service quality among biomedical scientists in the UK than organizational commitment.

For performers (Jackson et al, 1998; Hirsch and Jackson, 1996), a variety of knowledge and skills are necessary: networking, flexibility, versatility, managing a variety of work roles, working outside the profession, continuous professional development, perseverance, resilience, entrepreneurial skills, the need for good agents, the importance of reputation, and time management skills all seem important determinants of career success. These may well become increasingly important for both knowledge workers and managers.

Managerial careers may become increasingly 'boundaryless' and require a similar range of skills to performers (Allred et al, 1996). Organizational form has always driven managerial careers, and organization structure dictated core managerial competencies. These structures enable organizational behaviours; they also constrain behavioural possibilities, so that individuals or groups are limited by the structures around them in the actions they take. Different structures require different competencies, now including commercial, self-governing and collaborative skills as well as technical skills. Functional organizations offering primarily technical / specialist managerial careers have given way to divisional structures requiring commercial competencies and career paths. The evolving network form of organization (firms linking to provide the critical expertise needed for specific projects; internal or external partners used at various points of the value chain; and suppliers embraced as full partners) is seen as requiring collaborative skills such as referral, partnering, and relationship management skills.

Careers in network organisations require management across flat, multi-company partnerships, rather than long climbs up steep corporate hierarchies. Careers in the 21st century may no longer involve hierarchies, but cellular organizations more akin to minimalist, professional service organizations. Here, the organization acts not as labour provider but as facilitator and instigator, whilst members take full charge of their own careers. As organizations increasingly adopt or encounter cellular structures, managers, professionals and knowledge workers may become team cells responsible for a range of activity, especially the development of leadership, self-governance and

knowledge management skills.

Increasingly individuals may come to manage their own careers, with limited assistance from, and reliance on, organizations. Knowledge - based technical speciality, cross functional and international experience, collaborative leadership and self-management skills (including career planning and time management), continuous learning, and personal traits such as flexibility, integrity and trustworthiness, as well as knowledge management skills may become key attributes of successful careers in such cellular organizations. Careers may increasingly be seen as do-it-yourself projects: organizations of the future may be less employing frameworks and more tools to advance careers and create, share and apply knowledge through career management.

However, though there is some evidence for glimmerings of such career strategies, especially among MBA graduates (e.g. Thomson et al, 2000), many organizations seem to be still committed to career management responsibilities. A diversity of strategies may emerge, in part driven by diverse corporate strategies and differentiated by labour market segmentation. We may not be seeing the end of the career, but the beginning of a multiplicity of career paths and strategies as the economy in general, and careers in particular, become increasingly knowledge driven.

The rise in importance of knowledge management to employee resourcing may mean a greater focus on acquiring knowledge from the external knowledge market rather than the labour market (e.g. not necessarily employing knowledge workers as direct employees but as suppliers, consultants or partners in networking). Other organizations may attempt to build and retain knowledge in individuals and teams, as well as in databases and documents (e.g. clubs). This also raises the issue of career anchors (Schein, 1978).

It is likely that, in many sectors, employees with technical/functional, autonomy/independence, security/stability or entrepreneurial career anchors felt drawn to pursue general managerial careers in the 1980s, given the increasing disparity of rewards allocated to those pursuing general management, as opposed to technical/functional, careers (Table 1). The replacement of a professional/departmental ethos in central and local government, and even in the national health service in the UK, by a corporate/managerial ethos, and the increasingly felt insecurity of professional and managerial employment may have given rise for concern to those whose career anchors lay in other areas than general management. The increasing adoption of 'presenteeism' and the practice of working long hours in British managerial cultures (like the US, but unlike continental Europe) now threatens those with 'lifestyle' career anchors, though 'downshifting' to less stressed, but perhaps lower paid jobs (or moves into self-employment by some groups of managers) suggests a reaction against this. Those with security/stability or 'service' anchors may find their preferred career options under threat, for example in the financial services, utilities and public sector as 'managerialism' has grown in importance. This suggests that those with career anchors other than general management may find their preferred career anchors increasingly unobtainable, and as a result, may seek other institutional frameworks – for example, in temping, which has now moved also into managerial positions (known as 'interim' or 'bridge' management) (IMM, 2000).

However, it may also be that the increasing importance of 'knowledge management' may now favour not only those with entrepreneurial/creative career anchors, but also satisfy the aspirations of those seeking to pursue technical/functional careers, as technical/specialist knowledge, expertise and competence once again become highly valued and marketable assets within both internal and external knowledge markets. De-layering, the growth of project work, and the rise in portfolio careers may impact negatively on those with general managerial anchors, and suit those with challenge, autonomy or lifestyle anchors. Those with 'security/stability' anchors, however, are increasingly likely to feel under threat from the rise of 'transactional' contracts and the stress on employability rather than employment security. Protean or boundaryless careers may appeal more to those with technical/functional, lifestyle, entrepreneurial, challenge and autonomy anchors, and less to those with general managerial or security/stability anchors. So, as well as diversity of career management strategies, we may also be witnessing the emergence of a variety of career anchors and paths at the individual level as KM becomes increasingly significant to HRM and to employee resourcing and career management in particular.

Implications of KM for HRD

As KM involves recognising, documenting and distributing knowledge to improve organizational performance, it is of particular significance to HRD in training needs analysis and the planning of training to improve performance and deliver strategic results. KM challenges HR over intellectual property, professional identity and unit boundaries; KM perspectives move HRD's goal away from developing individual capacity to creating, nurturing and renewing organisational resources and interactions. Instead of devising training courses, HRD practitioners may need to identify organised elements that learners can reference as needed, depending on the particular challenges faced. Diverse experiences and examples may also need to be captured and rich commentaries and stories provided, as well as technical data in order to reflect different user concerns and learning styles. All these need to be embedded in KM system, not in a classroom (Rossett, 1999). Additional questions raised for HRD include how to encourage information sharing, counter resistance to publicising ideas, recognise individual contributions, provide security and status for individual contributors, and update skills and data. KM may well strengthen the view that training is a strategic investment, as a 'central objective of the human resource function of a firm is to enhance the firms competitive position by creating superior 'human capital' resource (Koch and McGrath, 1996, p336). Many HRD practitioners are however insufficiently informed about the implications of KM for HRD, and may not appreciate how adopting a KM perspective will transform their role away from direct training towards a more consultant-like knowledge intermediary (or knowledge broker) role.

Implications of KM for HRM in SMEs

Most research and theory-building in HRM is associated with studies of large organisations. However, most firms in the major and developing economies employ 50 people or less. In order to analyse the nature and role of HRM in SMEs, it is necessary to analyse SMEs and their similarities to and differences from large organisations. Some argue that small firms do not face any particular HR issues compared to large firms, but need HR to help them grow. HRD is often then translated into formal 'enterprise training', involving systematic instruction in business, managerial and functional skills. This 'official' view sees the SME sector as not facing any specific HR issues that differentiate it from large firms; HRD, of a formal 'enterprise training' kind, is seen as primarily necessary to facilitate their growth (e.g. Gray, 1993). SMEs from this perspective are seen as scaled-down large firms, and SME HRM as scaled-down large firm HRM.

However, evidence from UK Government-supported enterprise training programmes suggests that they have often not had the impact on performance anticipated (e.g. Storey, 1994; Gray, 1993, 1998; Stanworth and Gray, 1991). There is little evidence that small business-owners are particularly attracted to such training, either for themselves or their staff, and many commentators have argued that such training has often not been cost-effective, nor has it had the impacts desired. This may be due to the lack of education, inward looking orientation and lack of perspective of many owner managers (Watkins, 1983) or the individualism, stress on personal independence and desire for control of entrepreneurs (Stanworth and Gray, 1991; Storey, 1994). Such factors may all contribute to the rejection of outside training provision. In addition, very small 'micro-businesses' in particular may lack time, as well as sufficient clarity over their training needs.

Others have argued that, on the contrary, SMEs, especially sole-traders and micro firms, are very different from larger organisations, not just in being disadvantaged in relation to financial and labour markets, access to information, and compliance with regulation and reporting requirements, but also in terms of the cultural and personal motivations of owner-managers and their need for a wide range of skills in managing informal relationships. These are not often taught in formal training courses (e.g. Stanworth and Gray, 1991). For other firms, perhaps in the 'growth corridor' of fast growth SMEs with 15-24 employees (Stanworth and Gray, 1991; Stanworth et al, 1992), there may however be a need to introduce formal management and HRM, often perhaps because such firms are linked into complex supply-production-distribution chains and networks with larger businesses, and are often open to much more influence from large firms, including influences and demands over HRM practices. Formal HRD may have a positive impact here, as Wang et al (1997) show.

However, few studies have looked at how SMEs actually manage their own HRM. There is some evidence that many trainers focus on the past, on critical analysis, on knowledge, on passive understanding, on detachment, on symbols, on neutral communication and on concepts. However, entrepreneurs typically focus on the future, on insight, on creativity, on active engagement, on emotional involvement, on events, on personal communication and on problems and opportunities (Gibb, 1987). The entrepreneurs' stress on 'charisma' may contrast with the trainers' stress on order, rationality, and predictability, qualities emphasised in much formal training (Curran and Stanworth, 1989). As a result, there may be a greater receptiveness among SMEs to more informal development processes and more personalised development experiences, such as those provided by consultants and mentors (Curran et al, 1996). SMEs do engage in HRD, but not necessarily formal training, and such individualised, personalised and consultant-like relationships may help owner-managers identify appropriate training and knowledge needs and develop appropriate skills (Stanworth et al, 1992).

To conclude: a review of HRM in SMEs shows that, whereas SMEs are typically not, as the 'official' view suggests, large firms scaled-down and needing formal enterprise training to grow, neither are they uniform and homogenous with respect to HRM. Some very small firms, consultancies and partnerships may be influenced by very different drivers from most large firms, often attributed to the owner-managers or partners' cultural and psychological motivations and their desire for independence, autonomy and lifestyle considerations, with a fear that growth will inhibit their development. For such microfirms, undertaking very little formal training and not engaged in conventional enterprise training for the reasons discussed, individual consultant-like relationships may be more effective in identifying appropriate development needs and successfully developing key skills (e.g. Stanworth et al, 1992). Larger SMEs, especially those in the 'growth corridor' of fast growth SMEs with 15 – 24 employees, may be more receptive to formal HRD, and indeed do appear to be more engaged in staff training (e.g. Thomson et al, 2000). However, since such firms will often be linked into supply-production-distribution chains and networks, their interest will often lie in building relationships, accessing knowledge, and contributing to the knowledge chain as a knowledge intermediary. This suggests that consultant-like support from a knowledge broker may also be attractive to them, especially as our review of KM suggests that the roles of knowledge broker, facilitator, networker and intermediary will become increasingly important for HRM in general. Iles and Yolles (2000) for example discuss how 'technology translators' may play an important role in brokering knowledge transfer between SMEs and the 'knowledge base' of universities, large companies and research institutes.

Implications of KM for the role of HRM in promoting Innovation and Creativity

Much work in HRM has focussed on identifying facilitators and inhibitors of innovation, such as people (e.g. effective leadership behaviours associated with particular innovation phases), structure (e.g. the impact of

centralisation, formalisation, complexity, stratification, lateral communications, matrix structures, requisite variety, double-loop learning) and organizational size or resource availability. Though many seem to assume that larger organizations are more innovative than smaller ones (and there is some evidence of a positive relationship, e.g. Pavitt, 1991), Rogers (1983) found that smaller organizations in the USA were more inventive in producing new technological products. Culture would appear to be a significant factor in enabling such products, since it ultimately defines the worldviews of organizations (through their members) that in turn generates new knowledge. Size may be merely a surrogate for other variables, such as resource availability, the availability or slack resources, and complexity of structure. Other approaches have found that strategic type, organizational climate and culture, and organizational environment are also important facilitators or inhibitors of innovation. For example, Taylor et al (2000) using a large-scale survey have shown that the significance of inter-firm networking for innovation differs markedly between industry sectors, and that high innovating organizations often seek long-term, secure relationships with employees. Organizations also seem to adopt very different strategies towards staff directly involved in innovation as compared with staff in general, with less use of flexible employment policies for this group.

Rather than attempt to list the antecedents of innovation, another approach, developed here, is to examine the process (or series of processes, e.g. from initiation to implementation) of innovation. Unitarist approaches depict innovation as involving a linear sequence of discrete stages (e.g. van de Ven, 1986). An alternative, developed here, is to see innovation as more dynamic and fluid, allowing for groups, individuals and collaborative partners to differ in their perceptions and interpretations of events. Processes may develop in different, even conflicting, ways in different parts of the organization or partnership, alongside the development of diverse social worlds and worldviews (e.g. Anderson and King, 1993). Critical reflection on innovation in SMEs in particular leads us to propose the development of a more process-orientated, fluid, and non-mechanistic approach, one that recognises the existence of dynamic, conflicting and different worldviews, especially in partnerships and alliances (e.g. Iles and Yolles, 2000).

Our review of the implications of KM for HRM and for the roles of HRD, employee resourcing, HRM in SMEs, and facilitating innovation and creativity shows that it is therefore necessary to develop a more adequate conceptualisation of KM and HRM, one that responds more effectively to the challenges posed by KM. This paper goes on to develop such a framework, based on viable systems perspectives, re-conceptualising KM as a process of knowledge migration within a knowledge creation cycle.

Viable Systems and Knowledge Management: Towards a theory of viable knowledge creation

In understanding knowledge management and HRM, we need a more informed model of knowledge management and transfer. One approach to knowledge management and creation that may be sensitive in particular to stakeholders' differences in perspectives is **viable systems theory** (e.g. Yolles, 1999; Iles and Yolles, 2000).

A viable system may be defined as an active, purposeful, and adaptive organisation, seen as a system that can operate in complex situations and survive. Since complex situations entail variety differentiation, a viable system responds to the situational variety it encounters by generating sufficient variety through self-organisation (called requisite variety). It is often said in the cybernetic literature that variety is a measure of complexity (Yolles, 1999). Viable system is then able to support adaptability and change while maintaining stability. In particular, an organisation is viable if it can maintain stable states of behaviour as it adapts to perturbations from its environment. Organisational survival often hinges upon an ability to create and manage knowledge. Knowledge creation/recognition is therefore of prime importance to organisations.

The idea of knowledge creation is closely related to that of learning, and therefore HRD. Learners (individuals or organisations) will undertake viable learning if there is an ability to maintain stable learning behaviour. The caveat is that the learner is able to adapt to changes in a given learning environment that alters the learning situation. Whether a learner can adapt to changes in the learning environment is a function of that learner's plastic limit. In the systems literature, when perturbations push it beyond this limit, the system either changes its form (incrementally through morphogenesis, or dramatically through metamorphosis) or 'dies'. As an example of this, Iles and Yolles (2000) analyse partnerships which struggle for the reasons outlined earlier, and 'die' when one party leaves the partnership prematurely because new learning behaviours cannot be established. If a viable organisation survives, then it is able to change its form and adapt.

Knowledge creation is associated with different worldviews. These are seen as associated with the institutions that one is attached to in a given society and acquired by socialisation. Worldviews may be shared by a group of people, though when this occurs the individuals may retain their own realities while using (apparently) common models to share meaning.

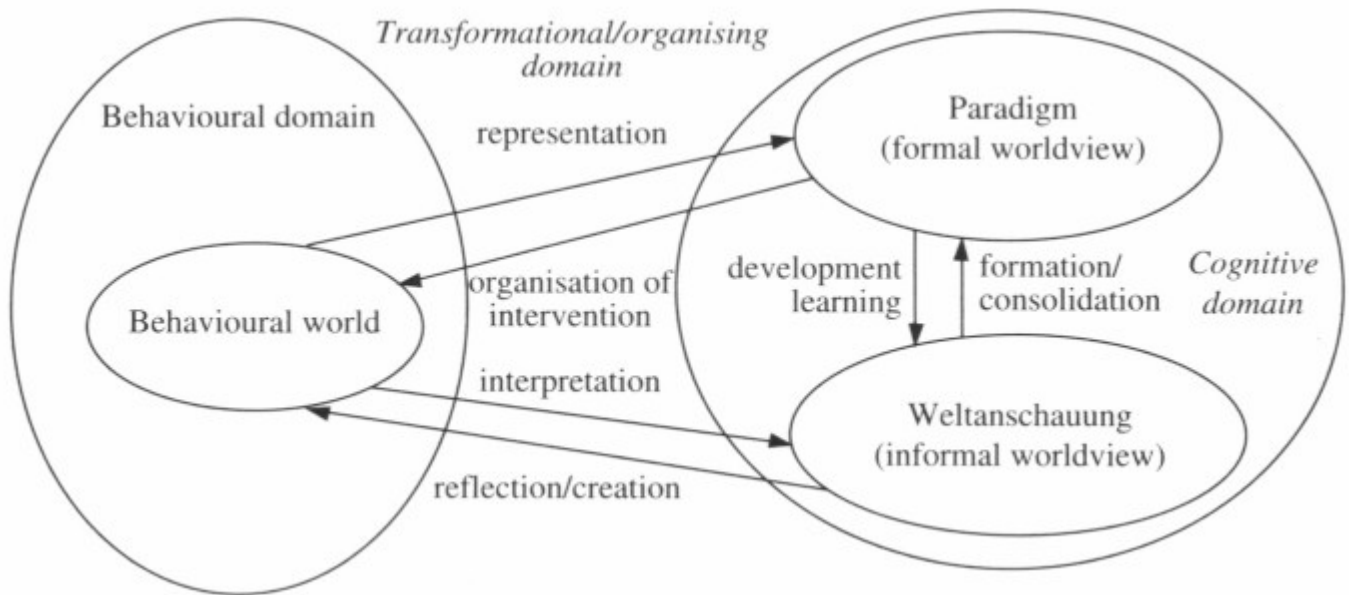
Two types of worldviews may be defined, informal (*weltanschauung*), and formal (paradigm). Informal worldviews are (more or less) composed of a set of undeclared assumptions and propositions, while formal ones are more or less declared. Both are by their very nature bounded, and thus constrain the way in which perceived situations can be described (Yolles, 1999). Consequently, the generation of knowledge is also constrained by the capacities and belief systems of the worldviews.

Following Yolks (1999) we assume that a worldview:

- (a) holds a cognitive structure (beliefs, values, and attitudes),
- (b) demonstrates normative control of behaviour,
- (c) represents a cognitive space of concepts, knowledge and related meaning that are manifestations of culture (national, organizational, occupational, institutional).

Worldviews interact, and this interaction can be placed in a cognitive domain that drives a purposeful adaptive activity system. The system has form, and thus has structure, process and associated behaviour. This is assigned to an energetic behavioural domain. The knowledge related cognitive domain is the “cognitive consciousness” of the system that it drives. According to Yolles (1999), the cognitive and behavioural domains are connected across a gap that we refer to as the transformational or organising domain, subject to surprises is strategic in nature, and operates through information (Figure 1). The three domains are analytically and empirically independent. This model can be applied to any purposeful adaptive activity system by distinguishing between cognitive, strategic, and behavioural aspects of a situation.

Figure 1
The Relationship between the Behavioural and Cognitive Domains in a Viable System



There are properties associated with each of these domains, perhaps most simply expressed in terms of Table 2 derived from Yolles (2000). Associated with each of the three domains is a cognitive property that guides organisations in the way that they function and survive. Exploration of the nature of cognitive influence associates this with the process of knowledge **migration**, that is the movement of knowledge between worldviews that is subject to redefinition every time it migrates. Since cognitive influences and purpose are ultimately dependent upon such knowledge migration, epistemology becomes an important consideration in terms of how organisations are able to survive. We are deliberately using the term ‘knowledge migration’ here rather than the more conventional knowledge management to emphasise the emergent, unpredictable and often unplanned nature of knowledge flows. Knowledge therefore is not simply a ‘thing’ to be managed or mobilised in the ways often implied in the KM literature. This conception of KM requires therefore that attention be given to epistemological issues.

Table 2
 Relationship between human cognitive interests, purpose, and influences (Yolles, 2000).

COGNITIVE INTERESTS OF THE BEHAVIOURAL DOMAIN (DATA)

Technical	Practical	Critical Deconstraining
Work. This enables people to achieve goals and generate material well-being. It involves technical ability to undertake action in the environment, and the ability to make prediction and establish control.	Interaction. This requires that people as individuals and groups in a social system gain and develop the possibilities of an understanding of each others subjective views. It is consistent with a practical interest in mutual understanding that can address disagreements.	Degree of emancipation. For organisational viability, the realising of individual potential is most effective when people; (i) liberate themselves from the constraints imposed by power structures (ii) learn through participation in social and political processes to control their own destinies. Autonomy and interdependence, rather than dependence result.

COGNITIVE PURPOSES WITHIN THE ORGANISING DOMAIN (INFORMATION)

Cybernetical	Rational	Ideological
Intention. This is through the creation and strategic pursuit of goals and aims that may change over time; enables people through control and communications processes to	Logico-relational. Enables missions, goals, and aims to be defined and approached through planning. It involves logical, relational, and rational abilities to organise thought and action, and	Manner of thinking. An intellectual framework through which policy makers observe and interpret reality. This has an ethical and moral orientation. It provides an image of the future that enables action through ‘correct’ strategic policy.

redirect their futures. thus to define sets of possible systemic and behaviour possibilities.

COGNITIVE INFLUENCES WITHIN THE COGNITIVE DOMAIN (KNOWLEDGE)

Social	Cultural Political	Formation
Enables individuals/groups to be influenced by knowledges that relate to the social environment. This has a consequence for social structures and processes that define social forms that are related to intentions and behaviours.	Belief. Influences occur from knowledges that derive from the cognitive organisation (the set of beliefs, attitudes, values); other worldviews. It ultimately determines interaction and defines logico-relational understandings.	Freedom. Influences occur from knowledges that affect the polity determined, in part, by thoughts about the constraints on group and individual freedoms, and in connection with this; how to organise and behave. It ultimately impacts on ideology and degree of emancipation.

Knowledge creation, learning and renewal

The question of what constitutes knowledge, and what constitutes management may be posed in different ways (Allee, 1997). One approach, often associated with KM, discusses questions of ownership, control, and value, with an emphasis on planning. Another view, adopted here, is that knowledge involves organic flows and self-organising processes and patterns. This approach explores how knowledge emerges, and how patterns change. In an organisational context, it can help analyse changes to an organisation’s knowledge base if a knowledgeable employee leaves, and how an organisation manages to capture that knowledge. As mentioned earlier, knowledge is increasingly recognised as an important organisational asset. Its creation, dissemination and application is often now seen as a critical source of competitive advantage (Allee, 1997; Lester, 1996). However, Table 2 shows that what counts as knowledge is not a neutral, but an inherently political, process, requiring attention for instance to political, ethical and ideological issues and the ways in which agendas are set and knowledge claims formulated, accepted and legitimised. This implies the need for self-reflection by organisations and individuals on both KM and on the learning process.

In developing a general framework for understanding KM, we refer to perhaps the most influential framework for knowledge creation developed by Nonaka and Takeuchi (1995) in their studies of knowledge creation and use in Japanese companies. Nonaka and Takeuchi (1995, p.8) distinguish, as we have seen, between two types of knowledge, explicit and tacit (Table 3). Tacit knowledge is basically experiential, whilst explicit knowledge is expressed, and often seen as transferable in one way or another; it includes cognitive and technical elements. Cognitive elements operate through mental models, working worldviews that develop through the creation and manipulation of mental analogies. Mental models (like schemata, paradigms, perspectives, beliefs and viewpoints), according to Nonaka and Takeuchi, help individuals perceive and define their world. The technical element of tacit knowledge includes concrete know-how, crafts, and skills. Explicit knowledge is about past events or objects “there and then”, and is seen to be created sequentially by “digital” activity that is theory progressive. An alternative perspective on the distinction between explicit and tacit knowledge, to be developed later in this paper, is also presented in Table 3. One difference is that the top row appears to be positivist in its orientation through its adherence to objectivity, whilst the bottom row is critical in nature.

Table 3
Typology of knowledge


Expression of knowledge type	Explicit Knowledge	Tacit Knowledge
Nonaka and Takeuchi	Objective Rationality (mind) Sequential (there and then) Drawn from theory (digital) Codified, formally transmittable in systematic language. Relates to past	Subjective Experiential (body) Simultaneous (here and now) Practice related (analogue) Personal, context specific, hard to formalise and communicate. Cognitive (mental models), technical (concrete know-how), vision of the future, mobilisation process Informal, determined through contextual experience.
Alternative	Formal and transferable, deriving in part from context related information established into definable patterns. The context is therefore part of the patterns.	It will be unique to the viewer having the experience. Not transferable, except through recreating the experiences that engendered the knowledge for others, and then the knowledge gained will be different.

Nonaka and Takeuchi (1995, p.8) offer a SECI model of knowledge creation illustrated in figure 2. At its core are conversion processes between tacit and explicit knowledge that result in a cycle of knowledge creation. Conversion involves four processes: socialisation, externalisation, combination, and internalisation, all of which convert

between tacit and/or explicit knowledge. Socialisation is the process by which synthesised knowledge is created through the sharing of experiences between people as they develop shared mental models and technical skills. Since it is fundamentally experiential, it connects people through their tacit knowledges. Externalisation comes next, as tacit knowledge is made explicit. Here, the creation of conceptual knowledge occurs through knowledge articulation in a communication process that uses language in dialogue and collective reflection. The use of expressions of communication are often inadequate, inconsistent, and insufficient. They leave gaps between images and expression, while promoting reflection and interaction. This therefore triggers dialogue. The next process is combination, where explicit knowledge is transformed through its integration by adding, combining and categorising knowledge. This integration of knowledge is also seen as a systemising process. Finally, in the next process explicit knowledge is made tacit by its internalisation. This is a learning process, which occurs through the behavioural development of operational knowledge. It uses explicit knowledge, like manuals or story telling, where appropriate.

Figure 2
The SECI cycle of knowledge creation (Nonaka and Takeuchi, 1995)

<i>From /To</i>	Tacit	Explicit
Tacit	<p><i>Socialisation</i></p> <p>Creates <i>sympathised</i> knowledge through the sharing of experiences, and the development of mental models and technical skills. Language unnecessary.</p>	<p><i>Externalisation</i></p> <p>Creates <i>conceptual</i> knowledge through knowledge articulation using language. Dialogue and collective reflection necessary.</p>
Explicit	<p><i>Internalisation</i></p> <p>Creates <i>operational</i> knowledge through learning by doing. Explicit knowledge like manuals or verbal stories helpful.</p>	<p><i>Combination</i></p> <p>Creates systemic knowledge through systemising of ideas. May involve media, and can lead to new knowledge through adding, combining & categorising.</p>



Towards a Critical View of knowledge Management and Knowledge Creation

In the critical perspective developed here, there is no absolute real world that can be separated out, because viewers create it and interact with their creation. Since what constitutes reality is determined through worldviews, it changes as worldviews change. In each worldview, we build our view of what we perceive to be the world through our mental models. We may believe that we share them with others, but they will be incommensurable to some degree (Yolles, 2000). This is because the models may involve different conceptual extensions, or the same conceptual extension may take on meanings that are qualitatively different. Whether these shared models are related or not depends on our ability to draw meaning from others' explanations provided through language, or by comparing what we expect from the behaviour of people in a situation with what we perceive that they are doing.

In our critical perspective, there is no Observer. Rather, we may propose that there is an Other, who is also a potential or actual viewer. In a social context, a viewer has a worldview that interacts with the worldviews of others, either directly or indirectly (through some of their apparent constructions). A result of the interaction is the creation of view-holder local knowledge - that is, knowledge that is personal and therefore local to the viewer. Since this knowledge tells us about reality, then reality is a local phenomenon. This is also the case if one considers only a situation involving a single worldview. In this case, reality is constructed as a result of the interaction between viewers and the information around them; again reality is seen as locally generated. However, this in turn leads us to question of what constitutes information, what constitutes knowledge, and what is the role of the viewer in defining them.

Knowledge, Epistemology and knowledge creation

As discussed earlier, a primary distinction often made in KM is between explicit and tacit knowledge; the former is often seen as objective, while the latter is treated as subjective. No elaboration of the nature of objectivity is provided by Nonaka and Takeuchi (1995); it appears to be consistent with positivist epistemology.

Adopting a critical epistemology, we can see that tacit knowledge is informal, determined through contextual experience, and unique to the viewer having the experience (Table 3, alternative). It is therefore not transferable, except through recreating the experiences that engendered the knowledge for others, and then the knowledge gained will be different. Tacit knowledge is therefore the result of self-learning. Explicit knowledge may be identified as formal, deriving in part from context related information established into definable patterns. Context formally exists as part of these patterns. Formal knowledge is transferable if the medium of transfer enables the transferral of meaning. Explicit knowledge can be a consequence of self-learning tacit knowledge, or received as knowledge transfer. Examples of such transferable knowledge occur when it is provided in a book, or set out in a knowledge base system as a pattern of meanings through a set of propositional rules, or through some other patterning process.

In the case of the SECI knowledge cycle, (figure 2) processes of knowledge creation are represented by socialisation, externalisation, combination, and internalisation. The proposition here that the knowledge creation cycle occurs as a continuous cycle is, however, quite different from this. No structural adaptability is considered with the SECI cycle, which must therefore be considered to support a positivist epistemology. This is because each phase in the knowledge creation process is predetermined by the prior phase, and, other than through conditioning, there is no mechanism by which one phase can be spontaneously enabled.

As an example of this, is conceptual knowledge to be assigned to the externalisation phase, only developed after socialisation; or can it develop independently without socialisation and be externalised? Perhaps, though, this might be through process of socialising with oneself? Our mental models centre on our conceptualisations, and these are not often made explicit. When we are unable to explain things that we believe, we create concepts that help us explain them. This is a process that Cohen and Stewart (1994) call collapsing chaos, which reduces complexity. It would also seem to be the case that the process of externalisation, leading to new theories and generalisations, offers a sound rational positivist logic. However, we are aware that such rational approaches tend to be unrepresentative of the way that patterns of belief can change the nature or relevance of knowledge. Returning to the socialisation process commented on before, Nonaka and Takeuchi (1995) acknowledge that knowledge is belief based. However, beliefs may develop into knowledge without the benefit of the socialisation process. In any case, socialisation itself may be suspect as a way of developing models that share common meaning.

Ideally, we require a metaprocess that enables us to show under what conditions combination (say) may follow socialisation. As in the case of Soft Systems Methodology (Yolles, 1999), this metaprocess may occur through the creation of a set of control loops that explain how morphogenic and metamorphic changes can occur in a cycle of knowledge creation.

A Viable Approach to Knowledge Creation and migration

The structured spiral of knowledge creation offered by Nonaka and Takeuchi (1995) follows a positivist perspective. An alternative approach is possible, linked with the viable system model. As noted, each of the three domains identified in Table 2 has an associated knowledge process: one connected with cognition, one with organising, and one with behaviour. This notion is consistent with Marshall (1995), whose interest lies in knowledge schema. Schema have four categories. They are firstly the mental organisation of individuals' knowledge and experience that allows them to recognise experiences that are similar. They can then access a generic framework that contains the essential elements of all these similar experiences. Further, they can use this framework to plan solutions. Finally, there is the ability to utilise skills and procedures to execute that solution. For this purpose, Marshall identifies three types of knowledge:

- Identification knowledge – the facts and concepts making up the knowledge domain
- Elaboration knowledge – the relationships between the individual knowledge components and the way they are organised
- Execution knowledge – the conceptual skills and procedures required to execute an activity

Marshall himself does not attempt to address knowledge creation, though we shall do so through our own model. We argue here that in given situations, knowledge creation occurs through a process of knowledge migration from one worldview to another, and involves knowledge identification. The basic knowledge cycle model is given in figure 3. It links to table 2 and figure 2, and depicts the three fundamental phases of the knowledge creation process: knowledge migration, knowledge appreciation, and knowledgeable action. Migration is associated with the cognitive domain, appreciation with the organising domain, and action with the behavioural domain. Each process has an input and an output. A control process is also able to condition each process through actions on the inputs or on the processes themselves. Knowledge migration is therefore conditioned through cognitive influence, knowledge appreciation through cognitive purpose, and knowledgeable action through cognitive intention. We shall elaborate on these shortly.

The control process involved with knowledge migration (figure 4) occurs through the development of interconnections between the worldviews of the actors in a given suprasystem, and is the result of semantic communication. As part of the process of knowledge migration, new knowledge is locally generated within the actor. While this may be seen as part of a socialisation process, it may also be seen as actor local spontaneous when the process of knowledge migration operates as a knowledge creation trigger.

Figure 3
The Knowledge Cycle

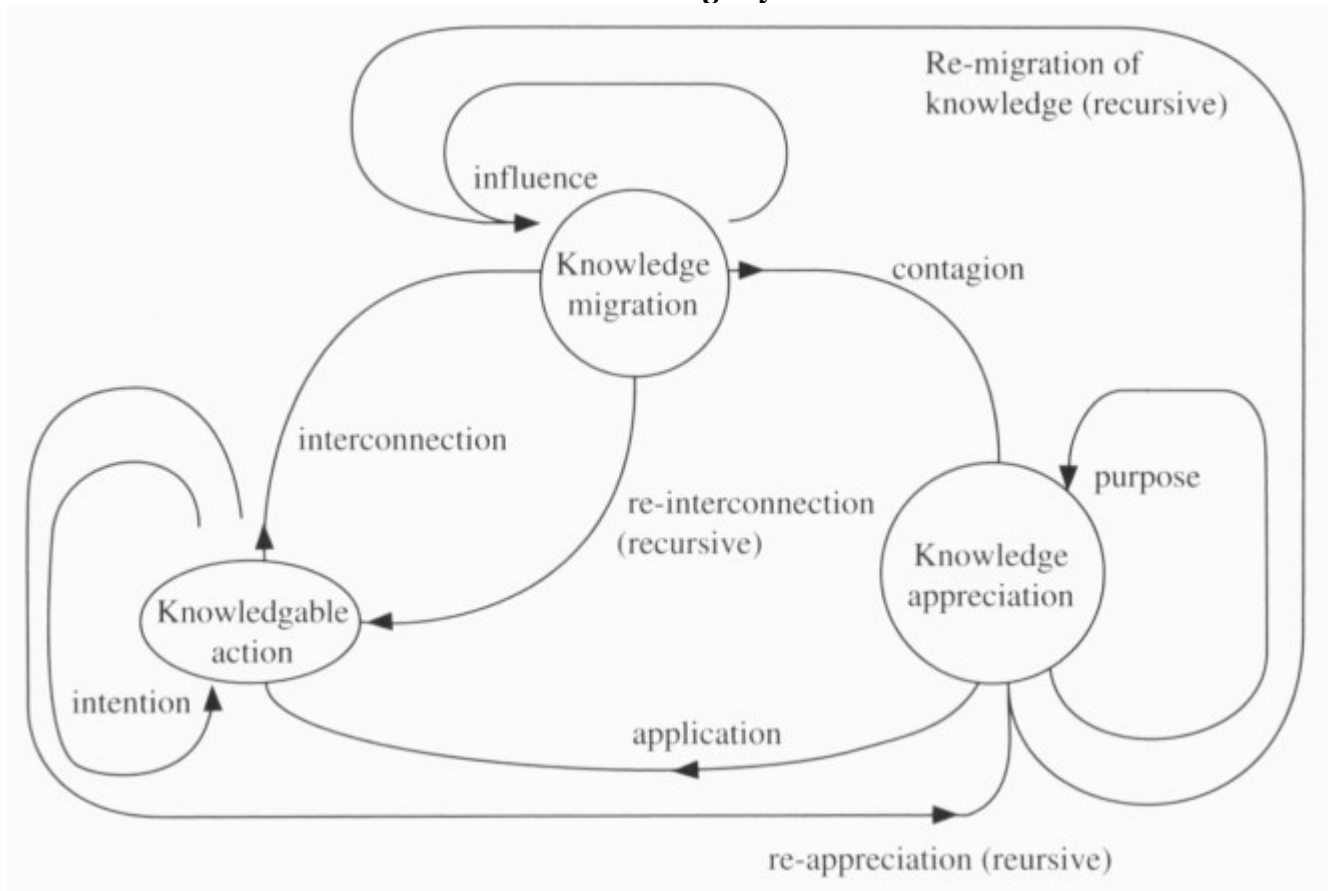
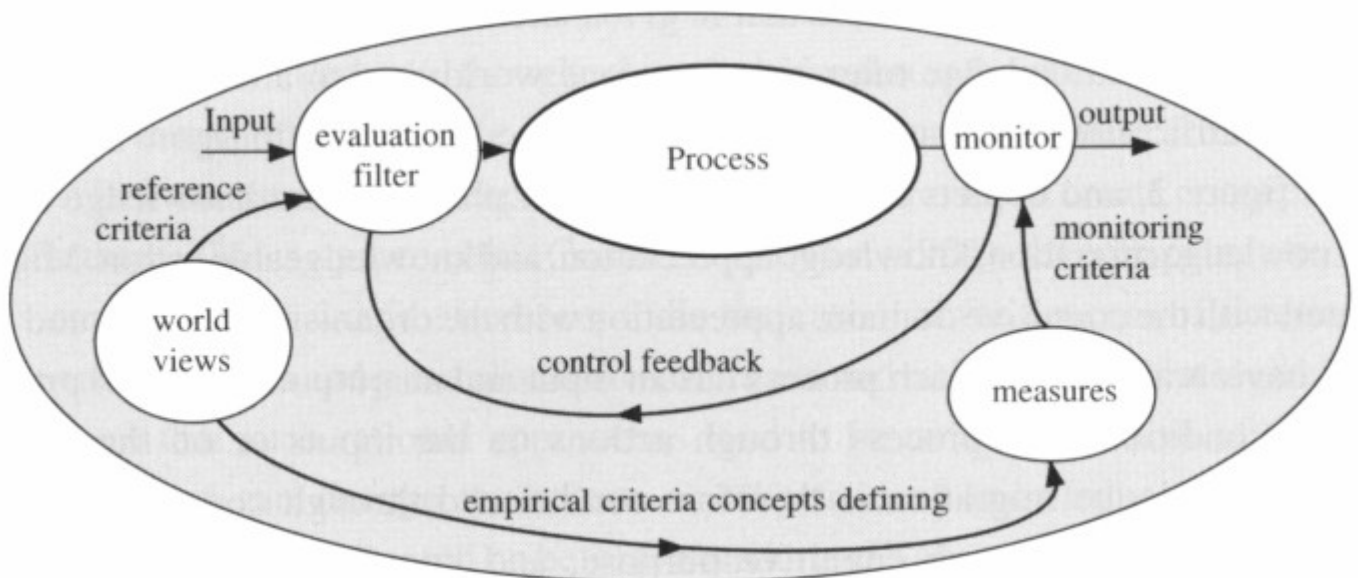


Figure 4
Basic form of the Control Model



Newly migrated knowledge may be shared and re-shared within the suprasystem, because the new knowledge created by one actor will have a local definition that will be different for others. As a result, the originally migrated knowledge will have to be re-migrated in a feedback loop. This is fundamentally consistent with the notion of paradigm incommensurability (Yolles, 2000) since every worldview will have its own distinct pattern of meaning that will be different from every other one. This does not stop the knowledge from being “contagious” to relevant others within a given suprasystem through a continuous semantic communication process in which they participate, involving recursive migration and re-migration of knowledge. Each recursive knowledge migration has the potential of new knowledge creation for each actor in the suprasystem. As knowledge is migrated, it is likely to

pass through a morphogenic process, and sometimes a metamorphic one, that makes it new to the group.

As we have seen, knowledge management is inherently a political process. Polity, a core aspect of politics, acts as a filter on knowledge migration. It is concerned with an organised condition of social (or civil) order. Polity is connected to politics through the causal relationships to behaviour that enables what may be referred to as social engineering. Within the context of knowledge about the creation of order, we can talk of polity knowledge, connected to what Marshall (1995) refers to as elaboration knowledge (relating to the relationships between the individual knowledge components and the way they are organised within a schema). Polity knowledge can be seen to address the relationships between individual knowledge components as perceived by an actor, to be possessed by other actors, and the relative way that they are organized. It would thus seem to be an active recogniser of identification knowledge (Ibid.) – i.e., the concepts and patterns of meaning that make up knowledge. When polity knowledge is applied to other actors, it enables us to decide about them. Sometimes, such decisions involve “false” assumptions that are not representative of the identification knowledge of other actors. This can inhibit the process of knowledge migration, since recognition of knowledge differences is required before knowledge migration can occur.

Towards a research agenda for studying knowledge creation and migration and its implications for HRM

A number of issues for further research in exploring the links between KM and HRM and how HRM may respond to the challenges posed by KM are raised by the model outlined in figures 3 and 4. The process of knowledge appreciation may follow knowledge migration. An appreciation of how migrated knowledge can be of use to relevant others is essential if they are to be able to harness it within a behavioural world. Knowledge appreciation by relevant others is dependent upon knowledge contagion to these others. However, this is filtered through knowledge that activates weltanschauung-derived ideology and ethics. In addition, the evaluation reference criteria derive from knowledge about intention and logico-relational cognitive purposes. Interestingly, this connects with Marshall’s (1995) idea of planning knowledge – the knowledge of which pathways to select in order to achieve a solution.

Contagion may therefore be explored by examining to whom knowledge has been passed, and whether it has been retained for use. Cultural and social influences can be studied by examining the parties’ respective beliefs, values and attitudes (cognitive organisation). One way of doing this is to examine resistance to the adoption of new patterns of cognitive organisation. Social influences represent knowledge about the way in which social processes operate. This dimension can be measured not in terms of social meaning, but in terms of the reticence that actors have to the introduction of new social meanings.

A consequence of the process of knowledge appreciation is its intelligent application. This phase is termed knowledgeable action. Measurements for this control process may be qualitative, requiring an inquirer to search the local environment for ways in which knowledge has been applied (directly or indirectly) to varieties of situations. The process of knowledgeable action may be dependent upon the application of knowledge. Knowledgeable action is action that occurs with awareness of what is being done within a behavioural world. Knowledgeable action in a situation is dependent upon knowledge application to the tasks that are perceived to require to be addressed within the situation. This is filtered through knowledge that activates weltanschauung-derived emancipative capabilities that enable knowledgeable action to occur. The evaluation reference criteria derive from knowledge about actor interests through work and interaction. It relates to Marshall’s (1995) idea of execution knowledge, seen as the computational skills and procedures required to execute a behaviour.

A consequence of the process of knowledgeable action that derives from knowledge migration is the creation of new definitions of relationships between identifiable actors. It gives meaning to work related activities, particularly with respect to those that involve interaction.

Measures within this control loop with respect to knowledgeable action may occur by examining the environment in which that action has occurred. Work and interaction knowledge that conditions knowledgeable action can be explored by examining how work and interaction processes change with the introduction of new knowledge. Knowledge about emancipation maybe determined through in-depth questioning of relevant others.

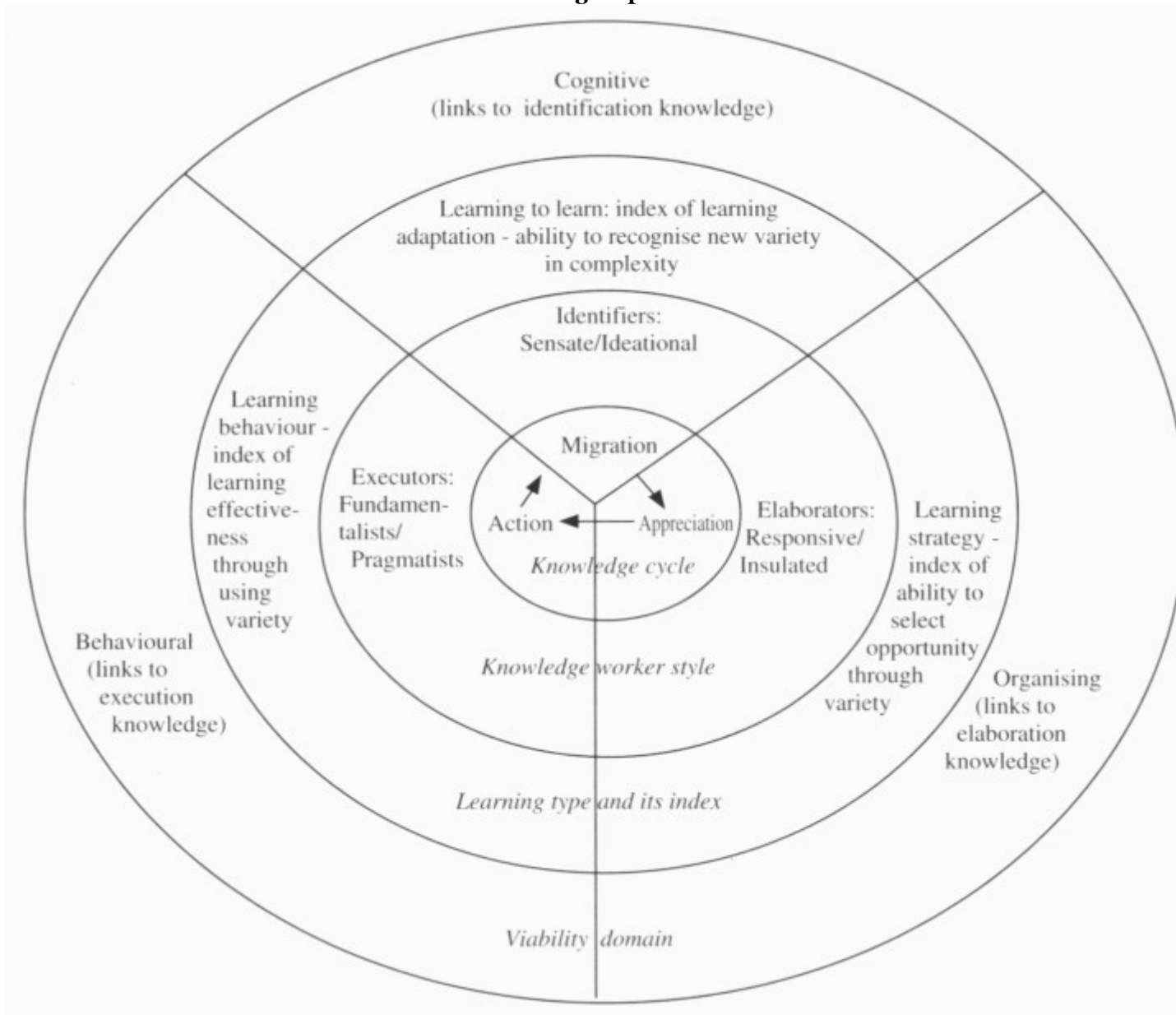
When the above control loops operate to make process changes, morphogenic changes occur in the knowledge phases of our knowledge cycle. When the control processes are complex and control action fails, knowledge process metamorphosis can occur (Yolles, 2000). As an example of a metamorphic change, a new concept may be born during the process of knowledge migration: a new way of working, a new way of facilitating learning, a new mode of consulting.

There are differences in the way knowledge creation is structured whether one adopts a positivist or a critical epistemology. The ideas of Nonaka and Takeuchi appear influential in the development of a theory of knowledge creation. While they are constructivist in their perception of each phase within the cyclic process, they are overall structurally positivist. It is not uncommon to have this type of sometimes benign methodological schizophrenia, though it may well be more aesthetic not to. An alternative approach that does not suffer from this problem was proposed in figures 3 and 4 above, deriving from viable systems theory. This does not see knowledge creation as a set of sequential steps, but rather as a set of phases that are constantly tested and examined through feedback. Shifts from one phase to another may occur according to the control phenomena that drive particular perspectives.

There are parallels between our proposed knowledge cycle and that of Nonaka and Takeuchi (1995). In the proposed model, knowledge can be created spontaneously within a migration process, and any socialisation process that occurs is through communication that maybe seen to act as a trigger for new knowledge. Unlike Nonaka and Takeuchi, our cycle is not required to be monotonic and continuous, relative to a conditioning process. Rather, the process of continuity is transferred to the communication process, and knowledge creation is cybernetic, passing through feedback processes that can change the very nature of the patterns of meanings that were initiated through semantic communications.

Central to this analysis of knowledge creation and a proposed research agenda is the knowledge typology shown in figure 5.

Figure 5
Typology indicating possible knowledge profiles of individuals (knowledge personalities) or coherent groups.



The typology depicted in figure 5 derives from the knowledge creation cycle, defined in terms of the processes of knowledge migration, knowledge appreciation, and knowledgeable action. Knowledge migration occurs through the development of interconnections between the worldviews of the actors in a given suprasystem, and is the result of semantic communication (Habermas, 1987). As part of the process of knowledge migration, new knowledge is locally generated within the worldview of an actor.

It is also necessary to recognise the unique attributes and value of knowledge work and knowledge workers, demanding new types of training and development in knowledge creation and transformation, competency building, and technology training. Associated with each phase of knowledge creation are, it is proposed, different types of knowledge workers. Thus, those who are particularly good at migrating knowledge are seen as knowledge identifiers which (after Marshall) we shall call identifiers, elaborators and executors. We can classify two cultural classes of identifiers, sensate and ideational, following Sorokin (Yolles, 1999, 2000). Sensate culture is to do with the senses, and can be seen to be utilitarian and materialistic. Ideational culture relates to ideas; an example might be adherence to spirituality or ideology. The appreciation phase of knowledge creation has associated with it those who might be called elaborators. It is possible to classify two polar types of elaborators, those who are responsive to

new knowledge, and those who are not. Finally, closely associated with the phase of knowledgeable action are executors. Two types of executors are proposed. Fundamentalists adhere to notions very strictly, whilst pragmatists provide for some degree of leeway in the way that adhere to notions. It is not necessary to be either fundamentalist or pragmatist. There may be phases in between them, in the same way, for example, as there maybe between insulated and responsive elaborators, or sensate and ideational identifiers. Thus for instance, an identifier may be able to mix sensate and ideational perspectives, in a condition referred to as idealistic. These notions have the potential for developing a set of measures that can develop a profile for knowledge personality/sociality and place individuals in coherent groups.

Clearly, these tentative propositions need testing through further empirical research. Differentiation is likely to evolve as KM becomes institutionalised inside and outside organizations. With such differentiation of types, aptitudes and skills, HR will not surprisingly find a fertile ground to apply its well grounded 'traditional' expertise in selection, assessment, performance management, training for skill enhancement and reward schemes.

Conclusions

This paper has argued that the increasing importance of knowledge, and knowledge management, (KM), to organizations challenges the nature, role and boundaries of HRM in significant ways, not always as yet recognised by HRM theorists, researchers and practitioners. In addition to discussing the challenges posed to HRM in general, this paper has discussed ways in which specific functional areas of HRM (employee resourcing, career management, HRD) can respond to these challenges, as well as discussing the implications of KM for HRM in SMEs and the role of HRM in facilitating innovation and creativity. The article has also developed a model of KM and HRM that goes beyond earlier accounts by outlining a critical model of knowledge creation, knowledge migration and knowledge profiles. It has also put forward a research agenda for HRM in relation to KM, and shown how this model can be applied by developing relevant measures and evaluation strategies. In terms of knowledge migration, HR may play a major enabling role in helping identify the potential of knowledge migrants through assessment and selection; by helping facilitate knowledge migration through appropriate communication, reward and recognition schemes; and by enhancing knowledge migrations' likelihood of success and retention through training and development, as well as by developing organizational processes that facilitate knowledge migration, knowledge appreciation, and knowledgeable action.

Last, but not least, with KM becoming an essential and inherent ingredient in any organised work activity in the first decades of the 21st century, HR will have to recreate itself as a KM enterprise in its own right. Would that be a curse or a blessing? Surely, that depends on one's weltanschauung, doesn't it?

REFERENCES

- Aliaga, O. A. (2000). Knowledge management and strategic planning in Herling, R. W. and Provo, J. (eds) *Strategic Perspectives on Knowledge, Competence and Expertise*, San Francisco: AHRD/Berrett-Koehler Communications Inc. pp 91-104.
- Alired B., Snow, C. & Miles R. (1996). Characteristics of Managerial Careers in the 21st Century, *Academy of Management Executive*, 10(4), 17-27.
- Allee, V. (1997). *The Knowledge Evolution*. Butterworth-Heinemann, Oxford.
- Anderson, N. & King, N. (1993). Innovation in organizations in L.L. Cooper and I. T. Robertson (eds.) *International Review of Industrial and Organizational Psychology*, 1993 Vol. 8 pp 1-35 Chichester, John Wiley and Sons Ltd.
- Allred B., Snow, C. & Miles, R. (1996). Characteristics of Managerial Careers in the 21st Century, *Academy of Management Executive*, 10(4), 17-27.
- Baruch, Y. & Peiperl, M. A. (2000). Career Management Practices: An Empirical Survey and Implications, *Human Resource Management*, forthcoming.
- Bassi, L. J. (1997). Harnessing the power of intellectual capital, *Training and Development*, 51(12), 25-30.
- Boerligst, J. G., van der Heigden, B. I. J. M. & Verteist, N. D. (1996). The measurement of expertise. Paper presented at the fourth Asia Pacific Conference on Giftedness, Jakarta 4-8 August 1996.
- Cohen, J. & Stewart, I. (1994). *The Collapse of Chaos: discovering simplicity in a complex world*. Viking, London.
- Curran, J. & Stanworth, J. (1989). Education and training for enterprise: some problems of clarification, policy, evaluation and research, *International Small Business Journal*, Jan-March, 7(2), .
- Curran, J., Blackburn, R., Kitching, J. & North, J. (1996). *Establishing small firms' training practices, needs, difficulties and use of industry training organisation*, DFEE Research Studies, HMSO: London.
- Davenport, T. H. & Prusak, L. (1998). *Working Knowledge: how organisations manage what they know*, Boston: Harvard University Press.
- Delaney, J. T. & Huselid, M. A. (1996). The impact of human resource management practices and perceptions of organizational performance, *Academy of Management Journal*, 39(4), 949-969.

- Edvinsson, L. & Malone, M. (1997). *Intellectual Capital: Realising your company's true value by finding its hidden brainpower*, New York Harper Business.
- Gibb, A. (1987). Enterprise culture: its meaning and implications for education and training, *Journal of European Industrial Training*, 11(2), .
- Gray, C. (1993). Stages of growth and entrepreneurial career motivation in Chithaden, F., Robertson, M. and Watkins, D, *Small firms – recession and recovery*, London: ISBA/Paul Chapman pp 149-159.
- Gray, C. (1998). *Enterprise and Culture*, London: Routledge.
- Habermas, J. (1987). *The Theory of Communicative Action*, Vol 2, Polity Press, Cambridge, UK.
- Hamel, G. (1990). Competitive collaboration: learning, power and dependence in international strategic alliances. Unpublished doctoral dissertation, University of Michigan, Ann Arbor
- Harris, L. (2000). A theory of intellectual capital in Herling, R. W. and Provo, J. (eds) *Strategic Perspectives on Knowledge, Competence and Expertise*, San Francisco: AHRD/Berrett-Koehler Communications Inc. pp 22-37.
- Herling, R. W. & Provo, J. (2000). Knowledge, competence and expertise in organizations in Herling, R. W. and Provo, J. (eds) *Strategic Perspectives on Knowledge, Competence and Expertise*, San Francisco: AHRD/Berrett-Koehler Communications Inc. pp 1-7.
- Herling, R. W. (2000). Operational Definitions of Expertise and Competence in Herling, R. W. and Provo, J. (eds) *Strategic Perspectives on Knowledge, Competence and Expertise*, San Francisco: AHRD/Berrett-Koehler Communications Inc. pp 8-21.
- Hirsh, W. & Jackson, C. (1996). *Strategies for Career Development: Promise, Practice and Pretence*, Institute of Employment Studies
- Huselid, M. A. (1995). The impact of Human resource management practices and turnover, productivity and corporate financial performance, *Academy of Management Journal*, 58(5), 645-672.
- Iles, P. A. & Yolles, M. (2000). Across the Great Divide: HRD, technology translation and knowledge migration in bridging the knowledge gap between SMEs and Universities *Human Resource Development International* (in press)
- IMM (Interim Marketing Management) *Attitude Survey of Bridging Managers 2000*
- Jackson, C., Arnold, J., Nicholson, N. & Watts, A. G. (1988). *Managing Careers in 2000 and Beyond*, Brighton, Institute of Employment Studies.
- Koch, M. J. & McGrath, R. G. (1996). Improving labour productivity: human resource policies do matter *Strategic Management Journal*, 17(5), 335-354.
- Lank, E. (1997). Building structural capital: a new key to generating business value, *Journal of Knowledge and Process Management*, 1(2), 73-9.
- Leadbeater, C. (1999). The knowledge-driven economy, Association for Management Education and Development Frontiers Conference Cranfield, August 1999.
- Lester, T. (1996). Mining Your Organisation's Knowledge Base, *Human Resources*, July/August 1996
- Lloyd, B. (1996). Knowledge Management The Key To Long-Term Organisational Success, *Long Range Planning*, 29(4), 1996.
- Marshall, C., Prusak, L. & Shpilberg, D. (1996). Financial Risk and The Need for Superior Knowledge Management, *California Management Review*, 38(3), 1996.
- Marshall, S. P. (1995). *Schemas in Problem Solving*. Cambridge University Press, Cambridge, UK.
- Mayo, A. (1997). Called to account, *People Management*, 8 April, 5, 7, p33.
- Miles, R. E. & Snow, C. C. (1978). *Organizational Strategy, Structure, and Process*, NY: McGraw-Hill
- Nijhof, W. J. (1999). Knowledge Management and knowledge dissemination. *Academy of Human Resource Development 1999 Conference Proceedings Vol. 1*. Arlington VA: Academy of HRD. pp 479-487.
- Nonaka, I., & Takeuchi, H. (1995). *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford University Press, New York.
- Pavitt, K. (1991). Key characteristics of the Page innovation firm. *British Journal of Management*, 2, 41-50.
- Pitt, S. M., Iles, P. A., Sands, R. & Rouncefield, M. (2000). Knowledge Work, Commitment and Quality: professional and organizational commitment among biomedical scientists and its relationship with service quality *British Academy of Management Annual Conference*, Edinburgh.
- Prahalad, C. K. & Hamel, G. (1990). The core competence of the corporation, *Harvard Business Review* 68(3), 79-91.
- Provo, J. (2000). Measuring human capital in Herling, R. W. and Provo, J. (eds) *Strategic Perspectives on Knowledge, Competence and Expertise*, San Francisco: AHRD/Berrett-Koehler Communications Inc. pp 76-90.

- Rogers, E. M. (1983). *Diffusion of Innovations*, 3rd ed. NY Free Press
- Rossett, A. & Marshall, J. (1999). Signposts on the road to knowledge management. *Academy of Human Resource Development 1999 Conference Proceedings*, Vol.1, Arlington VA: Academy of HRD, pp 496-503.
- Rossett, A. (1999). Knowledge management meets analysis Training and Development 53 (5) 62-70
- Rousseau, D. M. (1995). *Psychological Contracts in Organizations*, Thousand Oaks: Sage.
- Scarbrough, H. (1999). Science Friction, *People Management*, 8 April, 5, 7, pp 68-74.
- Scarbrough, H., Swan, J. & Preston, J. (1999). *Knowledge Management: a literature review*. London: Institute for Personnel and Development.
- Schein, E. H. (1978). *Career Dynamics: Matching Individual and Organizational Needs*, Reading, MA: Addison-Wesley
- Sonnenfeld, J. A. & Peiper, M. A. (1988). Staffing policy as a strategic response: a typology of career systems, *Academy of Management Review*, 13/14, p568-600.
- Sparrow, P. (2000). New employee behaviours, work designs and forms of work organization: what is in store for the future of work? *Journal of Managerial Psychology*, 15(3), 202-218.
- Stanworth, J. & Gray, C. (1991). (eds) *Bolton 20 years on: the small firms in the 1990s*, London: Paul Chapman SBRT.
- Stanworth, J., Purdy, D. & Kirby, D. (1992). *The management of success in 'growth corridor' small firms*, Milton Keynes: Small Business Research Trust.
- Stewart, T.A. (1997). *Intellectual Capital - The New Wealth of Organisations*, London, Nicholas Brealey Publishing.
- Storey, D. (1994). *Understanding the small business sector*, Routledge: London.
- Sveiby, K. E. (1997). *The New Organisational Wealth - Managing and Measuring Knowledge-Based Assets*, San Francisco, Berrett-Koehler.
- Taylor, P., Qunitas, P., Storey, J. & Fowle, W. (2000). Utilising internal and external resources for innovation: employment practices and inter-firm collaboration. *Management of Knowledge and Innovation Research Unit Working Paper 0011*, Open University Business School.
- Thomson, A., Mabey, C., Storey, J., Gray, C. & Iles, P. A. (2000). *Changing patterns of management development*, Oxford: Blackwells (forthcoming).
- Toracco, R. J. (2000). A theory of knowledge management in Herling, R. W. and Provo, J. (eds) *Strategic perspectives on knowledge, competence and expertise*, San Francisco: AHRD/Berrett-Koehler Communications mc, pp 38-62.
- Wang, Marshall, J., Alderman, N. & Thwaites, A. (1997). Management training in small and medium sized enterprises: methodological and conceptual issues, *International Journal of Human Resource Management*, 8(1), 44-65.
- Watkins, D. (1983). Development, training and education for the small firm: a European perspective, *European Small Business Journal*, 1(3), 29-44.
- van de Ven, A. H. (1986). Central problems in the Management of Innovation, *Management Science* 32, 590-607.
- Yolles, M. I. (1999). *Management Systems: a Viable Approach*. Financial Times Pitman, London.
- Yolles, M. I. (2000). The Theory of Viable Joint Ventures, *Cybernetics and Systems*, 31(4), 371-396.