

Knowledge Management in Extended Enterprises

Prof. Subhash Wadhwa

*Professor, Indian Institute of Technology
New Delhi, India
swadhwa@mech.iitd.ernet.in*

ABSTRACT

This paper highlights the importance of Knowledge Management (KM) in extended enterprises. Global competitiveness poses flexibility challenges in a time-based competition. One of the strategies adopted in industry is to develop extended enterprises by improving the level of collaboration between various autonomous firms. This coupled with several knowledge changes require a new focus on effective knowledge management. Judicious use of IT to form and support extended enterprises that gain from KM efforts is important. This paper presents the need and scope of Knowledge Management in enterprises facing the global competitive challenges. The emphasis of knowledge management as a process with a synergy between university and industry efforts is also outlined. A visionary approach based on a simulator and AI based architecture is discussed. It is suggested that models that promote IT based integration between objectives, decision and information (ODI) integration will be expedient for the evolving extended enterprises and virtual enterprises domains.

Keywords

Extended Enterprise, Knowledge Management, Flexibility, Time-Based Competitiveness

1.0 INTRODUCTION

The evolving business environment is characterized by many challenges that are propelling business towards extended enterprises with knowledge management focus. The customers are becoming more mature with increased customer service expectations. The evolving free market economy is shifting towards buyer's market. Competition is rising from the enterprise level to the supply chain level, and the new supply chain dynamics are calling for new vendor integration strategies. On the technology front, the advances in the product, process and information technology are further catalyzing these changes. This is supported by the various Government policies such as the information technology bill, support for e-commerce and thrust for new knowledge diffusion through educational institutes. From a product perspective, the globalized

markets are reducing the product life cycles and increasing the need for greater variety. In addition, the emerging focus on environmental issues is leading to new strategies like the eco-friendly manufacturing and reverse logistics. All these developments exert great pressure on the business enterprises. New dynamics require new competitive strategies. The evolving focus on knowledge management in the extended enterprises is a step in this direction. A flexibility and time based competitiveness challenge, that needs a new knowledge focus in enterprises is required (Figure 1).

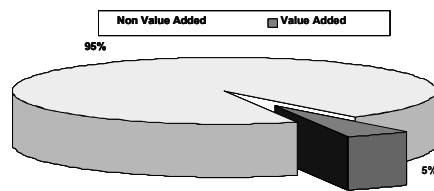


Figure 1: Time-Based Competition and Flexibility: A Knowledge Focus

2.0 Enterprises and KM

Davenport and Prusak (1998) define knowledge as a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. Knowledge Management (KM) is an effort to increase useful knowledge within the organization. Ways to do this include encouraging communication, offering

opportunities to learn and promoting the sharing of appropriate knowledge artifacts (McInerney, C. 2002). KM involves blending a company's internal and external information and turning it in to actionable knowledge via technology platform (S. Dimattia and N. Oder, 1997). KM is the ability to create and retain greater value from core business competencies. It addresses business problems particular to business-whether its creating and delivering innovative products or services, managing and enhancing relationship with existing and new customers, partners, and suppliers, or administrating and improving work practices and processes (Tiwana, 2000). There is a need to extend KM concepts in the extended enterprise domain. Hall and Andriani (1998) analyze that intangible resources and managing knowledge in the supply chain context. Nonaka and Takeuchi (1995) suggest that the cornerstone of the Theory of Organizational Knowledge Creation is the substantiate distinction between tacit and explicit knowledge. Several researchers define tacit knowledge as personal, context specific knowledge that is difficult to formalize, record, articulate, or encode. Barton & Sensiper (1998), extended the concept of tacit knowledge from an individual to a group level

Most works of KM have focused within an enterprise. There is a need to extend KM concepts in the context

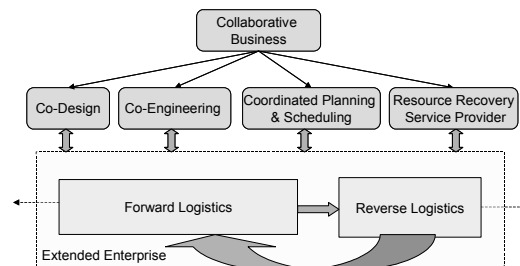
of extended enterprises, supply chains and virtual enterprise etc. Browne et al (1995) have discussed the role of extended enterprise to meet global competitive challenges. Schneeweiss (2002) gives a detailed study of supply chain management. Bates and Slack (1998) indicates the need for knowledge in dealing with supply chain issues. Tiwana and Ramesh (2001) discussed a knowledge management system to support collaborative information product evolution. They discuss a prototype Knowledge Management System (KMS). Nissen, (1999), explained the application of Knowledge Management in the re-engineering domain. A fundamental problem with knowledge management is that the IT employed to enable knowledge work appears to target data and information, as opposed to knowledge itself. In contrast, knowledge-based systems (KBS) maintain an explicit and direct focus on knowledge. Nomura (2002) discussed knowledge management in successful enterprise design to meet competitiveness. Wadhwa (2003a) proposes the need to enrich KM efforts with a focus on Knowledge innovation for the evolving supply chains, extended enterprises and virtual enterprises. Role of HRD in meeting such goals is considered crucial.

The challenge is to apply the KM concepts to extended enterprise (Browne et al, 1995), virtual enterprises (Goldman, 1994), Forbairt

(1996). Lee et al (1997, 1998) outlined the need to appreciate the role of information sharing to effectively deal with supply chain dynamics. Knowledge of such dynamics can save firms from the impact of distorted demand fluctuation known as the “Bullwhip effect. Such fluctuation could result in excessive inventory, poor product forecasts, insufficient or excessive capacities, long backlogs, uncertain production planning, and high costs for correction such as for expedited shipment and overtime.

3.0 Extended Enterprises & KM

The transformation towards extended enterprises (EE) requires the integration of enterprise business processes, functions, and software applications from end to end, including not only the internal operations, but also the entire supply/service chains. Towards this, the enterprise is extended to enable collaboration with customers, employees, and business partners in a connected economy. An important



challenge here is the KM of new collaborative functions (Figure 2).

Figure 2: Extended Enterprise (EE)

An extended enterprise comprises of an integrated view of the forward and reverse logistics that spans over several geographical and organizational boundaries. Thus the KM focused collaboration strategies and HRD constitute the important challenges. The various collaboration strategies include, the co-design, co-engineering, and coordinated planning and scheduling of operations, leading to a collaborative business.

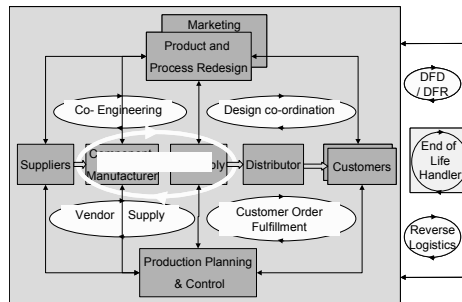


Figure 3: Changing business processes

The changing business processes involving co-engineering, design coordination, vendor management and customer order fulfillment require greater KM thrust (Figure 3). It is with respect to the management of multiple knowledge resources. The combined knowledge needs to be developed, shared, disseminated for wider benefits.

Transformation of isolated enterprises into extended enterprises requires both the methodological as well as technological support (Wadhwa, 2003b). It involves right connectivity, coordination, cooperation, collaboration and community with shared norms and goals (Figure 4).

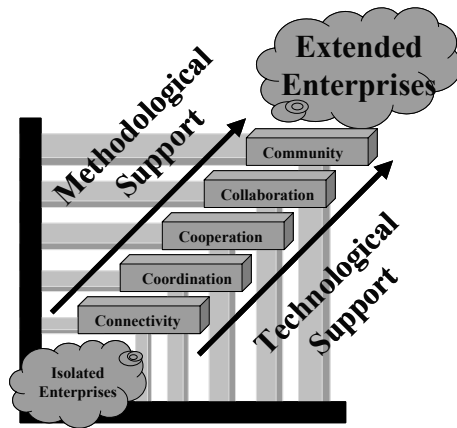


Figure 4: KM Challenges Towards EE (Wadhwa, 2003 b)

In coordination, the partners coordinate activities towards their common goal. In cooperation, conflicting objectives are resolved with a co-operation focus. Collaboration involves joint decisions with a win-win focus. Community will have shared norms and expectations, shared vision, values and roles, and the rules are jointly set. All this is enabled by the connectivity that provides seamless and transparent information flows.

Towards this, IT is an enabler. The extended enterprises focused on new customer value propositions evolves in this context with significant KM focus. The new values pose multi-attribute competition involving cost, quality, variety, lead time, delivery on time, access to information, end-of-life eco-friendliness, safety, reverse logistics, and so on. There is a time-based competition in such flexible systems with an IT focus. The key KM challenges involve extending the focus: from efficiency towards flexibility and efficiency, local performance to system effectiveness, partial productivity to total productivity, mass production to mass customization, and competing firms to competing chains. Towards this, a new system focused knowledge management is critically needed. This must be supported with judicious use of IT in enterprises for global competitiveness. In this context, HRD offers both challenges as well as opportunities.

4.0 KM: A Process Focus

The knowledge management must be viewed with an ongoing process focus (Figure 5). In our view, knowledge innovation may be seen as an explicit and important part of this process to achieve global competitiveness. Innovative KM systems must aim at improving knowledge flow through collaborative network groups in agile and virtual enterprises. In this context, it is

important to make a distinction between the flow of knowledge and the flow of information. The focus of HRM should be on the knowledge innovation focused HRD.

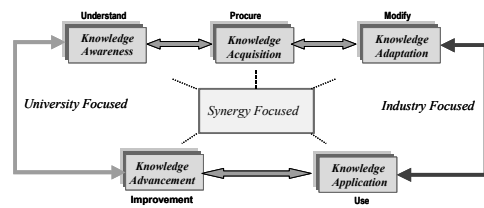
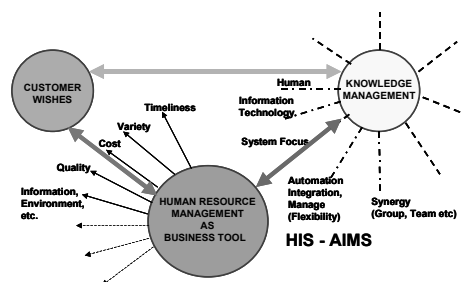


Figure 5: Process Focused KM Framework (Wadhwa, 2003 b)

From a HRM opportunity / challenge perspective, the knowledge management framework involves five processes, viz., knowledge awareness, knowledge acquisition, knowledge adaptation, knowledge application, and knowledge advancement. The first and the last are university focused while the middle ones are industry focused. The overall focus is to bring in synergy among all these processes towards greater effectiveness.



*Figure 6: KM and Customer Focus
(Adapted from Wadhwa, 2003 a)*

5.0 KM and Customer Focus: A Model

One of the motivations for knowledge management in a business context arises due to the changing customer preferences. KM must aim at customer focus (Figure 6). Changes in customer wishes may change the applicability of past knowledge. Thus KM must support a systems focus. For instance, often it is more important to reduce the non-value added time (NVAT) than to increase the value-added time (VAT).

Some of the important knowledge changes in enterprises may be summarized as follows: (a) The change from a cost based competition to multi-attribute competition. (b) From mass production to mass customization. (c) From a utilization focus to lead time focus (responsiveness). (d) From a function orientation to process orientation. (e) From local efficiency to system flexibility and efficiency focus. (f) From sequential decisions to concurrent decisions. (g) From best single design to best alternative DFM Solutions. (h) From a VAT increase goal to NVAT reduction goal. (i) From internal SME integration to supply chain integration. (j) From automate AS-IS to re-engineered flexible, agile systems. (k) Technology Focus to Human

Resource + Technology Focus and (l) Evolve KM towards new mindsets for effective IT facilitated systems

6.0 KM and Systems Focus

In the evolving global competitiveness, it is important to emphasize Knowledge management with a systems focus. It is important to develop a good KM strategy to facilitate Synergy between the Objectives, Decisions and Information (ODI) Integration in any enterprise. Following elements are important from the KM perspective:

1. Total System Focus
(Human + Technology + System)
2. Balanced IT Use For Synergy
(Flexibility, Integration, Automation)
3. Total Customer Focus
(Multi-Attributed Requirements)
4. Towards Total Productivity
(Consider Outputs with Inputs)
5. Total Enterprise Management
(Improve Visibility with Information)

KM must focus on the Totality in the enterprise, including Human, Technology, Knowledge, Processes, Structures and Systems etc. The aim is synergy amongst the various components. In our experiences the ODI focus (Figure 8) is extremely important to attain judicious use of IT in extended enterprises. First the objectives need to be aligned. Next the decision systems must provide use of knowledge to effectively move towards aligned objectives of the extended enterprise. The information

needed for this must be facilitated in a timely manner with IT systems.

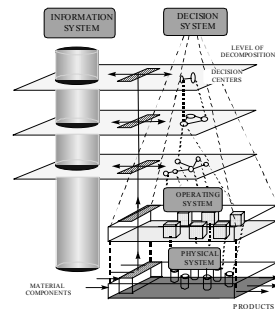


Figure 7: An Objective-Decision-Information (ODI) View

7.0 Judicious use of IT

IT is a key Potential Contributor to Total Productivity and Effectiveness of any enterprise system. Due to increasing customization and technology evolution pressures, the modern organizations reflect increasingly Complex and Dynamic Systems. IT plays the role of integrating these systems through improved availability of both internal and external information. IT facilitates both Decision and Information Integration and Automation. However IT is Costly, hence its Judicious Use is Important in modern enterprises. There is a growing need to develop and manage knowledge on How Much, Where, When, What IT solution etc. Some important knowledge focused questions are: Does More IT Means

More Productivity?, Does More Information Means More Output ? What knowledge can guide us towards best value for information?

In order to manage enterprise knowledge we need to appreciate major areas of IT use in Industry. Some modes of IT use in Industry are: As Facilitator: ERP, HRIS, e-learning, As System Enabler: FMS, CIM Systems, As Storage/Access : Database, KBS, As Global Integrator: e-Biz, e-HRM, As a Tool: Simulation, Expert Systems, As a Decision Support System: DSS, GDSS etc. In our experience, knowledge management on the flexibility, integration and the automation dimensions in the enterprises have maximum influence on the IT related performance of the enterprise. For this reason the development of knowledge models on each dimension such as flexibility are important to guide the enterprises on a journey towards greater competitiveness. Our enterprise knowledge indicates that from KM perspective we need to put people (and their implicit and explicit knowledge) first compared to IT. The flexibility of both people and technology towards higher level of knowledge is important. Further it is important to develop proactive knowledge management compared to the reactive management strategies. A KM perspective on proactive flexibility management is crucial (Wadhwa and Rao 2002). It is

envisioned that knowledge innovation must enrich KM efforts in future.

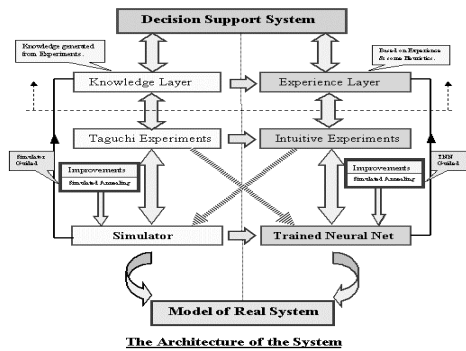


Figure 9: A Visionary Architecture (Wadhwa, 2003 a)

8.0 An Architecture Towards Knowledge Innovation

It is envisioned that extended enterprises and virtual enterprises of the future can significantly benefit from the concepts of knowledge management and innovation. As part of our ongoing R&D endeavors with industry, we have developed a knowledge innovation based architecture (figure 9). This aims to promote proactive planning and control applications in the enterprises. It helps managers to develop and manage the system knowledge more effectively. Our ongoing research in the domains of extended enterprises and supply chains aims at enriching these concepts to continually improve the system performance.

9.0 Conclusions

The global competition demands greater flexibility and time based performance improvements in extended enterprises. There is a new body of system-focused knowledge that is evolving. The enterprises need to effectively employ KM concepts to increase their competitiveness. There is a need to envision knowledge innovation based architectures. It is important as the modern enterprises are increasingly complex and dynamic. Knowledge management is to be seen as a process with an increasing focus on knowledge innovation. This goal needs synergy between university and industry for mutual benefits. Judicious use of IT in extended enterprises must be planned around the KM core for best benefits.

10.0 References & Bibliography

.D. Leonard-Barton, S. Sensiper (1998). *The role of tacit knowledge in group innovation*, California Management Review 40 .

T.H. Davenport, L. Prusak (1998). *Working Knowledge: How Organizations Manage what They Know*, HBS Press, Boston.

A. Tiwana (2000), *The Knowledge Management Toolkit*, Prantice Hall,

- Richard Hall, P. Andriani (1998). *Analyzing Intangible Resources and Managing Knowledge in a Supply Chain Context*, European Management Journal Vol. 16, No. 6, pp. 685–697
- Christoph Schneeweiss (2002) *Distributed decision making in supply chain management*, EJOR.
- T.H.M Tah and V. Carr (2001). *Toward a framework of project risk knowledge management in the construction supply chain*, Advances in engineering software, 32, 835-811.
- H. Bates, N. Slacks (1998). *What happens when supply chain manage you: A knowledge based response* European Journal of purchasing and Supply Chain Management, 4, 63-72 .
- McInerney, C (2002), *Knowledge Management and the dynamic nature of knowledge*, JASIST.
- Susan Dimattia and N. Oder (1997). Library Journal.
- Wadhwa, S. (2003 b), Invited Speaker APO, (See EE, KM Notes etc) *HRM* for Globalizing SMEs, Jakarta.
- Takahiko Nomura, (2002). *Design of 'Ba' for successful Knowledge Management-how enterprises should design the places of interaction to gain competitive advantage*, Journal of Network and Computer Applications, 25, 263,278.
- Mariano Nietok, (2003). *From R&D management to knowledge management An overview of studies of innovation management*, Technological Forecasting & Social Change 70, 135–161
- Lee, H., Padmanabhan, V, Whang, S., (1997) *The Bullwhip Effect in Supply Chain*, Sloan Management Review, pp. 93-102.
- Wadhwa (2003 a), Invited Keynote, Global competitiveness and IT: Vision on Knowledge Innovation, First HRD Conf., October, Tehran.
- Browne, J., Sackett, P.J. and Wortmann, J.C. (1995), "Future manufacturing systems towards the extended enterprise", Computers in Industry, Vol. 25, pp. 235-54 .
- Goldman, S.L., (1997) *Co-operating to Compete: From Alliances to Virtual Companies*, in *CMA*, p. 13-17.
- Forbairt (1996), *Virtual Corporation Defined*, Summary Section for Forbairt Internet Report, Ireland
- Wadhwa, S., Rao, KS. (2002), *Towards A Proactive Flexibility Management View*, GIFT Journal, Vol. 3, pp 1-10.
- Mark E. Nissen (1999), *Knowledge-based Knowledge Management in the Reengineering Domain*, Decision Support Systems 27, 47–65