INNOVATION AND GROWTH OF KNOWLEDGE BASED INDUSTRIAL CLUSTERS TO MAINTAIN COMPETITIVE EDGE

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“Every organization – not just business – needs one core competence: Innovation---.” – Peter Drucker

ABSTRACT

Innovation is the capability to see change as an opportunity and not as a threat. Innovation questions traditional rules, identifies innovative business possibilities and cut redundancies from non value added systems to improve performance levels. Successful innovations seamlessly connect concepts and ideas to their operation manifestations. The cluster approach revolved around the pattern of innovation and entrepreneurship characteristics which can help to improve the performance of SMEs. The changing dynamics of markets will create a need for continuous change in the business features and its functionalities. This paper seeks the importance of entrepreneurship and innovation in development of knowledge based clusters which would be a sustaining factor in the growth of SMEs.

Keywords: Innovation, Knowledge based clusters, Knowledge management, Alignment of technology & management.

1. Introduction

In global economic environment uncertainty is dominating. Product and services are loosing its shine and extinguishing from market rapidly. Only that company can survive which has the ability to consistently innovate new practices, products, explore new markets, and institute innovative changes in its organizations for enhanced efficiency. Societies are gradually turning into “knowledge society” (Grover & Davenport(9), 2001). Though many scholars have been researching on innovation and knowledge management, few of them have devoted knowledge management in industrial culture. This paper presents the importance on innovation and necessary factors which can be used as a reference for policy makers of industrial clusters.
2. Research Objective

The objective of this paper is to understand as to how entrepreneurship, innovation and clusters can improve the industrial growth in developing countries. Based on this understanding, the authors attempt to identify current & future needs that will identify necessary factors, processes, and characters of knowledge management of industrial clusters which can be used as a reference for policy makers of industrial clusters.

3. Conceptual Framework

Innovation is the application of technological, institutional and human recourses to productive and service process resulting in efficient practices (Drucker\(^6\), 1985). Innovation is the conversation of knowledge (existing or new) into new products and services to create additional value with increased productivity leading to growth in the business. Success in business does not come from feeling comfortable and keep using the orthodox methods. During the present economical meltdown, the business of many companies have been affected, only those companies have survived which have accepted the risk, measured its performance, assessed the market trend, felt the customer’s requirement and finally embraced innovation (D’Costa\(^5\), 2006). During these troubled times, innovation is more important to sustain the company’s survival.

Innovation questions the traditional rules. It identifies innovative business possibility. It cuts the redundancy from non value systems to improve performance levels. It is based on a novel principal that challenges the orthodox approach. It is systematic, involving range of methods and process. Innovation can broadly fall into - strategic, operational, people, management technologies/tools and product / service innovation.

Until recently innovation was seen as the means to research which results into commercially successful products or services. Today research is playing its critical role as a major contributor to innovation (Gopal\(^8\), 2007).

Society, we live in, is gradually turning into a “knowledge society”. The “knowledge” has become an essential organizational driver, and a key factor in value creation. Organizations are placing increased focus on expanding the organizational base, either by learning from others, or by creating new knowledge through innovation (Sharp\(^21\), 2003). Porter\(^18\) (2000) presented the notion of industrial cultures which many countries have been developing. Many industrial clusters have been developed – such as champagne in French, Ruhr industrial park in German, districts of Zhejiang and Guangdong in China, Cambridge industrial park in UK, Xinzhu in Taiwan, some industrial...
clusters in Silicon Village in USA, automobile spare parts manufacturing clusters in Gurgaon, Chennai, and Noida - India, footwear industry in Agra – India, woolen garments in Jalandhar - India. A distinct factor is evolution of knowledge. In knowledge evolution, cooperation effect which has very important meaning for the development of high technology is further strengthened.

4. Knowledge Evolution in Industrial Culture

Industrial clusters have its own characters which are different from traditional mass production industrial units (Zhang & Liu, 2005). Knowledge evolution intensifies competitive advantages (Porter, 1990, 2000) for the long development of industrial clusters. Knowledge elements changes with the environment & value. Market profit stimulates a new cycle of knowledge evolution. Knowledge evolution includes knowledge accumulation, knowledge environment, institution of knowledge evolution (Wang & Shen, 2008).

5. Insights for Innovation

Traditionally managers depend upon experience and intuition to develop “gut feel”. Most often a gut feel is based on past experiences. Gut feel and intuition are important, but in a fast changing competitive environment, experience of the past is less and less valuable.

Foresight is a result of understanding the competitive dynamics of structured and un-structured data. There is importance in identifying new patterns of relationship, predicting the behaviors and evolution of systems, and mitigating risks. Given the complexity of the entire system, the impact of change in any single variable will have ripple effect on the other related subsystems. Hence, managing the system wide impacts of changes can not be left to the gut feeling of the managers. Individual managers can, based on their experiences, interpret the signals differently – specially in a rapidly changing system. Hence, foresight based on the real time analysis of both structured and un-structured data is indispensable. Intuition and gut feelings can still be useful – but can not substitute for analytical capabilities – analytics (Gopal, 2007).
Analytics must be driven by strategy. Analytics assist to understand where to allocate resources and how to optimize the “resource network”. This is a real time decision for which firm must respond creatively. Analytics helps improve the strategic direction and business process. There is the need for richness and quality of data – both structured and unstructured. The capacity to combine different types of data enhances the richness of analytics. Managers need a method and clarity in approach to ensure data quality.

New knowledge becomes the source of innovation. Innovation would require analysis of opportunities, looking to be simple. Entrepreneurs exploit change in order to create new business opportunities. Drucker\(^6\) (1985) stressed that entrepreneurial executives must consider entrepreneurship and innovation as “a normal ongoing every day activity in their own work and in their own organization”.

6. Organizational Legacies

Propelled by technological changes and changing consumer expectations, many firm find themselves not ready to accept the challenges posed by this new reality. Managers face organizational legacies – both social and technological. Social architecture is the sum of the systems, processes, beliefs, and values that determine an individual’s behaviors, perspectives, and skills. It includes managerial behavior determinants such as organization structure, performance metrics, reward systems, career management, training, beliefs and values. These processes
collectively influence manager’s mindsets and behavior. Similarly, the technological architecture – applications, data base, system – represent the pattern of evolution of the firm.

Reinforced over time and embedded in the organization in standard operating procedures and rules, they lead to a predictable way of thinking about opportunities, competitiveness, and performance. Let us call this as ‘Controlling Logic”. This controlling logic becomes the lens through which managers see the world. Hence, organizational legacies can erode the capacity of an organization to innovate and create values.

The development of a new business model or creating a new business opportunity by an established firm breaks the orthodox functioning and creates a new opportunity. As the business model becomes successful, managers start embedding the processes that are optimized for this business model. For example the business model that got the Indian software firms (TCS, Wipro, Infosys, Birla-Soft, MBT) started their growth trajectory, which can be due to the following believes (Sunstar\(^{(14)}\), 2006):

- Quick response to all customers’ proposal.
- Meet the entire customer’s specifications and wants.
- Do the projects which are profitable
- Win over price
- Doing work in India (offshore) is better than doing work at the customer’s site (onshore). The cost advantage in offshore work is better for the firm.
- Availability of trained man power.
- Advantage of Cost arbitrage - the Cost arbitrage is based on the contribution (revenue to cost) per persons.

So to grow, these firms recruited and trained more people every year. The IT Company perfected the system to train engineers (with varying backgrounds – from Civil Engineering to Electronics) and MBAs to become software developers. Indian Software Firms were able to grow rapidly and challenge the global software companies, like IBM, Accenture. This model helped the Indian Software Company to gain great success.

The question for the Indian software companies now is whether they will be able to sustain front end consulting capabilities in the present scenarios to supplement their back end and delivery capabilities. The Indian
companies need to further innovate in their back end delivery capabilities. Developing this new capability is not just about investment. **It is about a new way of thinking about the new opportunity, skill, performance matrices and pricing practices.**

The reasons why business process transformation initiatives do not bear fruits in many organizations are largely managerial, social and technical failure, as stated below:-

- Lack of senior management commitment.
- Weak accountability.
- Misalignment of goals.
- Lack of discipline and under estimation of company strength.

7. **An Analysis of Feedback Systems of Innovative Firms**

Abernathy & Utterback\(^1\) (1978) argue that, when a new industrial sector is created, the first phase involves a high rate of product innovation, the second phase a high rate of process innovation, and the third phase a relatively low rate of both. Most of the literature on organizational innovation has concentrated on the causes of innovation but has not considered the nature and importance of feedbacks. A wide variety of potential feedbacks could be considered. We have analyzed three of these – i.e, \(a\) the complexity of orthodox organizations designed on the basis of Taylor’s principle – division of labor, \(b\) selection of change process, and \(c\) the survival strategy.

7.1 **Feedback of Orthodox Firms**

There are ample evidences to record that innovation has upgraded the skills and training of labor forces (Garry & Kennedy\(^7\), 2005), changed the process of manufacturing from traditional to flexible manufacturing system. The radical changes, through BPR, brought organization innovations (Hammer & Champy\(^11\), 1993). The researches have shown that the radical new process technologies showed a decline in employment across many industrial sectors in Europe, USA, and Japan.

7.2 **Selection of Change Process**

Some technologies enhance the capacities, and some technologies eliminate the firms from the market. It is very essential for an organization to assess the technologies correctly. The successful organizations are likely to do the former. Literature shows that new organizations are likely to introduce radical process innovations.
7.3 Survival Strategies

The analysis of data demonstrate that the organization which have flexible organization system were more prone for survival. Sushil (2005) reported the need of flexible strategy framework to help manage the different continuity – change (C – C) matrix to map both the continuity and change parameters in an organization.

8. Dynamic Reconfiguration of Talent

Firms have to learn to dynamically reconfigure human resources. The days of mass production – making one item in a repetitive, linear supply chain or the assembly line may be over. They do not create value by selling a product that is massed produced. For example, health insurance based on a demographics need different configuration of health management system based on personalized risk profile and continuous monitoring of the progress of an illness. As a result, the work of managers changes dramatically. It is no longer just managing an assembly line efficiently but responding to continually evolving opportunities. The core platform for value has shifted from product and service to solution and experience for the customer. Unlike mass production, each request from a customer can be different. Managerial work, as a result, is continuously changing. Emerging nature of managerial work – managing a series of micro and macro projects within the firm – suggests that a dynamic configuration of talent can’t take place unless specific attention is paid to the following:-

- Managers need to know where the talent is within the organization and where it can be accessed easily from the outside.
- Managers need to help project team members cope with stress caused by time pressures, ambiguous power and authority relationships, and cross – cultural and interpersonal interactions.
- Managers need to create the capacity to reduce “frictional losses” in the dynamic configuration of resources.

9. Knowledge Management

Knowledge has been regarded as a critical source. The focus remains in a firm’s ability to create, transfer and use of the knowledge in order to build up sustainable competitive advantages. In growing Indian industries, the conventional belief is that firms that possess higher technological and innovative knowledge have higher competitiveness. Thus, in general Indian companies are usually in disadvantageous position to compete in global market. Moreover, the companies face difficulties with acquiring advanced technologies from foreign/external
sources for three main reasons. First, scarcity of knowledge based industrial clusters in close geographical proximity. Thus there is perpetual disadvantage in access to knowledge spillovers and knowledge workers. Second, under-developed networks of manufacturing and distribution through which firms could capitalize on acquired technological knowledge. Third, foreign investors make technology transfer difficult because of legal protection of ‘intellectual property’. Conceptualization of knowledge management process involves the acquisition, dissemination and integration and commercialization (Gupta & Govindrajan, 2000). Subramaniam and Vekatraman, (2001), identified two factors – social capital and absorptive capacity for analyzing acquisition and transfer issues in knowledge management problems. Organizational design and institutional views also play vital role as supporting mechanism in facilitating knowledge acquisition, dissemination, and commercialization. A schematic model of factors influencing the knowledge management is shown in figure 3.

The European success stories (Schmitze & Musyck, 1995) indicate that horizontal collaboration between small and medium sized enterprises had yielded collective efficiencies in the form of reduced transaction costs, accelerated innovation through knowledge sharing and rapid problem solving to achieve greater market success. A similar experience has been observed in high technology companies in China (Lau, Lu, Makino, Chen, and Yeh, 2002). Basant and Chandra (2002) identified “3Ps”: products, processes, and practices which are embodied in technology. The nature of quantum of knowledge flowing through these “3Ps” can be affected by parameters, such as – (a) the extent of tacitness; (b) context specificity; (c) cumulativeness; (d) incrementality; and (e) appropriability. The conceptualization of “3 Ps” allows the industrial and technology policy to focus attention on specific aspects of technological capabilities and manage technology within an enterprise or a cluster. Bell and Albu (1999) identified the sources of knowledge in industrial clusters which is given in Table – 1. Basant (2002) summarized the factors likely to have effects on knowledge flows as given in Table – 2.

The industrial engineering department of IIT Bombay (2008) examined the return net worth (RONW), Inventory turnover, and advertisement intensity of 85 firms located in Maharashtra, NCR, and Chennai. The Institute observed that the “cluster industries” have definite competitive edge over non-cluster industries (as shown in figures 4 & 5) due to knowledge sharing.

10. Sum Up

The overall business model would be changing for models for value creation. The firms will require a new approach to accessing and using resources. This transformation of creating value provides an opportunity for
innovation. This transformation will not leave any company untouched. It is important to understand that this philosophy of creating essential connections between the various architectural elements that create entrepreneurial and innovative culture in a firm is an integrated package. Managers must reorient business functions to deliver the efficacy and flexibility demanded in the new world of value creation. This will influence several functions within the firm, such as marketing, sales, HRM, manufacturing and services. Managers must become adept at real time actions that are event and customer specific. The shift to this combination of capabilities will require changes in the managerial mindsets, skills, attitudes, and behavior. This transformation will involve migrating management practices. This migration should be planned. The role of leadership in organizations will be crucial in this transformation. We need leaders who can imagine and inspire and can shape the world as it can be!

Innovative knowledge allows a company to lead its entire industry to an extent that clearly differentiates it from other players in the market. It allows the company to change the rules of the game. Innovation management, as a core competence, will transform the organizations into cash generating stars.

Knowledge evolves in multidimensional in industrial clusters. Knowledge evolution happens in different department and in various directions. Industrial clusters have its own character. Policy makers of industrial clusters should emphasize construction of knowledge evolution, which will intensify competitiveness of industrial clusters.

The studies carried out in India and China highlighted an increasing awareness of the importance of knowledge sharing in sustaining competitive edge in global as well as in house market. The Honorable Prime Minister of India unveiled a five-point agenda for India’s development into a “knowledge” society. Based on the agenda the Planning Commission of India constituted a task force with the objective to define, shape, and communicate public policy issues that relate to the emergence of India’s knowledge society, developing public awareness programs, and researching issues related to knowledge society. The key implications are creating an organization culture that emphasizes trust, encouraging inner organization culture, designing processes that enhance tacit knowledge transfer, implementation mentoring programs, building general management capabilities.

Our study show that it is imperative for organizations that aim to become globally competitive to evolve a strategy to encourage building relationships with other organizations and promote knowledge transfer among organizations. This helps in creating industry clusters that ultimately sustain global competitiveness of organizations.

However, when an industry gets more sophisticated and the market becomes more global, these companies can no longer sustain their competitiveness. Firms have to develop new ventures, markets, and products. The question is how they can apply
their current knowledge to obtain synergy in the new ventures. What is the mechanism needed to achieve successful integration? What types of leadership or leadership competencies are required to sustain the competitiveness of these firms? These are the questions future studies of high-tech firms in which we have to address!
Figure 5: Comparison of Advertisement Insensitivity
Source: IIT Bombay (12)

Figure 6: Comparison of Inventory Efficiency
Source: IIT Bombay (12)
### Table – 1: Sources of Knowledge in Industrial Clusters

<table>
<thead>
<tr>
<th>Section</th>
<th>Sources</th>
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| **A  Intra Firm Sources** | 1. Learning by doing (Passive experience)  
2. Improved processes and practices derived from trial and error experimentation.  
3. Adaption and improvement of existing technologies (reverse engineering etc.)  
4. Aligning products, processes and practices within the firm. |
| **B  Intra - clusters Sources** | 1. Knowledge spillovers/diffusion between producers.  
2. Knowledge spillovers/diffusion between users and producers of machinery/material or production related services.  
3. Intra-cluster mobility of skilled labors.  
4. Training and skill development through cluster based/mediated initiatives.  
5. Links between enterprises and cluster based technology institutions (technology development, adaption, testing, certification etc.)  
6. Collaboration among cluster based enterprises for adaption and technology development (machinery, product design)  
7. Links between enterprises and customers located in the cluster (MNC, Large firm) |
| **C  Sources outside the Clusters** | 1. Customers and traders knowledge.  
2. Machinery and other input suppliers.  
3. Collaborative testing or technology development with technology institutions and enterprises outside the clusters.  
4. Externally sourced training.  
5. Visits to outside clusters/firms. |

Source: Bell & Albu\(^{(4)}\) - 1999
### Table - 2: Determinants of Knowledge Flows in Geographically Bound Clusters

<table>
<thead>
<tr>
<th>Factors</th>
<th>Likely Effects on Knowledge Flows</th>
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<tbody>
<tr>
<td><strong>A. Factors Internal to the Cluster</strong></td>
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<tr>
<td>2. Horizontal inter-firm linkages between firms producing similar products.</td>
<td>Positive, but collaboration is generally weak.</td>
</tr>
<tr>
<td>3. Vertical inter-firm linkages (user-producer)</td>
<td>Positive, collaboration relatively strong.</td>
</tr>
<tr>
<td>4. Demanding customers</td>
<td>Positive. Generally positive but depends on production organization.</td>
</tr>
<tr>
<td>6. Traditional industries</td>
<td>Positive, measurement difficult.</td>
</tr>
<tr>
<td>9. Cluster life cycle.</td>
<td>Critical for high tech and some traditional. Knowledge flows seem to be higher for pharmacy, hifg tech, science based industries.</td>
</tr>
<tr>
<td>10. Universities/ R&amp;D facilities.</td>
<td></td>
</tr>
<tr>
<td><strong>B. External Links of the Customers/ Suppliers</strong></td>
<td></td>
</tr>
<tr>
<td>1. External customers.</td>
<td>Positive if customer demanding and has less market power.</td>
</tr>
<tr>
<td>2. Links with equipment suppliers/R&amp;D Institutes.</td>
<td>Positive.</td>
</tr>
<tr>
<td>3. Links with Global production network or commodity chain.</td>
<td>Important location in the network/chain matters. Depends on technology gap and objectives of FDI.</td>
</tr>
<tr>
<td>4. Foreign Direct Investment (FDI).</td>
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### C. Policies Initiatives, Environment

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<th>Efforts to access knowledge to achieve optimal level of competition.</th>
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<tbody>
<tr>
<td>1. Enhancing competition (trade liberalization)</td>
<td>Depends on local manufacturing.</td>
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<tr>
<td>2. FDI policies</td>
<td></td>
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</tbody>
</table>

**Source:** Basant(3) - 2002

### References


