

Stronger IPR Regime: A Strategic Need in Punjab

Dr. Vijay Jain* & Dr. Ravikiran**

*Assistant Professor, IMS Unison University, Dehradun

**Professor and Head, School of Behavioral Sciences and Business Studies, Thapar University, Patiala

Abstract

SMEs of Punjab are facing competition in the new globalized era. There are several challenges that the Punjab companies have to face to remain at the forefront of technological innovation. The chief challenge is increasing complexity of business. On one hand they have to continue to generate cash from their existing businesses to be able to finance their innovation strategies -which implies a strong operational focus with emphasis on productivity and efficiency. On the other hand, they have to build advanced innovation capabilities. There is a strong need to evaluate available technological options to overcome new challenges and become top performers. At the strategic level, the main challenge is to become globally competitive by adopting collaborative manufacturing strategies. The process of acquiring a production capability is initiated by importing a plant from another country or having a new plant built with the help of a technology provider.

Through training and learning by doing, the firms learn how to operate the plant, and gradually improve the yield from it. In the next stage, firms develop an investment capability the ability to create a new plant of a chosen capacity and specifications. Finally, firms develop an innovation capability – the ability to create new products, and the manufacturing infrastructure to produce these products. So to be competitive, the manufacturer needs to produce efficiently, focus on new developments and also to be innovative enough to promote IPRS. The present study uses a survey technique to study the IPR awareness level and IPR filings of hundred SMEs of Punjab. The study covers Hosiery, Cycle, Machine tools, Pharmaceutical and Sports goods industries. The results of the present study highlight that IPR awareness and developments in SMEs of Punjab are still at a initial stage. SMEs of Punjab are only filing trademarks and copyrights. Patent filing is almost missing. The major findings are that the attitude of SME's of Punjab is not encouraging and the awareness level among the management about their organization's IPR's policy and problems is disheartening. So the present study focuses on the steps that can be initiated to improve the IPR culture of the SMEs of Punjab.

Keywords: - Intellectual Property Rights, Technology, SME's of Punjab.

1. Introduction

In this new changed business environment, corporations have to face new challenges to satisfy the insatiable consumer demands, aspiring for increased features and new developments in the products and services they consume. Firms have to switchover from competition to collaborative reconfiguration, dovetail supplier and subcontractor processes to the corporate goals and empower employees to be able to meet and surpass customer expectations. Due to global competitiveness now business firms are taking

more effective steps to improve overall productivity and efficiency. To attain a place in the competitive market, companies have to reduce the cost price of their product. But past experience highlights the fact that the Indian firms took decades to catch up with global productivity levels. But now there is a strong need to evaluate available technological options to overcome new challenges and become top performers. At the strategic level, the main challenge is to become globally competitive by adopting collaborative manufacturing strategies.

In the post-liberalization era, Indian firms have been under tremendous pressure to improve their competitiveness. The removal of restrictions on imports and the lowering of customs duties implied that Indian firms have to be as competitive as their international corporations in order to survive. This has accelerated the process of technological absorption. Several companies also pushed ahead in improving production and improving their products so as to be able to add value to their products and improve profitability. More recently, in the last decade, the emphasis has been shifting to innovation and product development. Several industries, particularly the automobile, IT and the pharmaceutical industries have of late been focusing on a high level of product innovation activity.

2. Literature Review

An exhaustive review of literature is essential for any study. The review has been categorized into the following three areas:

2.1 Technological Change

According to Beets (1994) science is a general approach to understand nature, technology is a generic way to providing a functional capacity of doing things. Technological change stands for the change in historically acquired capital structure and the problem of economic growth is then problem of accumulating a given amount and type of capital. But technological change also brings about an increase in per capita income, either by reducing the amount of inputs per unit of output or by yielding more output for given amount of inputs. Technology denotes the broad area of purposeful application of the contents of the physical life and behavioral sciences. It comprises the entire notion of techniques as well as the medical, agricultural, management and other fields with their total hardware and software contents. Martino (1983) defines Technology as the totality of means employed to provide objects

necessary for human sustainability and comfort.

Adoption the first stage of the technology transfer process is simply a firm's awareness of a certain technology's existence and the firm's initial pursuit of that technology. Adoption decision refers to the processes by which a new piece of technology is selected for the organization. While the adoption decision clearly affects implementation, it is composed of different processes and is analytically distinct from implementation (Steensma, 1996). The firms, which are able to adopt a particular type of manufacturing technology, become quite comfortable in adopting the next level of innovation (Mansfield, 1993). Adaptation of technology is a phase that starts after a technology has been adopted and put to use in production activities or facilities. According to Mansfield (1993), the success or failure of technology transfer solely depends on the accumulated level of technology of a nation. The higher the technological level of a nation, the better judge the nation will be for the assessment and selection of proper technologies. But technology alone is not the sole factors.

Some studies have focussed on the human resource as an important factor in enhancing competitiveness. Hassan *et al.* (2006) are of the opinion that successful organizations in today's business environment are those who manage along with their technological resources their human resources also well. The study by Hollbeche, 1998 includes effective manpower planning, recruitment and selection process, realistic performance plans and development oriented performance appraisal, effective learning system providing ample learning opportunities with the help of training, performance guidance and other mechanism such as mentoring. Organizations perform better when they are making investment in training their employees and broaden their skills. Sethi *et al.* (2007) focus on manufacturing flexibility in Indian

manufacturing. The results highlight the emergence of human factor in terms of skills, technical expertise, training involvement, and attitude as the most significant factor for achieving flexibilities in manufacturing industries. For gaining competitive advantage and developing firm's internal capabilities, technology adoption and adaptation are considered to be among the most critical elements for a firm. Kanwar et al. (2001) empirically examine the relation between the protection of intellectual property rights and technological change. The researchers found an evidence to support the claim that the former encourages the latter, insofar as intellectual. The results of the study imply that the lack of an incentive structure can be a significant mitigating factor for technological change even when other constraints such as internal funds, availability of skills and trade orientation may not be binding.

2.2 IPRs, Technological Development and Innovation

Intellectual Property is the creation of human mind. Intellectual Property is the most invaluable assets, especially, in the knowledge-based industries. The industries that have knowledge as its core resource and where the profits are generated mainly through the commercialization of new ideas and innovations are categorized as knowledge industries. The emphasis is not on physical or tangible assets but on intangible knowledge assets.

Intellectual property is vital because it is a stimulus to innovation, a vehicle for technology transfers, and a magnet for financing. Intellectual Property is the term that describes the ideas, inventions, technologies, artworks, music and literature that are intangible when first created, but become valuable in tangible form as products. In other words, Intellectual Property is the commercial application of imaginative thought to solve a technical or artistic challenge. Intellectual Property is not the product itself, but

the special idea behind it, the way the idea is expressed and the distinctive way it is named and described. (Idris, 2002)

A study by Kumar (2002) stated that there has been a lot of controversy on the role of intellectual property protection (IPP) regime especially the patent system in fostering innovation, technology and industrial development of a country. IPP is expected to encourage innovation by rewarding the inventor. Strong IPP regime may also inhibit diffusion of knowledge and even technology development in the countries that are technology followers. Countries have fine-tuned their IPP regimes as per their developmental requirements. Against this backdrop, the on-going attempt to strengthen the IPP regimes worldwide, as a part of the TRIPs Agreement, appears to adversely affect the technological activity in developing countries by choking the knowledge spill-over besides implications for the access and affordability to lifesaving drugs by the poor.

A convenient definition of innovation from an organizational perspective is given by Luecke and Katz (2003): 'Innovation is generally understood as the successful introduction of a new thing or method. Innovation is the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or services'. Innovation typically involves creativity, but is not identical to it: innovation involves acting on the creative ideas to make some specific and tangible difference in the domain in which the innovation occurs. For example, Amabile *et al.* (1996) propose: "All innovation begins with creative ideas. We define innovation as the successful implementation of creative ideas within an organization. In this view, creativity by individuals and teams is a starting point for innovation; the first is necessary but not sufficient condition for the second".

For innovation to occur, something more than the generation of a creative idea or insight is required: the insight must be put into action to make a

genuine difference, resulting for example in new or altered business processes within the organization, or changes in the products and services provided. A further characterization of innovation is as an organizational or management process. According to Davila et al. (2006), 'Innovation, like many business functions, is a management process that requires specific tools, rules, and discipline.' Through these viewpoints, creativity is typically seen as the basis for innovation, and innovation as the successful implementation of creative ideas within an organization (Amiable et al. 1996). From this point of view, creativity may be displayed by individuals, but innovation occurs in the organizational context only. It should be noted, however, that many authors use the term 'innovation' rather interchangeably with the term 'creativity' when discussing individual and organizational creative activity.

As Davila et al. (2006) comment, 'Often, in common parlance, the words creativity and innovation are used interchangeably. They shouldn't be, because while creativity implies coming up with ideas, it's the 'bringing ideas to life' that makes innovation the distinct undertaking it is.' The degree of patenting activity provides an index of countries or companies which are active in various fields and also the fields in which technology is progressing and the fields in which technology is stable.

The registered trademarks bear witness of commercial interest in the market of the country and analysis of IPR and their presence in different countries provides a means of testing the soundness of many policies and investment decisions. India is emerging as the hub of 'knowledge economy' in South Asia. India has proved her strength in Information Technology (Kavida et al. 2008). The study highlights that India has become one of the successful models in the Patent legislation. The general public was immensely benefited by the Patent system

followed until December 2005. Employee's creativity and innovation skills can increase only by giving them appropriate recognition and reward for their creative work (Koning, 1998).

A study by Haakon (2004) focused the need of IPRs and benefits to the different concerns. Planning for implementing such strategy demands an engagement across the whole organization affecting projects, processes and culture of the company. R & D should focus on uniqueness and trigger creativity, Invention and Innovation. A study by Kumar et al. (2003) assesses the impact of IPR on Indian Economy with reference to agriculture and Industry. Small and Medium Size Enterprises have tried to adjust to the new paradigms to acquire competitiveness. Their survival itself will depend heavily on how effectively they imbibe innovative technology. It is generally accepted that Invention and innovation are instruments of success in the Global Economy. The researcher highlights that the survival of Industries and their ability to acquire competitive edge will depend heavily on how effectively they imbibe innovative technology.

According to Chadha (2005) Innovation does not merely reflect the extent of technological opportunity but are strategic tool for gaining market share even in world markets. Thus it is an opportune time for developing countries like India to diversify their exports to exploit generic niche in international Markets. Export Market is substantially dynamic and implications of the results for government policy are immense. The Government could introduce policies designed for small firms to provide technical support, easy credit, marketing and distribution channels and information regarding foreign markets. According to Genus et al (2002) Synergy between operations, technology management and human resource management enhance the operational innovation in a firm.

2.3 Role of IPRs in the Manufacturing Sector

According to Pradhan (2007), small firms dominate the Indian pharmaceutical industry with significant contribution to the national drug production and employment. They had played an important role in enhancing domestic technological capabilities in drugs production and have been instrumental in keeping drugs prices affordable for the Indian populace in remote rural areas. This rise of small firms in this sector has been facilitated by a set of strategic government policies implemented in the past decades like adoption of a process patent regime, relaxation granted from price control and industrial licensing requirement, reservation of items for exclusive production and preference in government procurement, etc. Since 1990s the regulatory regime for small firms underwent dramatic changes with withdrawal of most of the favourable policies and implementation of regulations like a long-term product patent regime, withdrawal of exemption from price controls, implementation of good manufacturing practices, etc. These new policies have a number of implications for the survival and growth of small pharmaceutical firms today.

Narayana (2006) reported that the size of unorganised manufacturing employment is three times higher than the organized manufacturing employment. Recent years witnessed structural changes within the manufacturing sector and the unorganised segment reported to be better performing than the organized segment of the sector in case of employment. But the performance of organised manufacturing is better in terms of overall performance and Productivity. This can be primarily on account of substantial increase in outsourcing by the organized sector. (Kalirajan and Bhide 2005)

Productivity growth has long been recognized as an important driver of economic growth and a determinant of international competitiveness of a country in relative to others. According to

Krugman (1994), a higher growth in output due to growth in total factor productivity (TFP) is preferred to an input driven growth as the inputs are subjected to diminishing returns. A study by Kiran et al. (2005) covering the period 1980-81 to 2002-03 depicts a deceleration in growth of value added and Total factor productivity in post-reform period. In this changing environment of greater openness and competitiveness there is an urgent need for the industries to become more productive and then help the economy to achieve a higher growth. A focus on higher investment in R&D and encouraging firms for IPRs can play a major part in enhancing productivity and improving performance of Indian Manufacturing.

A study by Singh (2006) examines the industrial growth experience of Punjab economy during the period 1980-81 to 2001-2002, a decade before and a decade after the initiation of economic reforms. The empirical evidence clearly shows a downturn in industrial growth in the post-reform period compared to that of the pre-reform period. Factors that have contributed to the deceleration of industrial growth in Punjab were lower investment-GSDP ratio, lower plan expenditure and lower quality of human capital and infrastructure. Time and again studies have reported of a lower investment especially on R&D, which has its implications on technology competitiveness.

According to Hassan Arif et al. (2006) successful organizations in today's business environment are those who manage along with their technological resources their human resources also well. It includes effective manpower planning, recruitment and selection process, realistic performance plans and development oriented performance appraisal, effective learning system providing ample learning opportunities with the help of training, performance guidance and other mechanism such as mentoring. It also consists of mechanism to inculcate sense of pride in work, high degree of organization commitment, introducing such organizational development

systems as personal growth labs, creativity workshops, quality circles, Kaizen team building exercises etc. Sheel (2002) states that for technological advances new infrastructures, mainly telecommunication, information technology, new strategic thinking practices are needed for hyper competitive environment.

Smilor et al. (1988) opine that infrastructure (i. e. advanced equipments and resources) is one of the most important factors to be employed to support public and private projects regarding research and development, innovation and technology modernization. The manufacturing sector is an important sector in the Indian economy comprising about 31 percent of the non-agricultural sector, which makes up 75 percent of the overall GDP in India (Kalirajan and Bhide 2005). Available evidence suggests that the share of manufacturing sector in GDP at constant prices has been around 17 percent in the 1990s. The manufacturing activities in India take place in both the organized and unorganised sectors. The unorganised sector consists of units that employ less than 10 workers with the aid of power or less than 20 workers without the aid of power. All other units are classified under organized manufacturing sector. The organized sector accounts for the larger share in manufacturing output but the contribution of the unorganised segment to total manufacturing employment is huge.

According to Hunshyal et al (2005) American, & European Pharmaceutical companies are filling Evergreen patents, but in India out of 23, 575 pharmaceutical companies only ten are rich enough original research in international level number of patent claims could fall in the 'Mail box'. Hence IPR in Pharmaceuticals in India is major point of concern as liberalization takes place and the whole world getting an image of 'global village'. Pharmacy is a field, which orients as a life saving sector, performing needs with better focus and approach in the coming era.

Hence at the same time the protection for IPRs seems to be 50 considerably week specifically in Pharma sector in India. At this junction we can see both face, i. e., pre- IPR scenario and post-IPR scenario to advance beyond being primarily an outsourcing arm to global pharmaceutical industry; Indian companies need to develop their own 'upstream' R&D relationships.

Maheswary et al. (2008) opines that small-scale industries have failed to cope up with the emerging challenges to keep abreast with the latest developments especially, in the field of IPRs. In India most of these industries are lagging far behind and facing technical obscurity, being unaware about management of their Knowledge based assets like IPRs. Each player in a given field would try to outpace its competitors by introducing new products through innovations. The authors highlight the reason for protecting Intellectual wealth, role of government in making the small enterprises viable and also what measures should be and are being taken. The study also deals with the steps taken for creating IPR culture and suggests the initiatives for small-scale industries. In order to be competitive in today's world of globalisation and liberalization Indian organizations have to use of advanced technology, technical manpower, and innovative research and development (Narain *et al.*, 2004).

From the above literature review it can be said that IPR's can do a lot in promoting the technological advancements of the country.

3. Data Sources and Methodology

The present study has been undertaken to understand the reasons for protecting IPRs. For this a survey of 100 firms from Punjab manufacturing has been undertaken. The present research uses Structured Questionnaire to collect the data from Small and medium manufacturing enterprises of Punjab. Around hundred firms were approached. The responses were got from 66 firms which have been used for analysis purpose.

Table 3.1: Reliability Statistics

Reliability Statistics	No of Items	Cronbach Alpha
i. Technology Management Strategies and overall performance	20	.925
ii. Status of IPR	6	.902
iii. Extent of Intellectual Property Rights	12	.850
iv. Reasons for protecting IPR	12	.847
v. Enhancing IPR awareness	7	.802
vi. Overall impact of TRIPS on performance	9	.650
Total	66	.855

3.1 Reliability and Validation

Data has been tested for reliability and validity. Face validity of the questionnaire was good. The overall reliability score is quite good as the Cronbach alpha is .855. Item-wise the score ranged from .925 for Technology Management Strategies to .650 overall impacts of TRIPS on performance.

The overall reliability score is quite good as the Cronbach alpha is .855. Item-wise the score ranged from .925 for Technology Management Strategies to .650 overall impacts of TRIPS on performance.

4. IPRS and Punjab Manufacturing

The results as reported in table 4.2 suggest that IPR Awareness and IPR status of Indian Manufacturing is still in the nascent stage. The data of 100 SMEs highlight the poor scenario in terms of IPRs, especially the patenting status. The no. of patent filed was just one. The status was a little better in terms of trademarks where the number of trademarks has been six.

Next focus shifted to highlight the steps to be undertaken by firms to enhance IPR awareness among these organizations. The following section represents the steps that could be undertaken by the firms for enhancing IPR awareness. The

details of Mean and Standard Deviation for the same are given below.

Table 4.1: Status of IPRS in Punjab Manufacturing

Sr. No.	Items	Numbers
1	Patents filed	1
2	Trademarks filed	6
3	Copyrights filed	3

The results highlights the severe penalty for IPR violation has at the highest mean score of 4.74, indicating that imitating is still a major cause of concern for non filing of IPRs. The focus is also required to be given for support for entrepreneurial and development managerial to SMEs which emerge next with a mean score of 4.68. Lowest priority was given to pool patenting as a possible solution. A possible reason for this could be the problem of initially sharing the responsibility and finally sharing the profits.

As the above step-wise regression highlights that Overall Performance of R&D activities is dependent on: i) Quality upgradation, Total person employed and Staff Employed in R & D activities. These three predictors explain 57 percent of the variation. The other four variables viz. i) Increased range of goods and services, ii)

Table 4.2: Options to Enhance IPR Awareness

Options to enhance IPR awareness	Mean	Std. Deviation
i. Organizing More programs for IPR awareness	4.00	.68
ii. Pool patenting a possible solution	3.82	.68
iii. Reduction of Taxes and Fees	4.38	.59
iv. Faster Registration Process	4.52	.61
v. Govt. Assistance for facilitating Patent filing	4.67	.47
vi. Support for Entrepreneurial and Managerial Development to SMEs	4.68	.58
vii. Severe Penalty for IPR violation	4.74	.52

Table 4.3: Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.712 ^a	.506	.501	.63694	.506	100.576	1	98	.000	1.707
2	.737 ^b	.543	.534	.61609	.036	7.743	1	97	.006	
3	.764 ^c	.583	.570	.59140	.040	9.269	1	96	.003	
a. Predictors: (Constant), B 28: Quality Up gradation										
b. Predictors: (Constant), B 28: Quality Up gradation, B9: Total person employed (Presently)										
c. Predictors: (Constant), B 28: Quality Up gradation, B9: Total person employed (Presently), B10: Staff Employed in R & D activities										
d. Dependent Variable: B 33: Overall Performance of R&D activities										

Increased market share iii) Improved production, flexibility and iv) and Investment in R&D (% of expenditure) were removed from the model.

5. Conclusion

The results of the present study highlight that IPR awareness and developments in SMEs of Punjab

are still in the preliminary stage. SMEs of Punjab are only filing trademarks and copyrights, but even that is low. Patent filing is almost missing. The major findings are that the attitude of SMEs of Punjab is not encouraging and the awareness level among the management about their organization's IPR's policy and problems is disheartening. In this period of intense

competition, falling prices and wafer-thin margins, it is essential to attract and invest in creative minds. Focusing on Intellectual property, the organizations have to develop the ability to harness the creative energies of their own available workforce. The need of the times is to focus on creating and encouraging human capital. It is this pool of creative minds that will help in generating innovative ideas. Companies now have to formulate IPR strategies that complement their competitive strategies.

References

- Amiable, T., Conti, R., Coon, H., Lazenty, J and Herron, M. (1996). Assessing the Work Environment for Creativity. *Academy of Management Journal*, Vol. 39, No. 5, pp. 1154-1184.
- Beets, D. S. (1994). *Strategic Technology Management*. McGraw Hill, New York.
- Chadha, A. (2005). Product cycles, innovation and exports: A study of indian pharmaceuticals. Department of Economics, *Working Paper No. 0511*.
- Davila, Tony; Marc J. Epstein and Robert Shelton (2006). Making Innovation Work: How to Manage It, Measure It, and Profit from It. *Upper Saddle River*, Wharton School Publishing. ISBN 0-13-149786-3.
- Genus, A. and Kaplani, M. (2002). Managing operations with people and technology. *International Journal of Technology Management*, Vol. 23, No. 1/2/3, pp. 189-200.
- Haakon (2004). *Innovation and IPR*. http://www.telenor.com/teletronikk/volumes/pdf/2_2004/Page_058-059.pdf.
- Arif, H., Junaidah, H., Ismail Ahmad Zaki Hj (2006). Human resource development practices as department of HRD climate and quality orientation. *Journal of European Industrial Training*, Vol. 30, No. 1, pp. 4-18.
- Holbeche, L. (1998). High flyers and succession planning in changing organizations. *Journal of European Training*, Vol. 24, No. 2/3/4, pp. 65-93.
- Hunshyal, RD and Biradar, S. S. (2005). Intellectual property rights (IPRS) in pharmaceutical sector. *Health Administrator*, Vol. XIX, No. 1, pp. 48-50.
- Idris (2002). *Intellectual Property: A Power Tool for Economic Growth*, World Intellectual Property Organization, Geneva, Switzerland.
- Kalirajan, K. P and Bhide, S. (2005). The Post-reform performance of the manufacturing sector in India. *Asian Economic Papers*, Vol. 3, No. 2, pp 126-157.
- Kanwar, Sunil and Robert, E. (2001). *Does Intellectual Property Protection Spur Technology Change*. http://papers.ssrn.com/abstract_id=275322.
- Kavida, V. and Sivakoumar, N. (2008). *Intellectual Property Rights – The New Wealth of Knowledge Economy: An Indian Perspective*. SSRN-id 1159080.
- Khamba, J. S and Singh, T. P (2001). Flexible management of new technology. *Global Journal of Flexible Systems Management*, Vol. 2, No. 4, pp. 41-53.
- Kiran, R and Manpreet, K. (2005). Global competitiveness and productivity in indian manufacturing industries. *Oorja*, Vol. 3, No. 2, pp. 97-106.
- Koning, J. W. (1998). Three other R's: recognition, reward and resentment. *Research Technology Management*, Vol. 31, No. 4, pp. 19-46.
- Krugman, P. (1994). The myth of Asia's miracle. *Foreign Affairs*, Vol. 73, No. 6, pp. 62-78.
- Kumar, N. (2002). Intellectual property rights, technology and economic development: experiences of asian countries. *Research and Information System (RIS) -DP # 25/2002*.
- Kumar, R. and Philip P. J. (2003). IPR: implication for the indian economy. *Business Perspective* (Bimtech publication), Vol. 6, No. 1, pp. 43-52.
- Kumar, S. (2004). A decomposition of total factor productivity growth: a regional analysis of indian industrial manufacturing growth. National Institute of Public Finance (NIPFP), *Working Paper No. 22*, New Delhi.

-
- Luecke and Ketz (2003). <http://sisihyd.gov.in/Innovation/Innovation.htm>.
 - Maheshwary V. and Bhatnagar P. (2008). Small scale industries and IP Management: need to recognize intellectual assets. *Journal of Intellectual Property Rights*, Vol. 13, pp. 139-144.
 - Mansfield, E. (1993). The diffusion of flexible manufacturing systems in Japan, Europe and The United States. *Management Science*, Vol. 39, No. 2, pp. 149-153.
 - Martino, J. P. (1983). *Technological Forecasting for Decision-Making*. 2nd edition, North Holland, New York.
 - Narain, R., Yadav, R. C. and Jiju, A. (2004). Productivity gains from flexible manufacturing: experiences from India. *International Journal of Productivity and Performance Management*, Vol. 53, No. 2, pp. 109–128.
 - Narayana, M. R. (2006). Formal and informal enterprises: concept, definition, and measurement issues in India. In: Guha-Khasnobis, B., Kanbur R., Ostrom E. (eds) *Linking the Formal and Informal Economy: Concepts and Policies*. Oxford University Press, Oxford.
 - Pradhan, J. (2007). New policy regime and small pharmaceutical firms in India. *Institute for Studies in Industrial Development, Working Paper No: 2007/02*.
 - Sethi, A. P. S, Khamba, J. S., Sushil and Kiran, Ravi (2007). Linkages of technology adoption and adaptation with technological capability, flexibility and success of AMT. *Global Journal of Systems Management*, Vol. 8, No. 3, pp. 27-40.
 - Sheel, C. (2002). Knowledge clusters of technological innovation. *Journal of Knowledge Management*, Vol. 6, No. 4, pp. 356-367.
 - Singh, L. (2006). Deceleration of industrial growth and rural industrialization strategy for indian punjab. *Journal of Punjab Studies*, pp. 271-284.
 - Smilor, R. W., Gibson and Kosmetsky (1988). Creating the techonopolis: high technology development in Austin. *Benchmarking An International Journal*, Vol. 8, No. 3, pp. 191-211.
 - Steensma, H. K. (1996). Acquiring technological competencies through Inter-organisational collaboration: an organisational learning perspective. *Journal of Engineering and Technology Management*, Vol. 12, pp. 267-286.