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Technology Management Strategies: A Post TRIPS Study of Punjab Manufacturing

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Global competitiveness has forced the companies to initiate effective steps to improve overall productivity and efficiency. Past experience shows that Indian firms took decades to be able to catch up with global productivity levels. The present study has been undertaken with the objective to study the Technology Management Strategies used by the Punjab Manufacturing. The study is an attempt to highlight the extent of Intellectual Property Rights of Punjab Manufacturing and to recommend the factors for developing IPR Culture for Punjab manufacturing. The results of the study highlight the IPRs in Punjab Manufacturing are still low and the firm wise analysis depicted that Small firms reported low investment in R& D and no IPRs. So effort had to be focussed on improving the IPR culture. The results depict that i) Awareness and Facilitation and ii) Enhancing the pace of registration are the important factors for developing IPR culture. The firms responded that Govt. Assistance for facilitating Patent filing and Support for Entrepreneurial and Managerial Development for SMEs could help in improving the situation.

Field of Research: Intellectual Property Rights, Technology Management Strategies, Punjab manufacturing

1. Introduction

In the Post-liberalisation 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. The relationship between intellectual property protection and international trade has been one of the most controversial issues in global negotiations in recent years.

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The debate has been largely about the implications of the agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS) under the World Trade Organization (WTO) for international trade in general, and for developing countries in particular. Most of the views expressed by developing countries on the TRIPS agreement arise from their interest in technological development. Intellectual Property Rights (IPRs) play an important role in protecting innovations from being imitated by others and organisations now have to formulate IPR strategies that complement their competitive strategies. Many of the views expressed by developing countries stem from their perception that the TRIPS agreement affects their ability to use technological knowledge to promote public interest goals such as health, nutrition and environmental conservation.

In order to unleash full innovative potential, there is a need to put in place a National Innovation policy, which encourages competition among enterprises, greater diffusion of knowledge and increased support to early stage technology development initiatives and grass root level innovators. There is a need to foster increased collaboration among R&D institutes, universities and private sector enterprises and leverage upon their cumulative strengths in designing and implementing various innovation programmes.

The present study has been undertaken with following broad objectives:

1. To study the impact of Technology Management Strategies on performance of Punjab Manufacturing.
2. To study the extent of Intellectual Property Rights of Punjab Manufacturing.
3. To recommend the factors for developing IPR Culture for Punjab manufacturing.

The present research will try to study the changes in Technology Management Strategies of Punjab Manufacturing in the Post-TRIPS period and suggest the steps for enhancing Global Competitiveness. The study will focus on the following research questions.

i. What is the impact of stronger patent protection on Overall performance of the firms?
ii. What is the effect of stronger patent protection on the IPRs?

The paper has been organised in five sections. Section1 is the introduction, Section 2 covers literature review. Section 3 highlights the research methodology used. Section 4 deals with research analysis with focus on the Technology Management strategies of Punjab Manufacturing firms. The strategies were considered to study the impact of innovation activity on Production quantity, quality and reduction in costs and impact on overall performance. Finally Section 5 highlights the conclusion of the study.

2. Review of Literature

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. 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. Hence higher investment in R&D and encouraging firms for IPRs can play a vital role in enhancing productivity of Indian Manufacturing.

Intellectual property is vital because it is a stimulus to innovation, a vehicle for technology transfers, and a magnet for financing. (Idris, 2002) A study by Haakon (2004) focussed 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. Kanwar *et al.* (2001) study the empirical relation between the protection of intellectual property rights and technological change (and hence between the former and economic growth). The researchers found evidence that the former encourages the latter, insofar as intellectual property protection was found to have a strong positive association with R&D investment. This relation continued to hold even when several pertinent control variables were allowed for. Researchers felt that the results may have been even more pronounced, if they had reliable, quantifiable evidence on the implementation aspect of intellectual protection across countries. Many developing countries may appear to have strong protection laws on their statutes but are rather remiss in their implementation. The study results 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.

Maheswary *et al. (*2008) opine 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).

According to Hassan *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.

Organizations perform better when they are making investment in training their employees and broaden their skills (Hollbeche, 1998). Employee's creativity and innovation skills can increase only by giving them appropriate recognition and reward for their creative work. (Koning, 1998). 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.

Sethi *et al.* (2007) highlight that various factors may be quite important to manufacturing firms trying to compete with flexibility competence and technological capabilities. Human factor in term of their skills, technical expertise, training involvement, and attitude has been found to be the most significant for achieving flexibilities. The technology import process includes need assessment, selection, negotiation, acquisition, adoption and adaptation of Technology. 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 (Khamba and Singh, 2001).

A study by Chaturvedi *et al*. (2006) highlights that Trade Related Aspects of Intellectual Property Rights (TRIPs) have raised for Indian firms a perceived need for R&D and technological strength. For firms that have given little attention to research and innovation in the past, this transition is very difficult. Indian firms have to respond to these changes in novel and complex ways. Employing firm-level case studies, this study examines the contemporary strategic approaches adopted by Indian leaders for integrating new knowledge and capabilities in order to develop innovation competencies for tomorrow.

3. Research Methodology

The present research uses Structured Questionnaire to collect the data from Punjab Manufacturing. Around seventy firms were approached. The responses were got from 42 firms which have been used for analysis purpose. Descriptive statistics, ANOVA and factor analysis have been used for analysis. 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 .740. Item-wise the score ranged from .823 for Technology Management Strategies to .704 for Reasons for protecting IPR. The details are given in table I.

Table I: Reliability Statistics

Items	No of Items	Cronbach Alpha
Technology Management Strategies	7	.823
Extent of Intellectual Property Rights	6	.713
Reasons for protecting IPR	15	.704
Factors for Developing IPR Culture	12	.730
Overall	40	.740

4. Research Analysis

The present research focuses on Technology Management Strategies of Punjab Manufacturing in the Post-TRIPS period to study the impact of stronger patent protection on Overall performance of the firms. Effort has been made to study the effect of stronger patent protection on the IPR filings in Punjab and to suggest the measures for enhancing IPR culture and hence Global Competitiveness.

4.1 Technology Management Strategies

Technology Management strategies of firms were considered in terms of: i) Impact of innovation activity on Production quantity, quality and reduction in costs, ii) impact on overall performance and iii) IPR Scenario.

4.1.1 Impact of Innovation Activity

Table II: Degree of Impact of Innovation Activity

		Sum	Mean	Std. Deviation	Rank
i.	Increased range of goods and services	142	3.38	1.06	3
ii.	Increased market share	136	3.24	1.16	5
iii.	Improved quality of goods and services	154	3.67	1.05	1
iv.	Improved production, flexibility	140	3.33	0.85	4
v.	Reduction in Labour Costs per unit	110	2.62	0.91	7
vi.	Reduction in material and energy per produced unit/transaction	114	2.71	0.94	6
vii.	Improved Environmental impact or Health Safety aspects	152	3.62	1.19	2

The firms responded that the highest impact of innovation has been on: i) Improved quality of goods and services, ii) Improved Environmental impact or Health Safety aspects. The least impact was reported in case of reduction in labour costs as it had the least score (table II).

4.1.2 Impact on Overall Performance

Table III: Overall Performance of Punjab Manufacturing

		Sum of Squares	df	Mean Square	F	Sig.
Quality Up gradation	Between Groups	4.647	2	2.324	3.588	.037**
	Within Groups	25.258	39	.648		
	Total	29.905	41			
Change in managing & marketing practices	Between Groups	3.874	2	1.937	2.516	.094
	Within Groups	30.030	39	.770		
	Total	33.905	41			
Indigenous Technological development	Between Groups	7.476	2	3.738	15.081	.000***
	Within Groups	9.667	39	.248		
	Total	17.143	41			
Retraining of Workers	Between Groups	1.855	2	.927	1.754	.186
	Within Groups	20.621	39	.529		
	Total	22.476	41			
Price Strategy	Between Groups	.885	2	.443	1.270	.292
	Within Groups	13.591	39	.348		
	Total	14.476	41			

Overall performance of Punjab Manufacturing (table III) was gauged in terms of size of the firm and the following variables: Quality Up gradation, Change in managing & marketing practices, Indigenous Technological development, Retraining of Workers and Price Strategy. ANOVA results were significant for Indigenous Technological development and for Quality up-gradation. Results of Factor analysis highlight that two factors namely: i) Technology Factor and ii) Human Resource factor and pricing strategy factors explained 82.125 percent of total variation. Technology factor was the most significant factor explaining 50.55 percent of the variation. (Table IV)

Table IV: Factor Analysis of Overall Performance of Punjab Manufacturing					
			Initial Eigen values		
Factor Name	Items	Factor Loading	Total	% of Variance	Cumulative %
Technology Factor	i. Quality Up gradation ii. Change in managing & marketing practices iii. Indigenous Technological development	.896 .750 .857	2.528	50.554	50.554
Human Resource factor and pricing strategy	i. Retraining of Workers ii. Price Strategy	.892 .943	1.579	31.571	82.125

4.1.3 IPR Scenario

IPRs filed in Punjab manufacturing are still low and the focus has to be laid on improving the performance. In terms of the nature of IPRs the no of trademarks is higher compared to patents and copyrights.

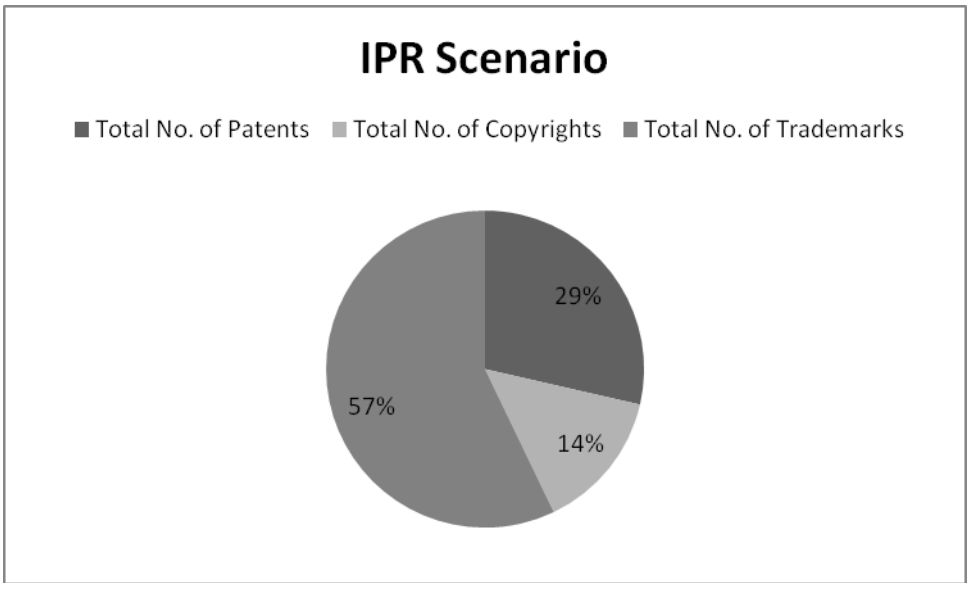

Table V: Reasons for Protecting IPR

			Eigen values		
Factor Name	Items	Factor Loading	Total	% of Variance	Cumulative %
Enhancing Global competitiveness	i. IPRs enhance Global Competitiveness	.921	2.536	25.358	25.358
	ii. IPRs enhance Global Trade	.889			
	iii. IPRs enhance inventions and encourage Innovations	.671			
Improving Performance	i. IPRs lead to enhanced Profits	.956	2.467	24.675	50.033
	ii. IPRs lead to enhanced Sales	.943			
Technological development	i. IPRs Protect Imitation of Technology	.760	2.190	21.900	71.933
	ii. IPRs lead to increased Licensing of Technologies	.758			
	iv. IPRs contribute to higher Economic growth	.738			
New investment opportunities	i. IPRs attract More FDI	.757	1.237	12.367	84.300
	ii. IPRs enhance expenses on R& D	.603			

The study tried to find out the Reasons for Protecting IPRs (Table V). Factor analysis results highlighted four factors viz. Enhancing Global competitiveness, Improving Performance, Technological development and New investment opportunities. These four factors explained 84.3 percent of total variation. Enhancing Global competitiveness and Improving Performance emerged as important factors explaining 25.358 and 24.675 percent of total variation.

Table VII: Promotion of IPR culture in SMEs				
	Total score	Mean	Std. Deviation	Rank
Organizing More programmes for IPR awareness	170.00	4.05	.79	6
Pool patenting-a possible solution	156.00	3.71	.55	7
Reduction of Taxes and Fees	172.00	4.10	.82	5
Faster Registration Process	184.00	4.38	.91	4
Govt. Assistance for facilitating Patent filing	190.00	4.52	.51	2
Support for Entrepreneurial and Managerial Development for SMEs	188.00	4.48	.92	3
Severe Penalty for IPR violation	196.00	4.67	.78	1

In terms of factors for promoting IPR culture the highest rating was given to i) Severe Penalty for IPR violation. This was followed by: ii) Govt. Assistance for facilitating Patent filing and Support for Entrepreneurial and Managerial Development for SMEs. Least rank has been given to: Pool patenting as a possible solution.

5. Conclusion

In recent years, a lot of attention has been paid to technology and, increasingly, to innovation and its role in the creation of wealth and the increased well-being of nation's. The rising cost of scientific and technological development has increased the importance of IPR protection, as well as the incentive to engage in cooperative R&D. The results of the study highlight that firms in Punjab have to focus on improving the status of IPRs in Punjab manufacturing. The firms responded that the highest impact of innovation has been on: i) Improved quality of goods and services, ii) Improved Environmental impact or Health Safety aspects. Enhancing Global competitiveness and Improving Performance emerged reasons for protecting IPRs. The IPRs are low and the firm wise analysis depicted that Small firms reported low investment in R& D and no IPRs. So effort had to be focussed on improving the IPR culture. The firms responded that Govt. Assistance for facilitating Patent filing and Support for Entrepreneurial and Managerial Development for SMEs could help in improving the situation. In this period of intense competition, falling prices and wafer-thin margins, it is essential to attract and invest in creative minds. Focussing 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.

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