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Enhancing innovation and intellectual property culture in manufacturing small and medium enterprises

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Technological innovation is an important challenge faced by small and medium enterprises (SMEs). This study investigates the factors that influence the growth, performance, and development of intellectual property rights (IPRs) attitude of SMEs in India. The study is an attempt to highlight the extent of Intellectual Property Rights of Indian manufacturing as a whole and a survey analysis has been undertaken for 100 SMEs of manufacturing sector of Punjab in India to understand the level of IPRS by firms in post TRIPS period. Punjab is a progressive state of India with an average growth rate of 10%. Punjab has been ranked as one of the growing states of India. The present study uses growth rates for analyzing the status of IPRs at all India level. It also presents the sector-wise status of patents filed. Manufacturing SMES have been categorized on the basis of use into durable, non durable and essential goods. The results of the study highlight the low level of IPRs in India. Durable industries have filed most of the trademarks. Most of the copyrights and patents have been filed by essential goods. The results of the factors influencing Innovation in SMEs of Punjab manufacturing depict that: increased market share, improved production flexibility, staff employed in R and D, status of trademarks in last ten years and status of copyrights in last ten years and: improved environmental impact or health safety aspect explain 87.6% of the variation. Finally, the study recommends the factors for promoting IPR culture for SMEs of Punjab manufacturing. Factor analysis results highlight that two factors namely; i) Factor analysis results highlight that two factors namely; policy initiatives and organizational factor explain 62.85% of total variation.

Key words: Intellectual property rights (IPRs), innovation, small and medium enterprises (SMEs), Punjab manufacturing.

INTRODUCTION

India is one of the largest economies in the world possessing an emergent market, vibrant capital market, and a growing financial sector. It is a leading developing country with one of the best brain pool in the world, having a large storehouse of scientists, engineers, technicians, artisans and managers. In this fast changing business world, corporations have to deal with entirely new challenges to meet customer demands. Due to global competitiveness, companies are taking more effective steps to improve overall productivity and efficiency. It can only be possible if production of goods is increased by applying same input or by reducing time wastage. To attain a place in the competitive market,

companies have to not only reduce the cost price of their product, but a consistent effort has to be placed on adopting new technologies and enhancing quality standards. Past experience shows that Indian firms took decades to be able to catch up with global productivity levels. Time has come to focus on technology management strategies with a focus on intellectual property rights. Technology plays a vital role in the development of any economy. Advances in technology have created new opportunities for businesses and new global rules giving value to technology matter more in the present times. New rules endorsed by all countries have brought tighter intellectual property protection worldwide. They raise the market value of technology, increasing incentives to invest in R and D.

IPRS are mostly filed by large and dominant firms, but it is now time for SMEs to focus on the IPR strategies and

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initiate steps to enhance IPR culture in SMEs of Punjab Manufacturing. The present study highlights the low innovation and intellectual property rights status of manufacturing SMEs of Punjab in India in the post-TRIPS period. Hence, there is a need to create IPR awareness.

LITERATURE REVIEW

Intellectual property rights (IPRs) have become important in the face of changing trade environment which is characterized by global competition due to: high innovation risks, short product cycle, high investments in R and D, production and marketing and need for highly skilled human resources. The literature review covers the concept of innovation, the studies related with intellectual property rights and studies focusing on SMEs and innovation and IPRs of SMEs.

Luecke and Katz (2003) define, 'innovation 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. Amabile et al. (1996) propose: '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. Davila et al. (2006), characterize innovation as an organizational or management process. According to them, 'innovation is a management process that requires specific tools, rules, and discipline.'

Firms' sustain competitive advantage by continuously differentiating their products and services from competitors (Chen et al., 2009; Koellinger, 2008). The firms can constrain and direct an R and D department's ability to take action and differentiate itself from rivals. Gopalakrishnan (2000) categorizes innovation on the basis of speed and magnitude and this provides an effective method of investigating the link between innovation and firm performance. Garcia and Calantone (2002) propose that if an idea has not been developed and transformed into a product, process, or service, or if it has not been commercialized, then it would not be classified as an innovation.

IPRs can play an important role in technological development of these SMEs. According to Idris (2002), 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. India is emerging as the hub of 'knowledge economy' in South Asia. India has proved her strength in information technology innovation (Kavida et al., 2008) and IPRs can play a vital role in the knowledge economy. A study by Haakon (2004) on 'innovation and IPR stated the need of IPR, benefits to the different concerns as well as planning for implementing such strategy, demands an engagement across the whole organization affecting projects, processes and culture of the company. It focuses R and D on uniqueness, triggers creativity, invention and innovation. A study by Kiran (2004), protection of IPR, plays a dominant role in inventions and innovation. The positive result of this study depicts the growth of patents during the post TRIPS period. A study by Kanwar et al. (2001) found evidence to support the claim that the intellectual property rights encourages the technological change, as intellectual property protection was found to have a strong positive association with R and D investment.

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. Narain et al. (2004) deal with the steps taken for creating IPR culture and suggest the initiatives for small-scale industries. In order to be competitive in today's world of globalisation and liberalization, Indian SMEs have to use the advanced technology, technical manpower, and innovative research and development.

Researchers like Kahn et al. (2003), Danneels and Kleinschmidt (2001) and Roseno (2005) call for a better understanding of exactly what innovation means, going beyond the typical extremes of incremental and radical classification. They argue that little has been said about what criteria are used for innovation classification and, mainly, who applies those criteria. Thus, introducing and stressing the different perspectives of individuals involved in the innovation process is becoming an essential point. As noted by Davison and Blackman (2004), although the focus of innovation is, historically, economic (Nyström, 1980; Scherer, 1984), the source of innovation perception is social (Zaltman et al., 1973; Burns and Stalker, 1961). Zaltman et al. (1973) is of the opinion that the distinguishing characteristic of an innovation is that, instead of being an external object, it is the perception of a social unit that decides its radicalness. It depends on the amount of experience people in the organization have with the innovation they are developing (Green et al., 1995; Hage, 1980; Roberts and Berry, 1985).

Among the few available indicators of technology output, patent indicators are probably the most frequently used. Patent-based statistics have several uses. They allow for measuring the inventiveness of countries, regions, firms or individual inventors, under the assumption that patents reflect inventive output and that more patents mean more inventions. Keller and Holland (1982) concluded that the number of an inventor's patents is significantly correlated with superior performance ratings and self-rating. Hagedoorn and Clood (2003) concluded that the number of patents filed by a company is a very good reflection of its technological performance. The study covered 1200 high-technology companies. At the country level, Rassenfosse and Pottelsberghe (2008) have found a high correlation between patent numbers and R and D performance. Patents statistics are also used to map certain aspects of the dynamics of the innovation process (for example, co-operation in research, diffusion of technology across industries or countries, etc.), or of the competitive process (the market strategy of businesses).

There are a lot of studies on the impact of size of the firm on innovations (Schumpeter, 1934, Scherer, 1984), as well as on productivity technology nexus (Scherer, 1982, 1983; Grilliches, 1984; Odagiri, 1985; Kiran and Kaur, 2007). Since the present study focuses on innovations as well as IPRS in manufacturing SMEs in the post TRIPS period, the analysis has been taken from the perspective of Nature of Industry and the Innovation and IPR activities. Many earlier studies have reported that machinery and technology manufacturing industries are more innovative and file more IPRs. So, the present study has been undertaken to cover the nature of industries, namely, durable goods, non durable goods and essential goods and the extent of innovation and IPR activities undertaken. The present study tries to understand the innovation culture of small and medium firms by taking a sample of 100 manufacturing firms. Today, manufacturing small and medium enterprises (SMEs) are playing increasingly important roles in global markets.

Objectives of the study

The study has been undertaken with the following broad objectives:

1. To examine the extent of intellectual property rights in post TRIPS period.
2. To identify the factors influencing innovation in SMEs.
3. To highlight the factors for promoting IPR culture for manufacturing SMEs.

On the basis of these objectives, the following research questions have been framed:

R₁: Post TRIPS period depicts inter industry differentials and patent filing is higher by technology intensive industries.

R₂: Intellectual property rights are important determinants of Innovation activity of SMEs.

R₃: Policy initiatives factor is more important for promoting IPR culture for manufacturing SMEs than the organizational factors.

RESEARCH METHODOLOGY

Punjab has been ranked as the number one growing state of India. Data has been collected by a self-structured questionnaire from 100 manufacturing industries of Punjab from the following districts: Patiala, Ludhiana, Gobindgarh, Jalandhar, Bhikhi, Mansa, Mohali, Barnala and Hoshiarpur. The reason for selecting these districts is that some of the prominent range of products of Punjab such as, engineering goods, hosiery items, pharmaceuticals, food and agro products, textiles, electronics, hand and machine tools are clustered in these areas. Ludhiana is known for the production of bicycles and components, hosiery, sewing machines and parts, machine tools, auto-parts, industrial fasteners, electrical and electronic goods. About 21% of the total industrial units in Punjab are located in Ludhiana district. Famous for hand tools, pipe fittings, valves and leather products, Jalandhar is well-known for its sports-goods too. Hoshiarpur, Mohali and Barnala are famous in the country for pressure cookers, castings and machine tools. Bhikhi, Mansa are known for cotton ginning. Mandi Gobindgarh, popularly known as the 'Steel-Town' of Punjab, hosts more than 600 steel re-rolling mills despite being situated far from the sources of raw materials.

Although there are around 0.2 million SMEs in Punjab, in the present study, only those units which have been considered for analysis and have at least 50 employees and a gross business income of over Rs 2.5million have been approached. The reason for taking these enterprises is that most of them are export oriented units and must be innovators possessing knowledge about IPRs. Small sized family units are not included in this study. The basis for the selection of these units is that they may be using some technology management strategies and hence, using some part of their earnings on innovations in the form of increased range of goods and services. The random samples were drawn from the population of enterprises in the Punjab state, stratified by provinces as explained earlier. The questionnaire designated was sent to 140 enterprises and 100 duly filled questionnaires have been taken for analysis. The rate of response is 72%.

The overall reliability of the questionnaire has been 0.837. Face and content validity have been used for the questionnaire. The questionnaire had been validated by the peers and has a good validation score. The changes suggested were incorporated in the questionnaire and responses recorded. The period of data collection was July 2009 to June 2010. Table 1 describes the reliability status. The data so gathered was analysed using SPSS ver.17. Chi-square, ANOVA, factor analysis, correlation and regression has been used for data analysis.

Regarding the nature of industry in the sample, out of a total of 100 firms, 52 firms are producing durable goods, 30 are producing non durable goods category and 18 are producing essential goods. Regarding the category of industries covered, effort has been made to cover all areas. Categories of firms within these sectors have been depicted in Figure 1.

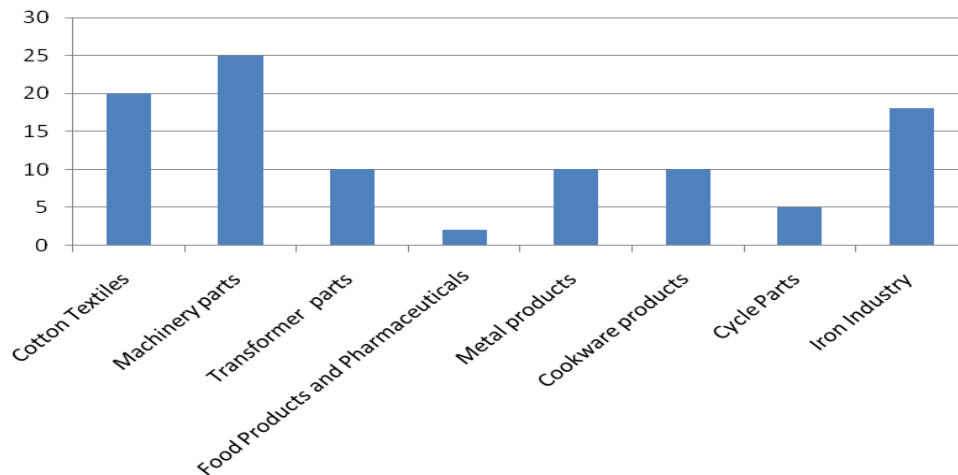
RESULTS

Post TRIPS IPR status: All India

Starting with the IPR status in the post TRIPS period, the

Table 1. Reliability statistics.

Item	No. of item	Cronbach alpha
Technology management strategies	22	0.901
Extent of intellectual property rights	12	0.901
Reasons for protecting IPR	11	0.804
Factors for developing IPR culture	07	0.795
Overall impact of TRIPS on performance	10	0.820
Overall	62	0.837

**Figure 1.** Category of industry.

research focus is switched over to innovation and IPR scenario of manufacturing SMEs. The two broad categories of IPRs covered are: patents and trademarks. As depicted in Table 2, the overall IPR scenario, the absolute number of trade marks filed in India is much higher as compared to the patents filed. In terms of growth rates of patents granted, the rate is higher than that of trademarks.

As shown in Figure 2, at all India level on the basis of use based classification, the consumer durable goods industry is growing at a faster rate than the other two categories. Non durable goods industry has a slower growth rate. The essential goods industry is also now growing at a higher rate after the recessionary slowdown in 2007/2008 and 2008/2009. In fact, impact of recession is felt on all three categories, but the recovery of durable goods has been at a faster pace.

Patents constitute an important form of IPRs. There is a lot of discussion whether patents filed and granted are higher in technology related industry. So the sector-wise growth rates of patents have been analysed to understand the inter-industrial differential in patent filing. As shown in Table 3, chemical, drug and food sectors depict higher growth rates than electrical and mechanical sectors. The results do depict inter industry differentials.

The highest growth has been accorded by chemical goods category, followed by drugs. Electrical industry growth rate has been the lowest, although in absolute terms, the number has increased from 787 in 2006/2007 to 1078 in 2007/2008.

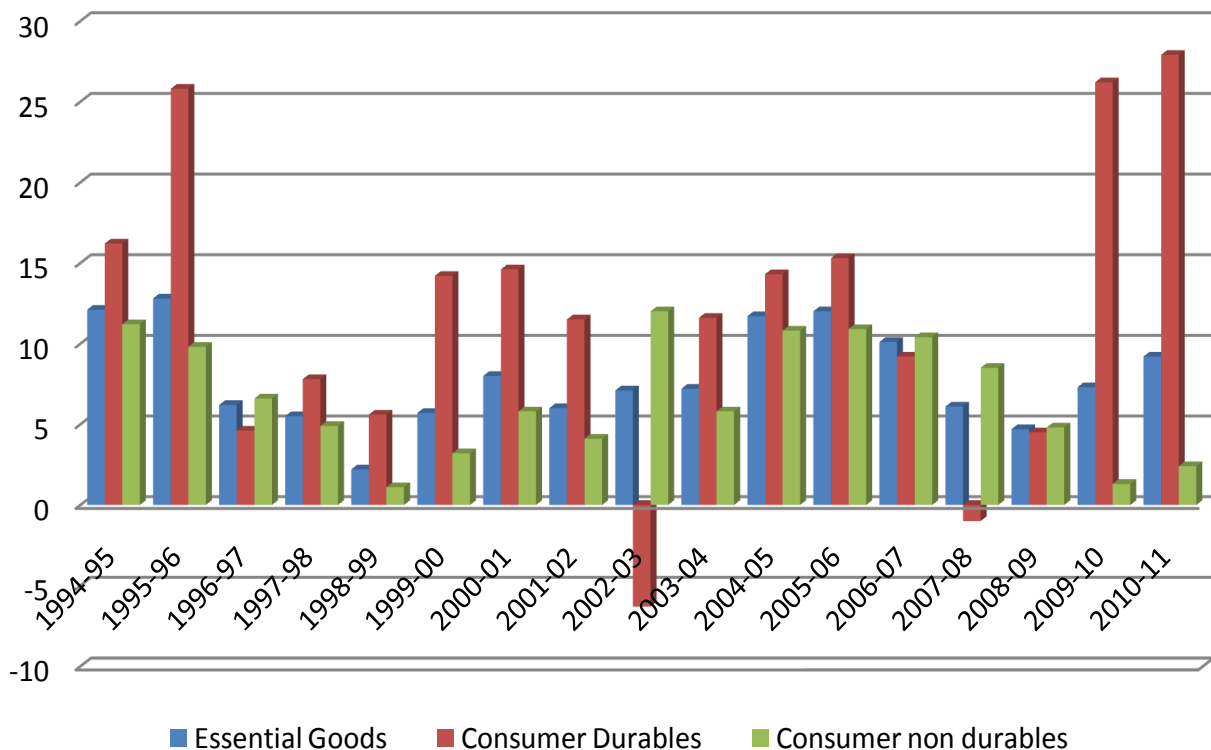
IPR status: firm level analysis

Table 4 depicts the IPR status of SME manufacturing of Punjab. Punjab manufacturing is mostly into filing trademarks. The patents filed are still low and hence the status needs to be improved. This data suggests that IPR awareness and IPR status of Indian manufacturing is still in the nascent stage. Durable industries have filed most of the trademarks (18 of 21). But it is lagging in filing patents and copyrights. And if we see the non durable industry, one cookware industry filed copyright and three trademarks have been filed by cotton ginning mill and cookware industry. Most of the copyrights and patents have been filed by essential goods. An obvious reason for this is that this sector covers the pharmaceutical industries and the food products and beverages, which are more active in patent filing. Thus, the status of IPR filing in Punjab manufacturing SMEs is low. So, we can

Table 2. IPR scenario in India.

Year	Patents			Trade marks		
	Filed	Examined	Granted	Filed	Examined	Granted
1995-1996	7036	18540	1533	42723	4357	5310
1996-1997	8562	24036	907	43234	5560	4686
1997-1998	10155	2706	1844	46712	7116	4120
1998-1999	8954	3424	1800	51704	42104	5300
1999-2000	4824	2216	1881	66378	42500	8010
2000-2001	8503	549	1318	84275	-	14202
2001-2002	10592	1356	1591	90236	159735	6204
2002-2003	11466	9538	1379	94120	249003	11190
2003-2004	12613	10709	2469	92251	89958	39762
2004-2005	17466	14813	1911	78996	72091	45015
2005-2006	24505	11569	4320	85699	77500	184325
2006-2007	28940	14149	7539	103419	85185	109361
2007-2008	35218	11751	15727	123514	63605	100857
2008-2009						
Growth rates	3.73**	4.57**	4.73**	2.25**	3.95**	4.18**

P< 0.01.

**Figure 2.** Growth rates of nature of industry.

say that the patent and copyright filing is at initial stage in case of small and medium manufacturing enterprises of Punjab.

Determinants of innovation

Innovation has been measured by the following

Table 3. Sector-wise distribution of patents.

Year	Chemical	Drug	Food	Electrical	Mechanical	General	Total
1995-1996	470	132	34	56	159	682	1533
1996-1997	282	71	18	54	142	340	907
1997-1998	503	291	58	177	381	434	1844
1998-1999	609	150	35	138	462	406	1800
1999-2000	516	307	250	147	569	92	1881
2000-2001	353	276	72	142	254	221	1318
2001-2002	483	320	36	139	311	302	1591
2002-2003	399	312	67	118	228	255	1379
2003-2004	609	419	110	396	539	396	2469
2004-2005	573	263	67	245	414	349	2053
2005-2006	1140	508	140	451	1448	633	4320
2006-2007	1989	887	244	787	2526	1106	7539
2007-2008	4071	1783	554	1078	3230	5011	15727
Growth rates	4.81**	4.17**	4.11**	3.81**	4.01**	4.09**	4.73**

P < 0.001.

Table 4. Nature of industry and status of IPRS in Indian manufacturing.

Nature of industry	Category of industry	Copyrights	Trademarks	Patents
Durable goods	Machinery tool parts		6	
	Iron industry		4	
	Electrical equipment		3	
	Cycle spare parts		3	
	Transformer parts		2	
Non durable goods	Metal products (sports)			
	Cookware	1	1	1
	Cotton ginning mill		2	
Essential goods	Pharmaceuticals and food products	5		4
	Total	6	21	5

discussed parameters.

DP₁: Investment in R and D as percentage of total expenditure

R and D as percentage of total expenditure is considered as the most important input indicator of the technological activity. Generally, firms' sustainable competitive advantage requires that the firms continuously differentiate their products and services from competitors (Chen et al., 2009; Koellinger, 2008). The firms can constrain and direct an R and D department's ability to take action and differentiate itself from competitors. Studies by Odagiri (1985) clearly show that improvement in productivity achieved by a firm/industry depends on research and

development (R and D) efforts of the firm/industry and the flow of new advanced technology embodied in intermediate inputs and capital goods resulting from R and D efforts of input suppliers.

On the basis of literature review, the following independent variables have been identified.

Nature of the firm (IV₁): According to Robson et al. (1988), the use of intellectual protection differs significantly across industries. The inter-industry differences in the use of IPRs are determined by the technology sector, by the nature of the products, their stage in the life cycle and competitive conditions.

Increased market share (IV₂): Increase in market share leads to enhanced sales, enhanced profits and hence,

Table 5. Regression results.

Variable	B	SE B	β	T	P
(Constant)	0.526	0.283		1.861	0.066
Increased range of goods and services	0.663	0.103	0.710	6.437	0.000
Reduced Labor Costs per unit	0.385	0.084	0.359	4.565	0.000
Market Share	0.441	0.127	0.463	3.476	0.001
Improved Environmental impact or Health Safety aspects	0.373	0.085	0.379	4.377	0.000
Status of trademarks filed in last Ten years	0.282	0.096	0.149	2.949	0.004
Quality Up-gradation	-0.140	0.070	-0.108	-2.002	0.048

$R^2 = 0.778$, Adjusted $R^2 = 0.764$; S.E of Regression = 0.549; DW = 1.986; F-statistics = 149.67; Significance (F-statistics) < 0.001.

more money can be spent for building innovation culture. Blundell et al. (1999) find a robust and positive effect of market share on observable headcounts of innovations and patents although increased product market competition in the industry tends to stimulate innovative activity. Furthermore, the impact of innovation on market value is larger for firms with higher market shares.

Improved production flexibility, quality up-gradation and ISO standards (IV₃, IV₈ and IV₁₂): Gunasakeran et al. (1996) states that overall productivity and quality improvement strategies are lacking in SMEs. The researchers consider continuous improvement in these to be a fundamental step along the innovation pathway.

Patents, trademarks and copyrights (IV₄, IV₅ and IV₆): According to Hanel (2006), as patent-friendly environment is now prevalent in India, patents are increasingly used for protecting innovations from imitation. Mansfield (1986), in an empirical study of one hundred American manufacturing firms, investigated the extent to which patents mattered, especially in case of firm's decision to introduce and develop its inventions. Hagedoorn and Cloudt (2003) concluded that the number of patents filed by a company is a very good reflection of its technological performance.

Improved environmental impact, health safety aspects, reduced labor costs, material and energy costs (IV₉, IV₁₀, and V₁₂): Innovations could be a result of technology that results in improved environmental impact and/or health safety aspects or cost reduction. Most efforts to drive business innovation policy treat energy efficiency as a separate and marginally relevant issue.

The results of the regression (Table 5) depict that predictors of the model are: increased range of goods and services; reduced labor costs per unit; market share; improved environmental impact or health safety aspects; status of trademarks filed in last ten years and quality up-gradation. These six variables explain 76.4% of the variation. The results of step-wise regression highlight that trade marks are important predictors, while the model does not choose patents and copyrights as important

predictors.

R and D expenditure as percentage of total expenses is directly related with increased range of goods and services; reduced labor costs per unit; market share; improved environmental impact or health safety aspects; and status of trademarks filed in last ten years. As is obvious, the increase in R and D expenses may be associated.

It is surprising that the factor, quality up-gradation, is depicting a negative association with investment in R and D as percentage of total expenditure. One reason for this could be that Indian SMEs are not introducing new radical innovations, but small improvements or producing new products due to new technology adoption. This once again highlights the need for creating awareness amongst small enterprise entrepreneurs regarding IPRs. The mentioned results also highlight that nature of firm, namely durable, non-durable and essential category has not emerged as an important predictor of innovation activity of SMEs.

Factors for enhancing IPR awareness

Further discussion (Table 6) represents the steps suggesting firms for enhancing IPR awareness. Factor analysis results highlight that two factors namely; i) policy initiatives and organizational factors explain 62.85% of total variation. The first factor, that is, policy initiatives, explains 32.99% of total variation. The second factor, organizational factors, explains 29.85% of total variation.

Policy initiatives factor covers the following items, i) government assistance for facilitating patent filing with item loading of 0.732, ii) support for entrepreneurial and managerial development for SMEs (0.718), iii) reduction of taxes and fees (0.709), iv) severe penalty for IPR violation (0.695) and v) faster registration process (0.595). Organizational factors include: i) organizing more programs for IPR awareness (0.912) and ii) pool patenting is a possible solution (0.844).

Overall mean of both the factors is 4.46. Mean of policy initiatives factor is 4.63 and is much higher than overall mean. The relative importance of this factor may also be

Table 6. Factors for promoting patenting culture.

Factor	Eigen value	% of Var. Exp.	Cum. %	Item	Factor loading	Mean	S.D	Rank
1. Policy initiatives	2.31	32.99	32.99	i. Govt. Assistance for facilitating Patent filing	0.732	4.73	0.45	2
				ii. Support for Entrepreneurial and Managerial Development for SMEs	0.718	4.72	0.67	3
				iii. Reduction of Taxes and Fees	0.709	4.32	0.68	5
				iv. Severe Penalty for IPR violation	0.695	4.84	0.55	1
				v. Faster Registration Process	0.595	4.56	0.7	4
Mean of policy initiatives						4.63		
2. Organizational factors	2.09	29.85	62.85	i. Organizing More programs for IPR awareness	0.912	4.14	0.71	6
				ii. Pool patenting is a possible solution	0.844	3.91	0.68	7
Mean of organizational factors						4.02		
Overall mean						4.46		

highlighted through the factor loadings. Three items viz. i) government assistance for facilitating patent filing, ii) support for entrepreneurial and managerial development for SMEs and iii) reduction of taxes and fees are having factor loading more than seven and the percentage of variance explained by this factor has also been high (32.99).

Thus, for improving the IPR culture in SMEs, the assistance by government is preferred in terms of patent facilitation centers as well as other policy initiatives like faster registration and lower fees is also having higher means than organisational factors. Pool patenting as a possible solution is least on priority with lowest mean score. Hence, the results highlight that policy initiatives factor is considered more important than organizational factors in developing IPR culture.

DISCUSSION

The results of the study highlight that at all India level on the basis, the consumer durable goods industry is growing at a faster rate than the other two categories; non durable goods and essential goods industry. All categories of industries are affected by recession. The recovery of durable goods has been at a faster pace and the essential goods industry is also now growing at a higher rate after the recessionary slowdown in 2007/2008 and 2008/2009.

The first research question that the present study tries to answer is R₁: Post TRIPS period depicts inter industry differentials and patent filing is higher by technology intensive industries. The results regarding IPR status (Table 2) shows that the absolute number of trade marks filed in India is much higher as compared to the patents filed but in terms of growth rates, patents granted are growing at a faster pace than that of trademarks. Patents play a vital role in terms of technology development. So,

analysis has been done to view the sector-wise patenting scenario. This will help in understanding the inter-industrial differential in patent filing (Table 3). Patents for the industry has grown at a rate of 4.73% per annum in the post TRIPS period. The results do depict inter-industry differentials. The highest growth has been accorded by chemical goods category at the rate of 4.81% per annum, followed by drugs at a rate of 4.17% per annum. Electrical industry growth rate has been the lowest, although in absolute terms, the number has increased from 787 in 2006/2007 to 1078 in 2007/2008, but the rate of growth has been at 3.17% per annum. This hypothesis is partially accepted as there are inter-industrial differentials as the overall industry statistics point out that Chemical and drugs industry are growing at a higher rate, but the statistics of SMEs is indicative of the slow growth of IPRs, especially patents. Hence, there is a need for building IPR culture amongst SMEs.

The next research question is R₂: IPRs are important determinants of Innovation activity of SMEs. The regression analysis has been performed for determining the factors influencing innovation in SMEs. The results of the regression depict that six predictors of the model are: increased range of goods and services; reduced labor costs per unit; market share; improved environmental impact or health safety aspects; status of trademarks filed in last ten years and quality up-gradation explain 76.4% of the variation. R and D expenditure as percentage of total expenses is directly related with increased range of goods and services; reduced labor costs per unit; market share; improved environmental impact or health safety aspects; status of trademarks filed in last ten years.

The results of step-wise regression highlight that trade marks are important predictors, while the model does not choose patents and copyrights as important predictors. One reason for this could be that Indian SMEs are not introducing new radical innovations, but small improvements or producing new products due to new technology

adoption. This underlines the need for creating awareness amongst small enterprise entrepreneurs regarding IPRs. So the present hypothesis has not been accepted. As the afore analysis depicts the poor performance of manufacturing SMEs regarding IPRs, the next research question has been focused on understanding as to which factor, policy initiatives or organizational factor, is more important in promoting IPR culture in manufacturing SMEs. Accordingly, the third research question is **R₃**: Policy initiatives factor is more important for promoting IPR culture for manufacturing SMEs than the organizational factors. Factor analysis has been used to answer this question.

The results of factor analysis highlight that two factors for enhancing IPR awareness, i) policy initiatives and ii) organizational factors, explain 62.85% of total variation. Policy initiatives factor is having higher Eigen value and higher mean score and the items in this factor have higher loadings, thus, this factor is more important than the organisational factors. Hence the third hypothesis has been accepted.

CONCLUSION AND MANAGERIAL IMPLICATIONS

The paper highlights the low level of IPR awareness. IPR filings by SMEs of Punjab are still at a nascent stage. SMEs of Punjab are only mostly filing trademarks and copyrights. Patent filing has not emerged as an important form of IPR in manufacturing SMEs. The overall IPR status also is indicative of the facts that the absolute number of trade marks filed in India is much higher as compared to the patents filed. Regarding the nature of industries, the Durable industries have filed most of the trademarks (18 of 21). But it is lagging in filing patents and copyrights. In case of non durable industry, cookware industry filed copyright and three trademarks have been filed by cotton ginning mill and cookware industry. Most of the copyrights and patents have been filed by essential goods category. An obvious reason for this is that this sector covers the Pharmaceutical industries and the food products and beverages, which are more active in patent filing. Thus, the status of IPR filing in Punjab manufacturing SMEs is low. So, we can say that the patent and copyright filing is low in case of small and medium manufacturing enterprises of Punjab.

The major findings are that the attitude of SME's of Punjab is not encouraging and there is a need for enhancing IPR awareness level for manufacturing SMEs. 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, 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. Policy initiatives by the government can play a vital role in improving the scenario of IPRs. The study is important as it will help SME entrepreneurs and managers focus on the policies to be adopted by SMEs to promote IPS culture. The govt. can also initiate measures in this direction to create awareness programs through patent facilitating centers to help SMEs file more IPRS and also help in conducting patent searches. At the same time, they can also conduct more programs in SME clusters and also highlight the best practices adopted by SMEs of other states. Adopting these measures is the need of the hour and this will help in fostering IPR culture amongst SMEs. The future of India is not relying upon the large and big industries, more focus needs to be given to the building a strong SME base as well. In today's competitive world survival of SMEs without IPRs is going to be very difficult. Hence, there is a need to focus on IPR policies.

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