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ASIAN AND PACIFIC CENTRE FOR TRANSFER OF TECHNOLOGY

C-2, Qutab Institutional Area
Post Box No. 4575
New Delhi 110 016, India
Tel: (91) (11) 2696 6509
Fax: (91) (11) 2685 6274
E-mail: postmaster@apctt.org
Website: <http://www.apctt.org>

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COMMERCIALIZATION OF TECHNOLOGY INNOVATIONS AND PATENTS ISSUES AND CHALLENGES

Abstract

This paper discusses various issues and challenges related to the commercialization of technology-innovations and patents. The main issues discussed here are: to go for patent or not, techno-innovations to techno-entrepreneurship, supports for commercialization of technology innovations/patents, technology business incubation, technology transfer, enterprising tendency & characteristics and some other small issues related to commercialization of patents. The issues are discussed with the help of literature review and three case studies.

Hemantkumar P. Bulsara

Assistant Professor (Economics & Management)

S V National Institute of Technology
Ichchhanath, Surat, Gujarat 395007, India
Tel: +91-9825535673 (Mob); +91-2612201555
E-mail: hbulsara@ashd.svnit.ac.in, hemantbulsara@gmail.co

Shailesh Gandhi

Associate Professor & Chairman - PGPX

Indian Institute of Management (IIMA)
Ahmedabad 380 015, India
E-mail: shailesh@iimahd.ernet.in

P.D. Porey

Director

S V National Institute of Technology
Ichchhanath, Surat, Gujarat 395007, India
E-mail: pdporey@svnit.ac.in

Introduction

For anyone, getting patent for his or her technology innovation will be an achievement. It can give them many advantages. If the person is in the academic field, it can earn him a lot of credits in terms of promotion or career enhancement. But most importantly, the real fruits of the patented technology innovations only come through commercialization which can earn them royalty if technology is transferred or earn them profit if the patented technology is converted in to a business organization which is called techno-entrepreneurship. But the things are not simple. It involves many issues and challenges. This has been discussed with three main case studies which are: Aura Herbal Textiles Limited – lead entrepreneur: Arun Baid; Nature Technocrats – lead entrepreneur: Arvindbhai Patel; and Mantis Technologies – lead entrepreneur:

Aurvind Lama. All these ventures are established in Ahmedabad, Gujarat, India.

Aura Herbal Textiles Limited is a company dealing with Herbal dyeing of Textiles – green technology. This technology is patented by Arun Baid. His journey was not that smooth while commercializing this green technology though he had the patent. Aura Herbal Textiles Limited was certified by Global Organic Textile Standard (GOTS) for their all natural/herbal dyeing process. The company used certified organic fabrics, textiles and yarns as raw material. Dyeing, weaving and printing were done under keen supervision to maintain quality standards. Dyeing of fabrics up to 120' width was achieved. The company managed to achieve lengths of up to 1000 meters in different fabrics like voiles, poplins, twills, flannels, corduroys, denims, knits and silks. Aura Herbal Textiles

Ltd had beautiful colour palette of earthy shades & various prints ensuring no waste was generated. The solid was used as manure and the liquid waste helped in irrigating their farms. This firm was supported by Centre for Innovations, Incubation and Entrepreneurship (CIIE), Technology Business Incubator and Indian Institute of Management, Ahmedabad.

Nature Technocrats is a case of Arvindbhai who has several technology innovations with patents. He had many innovations like Auto Air Kick Pump, Solar Water Heater, Natural Water Cooler, Auto Sprayer, Natural refrigerator, Innovative tong etc. He had converted some of his innovations into products for commercial purposes with the help of GIAN (Grassroots Innovations Augmentation Network), Technology Business Incubator in India. And some patented innovations were transferred with the help of GIAN. The satisfaction from these commercial ventures was limited.

Mantis Technologies was founded by Aurvind Lama and Partha Sinha mainly when both were the students of Indian Institute of Management, Ahmedabad (IIMA) in 2007. In a span of two years, they grew and as on 2009, they were on a look out for some major sources of funds, in the shape of venture capital. The Integrated Railway Reservation System in India has been there for quite a few years where all the trains of Indian Railways were well coded. Defining software system was comparatively easy. But if we think of the private bus service operators running their buses individually in India, then it is difficult to integrate them with the help of software. In India, low cost travel industry was very complex and unorganized with each player having his own business requirements. Mantis Technologies effectively integrated the private bus operators. This company was established in the year 2007 and has been growing very fast. With the

help of SAAS (Software As A Service) based model, the bus service operators were integrated which gave many advantages to: (1) Bus operators, (2) Travel agents and (3) Customers. The application was run through www.travelyaari.com as platform for booking of bus tickets. Mantis developed state of the art global distribution system (called Mantis Connect) which turned out to be the lifeline of Western Indian bus industry. Mantis pioneered in developing a dynamic bus global distribution system in India. This case also gives details of how founders started the company when they were just students at IIMA and how they grew. They have never thought of patents or copyrights for their technology.

Further, part of the paper will discuss the various issues and challenges related to commercialization of technology innovations and patents.

To go for patent or not?

While discussing the commercialization of any technology innovation, it is really very important to touch the issue of: 'To go for a patent or not?'. Going for a patent will lead to publication of your innovative technology. Whether it is good for business or not is a matter of debate. One can say that patent gives you protection, but then, what about the countries where legal procedures are slow and corrupt. It takes a lot of time to fight patent cases with many hurdles. There are people who believe that sound business model is more important. In the case of Mantis Technologies, they have never thought of any patent or copyrights as they believed that building a robust business model is more important. Once your business model is robust, even if somebody copies your technology, they may not be successful as your business will act as an entry barrier to provide solid competition. In some developing countries like India and others, filing patent itself is a very

slow process which gives frustration to the innovator and commercialization motive may go haywire. There are people who believe in open innovations for the whole society. However, there are many advantages of patents as discussed earlier and which protect the interest of the innovators. Hence, it is mostly advisable to go for a patent in the modern era.

Techno-innovations to techno-entrepreneurship

While discussing the commercialization of any technology innovations, whether patented or not, techno-entrepreneurship is the major issue. To be an entrepreneur by converting your own patented technology innovations into a product will always give you better results. But converting an innovator into the entrepreneur is a tough job which involves many aspects of business functions as shown in figure 1. The patented technology innovation should have commercial viability. The same can be checked by carrying out appropriate feasibility analysis in terms of marketing feasibility, economic feasibility and technical feasibility etc. The important thing is: how to convert techno-innovation into techno-entrepreneurship? There are many technology innovations but how many can be converted into techno-entrepreneurship is the question. When it comes to commercialization of patents, the ratio is very low. Technology innovation is important and it is difficult but an entrepreneurship is not just about technology & innovation. Techno-entrepreneurship is a broad concept and involves many things. Technology entrepreneur is the one who organises, manages and assumes the risk of a technology-based business enterprise (Nicholas and Armstrong, 2003).

Figure 1 gives inconnectivity between techno-innovation and techno-entrepreneurship:

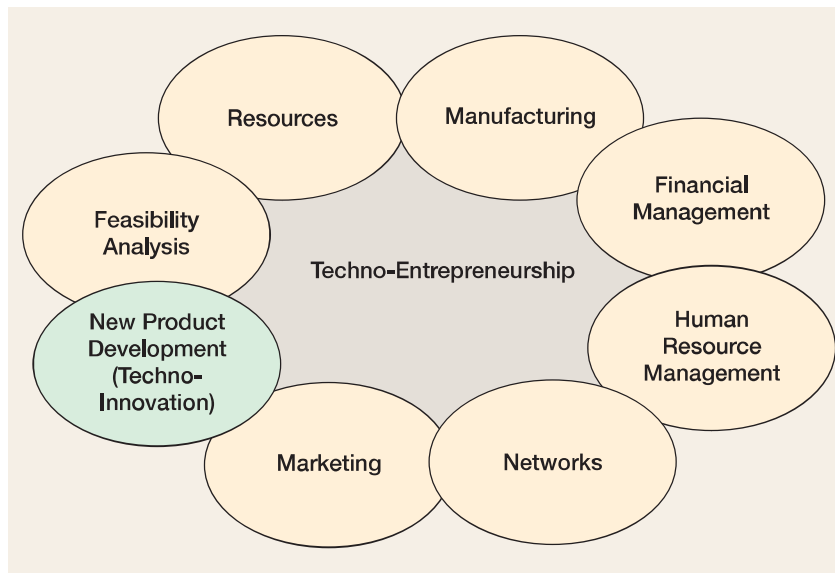


Fig. 1. Relationship between Techno-innovation and management functions

Source: Hemantkumar, et al., 2009

Entrepreneurship is 'the process of looking at things in such a way that possible solutions to problems and perceived needs may evolve in venturing.' Willingness to take the risks involved in starting and managing a business, particularly in establishing a business on unconventional innovations is a major issue. As an entrepreneur one has to think about all other components of business and not just about the technology innovation. And because of that, only the person who has technology innovation may require support for other components of business, otherwise as mentioned earlier even the greatest innovation may die. A techno-entrepreneur needs to have technical management skills, business management skills and motivation, then only he can be a successful techno-entrepreneur (Oakey, 2003). India is cognizant of the fact that current economic liberalization and changing patent scenario, the key factors determining success are to make rapid technological advancements with respect to quality, cost, productivity and velocity of commercialization in line with international standards (Sikka, 1999). New entrepreneurs who

have no existing markets and no existing customers, look for any market where their technology offers cost and performance advantages over existing products i.e., replacement of existing products (Walsh and Kirchhoff, 2002).

The field of 'teaching of entrepreneurship' has been divided as to whether entrepreneurship can be taught or not. Those who favour it as an independent academic discipline see it as a distinctive, if not unique component of the free enterprise system. In this respect, it creates wealth, improves the productivity of a region, adds to employment, and offers a more exciting dimension to society. A second consideration is that entrepreneurship contains specific knowledge, concepts and theories that apply in a reasonable and consistent manner across the discipline. The research of D'Cruz and O'Neal (2003) at University of Central Florida (UCF) has shown that integration of Technology Incubator program with academic entrepreneurship curriculum has yielded impressive results thus far. Entrepreneurship programs not only result in start-up companies, they also promote

intrapreneurial culture and attitudes in established organizations. Even, Wright, Hmieleski, Siegel and Ensley (2007) have shown in their research – 'it appears that there may be great benefits in university programs that combine science and technology with business management'.

Questions for Management: While discussing the techno-entrepreneurship & innovation, we need to give thought to the following questions:

- How to tackle the issue of geographical diversity in a vast country like India?
- How to maintain balance between traditional systems and innovations in a country like India where tradition has a lot of value?
- How to design reward systems to foster innovation and conversion of innovation into entrepreneurship?
- How to solve the problem of – 'who will get the credit?'

Here, the most important question may be – 'who will get the credit?' Mostly just because of this question, the innovation may die. Many a times, technology institute will have many students who come out with innovative ideas but they do not have proper support to convert their ideas into entrepreneurship. It has already been shown in figure 1 that entrepreneurship involves many components not just innovation in product development, whereas a management institute can have support for many components of entrepreneurship except technology & innovation. So, if they come together and start an intra-institution interaction & networking, they can best support the students who have innovative ideas. But here also, most of the times, the question – 'who will get the credit?' will create trouble and act as a hurdle to techno-entrepreneurship & innovation. When questioned, they may give polished answers, but in reality the fact gets distorted. (Hemantkumar et al, 2009).

Supports for commercialization of technology innovations/patents

In most of the countries, there are supports for commercializing technology innovations/patents. In India, to promote techno-entrepreneurship, many government and non government agencies are doing a lot of work. Particularly the Department of Science and Technology (DST), Government of India has established National Science and Technology Entrepreneurship Development Board (NSTEDB) with full fledged website and even web portal TIME IS – Technology Innovation Management & Entrepreneurship Information Services with web site: <http://www.techno-preneur.net> which gives all the information about techno-entrepreneurship and how to convert innovation into entrepreneurship with the help of various schemes of DST in India. Under the NSTEDB, DST has major schemes like: Entrepreneurship Development Cell (EDC), Science and Technology Entrepreneurship Development Project (STED), Science and Technology Entrepreneurship Park (STEP) and Technology Business Incubators (TBI). There are more than 30 EDCs established by DST all across India. STED projects are located at more than 35 places in India. There are 14 STEPs all over India. And most importantly there are more than 25 TBIs which are acting as the real booster to convert technology innovations into techno-entrepreneurship. Apart from these, DST has established National Innovation Foundation (NIF) in February 2000. Society for Research and Initiative for Sustainable Technologies and Institution (SRISTI) and Honey bee network are also there. GIAN – Grassroots Innovations Augmentations Network is an incubator for the grassroots innovations and traditional knowledge. It is established with the help of NIF at Ahmedabad, Guwahati and Jaipur.

Technology business incubation is one of most important support for commercializing technology innovations/patents.

Technology business incubation

Technology business incubation is one of most important support for commercializing technology innovations/patents. Business incubators are programs designed to accelerate the successful development of entrepreneurial companies through an array of business support resources and services, developed and orchestrated by incubator management and offered both in the incubator and through its network of contacts. Incubators vary in the way they deliver their services, in their organizational structure, and in the types of clients they serve (Wikipedia, 2008).

Technology business incubation involves the commercialization of science and technology through newer community institutional arrangements which can be thought of as technology venturing. It concentrates on alliances as an economic development strategy. Technology venturing is based on creative and innovative ways of linking public sector initiatives and private sector resources within and across regional and national boundaries for promoting economic growth. Technology business incubation can foster corporate and community collaborative efforts, while nurturing positive government-academic-business relationships. Technology venturing activities within a community are based on linking four critical factors: (1) talent – people, (2) technology – ideas, (3) capital – resources, and (4) know-how – knowledge. Support for each factor includes: expanding talent pool, accelerating the transfer of technology, increasing availability of capital and

improving availability of managerial, technical and business know-how. The primary drivers of technology business incubation are entrepreneurs – people who make things happen and technologies or ideas that have potential to be commercialized within a reasonable period of time (Tornatzky, Batts, McCrea, Lewis and Quittman (1996). There is a growing realization that the community at large also benefits from small business incubators. Not only can the incubator increase local employment opportunities, it can also diversify the local economic base and enhance the local image as a center for business activity. But in future, incubation centers may tend to be organized 'for profit', as public source of funding are stretched to their limits (Gatewood, Ogden and Hoy, 1985). The most effective use of the incubator as a tool for economic development will require careful consideration of the process by which those entrepreneurs choose to participate in the program (Spitzer and Ford, 1989). Allen (1985) has shown relationship between business incubators and start ups as an entrepreneurial marriage. To qualify for incubation program one must have: sound technical knowledge, competence in focus area, entrepreneurial traits, good business sense, global thinking, conviction and strong perseverance and strong references as per the Nirma Lab – one of the TBI in Ahmedabad. H.K. Mittal, Advisor and Head, National Science and Technology Entrepreneurship Development Board, DST, Government of India, has shown in his presentation that incubation is required because: innovative ideas have longer gestation period and skill set of entrepreneurship is not well developed in all innovators. So commercialization support in the form of incubation is really essential.

From the above discussion, we can say that technology business in-

cubation is really a very important mechanism of support for innovators who have patents but lack in business know-how and managerial skills. They can get all the supports for the commercialization of their patents. They can help one in becoming an entrepreneur or try for 'technology transfer'. Arun Baid of Aura Herbal received incubation support from CIIE, IIMA. He not only got incubation support but he also got some recognition for new green technology and brand equity of IIMA which helped him in establishing in the market. Arvindbhai got the incubation support from GIAN for his several innovations. Up to some extent, he tried to do business of his products with the help of GIAN but afterwards, he transferred some of his patented technology to other well established business organization.

Technology transfer

Technology business incubator can help one to become an entrepreneur by commercializing his patented technology himself. If this option is not suitable, then the other option is to transfer the technology to appropriate organizations which can commercialize the patented technology effectively. This arrangement will make an innovator earn in terms of royalty without being an entrepreneur himself. So, he can focus on other innovations also. One can transfer the patented technology himself also without taking help of any technology business incubators or any other supporting agencies. Nowadays, various universities and technology institutes have their own technology transfer offices to support the innovations of their faculty members and students.

But the technology transfer mechanism is not always simple, particularly, when the technology is new and has uncertainty. The receiving orga-

nization has to carry out feasibility study as discussed earlier. There are no set rules for deciding terms and conditions for technology transfer. Deciding pricing and monetary conditions (valuation of patented technology) are also very difficult as the patented technology may be quite new and not well tested in the market. These problems may invite frustration to innovators some time. Arvindbhai also got frustrated about the transfer of his patented technology innovations though the system of technology transfer is comparatively quite transparent and smooth at GIAN. GIAN officer also accepted that the transfer of technology is really very challenging as even they have to check soundness of the receiving company too.

CIIE normally emphasizes on converting technology innovations into techno-entrepreneurship by creating a company, whereas GIAN normally emphasizes on technology transfer as they are dealing with Grassroots innovators with low educational background and it is difficult to convert them into entrepreneurs.

Enterprising tendency/ characteristics

As mentioned earlier, mainly, there are two options to commercialize the patented technology innovations: (1) techno-entrepreneurship; and (2) technology transfer.

If the innovator is going for the 1st option i.e., techno-entrepreneurship, he should have enterprising tendencies or entrepreneurial characteristics. If one does not have entrepreneurial characteristics, then technology transfer would be a better option. Some of the entrepreneurial characteristics are given in the following discussion:

Need for Achievement: It includes the sub characteristics like: Forward

looking, self-sufficient, optimistic rather than pessimistic, task-oriented, result-oriented, restless and energetic, self-confident, persistent and determined, dedication to completing a task. Purnima (2006) has given that entrepreneurs should have achievement motivation and Misra et al (2000) has given importance to effective competence. Desai (2001) has given importance to self confidence and energy. These would have some matching with the sub-characteristics given in 'Need for Achievement'. In the case of Arvindbhai, that had motivated him to pursue more and more innovations continuously, though he was not successful in business. Arvind Lama showed a lot of confidence in his innovations and acted promptly. Hence, Mantis Technologies could achieve such a fast growth in just two years. But Arvindbhai did not have appropriate soft skills to develop effective business. So, his very high need for achievement was focused more on creating new innovations rather than business development. In the case of Arun Baid, his wife made him act promptly for their innovation of the herbal dyeing and as a team they could achieve good growth of the business.

Need for autonomy/independence:

It includes the sub-characteristics like: wanting to do unconventional things, prefers working alone, needs to do his 'own thing', needs to express what he thinks, dislikes taking orders, likes to make up his own mind, does not bow down to group pressure, stubborn and determined. Arvindbhai had very high tendency toward the need for autonomy. That may be the reason, he could not build a team of partners for his business development and tried to do everything alone without taking any partners. He lacked soft skills and business functional knowledge. He could have taken professional partners in his business but he never thought of that. He could become very good

innovator but could not become good businessman. Even, it made him like doing unconventional things.

Creative tendency: It includes: imaginative and innovative, tendency to day-dream, versatile and curious, lots of ideas, intuitive and can guess well, enjoys new challenges, likes novelty and change. Purnima (2006) has shown that creativity is an important characteristic for an entrepreneur. Even Desai (2001) has shown importance to creativeness and Misra et al (2000) have covered this in Cognitive Competence. All entrepreneurs scored above average scores in this category. All three entrepreneurs had high tendency towards this characteristic.

Moderate/calculated risk taking: It includes: acts on incomplete information, judges when incomplete data is sufficient, accurately assesses his own capabilities, is neither over nor under-ambitious, evaluates likely benefit against likely costs, set challenging but attainable goals. Purnima (2006) and Misra et al (2000) both have given importance to this characteristic. Misra has shown that in Cognitive Competence.

Drive and determination: It includes: taking advantage of opportunities, discounting fate, making one's own luck, being self-confident, believing in controlling one's own destiny, equating results with effort, showing considerable determination.

Other important issues and challenges

Apart from all the above issues and challenges for commercializing patented technology innovations, there are some other issues like: technology obsolescence, educational background & business soft skills, experience etc.

In many countries, there is a long period between patent filing and pat-

ent getting which may invite frustration and slow down the process of commercialization. More importantly, it brings the important issue of technology obsolescence. If the process is slow, the technology may become obsolete by the time one gets the patent. Entrepreneur has to take advantage of his technology innovation by speedy commercialization of technology before it becomes obsolete. In case of nature technocrats, the technology of Auto Air Kick pump was dependent on two stroke petrol engine vehicles. As soon as the technology of two stroke petrol engine became obsolete, his innovation also became obsolete and demand for his Auto Air Kick pump went down. Regarding educational background & business soft skills, though Arvindbhai had very good technology innovations but lack of soft skills and knowledge of business functions affected his business adversely. Whereas in case of other techno-preneur, Arun Baid and Arvind Lama, they had that and because of that they could grow.

Conclusion

Getting a patent for technology innovations is important but even more important is to commercialize it for the benefit of society and for the innovator himself. But for commercializing the patented technology, one has to emphasize on all the above issues and challenges.

We have seen in the article that how important it is to have know-how about marketing feasibility, economic feasibility, technical feasibility and other business functions while commercializing technology innovations and patents. Teaching entrepreneurship fundamentals to engineering students may be a good idea to build future techno-entrepreneurs with not only techno-innovations but also commercialization of knowledge. There are many supports for commercial-

ization of technology innovations and patents but effectiveness of all those supports have to be checked. We have seen that the technology business incubation is one of the most important support mechanisms with total support to patented technology innovations. But at present, we do not have appropriate sample size to check effectiveness of such a mechanism in India as this concept is comparatively new, started effectively in 2000 only. In five years time, we may have enough sample size of the companies supported by such incubation centers. At that time, the empirical studies to check effectiveness of the technology business incubation process in India can be conducted with the help of some of the parameters we have defined in this study. But with all these, the characteristics of the person who wants to commercialize the patents or even non-patented technology innovations also play a big role. He should have a tendency towards entrepreneurship or otherwise, technology transfer would be a better option.

References

- Allen, D. N. (1985), An entrepreneurial marriage: Business incubators and starts ups, *Frontiers of Entrepreneurship Research, Entrepreneurship Research Conference*, Babson College, Centre for Entrepreneurship Studies, pp. 38-53.
- Basant, R. and Chandra, P. (2007), University-Industry links and enterprise creation in India - Some strategic and policy issues, *in the edited volume – How Universities Promote Economics Growth* edited by Shahid Yusuf and Kaoru Nabeshima, The World Bank, Washington DC, pp. 209-226.
- Bhatt, D. V. and Bulsara, H.P. (2008), Promoting entrepreneurship culture among the engineering students – A

need of nation, *The Indian Journal of Technical Education*, Indian Society for Technical Education, India, Vol. 31, No. 2, April-June, 2008, pp. 13-17.

Brown, W. S. (1984), A proposed mechanism for commercializing university technology, *Frontiers of Entrepreneurship Research, Entrepreneurship Research Conference*, Babson College, Centre for Entrepreneurship Studies, pp. 136-143.

Bulsara, H.P. and Bhatt, D. V. (2010), A study and analysis of factors responsible for industrial sickness as perceived by the entrepreneurs, *International Journal of Research in Commerce and Management*, Vol. 1, No. 3, July, 2010, pp. 74-83.

Charantimath, P. (2006), *Entrepreneurship development small business enterprise*, Pearson Education, New Delhi, pp 48-96.

D'Cruz, C.; O'Neal, T. (2003, July 20 -24), Integration of technology incubator programs with academic entrepreneurship curriculum, Management of Engineering and Technology, PICMET 03, *Portland International Conference on Technology Management for Reshaping the World*, pp. 327-332.

Desai, V. (2001), *Dynamics of entrepreneurial development and management*, Himalaya Publishing House, Mumbai.

Gatewood, B., Ogden, L. and Hoy, F. (1985), Incubation centers – where they are and where they are going, *Frontiers of Entrepreneurship, Entrepreneurship Research Conference*, Babson College, Centre for Entrepreneurship Studies, pp. 1-17.

Gupta, A. (2006), Mind! As if it matters, *Honey Bee*, Sristi Innovations, Ahmedabad, Vol. 17(1-2).

Hemantkumar P. Bulsara, Shailesh Gandhi and P. D. Porey (2009), Mantis Technologies – A case on techno-

entrepreneurship, *VNSGU Journal of Management and Administration*, VNSGU, India, Vol. 1, No. 2, July-December, 2009, pp. 91-119.

Hemantkumar P. Bulsara, Shailesh Gandhi and P. D. Porey (2009), Techno-innovation to techno-entrepreneurship through technology business incubation in India: An exploratory study, *Asia Pacific Journal of Innovations and Entrepreneurship*, Asian Association of Business Incubation, Vol. 3, No. 1, May, 2009, pp. 55-77.

Lockett, A., Vohora, A. and Wright, M. (2002), Universities as incubators without walls, *International Journal of Entrepreneurship and Innovation*, pp. 245-256.

Michael, N.T., Summe, G.L. and Uttal, B. (1999), Commercializing technology – what the best companies do, *Harvard Business Review on Entrepreneurship*, Harvard Business School press, USA, (originally published in HBR – 1990), pp. 175-203.

Misra, S. and Sendil Kumar, E. (2000), Resourcefulness: A proximal conceptualisation of entrepreneurial behaviour, *The Journal of Entrepreneurship*, Sage Publication, New Delhi/Thousand Oaks / London, 9, 2 and references there in.

Mittal, H.K. (2006), Facilitating innovation and entrepreneurship, *2nd Global Forum on Business Incubation*, New Delhi (www.incubatorsnetwork.com).

Nicholas, S.P. and Armstrong, N.E. (2003), Engineering entrepreneurship: Does entrepreneurship have a role in engineering education?, *IEEE Annals on Propagation Magozine*, Vol. 45 (1).

Oakey, R.P. (2003), Technical entrepreneurship in high technology small firms, *Technovation*, Vol. 23, pp. 679-688.

Sikka, P. (1999), Technological innovations by SME's in India, *Technovation*, Vol. 19, pp. 317-321.

Spitzer, D.M. and Ford, R.H. (1989), Business Incubators: Do we really understand them? *Frontiers of Entrepreneurship Research, Entrepreneurship Research Conference*, Babson College, Centre for Entrepreneurship studies, pp. 436-442.

Tornatzky, L.G., Batts, Y., McCrea, N.E., Lewis, M.S. and Quittman, L.M. (1996), *The art & craft of Technology Business Incubation*, Southern Technology Council and the National Business Incubation Association, USA.

Walsh, S. and Kirchhoff, B. (2002), Entrepreneurs' opportunities in Technology based markets, technological entrepreneurship, *A volume in research in entrepreneurship and management*, Information Age Publishing, pp. 17-30.

Wright, M., Hmieleski, K.M., Siegel, D.S. & Ensley, M.D. (2007), The role of human capital in technological entrepreneurship, *Entrepreneurship Theory & Practice*, Baylor University, pp. 791-806.

<http://www.nstedb.com>

<http://www.ciieindia.org>

<http://www.gian.org/>

<http://www.sristi.org>

<http://nifindia.org>

<http://www.techno-preneur.net/>

http://en.wikipedia.org/wiki/Business_incubator

<http://www3.babson.edu/eship/>

<http://www.nirmalabs.org/>

<http://www.nenonline.org/>

<http://www.entrepreneur.com/encyclopedia/term/82280.html>

<http://www.ipindia.nic.in> □