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Entrepreneurial track of Indian I.I.T. Mumbai – A roadmap for higher education institutions in Marathwada for their quest of finding the 'new quality paradigm for higher education'

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ABSTRACT

This paper takes a bird's view of the historical and social background of Marathwada*, under which the local economy was grown so far. Despite of this upward trend in the economy, this region has constantly termed as one of the most backward regions in the country and subsequently the local population got least benefitted. This paved the way for realization of need and a subsequent rapid horizontal growth of education and specially the technical and scientific higher education.

In any part of the world, the natives got benefitted only when they have direct engagement with the economic and industrial activities around them. Of late, it was started getting realized that locals can only be associated with the economic engine of the region by their entrepreneurial and intellectual contributions. Centers of higher technical & scientific educations can play a crucial role for facilitating and providing an ambience for hatching ideas, economic activities and intellectual property to reinforce the local economy.

IIT Mumbai has established itself as an ideal place for nurturing, developing and transferring the aforesaid precious intellectual property. With the far-sighted policies and their timely implementing has made this institution as an ideal place for technology creation and transfer, not only considered in India but recognized globally as well. This paper has tried to enumerate the crucial stages crossed and policy decisions taken in this evolutionary journey of IIT Mumbai to get transformed into an entrepreneurial educational hub.

Off late in Marathwada along with in other parts of the country, a realization has got ground that till the time its institutions of higher education do not embark upon grooming this entrepreneurial ability, the economic and social consolidation of economic activities and making its benefits reaching to the local population cannot take place. This paper offers a roadmap as to how an institution of higher technical education can be transformed into a pivot for creating and transferring the intellectual properties and running the entrepreneurial activities based thereon.

** Central Maharashtra Region in India*

1. Objectives

1) Highlighting the necessity to kick-start entrepreneurial higher technical education in place of the current self centered pursuit of carrying out high grade of academic teaching and learning activities by the Institutions in a backward region in India, such as in Marathwada.
2) Providing an intricate yet crucial model for such a transformation of an institution of higher technical education, being run in its conventional ways into an entrepreneurial hub to contribute the local economy and society and to reinforce the national economic-engine.

The education scenario of Marathwada has had a mundane background of the education system of the autocratic Nizamshahi. The Nizam rule have been posing the most modern educational policies and ahead of its time outlook. On the backdrop of this, the Osmania University was established in Hyderabad in 1917. Its important to note that this university was meant for the propagating Higher education in Urdu. The students from the vast Marathwada had to go to the Osmania University for their higher education.

Nizam rule's bleak priority for creating facilities of higher education in Marathwada was ostensibly evident with the fact that first college in Marathwada, Government's College Arts & Science was established in 1923 and there was no other higher education facility in the region till its liberation in 1950 except this.

The evidences are there that even after liberation in 1947 because of its geographical reorganization, this Marathwada region remained backward educationally with comparison to similar growth in other region of Maharashtra and India as no policy decision was taken favorably for this. The very first effort was from a non-government entity, Marathwada Shikhan Samiti, which called up a meeting on December 12, 1954, in which for the first time, it was demanded publicly that a separate set of policies for educational and cultural development are made exclusively for Marathwada.

Again, on April 9 & 10, 1955, a non-government congregation of federal and provincial Legislatures representing Marathwada and other people of relevant eminence was convened in Hyderabad. This conference unanimously reiterated the demand for the establishment of Marathwada as a separate administrative entity immediately and for its pressing need of economic, civic, educational and cultural development to come to at par with the national average at least.

This disappointing stage of aspirations of people in Marathwada lasted till 1956, when this region was finally merged with Bombay which was reeling under its conflicting bi-lingual tension. This alignment gave this region its popular Marathi identity accomplished on the one hand, the promulgation of 'Marathwada Act-1958' by the Bombay legislature as a consequence of the pertinent recommendations by the 'Palintikar Committee', which was appointed by the Bombay Government, on the other.

The famous Marathwada university was established subsequently on August 23, 1958 and nine colleges dispensing education at degree level, were affiliated with it. The same university is renamed as Dr. Babasaheb Ambedkar Marathwada University in January 14, 1994 and is now epicenter of knowledge creation and dispensation in this south-central region of our country.

Apart from the Dr. B.A. Marathwada University itself, the other centers of Higher learning and knowledge creation are Government College of arts & Science, Aurangabad, Milind Mahavidyalaya, Aurangabad, M.P. Law college, Aurangabad, Government College of Education, Aurangabad, Government Medical College, Aurangabad, Government Engineering College, Aurangabad.

This apart a few private trusts are also functional contributing their bit in higher Knowledge creation and dispensation in this major part of Marathwada. They are Deogiri Institute of Engineering & Management Science and Deogiri College of Marathwada Shikshan Prasarak Mandal (Trust); Jawaharlal Nehru Engineering Collge and MGM Medical College of Mahatma Gandhi Mission (Trust) and Marathwada Institute of Technology of Gramaudyogic Shikshan Mandal (Trust)

With Dr. BA Marathwada University, Aurangabad, their department of chemical technology registered three patents on account of their research of the first order, one in 2008 and two in 2011. Under the centrally sponsored and enabling RUSA (Rashtriya Uchchatar Shiksha Abhiyan) scheme, a state of the art RUSA Centre for Advanced Sensor Technology has been established. This centre is meant for upgrading its research up to the University-Industry joint projects. The management of its lab-facilities foresees this centre as a source of revenue from their use by the local industries.

This apart, various other university departments have also shown their prima facie research caliber under inter-institutional collaborative projects viz. by:

1. Department of Zoology with the Indian National Centre for Ocean Information Science (INCOIS) and Indian Space Research Organization (ISRO).
2. Department of Physics with Inter University Accelerator Center (IUAC) / National Science Center (NSC), New Delhi; Bhabha Atomic Research Center (BARC), Mumbai and National Physical laboratory (NPL) / Department of Atomic Energy – Consortium of Scientific research (DAE-CSR), Indore Center
3. Department of Chemical Technology with the Inter University Accelerator Centre (IUAC), New Delhi on Toxic Vapour Nano Sensor Array.
4. Department of Computer Science with the National Micro Electro-Mechanical Systems Design Centre as a joint installed software facility.
5. Department of Zoology with the local municipal Corporation of Aurangabad of Zoological perspective planning.

Another university named as Swami Ramanand Teerth Marathwada University (SRTMU) was created by a state act in 1994 to serve the same purpose in another important city Nanded, which accommodates one important shrine of Sikh faith, the last abode of Guru Govind Singh Jee.

Though SRTMU was established very recently (in 1994) to share the responsibility of knowledge creation and dispensation in the vast land of Marathwada, it took all its steps for up-gradation of its research endeavours and even embark upon the joint / collaborative research projects with industries and other relevant agencies to relate its research prowess for the social and economic betterments. A RUSA Centre for Herbo Medicinal Studies has been established in 2013 with having the ultra modern facilities to isolate the actives from locally available medicinal plants and thereby transfer of technologies to other researchers, industries and other agencies.

Technology Transfer and the Concept of Entrepreneurial University:

The concept of Entrepreneurial University and the Technology Transfer are complementary to each other. In fact, a university's entrepreneurial status used to depend upon the Technology that it creates and its transfer for the commercial exploitation for social good.

As per the OECD (Organization for Economic Cooperation and Development), an entity comprises of the active memberships of 35 democracies of the world, the entrepreneurial university can start its journey while consolidating by its relevant transformational endeavours in following seven areas:

1. Leadership & governance
2. Organizational Capacity, people and incentives
3. Entrepreneurial development in teaching and learning
4. (demarcated) Pathways for entrepreneurs
5. University – business/external relationships for knowledge exchange.
6. Entrepreneurial university as an internationalized institution
7. Measuring the impact of the entrepreneurial university.

These are framework for a university's transformation and it's a stage wise evolutionary journey rather than a set of sundry areas of efforts, exclusive to each other.

The United Kingdom, though awakened a bit late, but in recent years they took some very ostensibly correct and up to date visionary steps in understanding, reforming and implementing the relevant policies in turning this concept of urship in Education) sees a 'entrepreneurial-university' as –

 # a vision and a strategy: Meaning that how has a university transformed its vision and strategy to place enterprise, entrepreneurship and innovation at the heart of the organization?

 # a culture and a mindset: Meaning that how has a university stimulated an environment that supports entrepreneurial mindsets both in its employees and students.

 # an entrepreneurial Impact: means that how have the university's efforts affected the nature of entrepreneurial activities among staff, students and alumni and stimulated a strong entrepreneurial impact locally, nationally and internationally?

 # a policy and practice: have the university's experiences and activities influenced policy at all levels and clearly demonstrated good practice and effectiveness?

The Quest of turning into an entrepreneurial entity and a hub for knowledge (technology) transfer by IIT, Mumbai:

As we can see, the IIT, Mumbai, being a high caliber premier institution, foresees its role in furthering the national interest by securing India's position in the concurrent global economics amidst augmenting industrial production with practicing innovation and ensuring (economic) growth by scientific and technical education as its core tool. scientific and technical education as it `core tool.

It was pertinent for the IIT, Mumbai to explore its aforesaid role because being an academic institution, it keeps a system which is obviously engaged in generation of new knowledge and be able to ensure an appropriate stream of benefits for the 'investors'.

Government's policy approach, as a facilitator for the entrepreneurial journey of IIT, Mumbai:

A silver-line for becoming a Innovation-Driven-Economy: with the churning of a continuing national debate, the writing on the wall was clear that the country can get its due position in global fraternity, if it becomes a knowledge superpower. Thereby a common understanding emerged that it could only be possible by holding scientific institutions responsible for generating the Intellectual Property (IP) and its subsequent commercialization in order to create jobs and wealth.

Some pertinent policy interventions by the government in the form of promulgation of some acts from time to time are worth mentioning here. Their motives were –

1. To increase the creativity
2. To create the Intellectual Property (IP)
3. Protection of the IP
4. To set a standard Incentive mechanism to benefit inventors in institutions of higher education
5. To Abide by the provisions of WHO's TRIPS (Agreement on Trade Related aspects of IP rights)

A simultaneous effort was there to ensure –

1. The availability of venture funding for commercialization of promising research.
2. The configuration of 'National Development Board' in 1980.

The background behind the entrepreneurial agenda of IIT, Mumbai:

We should not forget that IIT Mumbai came into existence as a result of some well thought national science policies only. Its subsequent course of directions and actions were an obvious coincidence with these government policies. They were-

I. **Scientific Policy Resolution (1958):** In this the emphasis was upon -
   a) Establishment of Higher technical Education Institutions for creating ample technical HR
   b) Supply of researchers and research guides

II. **Technology Policy Statement (1983):** it was aimed for-
   a) Emphasis on Research and Development
   b) Joining the educational institutions with R&D establishments (Govt. & Pvt. sector labs)
   c) Speedy technological / industrial development

III. **Science & Technology Policy (2003):** which aimed for -
   a) Establishment of a national innovation system instilled in the country's academic infrastructure.
   b) Technology Transfer offices in universities to make them having an entrepreneurial posture.
   c) Investment by industry in education and R&D to commercialize the knowledge creation and transfer processes.

This was the burgeoning trend of knowledge creation and transfer in Indian academic institutions, under which influence, the government came with another legal intervention and provisions are made that any Indian public education and / or research institution can keep the equity on spin off companies that it nurtures.

Subsequently, as a new means of Technology Transfer, the incubation centers were established by I.I.Ts, I.I.Sc. and C.S.I.R. to facilitate fully equipped infrastructure and enabling guiding mechanism after the aforesaid legal provision in 2009.

So as on 2009, the general scenario for the concept of entrepreneurial university and its crucial attribute, the process of technology transfer, in the country, has the following figures:

1) Science & Technology Parks as Technology transfer hubs: 15
2) Nurturing companies therein 788
3) Providing employments (in no of person) 5000+
4) Turnover (in Cr. Rs.) 130

The Entrepreneurial Journey by IIT, Mumbai:

First Phase:

Technology transfer in IIT, Mumbai got its first seed sown in the form of encouraging consultancy services comprising of its experienced faculty and inquisitive research scholars. The first set of administrative rules was laid by IIT, Mumbai in 1964, an apex administrative position of Dean (R&D) was created and a vibrant Industrial Research and Consultancy Centre (IRCC) was established in 1975. This trend and institutional initiatives augmented and intensified the industry-academia interaction and resulting into more number of industry driven projects as the outcome.

In this first phase, the IIT, Mumbai was engaged the technology transfer thoroughly in publication of more number of research papers. As far as IP creation, it was limited to filing the application for patents. In this while 11 applications were filed, 3 patents were approved, none, however, of them were commercialized and therefore the 'license-money' generated was nil. However the consultancy services had started giving fruits in the form of earning of Rs. 5.74 Cr. as consultancy receipt in the year 2000-01.

As far as the real entrepreneurial function, the technology transfer, there was no IPR policy in place and the rare licensing decisions were taken on case to case basis.

With respect to the facilitating services available within the IIT, Mumbai, though the core activity so far was the industry driven projects to provide industrial solutions and other advisory services, the legal set-up to safeguard the interests of inventor, was 'part-time' and was functional on the case to case basis in research-agreement preparation, patent application and technology-transfer agreement preparation etc.

Second Phase:

The technology creation activity, in an institution like IIT, Mumbai, has an evolutionary character which involves a benchmark as to how many of new students are inclined towards research and make the technology generation as their career-priority.

There is a phenomenal change in the character of the institution itself when a sizable part of its students' intake aspire to become researchers and be a part of fast-growing setup came into being for 'technology-generation' within the IIT-Mumbai. This was the reason why the IIT, Mumbai saw a sharp increase in its IPR activities in the form of more of its research & development interactions (with the industries) and much more number of Ph.D. teachers and student-scholars.

It was not a coincidence that all the aspirations at IIT, Mumbai was running just in parallel with the paradigm changes in government policies in general and Science & Technology Policy 2003 of GOI in particular. This dynamics paved the way for the establishment of 'Intellectual Property Management System' (IPMS) subsequently at IIT, Mumbai.

In the same phase, since the consultancy services extended by IIT, Mumbai got qualitatively better and quantitatively more, there was a felt need of revision of technological consultancy practice rules and regulations in favour of their providers.

This apart, another attributive change in the ambient of IIT, Mumbai was the centrality of "innovation" in its policies. Consequently, innovation was instilled in to product, processes and services and was inducted for the betterment of public at large. This was reflected in the entrepreneurial dynamics of IIT, Mumbai notably as well.

Obviously the level of research and its application-oriented dispensation had got a spurt and thus it was necessary for the management at IIT, Mumbai, to consolidate the human resource with its IRCC, so that a managerial assistance can be provided to the engaged researchers therein.

Another notable development of this phase was the establishment of Intellectual Property Management System (IPMS) at IRCC. It has some very crucial tasks based on its expertise viz.:

1. Identify and collection of Intellectual Property generated in its earliest possible phase. This was important for keeping the sanctity and security of the researcher's interests. Later it became a USP (Unique Selling Proposition) in the form of the credibility of a safe and professionally managed place for knowledge creation. This is easily reflected in its still burgeoning number of intake of research scholars as core technology-creators.
2. Handling the complexity of filing the customized I.P. application
3. Identifying the potential and the nature of licenses
4. Safeguarding and maintenance of a license and protecting all the financial rights involving the royalty of all the stakeholders judiciously so that everyone gets his / her / it's due share.
5. Preparation and execution of license agreements
6. Administering the license-money between the scientist and the institution (IIT-Mumbai) in pre-decided proportion i.e. Scientist : IIT-M :: 70 : 30

Soon, keeping in view the huge number of scientists / research-scholars, engaged in technology creation, there was a felt need to educate all of them as a community. Consequently an I.P.R. cell was came into existence in 2004, with a responsibility of dissemination of information about I.P.R. and its processes to the research-community.

In the same year of 2004, at the behest of the government's Science & Technology policy statement – 2003, the crucial technology incubation center was set-up.

Further, in the same year, the famous 'Society for Innovation and Entrepreneurship' (SINE) was set-up as per the country-wide directives and support of Science & Technology

Department of Government of India. This society was functional in arranging the 'seed-money' or soft-loans etc. for a budding entrepreneur.

Entrepreneurial Ecology:

By the year 2005-06, the entrepreneurial spirit within the folds of IIT-Mumbai had come of its age. One prominent development in this course was the ample supply of the research-personnel that typified the image of IIT-Mumbai into a research-community in its literal sense. They joined the caravan by way of –

- Sponsored research projects
- Contract research (consultancy jobs)
- Development projects
- Sponsorship of specialized research-labs
- Research consortia
- Doctoral research fellowships
- Targeted technical training of industries' personnel
- Advisory role in companies' boards

Performance Fact-sheet in 2005-06:

- Number of I.P. filed 16
- Number of I.P. granted 7
- Number of I.P. commercialized 4
- License-money accrued Rs. 13.8 Lakhs
- Earning through consultancy Rs. 12 Cr.

Third Phase:

By the year 2010-11, IIT-Mumbai had demarcated as its core research areas having a proven authority been recognized as a research-hub in specific research streams viz.:

1) Nano-electronics and nano-technologies
2) Solar Thermal Technology and photo-voltics
3) Information-technology

By this time, the IIT-Mumbai has grown into a fraternity of over 500 faculties, 1800 Ph.D. students, 2280 postgraduate and 3500 undergraduate students of which almost everyone was connected with the technology creation and dispensation.

It had now earned over 420 sponsored projects and 550 consultancy projects in its basket with an accumulated budget of Rs. 180 cr.

By simplification of 'Invention-Disclosure-format' and 'patent-filing', there was a notable spurt in the number of I.P. application filings to 88 of which 18 granted the patents.

By this time, the IIT-Mumbai had embarked upon identifying itself with an apt I.P. culture along with a professionally managed and flawless commercialization. IIT-Mumbai started boasting upon its proven caliber of a 'competitive I.P. assessment', a mature and seasoned 'I.P. valuation' and a professionally managed and multi-faceted commercialization of I.P. through –

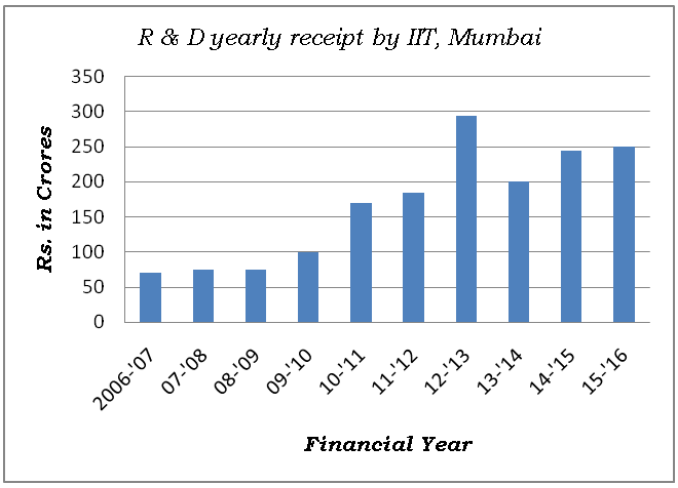
- Licensing
- Spin-off companies
- Joint venture companies
- Joint development and collaborative research projects.

Third Phase:

If we conduct a stock taking of this entrepreneurial evolution at IIT-Mumbai on the year 2015-16, we find an intense growth in the attribute of maturity in its concerned endeavour. The following description is self explanatory:

On 2015-16, if we take an overview of the Research & Development yearly receipts accrued in the bygone decade, we find a almost consistent compound annual growth rate (CAGR) of 37% in it. The revenue earned from R&D at IIT-Mumbai in the year 2015-16 has been Rs. 252 Cr.

The concerned growth is depicted as under-



Source: IIT-Bombay Annual Report 2015-16

In the year 2015-16, the research and development projects were run in all the major disciplines relevant for the IIT-Mumbai including Engineering and technology, science, social science and management. Majority of them were ranging of the duration of 3 to 5 years.The projects initiated in the last 3 years were as under-

	Sponsored Projects		Consultancy Projects	
Year	Number	Sanctioned outlay (Rs. In Crores)	Number	Project Outlay (Rs. In Crores)
2013-14	225	285.2	523	35.2
2014-15	294	165.25	513	32.2
2015-16	261	255.5	529	39.3

Source: IIT-Bombay Annual Report 2015-16

These research projects were from the worth range of one and a lakh to as much as of Rs. 83 Cr.

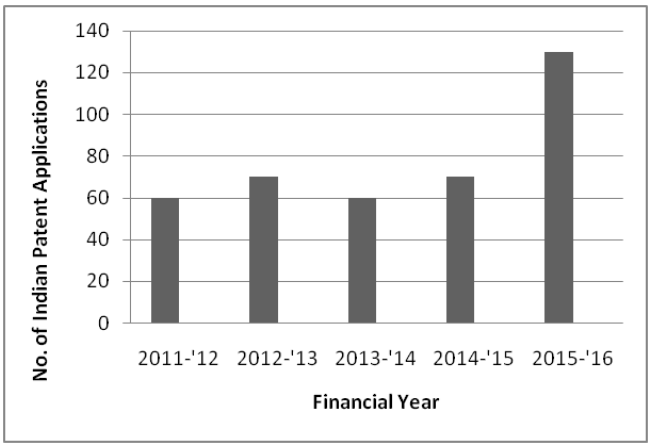
However, this good growth in research & development revenue has been sourced mainly (71%) from the government agencies, while 20% contribution was from Industry and rest was from the miscellaneous sources.

With respect of international research interaction, the IIT-Mumbai transacted with various government and non-government agencies of countries across the globe, viz. Belgium, Finland, France, Sweden, Switzerland, Netherlands, Norway, Germany, United Kingdom, Spain, South Africa, South Korea, Japan, Netherlands and United States.

Technology Transfer & Licensing:

I.P.R. activities:

During the year 2015-16, total number of patent applications filed was 128. If we overview the track record for the last 5 years of this exercise in the IIT-Mumbai, we find that there is again an almost consistent growth in this-



Source: IIT-Bombay Annual Report 2015-16

An international review envisages a clear spurt in the representative criterion which signifies the spirit of technology creation typifying the new (young) India of the year 2015-16. The following figurative depiction of applications filed in many relevant countries for registration, is self explanatory-

Patent application filed in the year 2015-16 was 128 in India and with respect to the Trademarks and Design related activities were 8 in number -

Territory	No. of Applications
PATENTS	
Indian	**128**
PCT (Patent Coop Treaty)	**6**
US	**5**
EU & Brazil	**4**
TRADEMARKS & DESIGN	
Indian	**8**

Source: IIT-Bombay Annual Report 2015-16

Conclusion:

It is clearly visible that in the first phase when government came with its very first policy paper in 1958 having to reorient it's science and technology policy to establish high technology institutions of national repute in course to create more number of scientists and research manpower, Indian Institute of technology came into existence.

Further, when in 1983, the second national policy statement was declared by the government to conjunct the research-endeavours of high technical education institutions with the interests of industries for its commercial exploitations. However, it seems that IIT-Mumbai, had had embarked upon working on the same turf much before 1983. This makes us think that though the very first policy paper on science and technology-1958 paved the way for the establishment of IIT-Mumbai, soon this institution started posturing the technology leadership in deciding the concerned national agenda. For example, much before 1983, IIT-Mumbai had established the office of Dean (Research& Development) in 1964 and the coveted Industrial Research and Consultancy IRCC was established in 1975. The success of these institutions of IIT-Mumbai set forth a reason for Government of India to set the said S&T policy declaration in 1983.

Similarly, much before 2004, when a National Technology Policy was framed to implant a value of a popular inspiration for creating the IPR and consolidating upon the Technology-Transfer process and fitting personnel to carry it out, the dynamic Intellectual Property Management (IPMS)was established within the functional ambit of IRCC within this institution. In other words, this institution, after a brief period from its establishment, the IIT-Mumbai had worn it's obvious responsibility for an institution having technology-leadership even for setting a concerned national agenda thereon.

This indicates the entrepreneurial leader's attribute worn by IIT-Mumbai soon after its establishment.

ROAD MAP FOR Technical Education Centers in Marathwada:-

Entrepreneurial journey of IIT-Mumbai could be a great learning case for starting and getting success in course of transforming it's image and the type of its output by a higher technical education institution of a backward region e.g. of Marathwada.

Following is a description of some of the crucial attributes needed for the transformation of such an institution. These attributes are not mutually exclusive to each other. It is important to note here that these attributes are the evolutionary building-blocks. The maturity of one stage has become the prelude of the other.

Since it's inception in 1958, the IIT-Mumbai had covered it's journey of growth based on certain in-built attributes and stages viz.

1) Evolutionary character:

As we can see that in the case of IIT-Mumbai, ithas a flow of growth areas which, in itself is a chain of stages viz. taking lead in creating technical manpower to the next stage where the more of the scientists are pursing researches and from there to the one where creation of more and more IPR was appreciated and became the benchmark for assessing the quality of its entrepreneurial development.

So without doubt, it is established that the nature of this institutional development, in fact, is evolutionary

2) Leadership:

There is another attribute which is it's leadership quality. IIT-Mumbai takes lead whenever it is required, whether it is creating more technical research manpower, as per the govt's Technology Policy Statement of 1983' or steps to develop create more intellectual properties and exploit the commercially in parallel with the 'Science & Technology Policy 2004'etc. This proves the exemplary character of leadership in it's growth.

The higher technical education institutions of a region such as Marathwada must not leave any stone unturned to play as a regional leader in encouraging researches for the local industrial and economic growth and become an industrial research hub. It can further be evolved into a multi-player entrepreneurial competition within the region having their own entrepreneurial-academic specialization fields for industry-specific research projects for generating IPRs.

This is the very first stage, at which the higher technical educational institutions based in Marathwada, must take a cue from IIT-MUMBAI to embark upon their entrepreneurial journey. It is undisputedly established fact that such institutions have crucially significant role here to play to embark upon an entrepreneurial-academic culture and expedite the overall growth including the economic one.

3) Techno entrepreneurial ambience encouraging IPR creation and its commercial exploitation. …and

4) Narrowly focused academic and research endeavours. (Specific subject areas e.g. nano technology w.r.t. IIT-MUMBAI)

The above two stages were passed by IIT-Mumbai one, after the other. In the first instance, they crafted a conducive ambience to nurture the lucrative common-opinion and respect for IPR creation and it's subsequent commercial exploitation. After this said was accomplished, the second evolutionary phase was embarked upon for going into vertically focused subject-areas with depth of an academic-research capability to create industry and society specific knowledge.

Currently the institutions in Marathwada are not compelled to take the above steps chronologically exclusive to each other. They should plan to undergo the above two stages simultaneously in which firstly, a conducive system and ambience is created and maintained in their organizational setups. The tertiary research professionals with proven academic track records should be inducted as senior faculty to pursue the research projects.

5) Development and induction of professional personnel with specialized expertise in ancillary supportive activities for knowledge creation and commercialization.

Institutional entrepreneurial character demands specific organizational reformation of priorities, policies and personnel. Research-scholars is a highly focused community which has in-depth vertical knowledge of a specific area and the functional expertise of knowledge-business cannot be expected from them. If an institution resolves for its entrepreneurial-transformation, then they are expected to equip with ancillary supportive setup with needed expertise. A quality setup with an efficient system along with professionally qualified personnel hierarchy is needed. The core-expertise areas of these personnel are facilitating, early-recognition of an IPR-in-making, nurturing, assessing, reinforcing, securing and commercializing with adequate business sense etc.

Another key factor of the last step is to establish and maintain a high level of credibility for a just and transparent incentive-mechanism for sharing the royalty / equity on such a created knowledge. The sharing and payment of the monetary-value of such a commercialized knowledge among it's all stake-holders including the researcher and the host-institution must be fair, simultaneous and transparent. Any ambiguity in such transactions and functional-opacity may be of a far-reaching adverse effect on the said credibility. Establishment and maintenance of such a consistently reliable and transparent' profit sharing mechanism' and the 'reimbursement-practices' therein, on the other hand, be commercial tools for marketing and positioning of such an institution in the communities of creators and users of a promising intellectual property.

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