

Institutionalizing Entrepreneurship in Higher Technical Education to Accelerate Innovations and Research and Development



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In India every year lakhs of students pass out as engineering graduates, attempting lakhs of academic projects. Even if 10 percent of these students' projects could be converted to industry or society useful products, it can greatly change the innovation, employment and entrepreneurial landscape of the nation for the better. This consideration also gives rise to a novel strategy for integrating entrepreneurial education with engineering curriculums. This paper proposes a novel strategy for institutionalizing entrepreneurship education in engineering institutions, based on kindling and nurturing entrepreneurial aspirations into students, starting with well documented cases studies of two greatly successful beginning steps in this direction, making the proposed scheme look quite promising.

Keywords: Final Year Projects, Major Projects, Project idea, Marketable Product, Entrepreneurial Project, Engineering Academic Institutions

1. Introduction

Nearly 8 lakh students graduate each year in India, with either a UG or a PG degree in engineering/technology (AICTE Dashboard). All of these students have to work for a major project during their final year or final semesters, which usually is a mandatory academic requirement of such UG/PG programs. Quite a good number of students carry out excellent projects putting in a lot of hard work. However, we do not have an effective mechanism, to convert even the successfully attempted ideas into industry or society useful products, causing a huge drain of the precious work done by the very students and their guiding faculties year after year. Also, nearly 50 percent or more engineers remain unemployed for a long time, after graduation. Many amongst the unemployed are also those graduates, who have successfully attempted and even demonstrated good final year major projects.

India also has nearly 633 lakh unincorporated non-agriculture MSMEs, which includes 68.25 lakh registered industries (MSME Annual Report 2018-19). A majority of these industries can indeed benefit from such academic projects, relevant to their area of activities. These observations suggest that if there is some reasonably good mechanism, which can convert some of the good, well attempted academic projects into industry or socially relevant products, then it can not only result in a good large scale entrepreneurship promotion and employment generation, it can also greatly benefit to so many industries.

A step in the direction of developing such a mechanism can be through making students get some good idea about how industries work during their academic programs, also introducing them with a small number of entrepreneurship development subjects and kindling in them the entrepreneurial aspirations and encouraging them to look at their final year major projects not just as their academic projects, but also as their beginning entrepreneurial endeavours.

2. The Problem under Observation: A Look at Three Disturbing Situations

2.1 Huge Unemployment amongst Engineering Graduates

India has more than 3300-degree engineering institutions. Nearly 8 lakh students pass out each year completing their UG and PG degree courses (AICTE dashboard). The table-1, shows as a quick glance the intake, pass-out and placed students' data made available at the AICTE's dashboard. In the table, the data within brackets corresponds only to PG students.

Table 1 Engineering Students' Data for the Academic Year 2016-17 and 2017-18.

Sr. No.	Parameter	UG + PG Engineering and Technology 2016-17	UG + PG Engineering and Technology 2017-18
1	Total Number of Institutions	3393	3326
2	Intake	8,54,899 (69399)	8,19,016 (68696)
3	Faculties	4,54,406	3,63,744
4	Passed	8,67,850 (70477)	7,83,684 (55421)
5	Placed	3,82,839	3,58,718
6	(Placed / Passed) %	44.11 (27.37)	45.77 (28.36)

There is one important and disturbing observation from this table - that only about 45 percent of the pass out students get campus placement at overall UG + PG levels. Which means about 55 percent - a very large part of students remain

unemployed for quite some-time. Considering the data of PG students alone, the unemployment percentage becomes far higher, nearly 72 percent.

2.2 A Huge Drain of Quality Academic Work in the form of Final Year Engineering Students' Major Projects

At nearly all UG and PG engineering degree courses, students have to undertake a major project, usually at final semester or at final year of the program. Taking the number of students per one project-group to be four at UG, and to be one at PG programs- the total number of projects attempted by the students are at least 2 lakhs per year. Not only students but even faculties guiding them, put in great efforts for such projects. It is sad to note that not even one percent of such projects become market ready products, not because such projects did not have the potential, but because there is no mechanism in place to productively use such an academic work, making all the efforts behind such projects just be a learning exercise.

2.3 A Large Number of MSME's which Can Benefit from Good Work of Students' Major Projects

India has 633 lakh unincorporated non-agriculture MSMEs, including 68.25 lakh registered industry units, till the end of December, 2018 (MSME Annual Report 2018-2019). Out of this, the estimated number of micro sector alone is more than 630 lakh making it more than 99 percent of the total number. A good part of the micro level industries usually do not have good infrastructure, resources and funds needed for good Research and Development.

Defining the Research Problem

Emphasizing the Need for Integrating Entrepreneurship Education with Engineering Education

The situation so described in the earlier section makes it compelling for us to know, if there is any such mechanism or solution available already. Traditionally there are Entrepreneurship Cells at quite many good academic institutions. Few such cells and lists are given in Reference Section of the paper. Many of the entrepreneurship cells also have incubation centres where a prospective entrepreneur would incubate his/her product. However, if the total number of students making use of such of such excellent facilities are to be judged, it is a very small fraction of number of graduating engineers. The reason for it is that as most graduates have never been exposed to even basic courses in entrepreneurship, and hence do not have the necessary entrepreneurial confidence. At times, students after their graduation come back to the institutions running such incubation centres, once they have some good product idea and some entrepreneurial confidence, mainly derived from the promise of the success of their technological idea. Another desirable factor presently missing at such cells is that there is no structured program leading to Degree or Diploma in Entrepreneurship integrated with the product under incubation, barring few exceptions. Summarizing, the reasons why most students are unable to take advantage of good facilities and schemes:

- Lack of Entrepreneurial understanding and confidence, keeping most students away from taking advantage of such options.
- Very little exposure to how successful industries work till a graduate himself works in an industry.
- Time gap between graduation and taking up entrepreneurial project for incubation.
- The risk associated with possible failure of the entrepreneurial idea, gradually becoming higher with the time-gap, as with increasing age of the candidate his/her family and social responsibilities keep increasing, making the candidate look for relatively stable and safer options, even if they are less rewarding.

This situation can be greatly improved if right at the engineering colleges itself, students are inspired towards entrepreneurship through few basic courses in such areas integrated in the engineering curriculums and are also encouraged to look at their engineering technological projects aiming to solve some industrial or social problems as their trial entrepreneurial endeavours by providing basic incubation facilities (Rehman Anisur, Yasir Arafat Elahi, 2012). It can be even better, if there are additional add-on degree/diploma courses in entrepreneurship management, offered by the engineering colleges which formally train aspiring students to become entrepreneurs over their live products under incubation. This can be quite a promising scheme, which needs to field tested for few trial runs. If such an experiment at engineering academic institutes proves a success, it would result in developing a good eco-system, which will produce quality entrepreneurs, year after year, who will hopefully turn many of their final year major projects into industrially or socially relevant products. For a country like India, such a development can answer problems like unemployment and poverty (Dwiwedi 2013) (Basu 2014). It can also greatly improve comfort and safety standards of the people and uplift economy (Panigrahi Ashok, JoshiVijay. 2016). In next sections a relatively simple and synergic scheme is discussed which will hopefully make the proposed task look much easier to attempt.

3. Literature Review

Good discussion is available emphasizing the importance and justification for of institutionalising entrepreneurial education as well as suggesting strategies with their possible strengths in the literature.

There is one thing that is apparently common across all the literature, and it is that the entrepreneurship, without doubt is considered as a driver for wealth and wellbeing of the society. Colin Jones and Jack English (2004), suggests a framework for finding and examining opportunities, commercialising a concept, developing an entry and a business plan, finding capital for starting and developing the business and harvesting strategies. It is a teaching strategy modelled on the entrepreneurial process itself. Slinger Jansen, Tommy van de Zande, Sjaak Brinkkemper, Erik Stam and Vasudeva Varma (2015) note that the academic entrepreneurship is fast becoming a priority for policymakers from within the universities as well as local

governments, and observe that an academic strategy providing opportunity for education, stimulation and incubation on entrepreneur turns out be useful. Panigrahi Ashok, Joshi Vijay (2016). The authors stress the importance of entrepreneurship education towards economic development of a country. The importance of entrepreneurship education arises because of increasing unemployment and under employment in developing countries. The authors highlight that every year thousands of graduates are passing out from various institutions of our country and remain as literate unemployed because they lack the required skill as per the industry standard and ultimately become a burden for the society instead of economically contributing to the society and nation.

Abinash, Gupta Rajen K. (2014). The authors study the relevance of rigorous academic research with the needs of the industry, with special reference to the management research scenario in India. The central thesis of the argument is that the gap between rigour and relevance needs to be bridged to make academic research more relevant to business organizations and practitioners. Some suggestions are offered to enhance the relevance of academic research to practice. Todd Davey, Paul Hannon, Andy Penaluna (2016) observe that the development of entrepreneurship is increasingly recognized as part of a university's role. It is executed by academics in the form of academic entrepreneurship and by students in the form of student or graduate entrepreneurship, while acting entrepreneurially is increasingly required of all stakeholder groups in the university, giving rise to the concept of the entrepreneurial university. The authors also dwell on the role of universities in entrepreneurship and how universities should effectively execute the same, and insist that universities need to improve their focus and rigor in this area. Iliia Mihai Tauceana, Ana Gabriela Strautia, Monica Tiona (2018) try to define entrepreneurship and offer to suggest vision and mission statements for an entrepreneurial university. Panda

Rehman Anis ur, Yasir Arafat Elahi. (2012, October). The authors explain the evolution of entrepreneurship education in India. They discuss the importance and role of entrepreneurship in Indian economy, and discuss the challenges with regard to the role of educational programs and the delivery systems for disseminating these entrepreneurship education programs. The authors further try to explain the role of B-schools in shaping and nurturing of future entrepreneurs in India suggesting the steps that should be taken by B-schools towards promotion of entrepreneurship education. Dwivedi, A.K. and Tiwari, M. (2013) stress that Entrepreneurship development programmes can surely be the answer to problems of unemployment and poverty and a means to ensure Inclusive Growth in the country. The authors while suggesting the need to critically evaluate the outcome of efforts by the Entrepreneurship Development Institutions and their programs, offer strategies that are needed in order to create an environment conducive to entrepreneurship training and teaching, to develop institutional mechanism in S&T academic institutions to foster techno-entrepreneurship and entrepreneurial culture, for generation of wealth and employment by S&T persons.

Basu, R. (2014) while describing entrepreneurship education as one of the most influential forces that determine the health of the economy, emphasizes that the study of entrepreneurial aspects should be prerequisite for management education and research and hence the need to compulsorily initiate the entrepreneurship courses early in the curricula. She also elaborates on her study of obstacles in teaching entrepreneurship, particularly in India. Dianne H.B. Welsh and Mariana Dragusin (2013) present a thorough study on the use of MOOCs for offering entrepreneurial courses to students, their benefits and also overall implications. Manoj Kumar Mondal, Aashish Kumar, Bishnu Pada Bose (2015) offer a thorough study of using MOOCs particularly for entrepreneurship education, discussing its benefits as well as challenges. Aurik Gustomo and Astri Ghina (2017) stress on the concept of Entrepreneurial University and present a systematic methodology to build the same.

4. Research Methodology

An innovative and synergic scheme is discussed herewith to address the issues described in the beginning. The proposed scheme is also tried and tested for several years, on engineering students, on at least two of the ideas suggested in the scheme. To validate the possibility of success of the proposed scheme, feedback over the tried ideas and opinion over the new suggested ideas has been invited from recent past students and documented. The scheme to address the issues listed in the beginning is presented here.

4.1 Mandatory Industry Internships for Engineering Students

Although in principle all academicians emphasize that the industry internships are absolutely necessary, barring certain very good colleges, such an important exercise, so vital for the quality of technical education, is left to the students' choice, rather than making it mandatory. In our proposed solution, this is the first requirement to be satisfied by the institute. The industry-internships should be made mandatory for all engineering students, for the duration of 8 to 10 weeks. Students should be encouraged, motivated and made to undergo mandatory internships during the summer-vacations of 1st, 2nd and 3rd year of the engineering programs. Industry Internships greatly help students to see how the engineering knowledge is used in the industries and how industries work. Such Internships also greatly help in making students realize the importance of engineering studies and academic rigor. Industry Internship is an important step towards making a student be industry ready, and it is the first step towards making him/her see things not just from an academic angle, but also from an entrepreneurial angle.

4.2 Motivating Students to Undertake Courses on Entrepreneurship

Traditionally the role of engineering academic institutions has been to impart engineering knowledge and skill to conceive, design and manufacture engineering products i.e. to provide solutions to issues requiring technological interventions. The mission statements of nearly all engineering institutions stress on assuring best efforts on part of institutions to generate

manpower which could provide excellent technologically competitive solutions to industry problems and is also capable of generating new knowledge (Dianne H.B. Welsh, Mariana Dragusin. 2013) (Aurik Gustomo, Astri Ghina. 2017). Many good institutes indeed succeed in such efforts. However there is one important point which is usually not addressed by engineering and technology institutions: barring few exceptions, the technical graduates have never been trained to take up entrepreneurship (Ilie Mihai Tauceana, et al. 2018). A big difference in the innovations and R & D landscape can take place, if the students who are interested are provided exposure to a few basic subjects from the domain of entrepreneurship management, during their undergraduate program at an early stage and are encouraged to think as an entrepreneur and develop entrepreneurial aspirations.

Presently a good number of online MOOC programs are available, some of which have also been given equivalence to university courses, by Government of India Gazette. Encouraging students to take up MOOC courses in entrepreneurship management either as a part of regular UG curriculum or as recommended add-on courses, can make it much more convenient for the students to study and pass such subjects at their pace compared to the regular courses offered by the institution. Such MOOC courses can be a boon also to academic institutions, as the institutions will not be required to hire a large number of faculty for such courses – at least during the beginning few trial execution of the scheme, till such a scheme gathers further momentum, in the form of more interest from the students. (Manoj Kumar Mondal, Aashish Kumar, Bishnu Pada Bose, 2015)

4.3 Motivating Students to Take Up Projects at Final Year, which Address a Need of Industry or Society

Engineering students have to do a project, when they come to final year. As per the stated methodology, students reaching final year would have completed the industry internship and also would have passed a couple of basic courses in Entrepreneurship. It is important now on part of the academic institutions to motivate students to take up such a major project that would address the need of industry or society. In fact students should be motivated to start searching for such projects right from the time they undertake, industry internships. Doing so greatly increases the chances of the project work being actually useful to industry or society. Such a move greatly enhances confidence of the students as engineers and it is a good step also because it mildly starts inspiring students to become entrepreneurs.

4.4 Encouraging Students to Look at Their Final Year Major Projects as Their Beginning Entrepreneurial Endeavours

A big difference in the innovations and R & D landscape can take place, if the students are also encouraged to take up their final year major projects as their technical cum entrepreneurial projects and to develop a “proof of concept” prototype at the laboratory level (Panda Abinash, Gupta Rajen K, 2014). Although, during their final year of engineering, students will be more focused on completing the project from technological angle, even then their exposure to the entrepreneurial subjects will guide them well to be mindful about finer customer and market requirements.

4.5 Organizing Project Exhibitions and Competitions to give visibility and Encouragement to the Entrepreneurial Endeavours of the Students

Next step is to organize Project Exhibitions at academic institutes, where all students’ final year major projects are to be displayed. Such project–exhibitions are open to all visitors from neighbouring industries and all students and faculties of the neighbouring colleges. The purpose of such exhibitions primarily is to make the MSME industry know capabilities and the good projects done by the students so that they may seek collaboration with academic institutes over projects of their interest for taking such projects to market. At such project expo’s all final year projects are to be displayed, and projects having very high entrepreneurial promise are to be shortlisted.

Now, such shortlisted projects are needed to be incentivised. One such well researched possible way to incentivise such shortlisted project groups is to provide them free and incentivised admission to a Post Graduate Diploma Course in the Technology Entrepreneurship Management – which as is described in the next point, should be offered by all engineering institutions under this methodology. Such students groups should be offered as incentives, additional entrepreneurial promotion assistance as is provided by some of the very good schemes of the Government, one such by Government of Gujarat is described in the next paragraphs.

4.6 Engineering Institutions to Develop Incubation Laboratories and offer a One Year Post Graduate Diploma in Technology Entrepreneurship Management

A next important step to go further in the proposed direction can be to have a one year Post Graduate Diploma in Technology Entrepreneurship Management at interested engineering academic institutes. Here there are two important considerations: Theory and Project. As discussed earlier, with the availability and use of many good quality online MOOCs, the theory part can be managed with fewer coordinating faculties. Faculties from management institutes and established entrepreneurs can be requested as visiting faculties. The Project part will require incubation laboratories. This will usually be in the form of additional lab space, with some equipment as needed by the projects under incubation. These requirements are not too taxing, and the benefit of this arrangement in the engineering colleges is that the same faculties who acted as guides during the BE projects can continue to be mentors of the projects under incubation. (Slinger Jansen, Tommy van de Zande, 2015). In the initial phases some guiding help can be sought from certain established centres (IIT Bombay, IIT Gandhinagar), which already offer such courses.

Students groups which have been shortlisted during Project Exhibitions should be offered free admission to such a course, with additional entrepreneurial promotion assistance, with a requirement to prepare a market ready prototype of their shortlisted final year project, and also take up and pass certain additional courses under Entrepreneurship management in one year (time extensions can be considered). Such a course should also be open for other students group who would have done fairly well at their final year project and are serious to make it as their beginning entrepreneurial project, even without any financial assistance or fee waiver. A start-up and entrepreneurial promotion schemes offered by Government of Gujarat is discussed in the next paragraph, can be made applicable to the candidates of PGD-EMs to make the entrepreneurship option even more attractive to interested students.

4.7 Incentivising Shortlisted Project Students: Making the benefits of Entrepreneurship Promotion Schemes by State or Central Governments be available to Shortlisted Project Groups

Many good State or Central Government schemes are available to promote entrepreneurship. A good summary is available at (Dwivedi, A.K. and Tiwari, M. 2013). One such scheme by the Industries & Mines Department of Government of Gujarat, Government Resolution No. MIS-102014-924909-I, for assistance to Start Ups/Innovation, provides following financial funding to budding start-ups:

- 4.7.1 The assistance for raw material usage/Product Development/machinery usage up-to Rs. 10.00 lakh, to be made available through the nodal institutions – with which the candidates have registered their entrepreneurial project for technical incubation.
- 4.7.2 Sustenance Allowance of Rs. 10,000/- per month to be paid to the project/start-up.
- 4.7.3 Marketing/publicity assistance of up to Rs. 10.00 lakh for the introduction of innovated product in the market.
- 4.7.4 The scheme also has a provision of up to Rs. 5 lakh assistance to the nodal institution for mentoring service.

Efforts can be made with Governments, at policy drafting level, to channelize such funding not just for encouraging start-ups but also for encouraging engineering graduates complete the (start-up) project with a certain number of entrepreneurial courses, to earn the PGD-TEM diploma.

5. Feedback and Opinion Survey Collected from Passed out Students of Last Three to Five Years

A live feedback and opinion survey from the past engineering students of a reputed engineering college in Gujarat is presented in this section. At this college, students have to undertake mandatory industry internships. Here students are strongly encouraged to take up industry internships. Also the college organizes Project Exhibition every year, where final year students have to mandatorily display their major projects. About 150 pass out graduated students were contacted and requested to provide their feedback and opinion through Google forms. Responses from nearly 20 to 25 percent of them have been received. A summary of their feedback is presented in a tabular form, in table 2. As can be seen, the results are highly encouraging and reassuring our faith that the proposed scheme will prove successful.

Table 2 Role of Mandatory Participation at Project Expo Exercise

	Total 37 Responses On following Queries:	Yes, very much in	Yes, to a good extent	Yes, but only to some extent in %	No in
1	In motivating students to do a better quality final year major project.	40.5	43.2	13.5	2.7
2	In motivating students to take up industry useful project.	40.5	40.5	16.2	2.1
3	Motivation for industry internships.	43.2	35.1	10.8	10.8
4	In nurturing entrepreneurial aspirations.	27	35.1	27	10.8
5	Inspiring junior students to take up good projects.	37.8	35.1	27	00
6	Enhancing academic environment of the college.	43.2	43.2	13.5	00

Table 3 Role of Mandatory Industry Internships

	Total 32 Responses On following Queries:	Yes, very much in	Yes, to a good extent	Yes, but only to some extent in %	No in %
1	For industry application of subjects and knowledge.	68.75	18.75	6.25	6.25
2	In deciding final year project definition.	56.25	31.25	12.5	0
3	In deciding industry relevant final year project definition.	56.25	34.37	9.4	0

Table 4 Opinion Survey over the Success of the Proposed Scheme

Total 37 Responses On following Queries:		Yes, very much in %	Yes, to a good extent in %	Yes, but only to some extent in %	No in %
1	At any stage of doing your project did you ever think, that if you had some basic understanding of entrepreneurship, you would have tried to give an entrepreneurial angle to your final year project?	45.95	24.32	18.91	10.81
2	In your opinion, if a student is introduced to about two entrepreneurship subjects (say from NPTEL MOOCs) during first three years, then will he / she be keen to take up -as a trial- his final year project as a technology cum entrepreneurial project?	35.13	35.13	18.91	10.81
3	At the time of Project Expo, if best projects are shortlisted based on their entrepreneurial promise, and are given some seed money (@ 1 lakh) and monthly stipend (@ Rs. 10K per month), to make the same project market ready, within one extra year of their graduation, then how many will like to take that offer?	43.24	35.13	18.91	2.7
4	Do you think, that the chances of students taking up the above mentioned opportunity will increase, if they are also asked to complete few entrepreneurship subjects, along with completing the project, in one year (or two years- for those who request for more time), with seed money (@ 1 lakh) and stipend for one year (@ Rs. 10K per month), and in the process earn a Diploma in Entrepreneurship Management?	51.35	24.32	21.62	2.7
5	If you had such (a) scheme/s during your time of study, would you have considered giving entrepreneurship a try?	40.54	27.02	29.72	2.7

Following inference can be deduced from the feedback of students, as described further.

5.1 Inference Based on feedback on Industry Internships (adding first two columns)

- Students are actually finding industry internships quite useful to see the industrial applications of the knowledge gained, as conveyed by more than 86 percent respondents.
- Students have found industry internships quite useful for deciding the final year project definition, as conveyed by more than 87 percent respondents.
- Students have found industry internships quite useful for deciding industry useful final year project definition, as conveyed by more than 90 percent respondents.

5.2 Inference Based on feedback on Project Exhibition (Project Expo) exercise (adding first two columns)

- Project Expo exercise has been helpful in motivating students to better quality final year project, as conveyed by more than 83 percent respondents.
- Project Expo exercise has been helpful in motivating students to take up industry useful final year projects, as conveyed by more than 80 percent respondents.
- Project Expo exercise has been helpful in motivating students to take industry internships (inspiring junior students), as conveyed by more than 78 percent respondents.
- Project Expo exercise has been helpful in motivating students to consider entrepreneurship option, as conveyed by more than 62 percent respondents.
- Project Expo exercise has been helpful in enhancing academic environment of the college, as conveyed by more than 86 percent respondents.

5.3 Inference Based on Opinion Survey from Students (adding first two columns)

- More than 70 percent respondents conveyed that if they had some basic understanding of entrepreneurship, then they would have tried to give an entrepreneurial angle to their final year project.
- More than 70 percent respondents conveyed that, if a student is introduced to about two entrepreneurship subjects (say from NPTEL MOOCs) during first three years of their four year graduate program, then will he / she can be keen to take up -as a trial- his final year project as a technology cum entrepreneurial project.

- More than 78 percent respondents conveyed that, during Project Expo, if best projects are shortlisted based on their entrepreneurial promise, and are given some seed money (@ 1 lakh) and monthly stipend (@ Rs. 10K per month), to make the same project market ready, then a good number of students would like to consider that option.
- More than 75 percent respondents conveyed that the chances of students taking up the above mentioned opportunity will increase, if they are also asked to complete few entrepreneurship subjects, along with completing the project, in one year (or two years- for those who request for more time).
- More than 67 percent respondents conveyed that if such schemes existed during their engineering study tenure, then they would have given a good consideration to giving entrepreneurship a try.

It can be seen that the results of the feedback over Industry Internships and Project Expo have been excellent. In the opinion survey also past students have found the proposed concept quite attractive.

6. Conclusions

Based on the strategy presented and based on students' feedback and survey, it can be easily concluded that:

1. Industry internships are greatly helpful in engineering studies, in knowing how industry works and for gaining self-confidence, as also confirmed by students.
2. The engineering students can be motivated to take up few subjects in entrepreneurship.
3. The engineering students can be motivated to take up their final year project as a technology cum entrepreneurial project at least as a (safe) trial.
4. If properly incentivised, the shortlisted project students can take up a one year PGD-EM wherein they would complete the product, based on their (shortlisted) final year major project of BE/BTech studies.
5. The students passing out such a PGD-EM diploma course, would be confident entrepreneurs, they would have eventually (even if some time extension was asked by them) convert their good final year project in to a good product, thereby saving the drain that would have occurred in the form of work done on their engineering major project, which would have been terminated at just being a good academic exercise. Many of these products would obviously be useful to industry or society.

If seen carefully, the last statement answers all the three disturbing issues that were being addressed. It may be noted that in the process all the students will earn a great degree of self-confidence of at least trying a good project useful to the society or industry or nation. It should be noted however that in order to make this scheme a success, Governments (State or Central) will have to support engineering academic institutes to start such PGD-EM's with all the incubation and (minimum) necessary faculty support and with some basic incentives to the deserving candidates.

It can also be seen that the proposed scheme not only can be a good scheme "Institutionalizing" entrepreneurship with engineering curriculums, it actually offers a great "Built-In" benefit, and quite some motivation to try the same as soon as can be possible. It is indeed hoped that such a scheme will be considered for a decent trial, and hopefully for actual implementation, as a model framework, even with all the necessary refinements.

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