

Enhancing Employability, Innovation, Entrepreneurship And Creativity In Changing World.

Institutions can do better. They need world class visions and missions, a spirit To compete on innovation
Education charged with a spirit of innovation, entrepreneurship, discovery and creativity alone can move a nation forward.
Future belongs to those who understand this.

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Abstract Enabling students to learn Innovation in colleges and creating innovative leaders and not only followers is the only pathway to enhance employability and prosperity. Innovative persons never remain idle or jobless. They are always in demand. This is the global experience. Those who realize will win. Others may have all the resources at hand yet they may lose. Tsunami changes are in the offing. Those who learn surfing will stay on the top. What does the future look like for higher education institutions? Will the architecture look like it does today or is there a far more effective model for addressing current problems? You will find answers in this article.

Introduction

The conventional wisdom in higher education which once served well is no fit for today and tomorrow. Time demands revolutionary changes to promote innovation and entrepreneurship. Institutions must act fast to reform; otherwise foreign universities are likely to come, overpower Indian institutes, and dominate or take away the huge education market, leaving India a poorer nation.

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Conventional teaching in class rooms is necessary, but not enough. Higher education institutions, without centers on campus for technological innovation, entrepreneurship development, patent and technology transfer, venture capital, hi-tech start ups, spin-off of companies and spin-off of technologies are incomplete, irrelevant and nonviable in modern sense. If India dreams to be a developed nation by the year 2020 the present higher education system needs to be strengthened urgently in respect of above stated centers. They have to be able to provide "Technology Push" matching with "Market Pull" and turn out graduates as creative leaders, to take the nation in higher orbit. Such innovative persons presently are in short supply. Innovative persons always think out of box to redesign their systems to generate new knowledge and new technologies ahead of others. The present approach, distributing knowledge generated elsewhere in the world is unfit for the purpose. They will have to install systems as WELL SPRINGS of new knowledge and new technologies.

How can the institutions remain ahead of time? Institutions have to change present frame in favor to establish above stated centers afresh in their campuses, essentially in partnership or in association with industry. Restructuring in the context of global change have to be the main item on national agenda, without which the intellectual resource will continue to be underutilized, wasted and opportunities missed. AICTE and UGC and colleges should have to do bench marking with the best in the world and make gap analysis. This is urgent because, our institutions

follow only that which these apex bodies prescribe. It is said Indians are good copy cats. Give them even a wrong thing to copy they will copy best. They do not think critically. In western world Indian engineers are considered to be technology coolies. They are by and large technology followers.

The key factor behind unemployment is insufficient entrepreneurship, and insufficient innovation. Shortage of people with enterprising and innovation skills is a major barrier in employment generation. Universities, colleges and polytechnics which have a major influence on nation's capacity for innovation should have to resort to new strategies. They would have to install systems to generate new ideas and new technology for industry and help them to win. Indian higher education institutes must recognize the full scope of the innovation phenomenon. They should produce leaders, and captains not only followers for industry of world standards.

Employment cannot come to youths from yesterday's industry and sunset technologies. Employment should be generated in hi-tech, of high value and high income, in sun rise technologies. This requires a mechanism namely "University Related Research Park"[URRP]. Will India government initiate creation of URRP in every university? This will make the research relevant, purposeful and productive. Standard of education will increase. Employability of graduates will increase. Those nations which went this way are immensely benefitted. There is no other way to increase employment than this.

Key words: innovation, Research Park, employment, incubation, patent & IPR

Statement of The Problem

On one hand there is so much of unemployment amongst educated youths and on the other hand there is a shortage of entrepreneurs to develop innovative enterprises. There is abundance of natural resources on one hand and shortage of finished goods and services on the other hand. Lucrative opportunities

due to lack of entrepreneurs are either dying or being taken away by foreigners. There is an influx of goods from east and west countries in Indian market. Indian industry unfortunately is far too behind the world. India ranks as low as 42nd in industrial competitiveness, and 127th in Human Development Index Government has set a goal to build India a developed nation by the year 2020. So as to accomplish this, young engineers urgently need to depart from their conventional approach and focus their attention on innovation and entrepreneurship. Higher Education Institutions in partnership with industry, in this cause, have a key role to play. They ought to become business oriented, with focus on spin-off of hi-tech start-ups. They ought to capitalize on emerging technology. Can they provide "Technology Push" matching with "Market Pull" on sustainable basis? The present frame of universities and colleges without innovation and entrepreneurship centers is not competitive enough to produce leaders of world class standard. They are producing good soldiers, which is necessary but not enough. They need to produce competent captains to lead in industry and economy. To be able to become so they are going abroad every year, in increasing numbers and many do not return, a great brain drain.

Universities need to be enlarged forthwith to cover centers like, Technology Innovation Relay Center, Entrepreneurship Development Center, Technology, Incubator, Business Incubator, Research Park, Venture Capital Foundation, Technology Park, Patent and IPR Center, Industrial Services Center, Technology Transfer and Marketing Center, Corporate Education Center, which are existing from last more than 50 years in counterpart institutions in developed countries. It is on account of this that those nations have prospered. IITs, IISc have recently started such centers in their campuses. This is good but not enough. Many engineering colleges must take steps to become enterprising.

Institutions should have to initiate a movement for creation of New Technology Based Firms [NTBF] and venture capital foundations, and angel networks. It is a new dimension to be added to our present university and college campuses. They function as profit centers. They are not a liability on university finances, but generate wealth, which subsidizes cost of education and makes education relevant to market needs.

Prof Terman in 1950 observed that,

"Industry so as to remain competitive globally needs access to first class research in universities. So also the first class researchers in universities need access to industry so as to commercialize their research findings."

There is a greater need of University Related Research Parks (URRP), in India. Parks, in isolation from academic institutions being set up are good but can not substitute University Related Research Parks [URRP]. These centers have to be the key players. They have to be the drivers of technological revolution.

A formal policy of technological innovation in higher education is urgently needed to drive the spirit of innovation and entrepreneurship as a far reaching change in society, and not just to target potential entrepreneurs.

Need to Produce Leaders in Technology and Leaders in Industry, Captains and Generals needed and not only soldiers to win on technology battle ground.

It was presumed in good old days that new technology could be discovered only abroad. Our colleges, universities and companies used to be happy to become best followers. We have been as a result constantly buying the technologies and they are selling. But now Indian talent has become conscious of its capabilities. It has become ambitious to discover new technologies ahead of others. Indians in Silicon Valley have made a mark. It is observed that students, who learn to innovate in college days, are better suited to discover unknown in service career. They are fit to lead in world market. Students who aspire to become leaders in technology and leaders in industry should have necessarily to acquire skills to generate new technologies, new products and new processes and obtain patents. It is realized that

The key factor behind unemployment is insufficient technological innovation and entrepreneurship.

Do the institutes possess visions and missions to generate new knowledge? Have they nurtured culture to produce new technologies? Visions are in short supply and not the capabilities or the resources. We need to acquire them from world class institutions. Low aim is a crime.

Why do thousands of students go abroad for higher education? They have been going from pre-independence period. How many more years they may have to go? Can all those who desire go? What are the things which foreign universities teach, but we do not? Unless we teach students skills of innovation, skills for generation of new technologies, skills for discovery of new knowledge, patent and IPR, our institutes will remain behind the time and the outflow of talent will continue.

Their institutions are innovative in character, our institutions are conservative. Foreign universities live today as if future has arrived, we exist today as we existed in past. They teach sunrise technologies we teach sunset technologies. They produce leaders we produce followers. They lead a change we follow the change. They are engines of growth we remain bogies. They are not afraid of change we are. They practice creative destruction, meaning there by the weed out old systems to create new.

The challenge now is to create a knowledge based society. It is that society in which new knowledge is not only used but also generated. The mindset of key people in UGC and AICTE needs to be reframed in favor of creating hi-tech entrepreneurship rather than to prepare youths with knowledge for employment in national and Multi National Corporations. Equipping universities in respect of innovation infrastructure is a crying need to achieve the desired goal.

Technological Innovation is an essential precondition for growth, maintaining employment and competitiveness. An innovative person never remains unemployed on the contrary he is more in demand. He has a mission in his life, which gives him extra energy and purpose. An innovative person constantly strives to improve. He is always dissatisfied with the prevalent. He wants to create new and again new. The innovation is progressing constantly on the strengths of new ideas of such scholar persons. Can the institutions produce such innovative persons more in number? If they do so institutions will be more in demand like Oxford and Cambridge.

Innovator is job generator and hence is Indispensable

Ideas are the real capital. Ideas are needed to succeed. They come from innovation. Idea generated is opportunity generated. Idea killed is opportunity killed

Knowledge memorized and stored in brains is important, but more important is the ability to discover new knowledge, new theories and new ideas.

Institutions are the legitimate places, the crucibles of experimentation, for the manufacture of ideas. It is their prime function. They have no reason to exist if they do not do so. Institutions are places to create dreams and to create capacity and imagination in youths to implement dreams.

The importance of innovation to the country's economic future should be realized and infrastructure as stated above provided forthwith in higher education institutions. This will avoid the shortage of suitable persons for innovation and entrepreneurship, which is found to be a major barrier in employment generation.

Most of the students in colleges and polytechnics learn in a passive way. Students learn quietly what is handed over to them. They learn through transmission and are not guided to take active hand in creation of technologies. What did the famous philosopher Socrates teach his students? He taught how to raise pertinent questions. That means institutes have necessarily to ignite the creative minds of students.

The competency of work force today is measured in terms of its ability to innovate. People have to be innovative to see ahead of others the incoming opportunities.

India possesses the largest pool of youthful work force and high quality human capital. This is our competitive advantage. We ought to prepare youths globally competitive, make them enterprising by global standards for global needs.

Commercial Exploitation of Brand New Technology

Invention when exploited commercially is known as innovation. Research conducted in universities colleges and polytechnics often results in publication of wonderful papers, but rarely results in commercial exploitation. Thesis written mostly remains on shelf. No conscious effort is made to obtain economic value from them, mainly because vision in this direction is lacking. Students do not get opportunity to learn to convert inventions into usable goods and services. To that extent skill set of students, in spite of potential, remains deficient. This in addition reduces utility of research done and reduces the rate of return on investment.

It is a good sign that higher education in India is growing. But innovation and acquisition of skills for commercial exploitation, which is the demand of time, is lagging.

Multifaceted units in partnership with industry, like Research Park, Innovation Center, Patent and Technology, Transfer Center, Entrepreneurship Development Center, Incubator, Venture Capital Foundation, angel networks, IPR center etc which constitute innovation infrastructure, is found to lead to creation of enterprising atmosphere enabling students to acquire innovation skills. More the commercialization of technology more is the wealth generation. In developed countries innovation in academic institutes is a usual practice. This has generated a wave of entrepreneurship facilitating students and the whole community to be creative, tapping the market in the whole world. USA produces leaders who employ followers from countries like India. Unfortunately this wave of creativity, leadership and outward looking culture is yet to reach the Indian shores.

A New Vision of New World

How long students should keep learning knowledge generated by others elsewhere in the world? How long they should join the army of foreign companies, serve in supporting roles and be content with that? If the necessary infrastructure is provided some of the students, if not all, would certainly become "First Mover Entrepreneurs." the institutes and students need to dream high, in tune with global competitiveness. Learning innovation enables students to consolidate their knowledge of basics. Innovation Center is more than a learning place. It gives an inspiration to students besides generating economic surplus. The role of institutions in vision development should not be under estimated.

Innovation in education institutes in India is conspicuously absent.

Students do not get global perspectives. This is a serious lacuna. The institutes without innovation are truly incomplete in modern sense. They still follow an old outdated model whose, educational and financial efficiency is too less. They live in past, while their counterparts abroad are ahead of time.

Quality of technical education and research can substantially be enhanced and returns on investment

increased if innovation policy in universities colleges and polytechnics is introduced.

Joblessness and industrial slow down is a result of lack of innovation. When shall we realize this? The situation is to innovate or die. Hence Government of India has launched the following program.

Quality Improvement Program

For reformation of higher and technical education Government of India has recently launched a massive program, termed as Technical Education Quality Improvement Program {TEQIP}. The objectives are, to impart world class education, to enable students to grow to the level they are capable for, so also reduce dependence on foreign.

From what is reported it is observed that the scheme is good, well formulated in many respects, and well implemented through but in competitive environment it lacks a step towards "Technological Innovation, organizational innovation, and business innovation". Modernization of laboratories, library, class rooms, faculty development as usual are essential but not sufficient it is necessary to think differently, think great going beyond current practice. It is necessary to design new organization structure oriented towards innovation, and enable students to acquire enterprising skills equal to, if not more than their counterparts abroad, which is the need of the hour. This is to say that institutions must provide a portal through which all the students compulsorily should have to pass through, practice of commercial exploitation of the new knowledge that is to say new technology. They should specially target their efforts towards production of marketable technologies, patents etc. The students should have to do some field surveys to identify level of technology used, productivity, and difficulties in using the latest knowledge. TEQIP has created an impact but greater especially in NTBF is expected.

Can Higher Education Institutes give new ideas, leadership to Help Industry to Win?

Jobs will come not from old type of industries and old technologies, but from sun rise industries and sun rise technologies. Surveys conducted elsewhere in the world indicate that NTBF started by young entrepreneurs with origin in academic institutions are far more successful than those started by persons with experience in industry Academic institutions provide

a powerful engine to launch the new technology based enterprises and thereby generate hi-tech, high income employment.

According to a new item published recently. "India slipped to 21st rank from 13th in number of scientific output." The PhDs produced in engineering are far too less. According to an estimate given by TEQIP [2009] there is a shortage of 30,000 PhDs. US produces 30 PhDs per million population, Japan produces 28, India produces only 0.5. The number of graduates produced in USA are almost double than in India. Yet all get jobs or become self employed. Still they have a shortfall. To meet the same they invite engineers from abroad. This is mainly because they produce larger number of PhDs. Who constantly explore new opportunities, everywhere and anywhere in the world.

A critical examination of the schemes of technical education in the light of global winds of change, so as to avoid mistakes is essential. If the infrastructures like Entrepreneurs Center, Research Park, Incubator, Innovation Centre Venture Capital Fund, Patent and Technology Transfer Center etc. in partnership with industry are not incorporated, it is feared that the whole effort of reformation will remain on traditional lines, preventing change. Massive investment being made will not yield expected results. The education policies and practices should have to come out of old ruts. They are less efficient, unproductive and outdated. You need new ideas to win in new world.

It should be remembered that any investment in present structure, present systems and procedures without introducing autonomy and improving academic culture is like investment to perpetuate and subsidize incompetence, inefficiency leading to failure.

Change is most wanted to replace worn out ideas. The resources should not be frittered away on trodden paths but should be used creatively on to proceed off the beaten paths, essentially importing academic culture and output. Developing countries in general, are hopelessly conservative, inward looking and hostile to change. Innovative societies are essentially outward looking. Individually, Indians are forward looking but society wise not. Unless we change our mind set, brain wash UGC/AICTE and work to accelerate reformation process we can not progress.

Academic culture and Infrastructure

Unless innovative measures like academic autonomy, administrative autonomy, are introduced in higher education the additional investment in infrastructure will not pay dividends. Our own people in college, university and government unknowingly, out of inertia become obstruction to reformation. The authorities who are used to older style of working and for personal benefits do not take initiative to change. Infrastructure created may remain unutilized. However, this should be guarded to avoid failure.

The experience of India - Canada project and World Bank project in the recent past, has taught us many lessons. Financial Aid from World Bank to countries like Congo, Zambia indicates that the aid turned out to be counter productive. The men in charge of governance were accustomed to benefits from the present system. So they did not take any initiative to change. It went towards subsidizing inefficiency, bad policies, corruption, discouraging reformation etc.

The present case of universities and colleges, which are offering resistance to change, change to use autonomy, reformation as per NKC recommendations is a capability failure. Raising the organizational capability, making them competent and amenable to change is the key aspect which must be attended to with utmost care by aid receiving institutions. Without which they may not be able to make most of the aid. Development of an institute can not be forced from outside. It comes only from within. It is an endogenous growth. Organizational capability need to be developed so as to bring about change. Exposure to developed world needs to be made, time and again, to accelerate arrival of change.

Benchmarking with the best in the world

What we observe differently in higher education institutes abroad is that research and innovation private companies are flocking round the university in search of the latest knowledge. Students work in these companies in vacations and research entrepreneurs teach in university. Exchange, circulation of innovators is made easily possible. Interaction between industry and institution for research is facilitated. Universities have on their campuses centers like Research Park, Patent and Technology Transfer Center, Entrepreneurship Development Center, Incubator, Innovation Relay Center, Industrial services center for outreach, etc. Venture Capital companies have opened offices in the campuses for early commercialization of technologies. Institutes

have become sources of new ideas enabling companies to win. An institute functions like a light house for industry. It is these things which have increased productivity and added value to growing economy. Such institutes are functioning like a magnet attracting best of brains from anywhere and everywhere in the world. Benchmarking is considered to be a big driver for improvement.

Systems in world have changed - Where are we? Can we afford to be stationary?

All these multifaceted centers provide an opportunity to students to learn beyond curriculum, as per their intrinsic motivations. They have been established especially after 1980, in 84 technical universities of Germany, in 125 research universities of USA, and in many universities abroad MIT Boston has a technology licensing office [TLO] in which about 200 people work. The author has personally visited this office. The institute earns about one hundred patents every year and earns as much as 20% of its budget from the sale of technology.

Quality and relevance of education in developed countries is reported to have improved mainly because of the presence of centers in the campus. Enterprising culture is imbibed in students, which leads to spin-off of companies. Around ten companies are born every year in MIT. Institutes have become the maternity homes, where good baby care is taken and companies are consequently born without any congenital defects. This is found to be a good help to budding entrepreneurs. Our institutions are lacking in all such ideas. Can we not adopt these strategies? True that it is a long journey. But it has to begin some where. Is it not that a thousand miles journey begins with a single step? The vector of learning of our students should have to be made in right direction. Otherwise their efforts, time and money goes astray.

Innovation - Generates jobs

Cambridge Research Park, Limerick University research Park, Harburg University Park in Germany, technology based spin-offs from Sophia Antipolis, university park in France, Oulu Business University Park in Finland etc are world famous examples which have benefited most of the students, industry and academia. The author has personally verified by visiting them. China, Taiwan have installed such parks in their institutes and thereby currently have successfully been converting brain drain into brain

gain. An OECD study recently reported that

Those nations which lead in introducing innovation tend to win jobs from those who lag.

Joblessness in India is increasing due mainly to lack of innovation. Insufficient innovative activity in India is due to shortage of people possessing innovation skills because innovation is not taught in colleges. This is cited as a key factor behind under performance of Indian economy and fast growing unemployment

India must recognize the full scope of the innovation phenomenon without which proportion of sick industries will increase and new born companies will be handicapped at birth itself.

Can Indian academics teach innovation skills by international standards? Can they teach skills of discovery and skills to generate technologies equal to their counterparts abroad? Certainly Yes! They have the potential. Can India hope to become a developed nation with out learning innovation? Should we keep on teaching sun set technologies? Can we hope to reform education without adopting innovative strategies? We can not generate employment without NTBF. Can students acquire innovation skills without infrastructure for innovation? We essentially need a swimming pool to learn swimming.

Conclusion

Education and training in universities, colleges and polytechnics have a major influence on nation's capacity for innovation. The role played by them, however is not satisfactory. Much needs to be done. Scientific methods like in developed countries need to be introduced. Innovation policy needs to be evolved. Can they produce NTBF, and how many, is a pertinent question which they should be asked. Do the institutions have innovative character? How can they acquire?

The role of colleges and universities in fiercely competitive world are changing. A new enterprising society in the world is coming into being. Institutions should therefore focus their attention on reorienting students for closer integration with the world. Mobility of academicians at international levels is advocated. This has remained our serious deficiency in the past.

How much knowledge is acquired and stored in brains is important, but how well innovative skills are learned deserves priority. India in globalization should deviate from traditional methods of learning and take a lead in sharpening the innovation potential of students. They have missed opportunities in the past because necessary infrastructure and direction for self employment were not available. Now at least in future they should not miss.

If India does not become a center for technological/ organizational/financial innovation then there is no other way to become a developed nation. If we develop systems in colleges to produce new knowledge and new technology, then there is a fair chance to convert brain drain into brain gain.

The knowledge infrastructure proposed in this paper is a profit center. It generates wealth much in excess of consumption. It is found to subsidize education and research, besides improving the quality and relevance. It should therefore be installed forthwith in each university, college without any delay. Government should play its central role. Systems like autonomy should be perfected forthwith, otherwise infrastructure created may remain idle.

If India desires to become a technological super power, then higher education institutions must have to throw away the old shackles, and install new innovation and entrepreneurship culture to create NTBF. This is no more an option but compulsion.

Resources are not in short supply, but the visions. Capacity to implement visions matters. Universities must generate leaders and brand new ideas to enable industry to win.

Education charged with a spirit of entrepreneurship, innovation and creativity is not a luxury; it is a basic necessity to make education globally competitive.

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