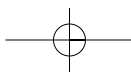
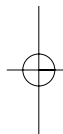
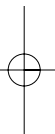
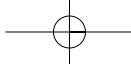


PanIIT Panch Ratnas



Five Actions to Reform
HIGHER EDUCATION
in India
JULY 2009





About PanIIT

The PanIIT organization was formed as an umbrella organization, covering alumni of all Indian Institutes of Technology (IITs), to evolve a brand that would provide strong fraternity among IIT alumni. In 2002, several alumni came together and formed a PanIIT Board. The PanIIT Board hosted the San Jose (Jan 2003) and Bangalore (Feb 2003) events, which were highly successful. Subsequently, Annual Global Conferences have been held, alternating between India and the USA.

The Vision of PanIIT is to help IITs and IIT Alumni achieve their full potential and be counted among the best in the world.

The Mission of PanIIT is to:

- Provide networking opportunities for members of the IIT system.
- Contribute proactively to nation building.
- Enhance the IIT Brand.
- Engage with the IIT governance and vision.
- Provide a forum for advocacy.

Over the years, PanIIT movement has developed and consolidated itself in many ways. It has now fully functional chapters in India, the USA, EU, Canada, Australia, Japan and Singapore, amongst others.

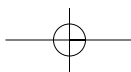
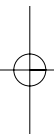
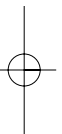
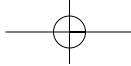




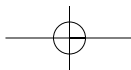
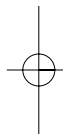
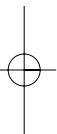
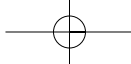
Table of Contents

Foreword.....	3
The Case for Change	5
Where We Stand Today	6
PanIIT Vision of Higher Education in India.....	8

Panch Ratna Recommendations

1. Implement Comprehensive Reforms in Policies and Governance	12
2. Mandate Quality and Increase Capacity.....	18
3. Enable Quantum Improvement in Faculty Service Conditions.....	22
4. Deploy Technology for Teaching and Collaborative Research.....	25
5. Establish an Active Industry-Academia Interface.....	27

List of References





Foreword

This white paper is in response to the invitation extended by the Hon'ble President of India, Smt Pratibha Devisingh Patil, to PanIIT Alumni India to propose initiatives that the Government of India (GoI) should take to reform higher education in India, when the PanIIT delegation called on her on 5th February 2009.

Since its inception in 2002 in the USA, PanIIT Alumni has initiated several nation-building projects in India. Some of these include Indo-US Collaboration for Engineering Education for upgrading faculty quality, IITians for ITIs to improve the effectiveness of vocational education, and Reach for India for rural job creation and building entrepreneurship.

This paper proposes five actions, 'Panch Ratnas', that the Government should immediately undertake in order for India to become a global hub for knowledge creation and talent development by 2022.

1. **Implement Comprehensive Reforms in Policies and Governance**
2. **Mandate Quality and Increase Capacity**
3. **Enable Quantum Improvement in Faculty Service Conditions**
4. **Deploy Technology for Teaching and Collaborative Research**
5. **Establish an Active Industry-Academia Interface**

The white paper is based on needs, context, and culture of India and incorporates the best global practices studied and abstracted by select members of PanIIT, who have intimate experience of the global education system. This paper will be a 'living document' that outlines specific actions for implementation by all stakeholders: central and state governments; universities and colleges; industry and society; and faculty and students. The PanIIT Education Committee will be expanded to bring in greater capabilities of PanIIT worldwide and provide a 360-degree view spanning multiple perspectives and stakeholders.

The document will be reviewed and revised periodically to remain current in the changing environment.



The recommendations in this document are more aspirations-driven and not constrained by the means to execute. In order to realize these aspirations, the implementers and administrators will have to be carefully chosen to have a 'can do, will do' attitude. As a next step, PanIIT Education Committee is launching 'PanIIT Knowledge Leaders Initiative', which will, to start with:

- (i) Organize a workshop in India for representatives from the Government, industry, universities, colleges, NGOs and concerned citizens to highlight the need to change the current education paradigm, to discuss the Panch Ratnas and to identify potential 'alliance partners' for implementation.
- (ii) Organize a Global Summit on Higher Education in Chicago, USA at the 'PanIIT Global Conference on Entrepreneurship and Innovation in the Global Economy' in October 2009. This summit will bring together leaders from business, Government and academic institutions from India, USA and other countries to focus on knowledge sharing and collaboration.

I really appreciate the efforts put in by the team under the leadership of Vijay Thadani to prepare a comprehensive report. In particular, would like to thank Ashok Kalbag, Ashok Saxena, Krishna Vedula, M P Ravindra, Nitish Thakor, Pradeep Gupta, Ramakrishna (Ram) Akella, S N Zindal, and Vivek Singhal, who have contributed to this document. I am also grateful to Parimal Mandke, Adeesh Sharma and Maitreyee Mukherjee for their painstaking efforts in giving a final shape to this document. We strongly believe that adoption of PanIIT Panch Ratnas will truly propel Indian higher education to a level where it will set the global benchmark.

Ashank Desai

Chairman

PanIIT Alumni India

July 14, 2009



The Case for Change

India needs to maintain a superior annual economic growth rate of 8% to 10% to take its rightful place on the world economic map. It is widely acknowledged that a critical factor for India to maintain this growth will be the availability of educational and economic opportunities for its diverse population. With a population of 120 crores, of which more than 54 crores are below the age of 25, India's human capital is one of the biggest natural resources that can be converted into an asset for India and the global economy.

It was this recognition of the need to develop human potential that led the Government of India (GoI) to establish some excellent institutions of higher education, such as AIIMS, IIMs, and IITs soon after independence. Graduates from these institutions have contributed to the economic development not only of the Indian economy but also of the broader global economy. According to the IIT Impact Study^[1], released by the Prime Minister of India in 2008, the number of alumni from seven IITs has now reached 1,75,000. Together, their contribution spans both the developed and emerging economies of the world.

Realizing the potential of socio-political and economic benefits of education, the GoI has placed a much higher priority on education in the Eleventh Five Year Plan (2007 to 2012). This change in priority is supported by a proposed Rs 2,70,000 crore[†] allocation to education, which represents a four-fold increase over the Tenth Five Year Plan. While searching for information, we observed that the GoI has initiated schemes to ensure 'Universal Access to Quality Primary and Secondary Education' while significantly expanding the capacity of higher education to provide educated and skilled workforce for the 21st century economy. The GoI has made a bold move by allotting 30% of the total education outlay to higher education and thereby committing to an eight-fold increase in, the spending on higher education in the Eleventh Five Year Plan^[2].

[†] *1 crore equals 10 million. 1 million equals 10 lakhs. Conversion from US Dollars to Indian Rupees is: USD 1 million approximately equals Rs 5 crores.*



The current economic crisis has precipitated the need to radically reform education not just in India but in other parts of the world as well. There is an emerging consensus for the need to change the current educational paradigm to prepare youth for the global economy of the 21st century.

We believe that by implementing the recommendations proposed in this document, India has an opportunity to leapfrog into a leadership role and set the defining global benchmark.

Where We Stand Today

The Indian higher education system is vast, with 20,677 colleges and 431 universities as of September 2008, and 1.4 crore students on rolls, of which about 35 lakh graduate each year^[3]. It boasts of world-class educational and research institutions, such as pre-independence institutions like IISc, ISI and TIFR, and post-independence institutions like AIIMS, IIMs and IITs. While it must be acknowledged that the definition of a ‘world-class’ institution of higher education is evolving, the fact is that only three of Indian institutions, namely, IISc Bangalore, IIT Delhi, and IIT Kharagpur are included amongst the top 500 institutions in the world^[4]. Even though the sheer number of graduates from Indian universities is high, the Gross Enrollment Ratio (GER) in higher education is only 11% and only 25% of this 11% receive post-graduate education^[5]. Teaching and research as professions are undervalued and consequently under-served, leading to an acute shortage of high-quality teachers and professors. Hence, even though India produces some of the most talented and intelligent students and workers, questions related to quality, access, and equity still vex educational planners.

The following facts and figures highlight the state of higher education in India:

- India’s current GER of 11% is low compared to the world average of 23.2%, 36.5% for countries in transition, 54.6% for developed countries and 22% for Asian countries. It is projected to marginally rise to 15% by the end of the Eleventh



Five Year Plan and to 21% by the end of the Twelfth Five Year Plan in 2017, but will continue to significantly lag the world average of today^[6].

- Of the Rs 81,000 crores allotted to higher education in the Eleventh Five Year Plan, Rs 30,682 crores, about 38%, are allotted to higher technical education. According to the Planning Commission, the estimated required funding for higher technical education alone is Rs 2,52,260 crores^[7]. This is a huge gap, which will only widen further as we move towards a higher GER.
- 80% of the enrolled students pursue Arts, Science, and Commerce programs and the remaining 20% are in professional programs such as Engineering, Architecture and Medical Sciences^[8]. The employment rate, among the two groups is a meagre 10% and 25%, respectively as per a McKinsey study^[9]. While both figures are abysmally low, the unemployment amongst Arts, Science and Commerce graduates is a far more serious issue. In comparison, the employment rate among college graduates in the USA is 72% to 81%.
- The entire higher education system is obsessed with entrance examinations. There are a multitude of entrance examinations for admission into colleges, ranging from national and state examinations, to those conducted by individual institutes. Preparation in the form of coaching for the entrance examinations has created a burgeoning Rs 8,000 crore industry^[10].
- The number of PhDs awarded in Science and Engineering in India in 2003-04 was 6,316 compared to 9,000 in China and 26,891 in the USA. Less than 0.4% of Science and Engineering graduates in India obtain doctorates compared to 7% and 4% in Europe and the USA, respectively^[11].
- The number of researchers per million people in India during 2000-04 was 119 as compared to 344 in Brazil, 708 in China, 3,187 in Korea, and 4,605 in the USA^[12].



- Indians spend over Rs 50,000 crores annually in foreign exchange for higher education by supporting over 1,50,000 students in educational institutions overseas^[13]. This amount is three times that of the GoI allocation to higher education per annum in the Eleventh Five Year Plan. A simple calculation shows that the expenditure per annum on an Indian student studying overseas is about 30 times that on a student studying in India!

PanIIT Vision of Higher Education in India

Our vision for India is to provide accessible, affordable, and quality education that prepares its youth for greater roles in the global economy and enables them to significantly better their lives by tapping their full potential and accessing new opportunities.

The Opportunity

The opportunity for India to capitalize on its human assets by building two cadres of human resources (Figure 1)^[14], was advocated by the Hon'ble Former President of India, Dr A P J Abdul Kalam, at the 2006 PanIIT Conference.

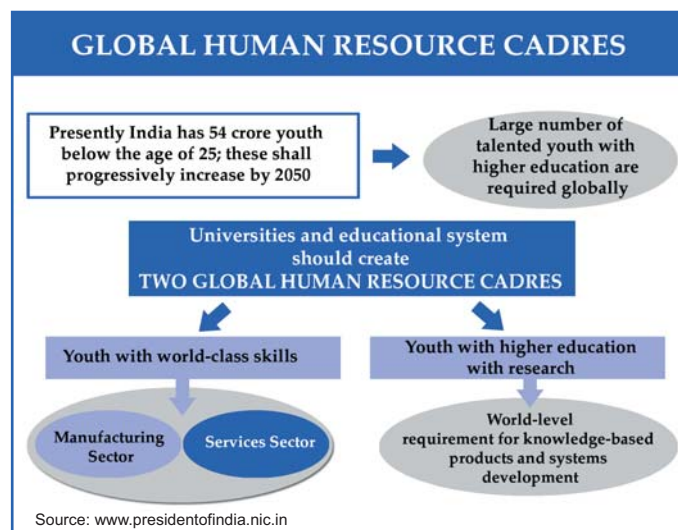


Figure 1



Goals

Based on the inputs of Prof C K Prahalad as a part of India@75 vision, the Confederation of Indian Industry (CII) has set the following goals for higher education in India by 2022^[15]:

- India should build a 70 crore globally employable workforce, comprising 20 crore university graduates and 50 crore vocationally skilled people.
- India should develop world-class infrastructure to become a global hub for knowledge creation, talent development, and entrepreneurial incubation.
- India should set global standards and become a large-scale provider of value-based, learner-centric education, skills development and professional educators through industry partnerships.

Given the present state of affairs and projections of the GoI—increase in GER from 11% in 2007 to 15% in 2011-12 to 21% in 2016-17—and extrapolating from the same, GER at the end of the Thirteenth Five Year Plan (2021-22) can be expected to be at 29%. Students on Rolls (SOR) according to the Planning Commission projection will be 2.1 crores in 2011-12. Assuming GER to reach 29% at the end of the Thirteenth Five Year Plan, the projected SOR will be 5.15 crores, which will reflect a Compound Annual Growth Rate (CAGR) of 2.5% over the 13-year period. The stock of graduates, currently estimated at 3.8 crores, can be expected to reach 13.8 crores by the end of the Thirteenth Five Year Plan. This represents a shortfall of 6.2 crores if the slated target of 20 crore university graduates is to be achieved by then.

If India targets to achieve GER of 55%—the current average in developed countries—at the end of the Thirteenth Five Year Plan, with interim targets of 18% at the end of the Eleventh Five Year Plan and 35% at the end of the Twelfth Five Year Plan, it would result in a CAGR of 6% in SOR over a 13-year period. Even then, India would just catch up with the current GER of developed nations. To achieve this GER in higher education, the challenge will be to improve enrollment and completion ratios in the school system.



Yet another challenge will be to get the required funding for expansion. It is amply clear that the growth rates mentioned earlier cannot be met solely through Government resources. At the end of the Tenth Five Year Plan, India's total spend on education was 3.46% of GDP, which at the end of the Eleventh Five Year Plan is projected at 6%. This is far too less to achieve the slated target. In the USA, the American Recovery and Investment Act of 2009 (ARRA) recently provided \$100 billion as stimulus to education sector. The stimulus itself is 50% more than the total allocation by the GoI to education in the Eleventh Five Year Plan. Existing policies of the GoI would have to undergo a fundamental shift to allow Foreign Direct Investment (FDI), attract rich endowment funds of foreign universities and permit private for-profit providers in higher education.

Further, quantity by itself will not take India too far unless the issues of quality and employability are given appropriate attention. Both, the near absence of world-class institutions and poor acceptance of graduates by industry point towards the need for bringing in an integrated research culture, development of research-oriented faculty, strong linkages with industry, skills development as an integral part of the curriculum and effective deployment of Information and Communication Technology (ICT) infrastructure to make India a global hub of excellence in higher education.

The foremost and critical driver of this change has to be Government policies. A fundamental and constructively critical review and consequent reform of the higher education policies of the GoI on an immediate basis should be the first item on the agenda for Human Resource Development for 21st century India. In making actionable recommendations, we view higher education as a system and consider the various inputs to the system—and its key enablers that will lead to desired outputs. Our recommendations are aimed at enhancing each of these elements so as to maximize the capability and learning output of the Indian higher education system while minimizing costs through effective use of resources. Figure 2 captures the elements of this model and provides the context for our detailed recommendations.



Systems Model of Higher Education

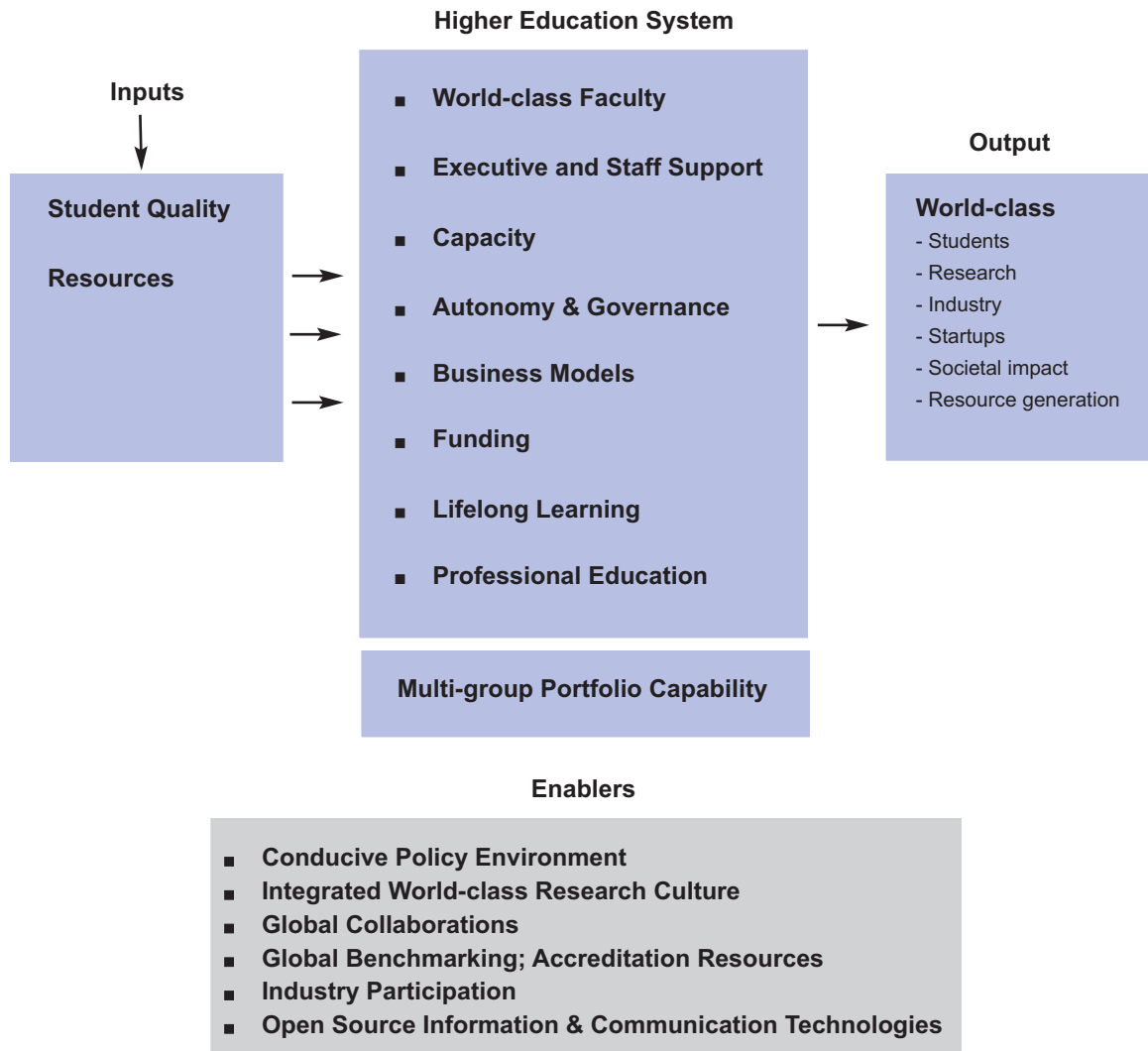


Figure 2



PanIIT Panch Ratnas

Considering the magnitude and multitude of challenges before the country's higher education system, we make the following Panch Ratna recommendations:

1. Implement Comprehensive Reforms in Policies and Governance

1.1 Revamp the Existing Academic Structure

1.1.1 Revamp the current 3-year graduation degree structure in Arts, Sciences and Commerce to include an extra year for skills development—thus making it a 3+1 year course, and compatible with world standards—to make the graduates truly employable in the global industry.

1.1.2 Allow students the flexibility to choose their courses and change their majors and specializations. For instance, a student might want to change from a Technology degree to a Humanities degree and vice versa. Such flexibility must be built within the system.

1.1.3 Revise curricula to provide broad exposure to Humanities and Applied Sciences disciplines in professional programs to develop people and leadership skills and exposure to Basic Sciences and analytical courses in non-professional programs. The goal is to train and encourage students to be leaders and creative innovators with initiative.

1.1.4 Make suitable changes in apprenticeship laws so that graduates from all disciplines including Engineering can be employed as apprentices.

1.1.5 Adopt a competency framework which provides educational opportunities to fulfill the stated goal of preparing a 70 crore globally employable workforce. Figure 3 illustrates a typical competency framework.

A Typical Competency Framework

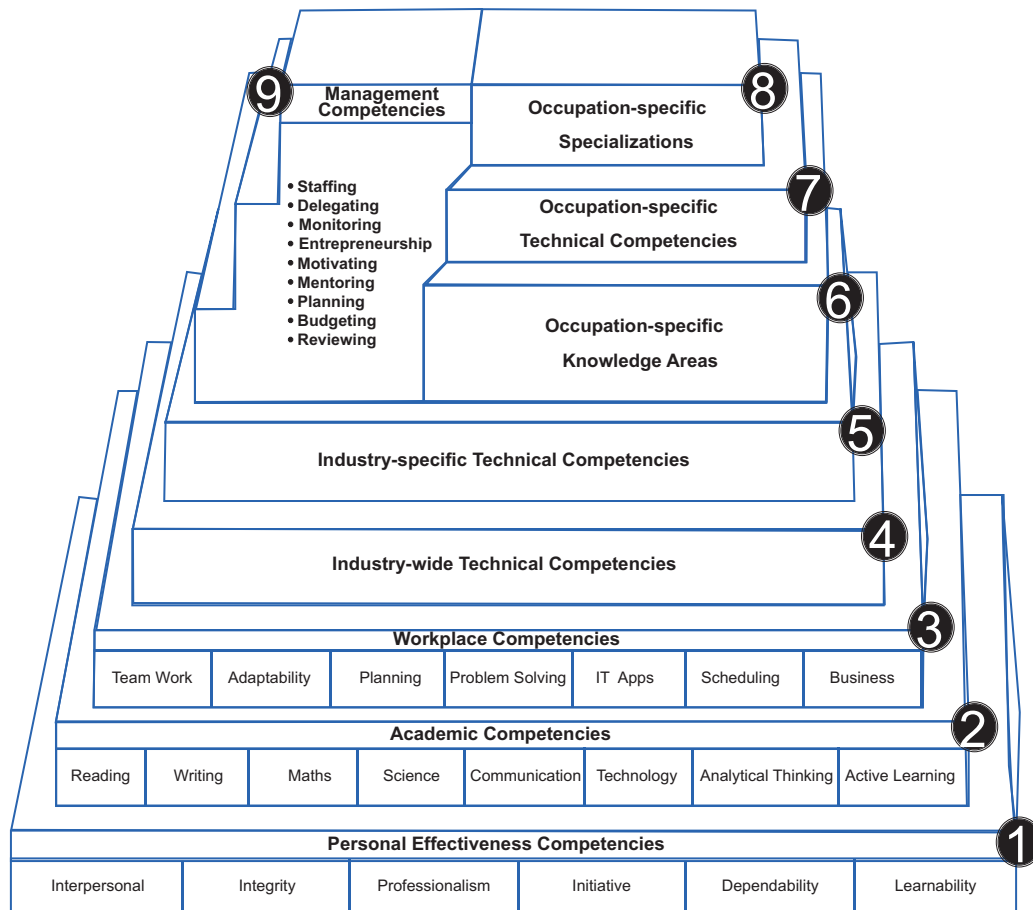


Figure 3

1.2 Abolish Multiple Entrance Examinations

1.2.1 Introduce one National University Entrance Examination (NUEE) system. Such a system would test not only for facts and fundamentals but also for other qualities and qualifications, including creativity, scholarship, problem solving ability and leadership. Such a system would ensure credibility of the selection process for a diverse student applicant pool. For specialized courses, such as Engineering and Medicine, introduce an advanced examination after NUEE to test special skills and knowledge.

1.2.2 Allow institutions the flexibility to decide on a transparent criterion, in addition



to NUEE, they would like to introduce in their admission policy. For example, the criteria could be judging on the basis of performance in classes X and XII, involvement in extra-curricular activities such as sports, fine and performing arts, social service and community activities.

1.3 Improve Student Access without Compromising Quality

As a fundamental principle, we believe that each student must be provided with all possible support to realize his/her full potential, regardless of financial and social circumstances. The ultimate goal is to provide equal opportunities for success in obtaining a job and developing a successful career for all citizens of India, while obviating any limitations due to their backgrounds. The prevalent quota and reservation system, particularly for those who have been disadvantaged historically, has existed in higher education for the last six decades. It has served a useful purpose but must now be refined to suit today's challenges. While that requires a detailed study, the recommendations given here are more transitional in nature and should be implemented in the interim.

1.3.1 Create an inclusive mechanism to educate and train students with diverse backgrounds and learning styles. Any student potentially capable of pursuing higher education, but found deficient in the educational level required for admission at any stage, should be given extra time and provided preparatory educational inputs to bring him/her at par with others. Each university should either open a special school or mentor an existing school, from Class IX to XII, to cater to the needs of students from disadvantaged categories.

1.3.2 Set up a mechanism to address the needs of economically challenged meritorious students by providing scholarships while allowing the regular fee structure to be driven by the quality of education and market forces.

1.3.3 Launch attractive credit and loan schemes to meet the short-term economic



needs of a large number of students. Introduce education savings bonds scheme to enable parents to begin saving for higher education early in the lives of their children.

1.3.4 Conduct a detailed study of the overall impact of the reservation system with emphasis on the outcome with appropriate measures such as success in securing jobs and building careers. The success measured by a corresponding reduction of the disadvantaged class would progressively decrease the need for reservation. Implement the best practices from past experiences and from other successful examples worldwide.

1.3.5 Target to reduce reservation by 100 basis points every year as a measure of success of the outcome as mentioned in 1.3.4.

1.4 Mobilize Private and Foreign Investments

This is an inevitable action if the stated GER targets are to be met by 2022. Investment in higher education outside the Government has mainly been through philanthropy by the private sector and through emerging sources such as Corporate Social Responsibility (CSR) and Alumni funds. In recent times, there have been cases of unscrupulous misuse of the provisions in the system. There is a need to formalize the participation of private sector and foreign investors.

1.4.1 Allow 'for-profit' private sector investment in higher education.

1.4.2 Enact the Foreign University Bill in a modified form with higher operational flexibilities to foreign providers, on the lines of the UAE, Singapore, and China models. The bill should facilitate the entry of high-quality institutions that clearly demonstrate commitment to high quality education.

1.4.3 Make Foreign Direct Investment in higher education an attractive proposition



by enabling corporate structures including limited companies and permitting repatriation of funds.

1.5 Encourage Autonomy in Governance

1.5.1 Encourage higher autonomy—academic, administrative and financial; higher accountability; and higher transparency in institutions by permitting independence in:

- Long-term direction and strategy.
- Academic policies and fee structure.
- Selection of the vice-chancellor, director and appointment of faculty.
- Board composition with minimal government representation and mandated alumni representation.
- Compensation structure and salaries driven by market forces.

1.5.2 Choose heads of institutions not for academic excellence alone, but the ability to be strategic and to implement solutions to achieve excellence.

1.6 Restructure the Policy Making and Governance System

1.6.1 Create a unified 'Higher Education Act' for improved governance at the national level. Set up the National Commission on Higher Education and Research (NCHER) as recommended by the Yashpal Committee on Renovation and Rejuvenation of Higher Education^[16]. This recommendation is in line with the National Knowledge Commission recommendation to establish an Independent Regulatory Authority for Higher Education (IRAHE) which will function at an arm's length from the Government and independent of all stakeholders including the concerned Ministries of the Government^[17].

1.6.2 Introduce a Model Governance Code to provide guidelines to institutions while



maintaining their autonomy. Accreditation bodies can use it as a basis for evaluation of institutions.

1.6.3 Centralize higher education policy making and implementation at the central government level vis-à-vis the current treatment as a concurrent subject.

1.6.4 Ensure adequate representation of educationists at senior levels in policy making in Ministry of HRD.

1.7 Establish an Independent Accreditation and Rating System

1.7.1 Establish an independent accreditation system as recommended by the Yashpal Committee and on the lines of CII-NASSCOM-ICRIER White Paper^[18]. This would entail setting up of independent not-for-profit bodies with state-level sectoral councils, each addressing specific industry specialization. International accreditation bodies should be permitted to provide accreditation and collaborate with Indian agencies. The transparency of operations and quality of education would be ensured through a ranking system by multiple accreditation bodies.

1.7.2 Reconstitute National Board of Accreditation (NBA) as a separate entity from AICTE, reporting directly to MHRD for institutional accreditation. Provide autonomy, bring in greater industry partnership, and enable it to be an oversight agency for other regional/sectoral accreditation bodies and for representing India at world fora such as Washington Accord.

1.8 Undertake Capacity Planning Study

Appoint a task force comprising members from industry associations, research organizations, academia, PanIIT alumni, and economic research groups and headed by an eminent economist to undertake an exercise of capacity planning for the year 2022. The number of universities, SOR, GER and other goals recommended in this white



paper are not based on detailed projections, which should be done as an independent exercise to arrive at ambitious but realistic goals. For example, the capacity planning study should help us arrive at realistic goals by 2022. Such a study should not assume an extrapolation of cost structures, as some key enablers of education such as teaching efficiencies will improve significantly with the use of ICT systems while costs of technology are bound to decrease with time.

2. Mandate Quality and Increase Capacity

2.1 Reclassify the Current University System into Three Groups

(Refer to Figure 4)

(Note: The classification into a particular group is based on the primary mission of the institution and is not meant in any way to imply any type of ranking classification.)

2.1.1 Group R (Research Focused): Universities covered under this group will be comprehensive, research-intensive institutions with a high level of PhD production and cutting-edge, multi-disciplinary research. The best among the Group R universities will be capable of being ranked among the best universities in the world. They will cater to approximately 10% of total enrollments in higher education.

2.1.2 Group P (Professional Education Focused): Here, universities will focus on undergraduate and post-graduate education and engage in preparing graduates for professional careers in fields such as Engineering, Medicine and Business. The faculty at these institutions is expected to have earned PhDs in their fields and they must also be engaged in scholarly pursuits. Group P universities will cater to approximately 30% of total enrollments in higher education and the best of these institutions shall be internationally renowned for teaching and research and for preparing graduates that are highly sought after in a global job market.

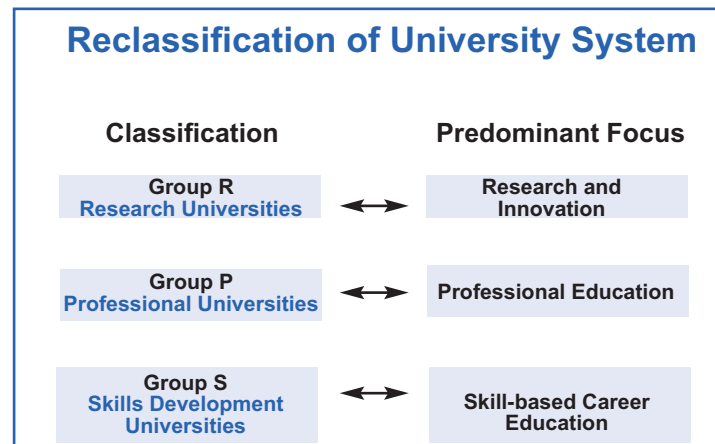


Figure 4

2.1.3 Group S (Skills Focused): This will constitute universities that offer affordable, skill-based career education using the best open source and distance education resources. The Group S will cater to approximately 60% of total enrollments in higher education.

2.1.4 Transferability amongst institutions: All institutions, regardless of the group, must have transparent policies for accepting students from other institutions and for transferring academic credits from other recognized institutions.

2.2 Set Up New World-Class 'Group R' Universities

2.2.1 Set up Ten outstanding public universities in the next five years, along the model of the University of California (USA) or Ecole Polytechnique (France), to produce future national and world leaders with a mandate to provide broad-based education spanning Humanities, Commerce, Sciences, Engineering, Medicine and Law. These universities, with a student population of up to 50,000 each and faculty strength of about 5,000 each, should be established in 'campus towns' along the lines of Oxford and Cambridge or University of Illinois and University of Michigan.



2.2.2 Leverage the expertise of top Indian institutions such as IISc, ISI and TIFR to accelerate the above mentioned endeavour and rapidly attain world-class status.

2.2.3 Invite the private sector to set up, Ten world-class private universities in the next five years, through investments and/or their tax-efficient donations and endowments. These universities will value and leverage on innovation and entrepreneurship to produce future world-class innovators/inventors, technocrats, and entrepreneurs. Modeled on Cal Tech or Carnegie Mellon, such universities will be established on a smaller scale, with less than 5,000 highly selective students and faculty.

2.2.4 Pair the above public-private universities synergistically along the lines of University of California, Berkeley, and Stanford University.

2.2.5 Combine institutions of excellence in a geographic area to create a world-class university that can rapidly secure a place in the top-ranking universities in the world. For example, in Bangalore, the Silicon Valley of India, group together IISc (Science and Technology), IIM (Business), Law College (Law) and NIMHANS (Mental Health), expand existing Medical College to include biomedical research, and provide significantly enhanced funding to establish such a world-class university.

2.3 Convert Top 10% Colleges into Universities

Increase capacity and competition by giving university status to 10% or so of existing top-ranking colleges, selected on the basis of their size, performance and reputation. Form a cluster of 20 to 30 colleges in a proximate geographical area, such as a smaller state or districts of larger states, to bring them under each of the above mentioned top-ranking colleges, now converted into universities.



2.4. Strengthen Existing and Set Up New 'Group S' Universities

2.4.1 Strengthen the use of technology in delivery and improve skill outcomes. Synchronous Learning Technology should be effectively used to improve delivery and to reach larger numbers.

2.4.2 Create a system of community colleges to impart economical trade skills, combined with broad-based foundational education.

2.5 Establish Private Universities near Large Metropolitan Areas as Part of Special Economic Zones (SEZs)

These SEZs should be made into new townships built to take full advantage of the economic activity that will result from the research conducted in these universities.

2.6 Attract Foreign Universities and Foreign Direct Investments

Through FDI and collaboration with top foreign universities, Group R universities should fast forward the attainment of world-class excellence. Large investments for developing world-class research facilities and those required to hire the best research faculty, globally, can be made available by mobilizing resources through above means.

2.7 Construct a Collaborative Feeder System Among the Three Groups and Expand to a Global System

Such a system will develop a continuum of institutions, providing ease of mobility to students and faculty on the lines of California State Higher Education System in the USA, where community colleges, state colleges, and research institutions form a continuum in which students and faculty can move around with ease.



Expand the feeder system to include major universities in the world, such as the University of California, Stanford University, MIT, Harvard University, Johns Hopkins, Cambridge University etc, by establishing collaborations.

2.8 Discontinue the Current College-University Affiliation System

The prevalent system of affiliation of colleges with universities should be discontinued in a phased manner.

2.9 Change the University Admission Process to Attract More Foreign Students

Foreign students will bring a stronger global orientation and also propel universities to be competitive globally. It will be important to change the visa rules and bring transparency in academic performance to make the Indian university system attractive worldwide.

3. Enable Quantum Improvement in Faculty Service Conditions

There is a wide recognition of the current faculty crisis in all realms, whether quantity, quality, or qualifications.

3.1 Attract the Best Faculty from Across the Globe

There should be continuous emphasis on maintaining the spirit of competition in selection of faculty candidates and on providing sufficient competitive start up research packages and salaries. It may be noted that IITs and other reputed institutions have a large number of alumni globally with extensive experience in managing higher education. A concentrated effort needs to be put to attract them back to India to aid this effort.



3.2 Change the Recruitment and Reward System

3.2.1 Establish a flexible compensation structure and an aggressive reward system commensurate with qualifications, experience, and expertise of the faculty members in all Government and private institutions.

3.2.2 Set a goal of grooming and producing 10 Nobel laureates and 10 times as many innovators, who have to their credit world-class patents, in the next 15-20 years. This goal can only be stimulated by grooming excellence at all ages and levels—from recognizing and rewarding members of national and international academies to recognizing and rewarding young prodigies out of schools and colleges.

3.3 Enable Balancing of Teaching and Research Responsibilities

3.3.1 Maintain a reasonable balance amongst teaching, research, self-development, and administrative duties. In a multi-group academic structure, faculty in Group R universities would focus more on research; in Group P institutions, teaching would receive greater attention; and in Group S, the focus would shift to technical and trade education and skill-development in large numbers and hence on innovations in teaching-learning methodologies for improving cost-effectiveness.

3.3.2 Make effective use of open courseware, e-Learning and Synchronous Learning Technology (SLT), and electronic assessments to improve the efficiency of utilization of faculty time in teaching.

3.3.3 A proper balance between teaching and research should help increase the number of PhD degree holding professors in universities. Leverage the large population of Indian diaspora in the academic field globally to serve as joint guides for PhD supervision.



3.3.4 Foster professional development of faculty and collaborative research in Engineering by promoting and funding programs such as the Indo-US Collaboration for Engineering Education, an initiative of PanIIT.

3.4 Set up an 'Institute of Teaching Professionals' on the Lines of the 'Institute of Chartered Accountants'

3.4.1 This Institute will certify faculty members at many levels, thus creating a cadre of teaching professionals. Such professional development certificates shall be issued for specific capability at each level.

3.4.2 Faculty members will have self-determined targets on self-development, research publications, and guiding research theses and quality metrics to enable them to maintain their professional certifications.

3.5 Build Staff and Faculty College in Each University

Each university must have a staff and faculty college for training and development of faculty members.

3.6 Build Special Universities for Faculty Development

As one of the measures to tackle the acute faculty shortage, 10% of the new universities should be specialized institutions for development of faculty members. Today, there are about 5,00,000 faculty members and this number is still short of the requirement by 3,80,000^[9]. This gap would be bridged through these specialized universities.

3.7 Set up a Leadership Foundation for Educators

There is a need to have, at the national level, a Leadership Foundation with the charter



to develop and train the existing and future academic leaders like vice-chancellors, planners and policy makers. IIMs should run special in-service programs for management and administration of higher education.

4. Deploy Technology for Teaching and Collaborative Research

4.1 Improve Delivery Efficiency through Open Courseware and ICT

4.1.1 Adopt the Open Courseware Consortium and standards, and use of e-Learning and Synchronous Learning Technology (SLT) to increase the efficiency of educational delivery.

4.1.2 Leverage the strength of the private sector through Public-Private Partnership (PPP) on the lines of the 'ICT@Schools' program. The private sector has the technology expertise in areas of learning content development, e-Learning content development, student management system and campus management system, from which most public higher education institutions can benefit immensely.

4.1.3 Mandate all assessments to be electronic, wherever possible. This will significantly add to the efficiency of the higher education system.

4.2 Achieve Excellence through Collaborative Research

4.2.1 Use virtual networks to enable joint guidance of doctoral students and joint doctoral programs amongst countries, thereby increasing the production of PhDs in the country and the quality of faculty.

4.2.2 Leverage the existing collaborations of the GoI with leading international universities/agencies, such as University of California (UC) and UK-India



Education and Research Initiatives (UKIERI), to accomplish the above goal.

- 4.2.3 Support funded research visits, expanded conference support, and short visits with top faculty, groups and schools in the USA, and other parts of the world for faculty, students, postdoctoral scholars and researchers in laboratories to learn osmotically and to further accelerate excellence in research, as well as to build bridges to the USA and the global research community. It would be worthwhile to set apart funding and expand the two-way STIO (Scientists and Technologists of Indian Origin) program to have extensive and regular collaboration and research visits, as also longer 1- to 2-year visits. Study and adopt the Chinese, Japanese, Korean, and Finnish models.
- 4.2.4 Encourage joint research proposals with funding from agencies of the collaborating countries. This will generate research funds for mutual benefit as a result of unique contributions from each partner and will be of relevance to the global as well as local economies. The objective would be for Indian researchers to be part of the leading global research talent pool to attract research funding and contribute at a global level, and grow India's world-class research capability.
- 4.2.5 Amend the Intellectual Property (IP) Law to incorporate the anticipated complexities and nuances, which are bound to arise once the Indian research community engages itself extensively with the international research community in both conventional and technological ways.
- 4.2.6 Develop partnerships with global groups such as the International Federation of Engineering Education Societies (IFEES), which brings together Engineering education and research groups all over the world for the benefit of mankind.
- 4.2.7 Encourage collaborations amongst Indian Universities and CSIR and other national research laboratories. These laboratories are amongst the premier R&D



organizations in the country. They file a large number of patents and can extend their expertise by collaborating actively with universities. Similar laboratories in the USA are usually attached to universities.

4.3 Implement e-Governance Practices in Education

Emergence of higher education as a large sector with multiple stakeholders warrants efficient and transparent governance. The sector should learn from the best management practices in the industry for improving efficiency and effectiveness on one hand and providing autonomy on the other.

5. Establish an Active Industry-Academia Interface

5.1 Promote 'Industry with Universities Inside' and 'Universities with Industry Inside'

5.1.1 Formalize all learning occurring in industry, in the form of training or projects, into credit awards of a particular university for employees. On accumulation of certain credits, employees should be awarded a higher-level degree/diploma from that university. Academia and employers thus come together and promote work-based learning.

5.1.2 Set up incubation centers in universities to work with startups and established companies. Universities should adopt best practices from the industry. Conversely, the industry can gain from the practices of the academic world.

5.2 Create Local University-Industry Clusters

5.2.1 Attach a cluster of universities to industry organizations within a geographical area through formalized linkages.



5.2.2 Create industry supported interactive teaching and research engagements, wherein research scholars get involved in teaching and support senior academics, and will get absorbed by the industry, upon completion of their doctoral programs.

5.2.3 Encourage companies to create endowments, professorships and chairs in areas that are of interest to their organizations. Senior academicians, researchers and scholars, who are part of this initiative in academia, will also provide strategic guidance to companies.

5.3 Create a Framework for Joint IP Development

5.3.1 Create a framework for IP rights for collaborative projects between industry and academia, to enable effective technology transfer through appropriate licensing. The goal is to ensure mutual benefit for the university, industry and the government. Adopt and adapt best practices from regions in the world, such as the Silicon Valley, and universities such as Stanford which have a track record of innovation and commercialization. This should include recognition and reward for the creative faculty and students, such as academic recognition, stock options and support for startups. There should be visible benefits to the educational institution, and a clear process for industry to acquire the rights to commercialize.

5.3.2 Create joint ventures with equity participation from academia and develop spin-off companies and financial support systems for budding entrepreneurs to promote entrepreneurship on campus.

5.3.3 Develop interfaces to stimulate an ecosystem, similar to the Silicon Valley in the USA, where a culture of basic research, university-industry interaction, venture capital availability and patent creation capability to facilitate commercialization, exist together.



5.4 Encourage 'Practising Professors' and 'Professor-Practitioners'

5.4.1 Offer incentives and rewards to faculty to build startups, do consulting work and work with the industry. While it has been a common practice to involve industry practitioners in teaching, the other way round does not happen.

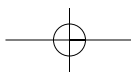
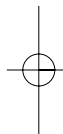
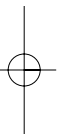
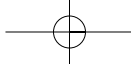
5.4.2 Encourage faculty to take sabbaticals to spend time with industry.

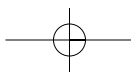
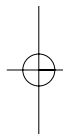
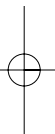
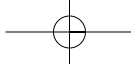
5.5 Extend Fiscal Benefits for Industry-Academia Partnership

Create an attractive fiscal regime for academia-industry partnership, including tax incentives for industry to invest in such programs.

List of References

- [1] IIT Alumni Impact Study 2008, jointly by IBEF and PanIIT
- [2] <http://www.education.nic.in> - Department of Higher Education, Statistics Section
- [3] Emerging Issues in Higher Education – Approach and Strategy of 11th Plan, Sukhdeo Thorat, UGC 2008
- [4] <http://www.arwu.org>
- [5] <http://www.education.nic.in> - Department of Higher Education, Statistics Section
- [6] <http://planningcommission.nic.in> - Chapter 1, Education
- [7] Draft Report of Working Group on Higher Education, 11th Five Year Plan (2007-12), Planning Commission, Government of India
- [8] Higher Education in India: Issues Related to Expansion, Inclusiveness, Quality and Finance, UGC, 2008
- [9] Achieving Substantial Improvement in Higher Education in India, McKinsey and Company, August 2008
- [10] CLSA India Education Outlook, March 14, 2009
- [11] Pawan Agarwal, June 2006, Higher Education in India: Need for Change, ICRIER Working Paper No. 180, ICRIER
- [12] UGC Annual Reports 2000-2004
- [13] Times of India, March 17, 2008
- [14] PanIIT Conference, 2006
- [15] CII National Committee on Education Report, March 2009
- [16] Report of the 'Committee to Advise on the Renovation and Rejuvenation of Higher Education,' June 2009 headed by Prof Yashpal.
- [17] Report to the Nation 2006-2009 by National Knowledge Commission headed by Dr Sam Pitroda.
- [18] CII-NASSCOM-ICRIER White Paper on Establishing Independent Accreditation and Regulation Systems, April 2009





About the Authors



Ashank Desai is a BE (Mech) from Bombay University, and an MTech (Mech) from IIT, Bombay, with PGDBM from IIM Ahmedabad in 1979. He is founder of Mastek Ltd. He was on the National Council of CII and presently is a member of the National Executive Council of FICCI. He is also one of the founders and past Chairman of NASSCOM, and Chairmen's Council Member. He is on the Board of Governors of IIM, Ahmedabad. He is a Distinguished Alumnus of IIT, Bombay and the Chairman of PanIIT Alumni India.



Ashok Kalbag graduated from IIT, Bombay with a BTech in Mechanical Engg in 1974. He was instrumental in leading the team for design, manufacture and commissioning of India's only indigenous Rail Flash Butt Welding Plant for North Eastern Railway at Gonda, UP. Several innovative resistance welding solutions have been developed based on his extensive and varied experience. Presently, he is Secretary General of PanIIT Alumni India, based at Mumbai. He is also a member of a core group, Programme Advisory Committee of Vigyan Ashram, Pabal, near Pune. Vigyan Ashram (<http://www.vigyanashram.com/index.htm>) is an NGO working in the field of basic technical education in rural India.



Dr Ashok Saxena, BTech, 1970, Mechanical Engg from IIT Kanpur received his MS and PhD degrees in Materials Science and Metallurgical Engg from University of Cincinnati in 1972 and 1974, respectively. Since 2003 he has served as the Dean of the College of Engg and the Irma and Raymond Giffels' Endowed Chair and Distinguished Professor at the University of Arkansas. Prior to that he served as a Regents' Professor and Chair of the School of Materials Science and Engg at the Georgia Institute of Technology in Atlanta. He is the recipient of numerous research awards and is a Fellow of ASM International and ASTM International, and of the International Congress on Fracture.



Prof Krishna Vedula is a BTech from IIT Bombay, MS from Drexel University and PhD from Michigan Tech University. He has 25 years academic teaching and research experience in Materials Science and Engg, including 10 years as a faculty member at Case Western Reserve University, 5 years as Chair of the Materials Science and Engg department at Iowa State University and 8 years as Dean of an Engg college at UMass Lowell.



Dr M P Ravindra did his PhD from IISc in 1974 and has a wide ranging experience in academics, government and industry over the last 35 years. He worked for IISc as a full time research faculty before joining NIC and worked for Wipro, HCL Tech and Infosys in varied capacity of middle and senior management positions. He was elected Infosys Fellow for his contributions to the IT field. As Head EnR & SVP of Infosys, he built up a scalable model and infrastructure for technology competence development in Infosys that is renowned worldwide as one of the best corporate universities.



Nitish Thakor is a graduate of IIT, Bombay and now a Professor of Biomedical Engg at Johns Hopkins University. He is a Fellow of IEEE and American Institute of Medical and Biological Engg and a recipient of the Presidential Young Investigator Award. He is the author of 200 journal papers and Chief Editor of IEEE Neural Engineering journal. He is the Chief Editor of PiTech, the Pan IIT magazine and Board member of IIT-B Heritage Fund.



A BTech from IIT Delhi and PGDBM from IIM Calcutta, **Pradeep Gupta** is the chairman of CyberMedia Group, South Asia's first and largest specialty media house, with brands such as Dataquest, PCQuest, Voice&Data, BioSpectrum, DARE and Global Services. Pradeep is a Past Chair of PanIIT India and a member of the IIT Delhi Advisory Council. He is Co-Founder of Indian Angel Networks; Chair, Tech Committee, Indian Newspaper Society; President of TIE, Delhi and VP, Association of Indian magazines.



Prof Ram Akella is Director of Knowledge, Info Systems and Tech Management, University of California at Santa Cruz. After a BS in Electronics from IIT, Madras, PhD in EECS (CSA) from IISc, Bangalore, he held postdoctoral appointments at Harvard and MIT (EECS/LIDS/LFM). He started as an Associate Professor of Management and CS at CMU (1985), followed by appointments at UC Berkeley and Stanford University. He has received numerous awards; major editorial and industrial boards, including UTI Ventures.



S N Zindal is a BE (Hons) in Electronics from BITS, Pilani and an MTech (Electrical) from IIT, Kanpur. He has 36 years experience in private, public and government sectors including autonomous societies with a unique blend of background in IT, Telecom and Electronics, with 12 years as a Chief Executive Officer. He is currently an independent consultant, providing consultancy and advisory services in various domains.



Vijay Thadani is the CEO of NIIT Ltd, India, a leading Global Talent Development Corporation, with operations in 40 countries. He currently chairs the CII National Committee on Education and serves on the board of Comptia, USA. He also chairs The National Accreditation Board for Education and Training, India. A 'Distinguished Alumnus' of IIT Delhi, Vijay was honored as 'Economic Consultant' to Chongqing, in the People's Republic of China.



A BTech from IIT Delhi, **Vivek Singhal** was awarded MS and MBA by the University of Michigan, Ann Arbor. He is the Chairman of a management advisory firm, Strategic Business Management (SBM), which he founded in 1986, after working for a dozen years for three Fortune 50 corporations. Vivek also serves as Director and Chairman of the Finance Committee of the Product Development and Management Association, the premier global advocate for product development and management professionals.