Facilitating Global Leadership Competencies of Tenured Faculty Members to Offer International Engineering Programs

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Abstract

In this twenty-first century, almost all countries depend on each other. Well-developed nations depend on foreign graduates to take up design, research, product development, manufacturing, and maintenance. Many fast-developing nations in Asia have to develop their higher education institutes to train outstanding graduates to take up research and development work. Unless they focus on offering needed diverse global faculty development programs and the capacity to undertake sponsored research projects, these fast-growing nations will plan to establish new companies in foreign countries. Hence, this research focuses on assessing the needs of various countries, training the faculty members to bid for consultancy projects under various international development agencies, establishing campuses in various countries, and offering graduates with excellent attributes. The Indian National Education Policy 2020 suggests that Indian higher education institutes develop diverse global faculty development programs and undertake consultancy projects under multinational companies (MNCs) and international development agencies (IDAs). The Technical Teachers Training Institute (TTTI, now NITTTR), Chennai [1] pioneered in this area and succeeded since 1980. Based on this model, this paper suggests a five-stage process of training and developing tenured faculty members, improving

the institute's resources, and getting support from the government. It is expected that most of the national institutes and institutes of national importance will launch more overseas institutes in Asia and Africa. This approach can be refined by various countries that plan to offer diverse global faculty development programs and undertake consultancy projects under IDAs and MNCs.

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1. Introduction

Nalanda University was founded in 427 CE and is considered the world's first residential Indian university, a sort of medieval Ivy League institution home to nine million books that attracted 10,000 students from across Eastern and Central Asia. They joined this university to learn medicine, logic, mathematics, and Buddhist principles from some of the revered scholars. In the more than seven centuries that Nalanda flourished, the monastic university predates the University of Oxford and Europe's oldest university, Bologna, by more than 500 years (BBC, 57). Well-known American and British universities have offered programs for international students. The last twenty-five years have witnessed the emergence of the International Branch Campus (IBC) as a means of providing Transnational Higher Education (TNE) (Rob Hickey and Dan Davies (2022). Important trends in Higher Education Internationalization and Innovation are International Branch Campuses (IBC), International Universities, joint degrees, and online and blended learning programs, including Massive Open Online Courses (MOOCs) (Jose Manuel Martinez Sierra and Jean Monet, 2015).

National Institute of Technical Teachers Training and Research, Chennai [earlier known as Technical Teachers Training Institute] [1] was established in 1964, and the British Council assisted the faculty through Huddersfield College of Education. Later, this institute became an associated institute of UNESCO's Asia-Pacific Educational Innovation for Development in 1978 and an associated institute of the Colombo Plan Staff College for Human Resources Development in 1977. This institute has offered a set of diverse global faculty development programs since 1982. There are about 3500 alumni in 150 countries throughout the world. Indian Institute of Technology (IIT), Madras, received assistance from Germany; IIT Delhi received assistance from the United Kingdom; IIT Kanpur received assistance from the USA; and IIT Bombay received assistance from the USSR. Birla Institute of Technology, Pilani, received assistance from the USA. Many American universities established their overseas campuses in the Middle East in the late 1990s, and many

Australian universities established their overseas campuses in Malaysia. The globalization of engineering education brought the exchange of ideas, scholarly rigor and excellence, and quality education.

In this 21st century, most of the fast-developing nations compete with the well-developed nations in analysis, design, developing prototype products, refining, manufacturing, planning quality, and cost-effective and energy-efficient components, marketing them globally, maintaining them, scrapping the old products, and planning efficient and innovative products. All this is due to the establishment of national and state technical universities, institutes of national importance, institutes of information technologies, management, production, institutes of science education, etc. All these institutes have established research parks to facilitate the design of innovative products in collaboration with multinational companies. The high-performing faculty members have established very effective continuing education centers, centers of excellence, and multidisciplinary research and development centers with a global focus. Due to the globalization of national economies, many foreign development organizations have substantially invested in green-field manufacturing of cost-effective products for global markets. They employ graduates of these institutes for analysis, design, development of innovative products, manufacturing, and maintenance. Most of the outstanding faculty members have excelled in advanced research, developed intellectual products, and obtained global patents. In the past ten years, around one million Indian graduate students have migrated to overseas universities to undertake postgraduate and doctoral programs. In the 21st century, the government of India has focused on attracting global students to Indian institutions and facilitating the establishment of overseas institutions in many developing countries in Africa and Asia. Many outstanding faculty members have undertaken sponsored research projects under many International Development Agencies. Only a few institutes have offered diverse global faculty development programs that are sponsored by various funding schemes of the Ministry of External Affairs and Ministry of Finance. To expand such diverse global faculty development programs and offer consultancy projects to various multinational corporations (MNCs), these institutes have to develop strategic planning. The tenured faculty members have to be developed to offer various diverse global faculty development programs and consultancy projects to MNCs. This research paper focuses on these areas. Many advanced countries have offered diverse global faculty development programs and assisted their economies. It is beneficial to offer development programs so that many industrial collaborations will emerge. When multinational companies establish their production centers, they get qualified engineers and the manufacturing cost will be minimized. Diversity brings more innovation in design and production. Millions of Indian students migrated to the USA, the UK, Canada, Australia, and Germany and earned higher qualifications, and they contributed to the growth of technology and industries in all these countries. Fast-developing countries in Asia have to focus on the globalization of higher education and become reputed creators of human and knowledge capital.

The need for establishing branch campuses in overseas countries arises to utilize the skills and abilities of outstanding faculty members, to get a global ranking of the institution, to create well-trained graduates to support multinational companies, to support the growth of companies established in the host countries, to improve trade, to supplement the growth of researchers to form consortia, and to support the market for global sales of instructional packages [2][3][4]. Fast-developing countries have to focus on the availability of rare raw materials for manufacturing and marketing finished products. Further, this initiative creates engineers without borders and ensures the availability of well-trained engineers,

scientists, managers, and computer scientists for a further global reach.

At present, only a few senior faculty members have a global focus, which they acquired during their studies in foreign universities, and are involved in various sponsored global projects. A few institutions are upgraded as associated institutions to offer local services to many international development agencies. Due to offering many global-focused programs, they are exposed to the needs of other countries. Branch campuses demand faculty members who can lead local faculty members and students to global challenges.

2. Statement of the Problem

“The need for incorporating global programs and consultancy centers at national institutes of technologies and institutes of national importance, state technical universities, deemed to be universities, and autonomous institutes is to be researched. The faculty members of the national institutes, Indian institutes, state technical universities, deemed universities, and autonomous institutes need sufficient resources, funds, and development of diverse faculty members to institutionalize the art of planning and developing needed centers to develop global programs and undertake complex consultancy programs**.** Besides these, they should have a global focus and vision to excel and be ready to offer diverse global faculty development programs under various funding agencies. Further, the government has to facilitate global programs to facilitate engineering education without borders. Fast-growing countries need to establish branch campuses in other countries under bilateral agreements.”

3. Objectives

1. To assess the needs of other developing countries in establishing technical teacher training institutes, engineering institutes, and management institutions.
2. To formulate strategic plans to establish global programs in various engineering institutes in India.
3. To train and develop the tenured faculty members in planning and implementing global programs.
4. To market these programs efficiently and attract a sufficient number of global participants.
5. To plan and establish overseas campuses in various countries through the necessary collaboration of client countries.

4. Literature Survey

Hall, Zhu, and Yan (2001)[5] asserted that a few attempts have been made to lay a foundation on how to develop individuals into global leaders. Smith and Peterson (2002)[6] stated that very little has been looked into what it takes to develop a “global leader”. Sloan, Hazucha, and Van Katwyk (2003) [7] asserted that global leadership development should be part of the strategic plan of any organization that wants to flourish in the global market. Black and Mendenhall (2007) [8] stated that leadership is extremely important for organizational success in this globalized economy. Robinson and Harvey (2008) [9] stated that in an increasingly global environment, leaders are exposed to many complex challenges,

and what many researchers know about leadership theory and development may no longer be effective in this global context. Jonna Story (2011)[10] stated that global leadership development has received increased attention in recent years from practitioners and researchers. Drawing from a global mindset, constructive development, and instructional sensitivity literature, he proposed a model for developing global leaders [11][12][13][14][15][5][16][17]. According to her, developmental activities are challenging for most individuals, and she proposed that training domestic leaders to develop psychological capital will facilitate their growth into global leaders. She developed a three-step model to become a global leader. According to her, leaders need to develop a global mindset, develop a self-authored identity, and develop an adaptation worldview. According to Levy, Beechler, Taylor, and Boyacigiller (2007) [18], a global mindset describes skills, attitudes, competencies, behaviors, strategies, and practices. A global mindset is necessary to be an effective leader in the global environment. Trade in educational services is of increasing international significance in the present scenario. Laura Engel, Heidi Gibson, and Kayla Gatalica (2019)[19] in the global education context, learned four lessons: i) The Power of the Champion, ii) Leveraging Partnerships, iii) Developing and Telling the Story, iv) Building a Network. In LinkedIn, a seven-step model for designing and delivering effective global leadership development has been discussed. The model consists of: 1. Defining the objectives and outcomes, 2. Assessing the needs and preferences of the participants, 3. Selecting the appropriate content and methods, 4. Designing the structure and schedule, 5. Implementing the programs and monitoring the progress, 6. Evaluating the program and follow-up, 7. Sharing the personal experience. However, a few nations have developed advanced programs for their faculty members to establish global programs. The World Trade Organization brought many models to improve global programs [11].

The process of globalization in the field of higher education has now received a great boost with the emergence of the General Agreement of Trade in Services (GATS)[20][21][22][23] regime. Education is identified as one of the 12 main services that have to be opened up for the free flow of trade between countries. The University Grants Commission (UGC), India's premier policy-making and regulatory body for state-funded higher education, has proactively and positively responded to globalization. Indian higher education already has a high brand value abroad, as evinced by the high and continuing demand for qualified professionals educated in India in engineering, medicine, computer science, biotechnology, etc.

4.1. Initiatives for Globalization of Indian Engineering Education

Engineering education is driven by innovation. Innovation is incubated in reputed engineering institutions. The General Agreement on Trade in Services (GATS) is a multilateral agreement under the World Trade Organization (WTO) with education as one of the services. India is a signatory of WT [20][21][22][23]. The modes of supply under GATS are:

- Mode 1: Cross Border Delivery (CBD): Programs offered through distance mode
- Mode 2: Consumption Abroad (CA): Mobility of students to foreign countries for studies
- Mode 3: Commercial Presence (CP): Establishment of campuses in foreign countries, offering programs through collaborations in foreign countries, and
- Mode 4: Movement of Natural Persons (MNP): Exchange of faculty across borders

Activities under Globalization of Higher Education

Table 1. Current Indian Practices

No.	Mode	Process	Current Practice
1	1. CA	Admission of international students in Engineering Institutions in India	Non-resident Indian students are admitted to many engineering universities,
2	2. MNP	Implementing global projects	NITTTR Chennai [1] & Bhopal [24] have their projects under the World Bank's Cement Manufacturer's Association-Danish Association for International Development-Human Resource Development project.
3	3. CP/MNP	Networked programs and projects in India and abroad	Research projects in cooperation with the best universities abroad
4	CA	Global networked programs and projects of other countries	Asian Development Bank program- ADB-NEP-974 for Nepal, UNDP sponsored project for Bhutan Technical Education, Indian Institute of Technology is implementing engineering programs in Tanzania, IIT Delhi is implementing engineering programs in Nepal, UAE, Egypt, Abu Dhabi, and Saudi Arabia [25]. The University of Madras permits overseas participants to register for part-time Ph.D. programs
5	CBD	Distance Education /Online Programs	Indira Gandhi National Open University (IGNOU) admits international students
6	CP/MNP Projects	Undertaking international projects sponsored by the World Bank, United States Agency for International Development (USAID), United Nations Development Project (UNDP), Asian Development Bank (ADB)	NITTTR Chennai[1] completed a project under USAID in water management in the southern region; UNDP sponsored project for Technical Education in Bhutan,
7	CP/MNP Faculty Training/Student Programs	Educational services through Attachés of Indian Missions abroad	NITTTR Chennai and Bhopal are conducting diverse short-term programs for faculty members from other countries under the Ministry of External Affairs (SCAPP, and TCS), the Ministry of Finance (ITEC)
8	ABET/Global Accreditation for Indian programs	A large number of graduate programs are accredited under the National Board of Accreditation (NBA)	The National Board of Accreditation has been approved by ABET

4.2. Inference

Only a handful of institutions have started implementing global programs. One of the reasons is that the Government of India has not permitted global programs. When Singapore invited the Indian Institute of Management, Bangalore, to start an MBA program, the Ministry of HRD didn't permit it. Also, when IIT Delhi planned to start a branch campus in Mauritius, the Ministry didn't permit it. Now, under the National Education Policy 2020, the government has permitted the establishment of overseas campuses in Africa, the Middle East, and Nepal. Most of the senior faculty members have their Ph.D.s from various overseas universities. In due course, many institutes of national importance and deemed universities will establish new campuses in other countries.

5. Possible Rapid Growth of New Technology Programs

The following approaches will enable the radical growth of engineering programs to meet the fast growth of advanced technologies.

5.1. Creating a Post of Chief Learning Officer (CLO) to Assess the Needs of Various Overseas Countries

Chief Learning Officer (CLO) posts are created by leading multinational companies to assess the growth of new technologies that may impact the global markets. A CLO has to study the possible impact of new technology and how it will become a market changer. He/she has to prepare a detailed information brief and pass it on to the CEO of the company to debate it and prepare the company to launch new products to stay in the market. Similarly, most of the global research universities focus on new and innovative technologies.

5.2. Creating a Post of Chief Knowledge Officer (CKO) to Collaborate with Various Centers of the Institute

A CKO has to plan to implement new products, train the workers, and add new equipment, tools, consumables, and prepare the production of new products. In technical universities, the academic council has to explore new technology-based graduate and postgraduate programs, introduce new interdisciplinary graduate and postgraduate programs. Such innovative efforts lead to capturing the fast-growing market for graduates.

5.3. Establishing Centers for Global Programs and Projects

A few autonomous institutes establish needed centers for global programs and projects if they have full academic autonomy, needed resources, outstanding faculty members, and an academic culture of innovation. A learning organization continuously provides freedom and empowers the faculty to plan many thought-provoking research projects and seek funds from national funding agencies. This effort provides a lot of success in creating knowledge capital and human capital.

5.4. Needs of Developing Countries to Establish Technical Teacher Training Institutes (TTTI Now NITTTRs) [24][1] Engineering Colleges, and Management Programs

Many official teams from various countries have visited TTTI (now NITTTR) Chennai[1] and expressed their needs. This forms only part of the identification of global needs. The participants of various courses have also expressed their countries' needs. Many courses have been developed and implemented, evaluated, and improved based on the feedback from the participants.

Table 2. Training Needs of Various Countries

Country	*Technical Teacher Training*	*Engineering*	*Management*
Singapore			Desired to develop a management school in collaboration with the Indian Institute of Management, Bangalore
Ethiopia	Technical Teacher Training College in collaboration with TTTIs (now NITTTRs) of India	Desired to establish engineering institutes in collaboration with India	
Sri Lanka	Training the teachers of Plantation Institutes of Sri Lanka		Short-term courses in Human Resource Development (HRD)
Somalia	Teacher Training through long-term programs		
Mauritius	Short-term teacher training courses, Water Resources, Environmental Engineering, Planning Technical Education, Electronics, Computer Science, Information Technology	Industrial Training Institutes, Skill Development Institutes	Short-term courses in HRD
Other countries	Teacher training courses in technical education, vocational education,	Establishing engineering colleges	Short-term courses in HRD

5.5. Developing Focused Research and Training Programs

In the last fifty years, the Government of India has introduced many funding agencies for supporting promising projects from the universities. Such R&D programs have yielded a large number of new products that are patented and offered to companies through a licensing process. Through this, many institutes have become market leaders and earned substantial income. They improved the market reputation and return on investments (ROI).

5.6. Bidding for Global Projects under various International Development Agencies (IDAs), Overseas Governments, and Multinational Companies (MNCs)

Most of the leading institutes have encouraged their outstanding faculty members to bid for complex global projects under various IDAs. This process has been popularized by many institutes. The Government should give autonomy to bid for promising projects without any bureaucratic, time-consuming process. The Board of Governors can approve such an innovative development process.

5.7. Assessing the impact and undertaking remedial measures to improve the programs

There is a need to conduct an academic audit on all completed projects to assess the strengths and weaknesses of the project planning and implementation. This will enable them to continuously improve their perception and capability of the project team. Continuous learning is possible. Learning on the job will clarify the assumptions and problem-solving abilities of the project teams.

5.8. Assessing the Faculty Skills, Abilities, and Conducting Needed Development Programs to Reach Global Leadership [11][12][8][26][13][14][15][5][16]

First, assess the current status of the accredited faculty members, their existing competencies, desired competencies, needed development initiatives, and planned outcomes. This is presented in the following Table 1.

5.9. Training and Developing Tenured Faculty to Plan and Implement Global Programs

Faculty Development Stages:

Five stages were identified as follows: 1. Tenured Assistant Professors, 2. Associate Professors, 3. Professors, 4. Deans, 5. Directors/Vice-Chancellors/Provosts. Key performance competencies were identified based on the programs completed up to 2023.

Table 2: Tenured Assistant Professors: Key Performing Competencies, Desired Competencies, Needed Development Initiatives, and Planned Competencies [36][37][38][39][40][41][13][14][15][5][16][17] **and** [27][28][29][30][31][32][33][34][35]

Key Performing Competencies	*Desired Competencies*	*Needed Development Initiatives*	*Planned Outcomes*
Strategic Planning	Identify vision, mission, program objectives, and course outcomes.	Offer in-house development programs.	Capable of preparing a strategic plan.
Create Smart Goals	Goals have to meet the fast-growing needs of MNC employers.	Offer in-house workshops.	Capable of creating smart goals.
Planning Outcome-Oriented Competencies	Planning diverse global faculty development programs.	Expose them to the art of planning and implementing diverse programs.	Capable of planning outcome-oriented competencies in graduate programs.
Planning Interdisciplinary Programs	Planning diverse global-based interdisciplinary programs.	Conduct a workshop on planning needed interdisciplinary courses and workshops.	Capable of planning and implementing interdisciplinary graduate programs.
Building Strong Communities	Create linkages with all stakeholders.	Exposure to global stakeholders like MNCs, IDAs, and Foreign Countries which are signed bilateral linkages.	Willingness to build strong communities around the institute.
Building Supportive Culture	Developing skills to assess the needs of national stakeholders.	Conduct workshops on needs analysis.	Ready to build a supportive culture.
Building Strong Institute's Communities	Developing interpersonal skills, working teams, and technical support staff.	Sharing the project-specific skills, quality, quantity, time, and deadlines.	Ability to build strong internal communities consisting of all departments and centers.
Creating Passion for Outstanding Performance	Focusing on excellence, cooperation, collaboration, and fixing smart objectives.	Cooperation and collaboration with companies, and stakeholders, generating smart objectives.	Highly motivated for outstanding performance in all academic programs, and consultancy projects.
Cultivating Outstanding Leadership Skills [15][5][16][17],	Supportive Leadership skills focused on achievement motivation.	Focusing on leadership with equity, integrity, humility, and outstanding culture.	Can cultivate outstanding leadership skills in all programs and projects.
Interdisciplinary Research Projects	To undertake real-life projects.	Assessing the needs of various companies and getting needed improvements through real-life projects.	Ready to undertake interdisciplinary research projects under IDAs.
Interdisciplinary Postgraduate Programs	To meet the challenges of disruptive technologies.	Should be based on the fast-growing industrial product design, testing, and improvement.	Ready to develop an interdisciplinary-postgraduate program under an MNC.
Equity [27][28][29][30][31][32][33][34][35]	Sharing the resources with all faculty members without any discrimination.	Never discriminate against the faculty.	Ready to share the project gains as per the service rendered and norms.
	Providing assistance and support to	Provide needed support when	Be ready to assist the team members when

Empathy	Providing assistance and support to fellow members	they struggle to complete the project.	Be ready to assist the team members when they face difficulties
Counselling	Providing needed information to solve the problems.	Counsell when they have to choose the appropriate method.	Gather controlling rules, acts, norms, and laws, and analyze, and counsel the students.
Coaching	Providing advanced skills to team members to succeed.	Develop needed talents through coaching.	Be an expert in coaching.
Mentoring [35]	To resolve the personal and professional issues/ conflicts	Be available when they need advice and suggestions.	Be an expert mentor to team members.
Self-directed Learning	Plan to acquire needed advanced skills, competencies, and attitudes.	Encourage them to choose massive open online courses [MOOCs] or suggestions to choose needed courses.	Select needed research articles, books, MOOCs, and case studies that are needed for self-directed learning.
Appreciative Inquiry	Making fellows know their skilled performance and plan to acquire needed skills.	Make them to self-evaluate and identify their shortcomings.	Encourage faculty members and students to self-assess their best performances and identify weaknesses.
Rewards for Excellent Performances	Timely rewards for excellent performances and leading to new milestones.	Appreciate the best performance and reward them.	Reward and improve the vision of the faculty and students.
Shared Governance	Cooperation in sharing the resources and technical staff.	Facilitate group problem-solving through quality circles.	Invite more assessment and guidance to solve the problems.
Decentralization	Creating opportunities for quick and timely decisions for projects during negotiations with clients	Make the groups responsible for auditing the progress, to overcome bottlenecks and improve.	Decentralize the decision-making process and make them take care of planning decisions,
Empowerment	To bid and to employ adjunct faculty members.	Empower the faculty teams to bid for projects.	Empower the faculty to prepare technical and financial proposals by following norms.
Inventing Future	Utilizing excellence to solve emerging industry-specific problems.	Focus on challenges and train them to be ready to solve the problems.	Be a creative manager and plan for innovative programs to meet the arising challenges.
Immersed in New Technologies	Continuous updating of skills and competencies.	Provide courses in finishing schools.	Assess the growth of new technologies.
Engineering without borders	Focus on new emerging technologies in other nations and universities.	Let them learn to become global citizens.	Be open to assisting other developing countries without any discrimination.
Progressive Incorporation of New Technologies	Taking steps to conduct mini-courses, short-term courses, postgraduate programs, research and development programs.	Expose the growth of new technologies. Provide opportunities to learn through internships.	Plan and implement short-term courses on new technologies.
Global Challenges	Learning emerging global challenges due to unforeseen disruptions.	Give a wide exposure to challenges, and sustainable development issues.	Assess continuously emerging global challenges.
Global Mobility	Having a global mindset to travel to other countries.	Encourage attending global conferences.	Be prepared to travel to various countries to undertake development.
Creating a Network with other Development Institutions	Creating a consortium with other outstanding institutes, national labs, R&D centers of industries, and funding agencies.	Form a consortium of the best institutions to exchange the advancements.	Create a consortium of experts, departments, and institutions.
Preparing Bid Documents for Consultancy Projects	Ready to resolve problems through projects based on the terms of reference.	Forward all the letters of invitation and train the faculty to prepare bids based on the terms and conditions. Review the bid documents and	Be ready to prepare winning bid documents. A technical proposal has to meet the challenges. Financial proposals should demand adequate payments.

		suggest improvements.	
Scaffolding Global Leadership	Collaborating with other global leading faculty members.	Extend sabbatical leaves, and permit to join global institutes when they are selected.	Assess the problems and scaffold the project teams.

Stage 2: Focus on Associate Professors: After completing various learning programs, projects, and development programs, Associate Professors will be ready to plunge into global programs. However, they need more scaffolding and empowerment to plunge into challenging projects.

Table 3. Associate Professors: Key Performing Competencies, Desired Competencies, Needed Development Initiatives, and Planned Outcomes

Key Performing Competencies Over and Above Assistant Professors	***Desired Competencies***	***Needed Development Initiatives***	***Planned Outcomes***
Planning High-Quality Engineering Programs based on the Accreditation	An exposure to the macroeconomics of selected overseas countries where they can collaborate for development.	An exposure to comparative global university programs and projects.	An in-depth vision to improve the skills and abilities of the faculty teams.
Completed many consultancy projects under various governments and private companies	An exposure to possible consultancy projects on the ongoing development projects under various IDAs.	A focused workshop in the art of planning bid documents under various IDAs.	Expertise, competencies, and achievement orientation.
Successfully published research papers through international conferences/ journals	Mastered interdisciplinary competencies to select research topics and conduct research	Knowledge about the peer review process.	Expertise, competencies, and needed in-depth skills in planning and completing research projects.
Participated in many global workshops organized by IDAs	Expertise in developing research methodologies, and presenting them to a group of faculty members.	Institutes can offer needed abilities through MOOCs, in-house programs, and international conferences.	Competencies in planning needed consultancy projects.
Created vision for global programs	Ready to prepare a strategic plan centered around the letter of invitation (LOI).	Provide case studies on the successful completion of challenging projects.	Ready to interpret the terms and conditions of the global clients.
Capable of planning needed diverse courses for global participants	Select a set of sample courses, and analyze the training needs, resources, resource persons, funds, and contracts.	An exposure to various ongoing innovative programs in various universities.	Should be ready to plan diverse courses for a selected nation.
Capable of undertaking consultancy projects under various IDAs	Capable of checking the terms and conditions, nature of organizations, and nature of the faculty.	Assess the strengths and weaknesses of the institute team.	Be ready to undertake the consultancy project.

New Challenges:

- Excellence in Developing Outcome-Oriented Curriculum, Participative Instructional Design, Conducting Curriculum-Specific on-the-job training in cooperation with the specified companies
- Appreciative Inquiry, Innovations in Teaching, Interdisciplinary Instructional Packages, Interdisciplinary and Collaborative Research, International Publications, Creating Intellectual Properties, Services to Industries, Institutions, Society, and Engineering Departments, Global Consultancies under International Development Agencies

Stage 3 Professors: Key Performing Competencies, Development Initiatives, and Planned Outcomes

Table 4.

Key Performing Competencies over and above Associate Professors	*Desired Competencies*	*Development Initiatives*	*Planned Outcomes*
Capable of guiding globally focused research programs	Planning interdisciplinary research programs based on the needs of a nation	Skills in forming competent teams who have proven track records in global research programs	Outstanding skills in analysis, design, collecting data, interpret and draw inferences.
Capable of preparing country-specific consultancy projects	Provan track record in completing consultancy projects.	Ready to assess the terms, conditions, resources, status of the institutes, planned growth, and vision of the authorities.	Propose the desired outcome based on the in-depth analysis, prepare, and implement successful projects.
Undergone many visits to foreign universities	Should be having in-depth expertise on the resources, people, opportunities, and potential for transformation in various countries.	Critical analysis, problem-solving abilities, and country-specific strategic planning for radical growth.	Creating a vision for radical growth.
Capable of conducting international conferences on upcoming technologies	Should have sufficient expertise in planning international conferences to share the expertise of various researchers and their impact on the macro economy.	Ready to explore the resources, people, development organizations, potential areas for commercial development, and formulating strategic planning	Ready to lead a country-specific development team, and plan variable projects, resulting in capacity development, quality improvement, and efficiency improvement.
Capable of organizing needed global faculty development programs	Variety of expertise, and track records in organizing and implementing diverse global faculty development.	Ready to join development initiatives under various IDAs.	Institutionalize the development programs for critical faculty members and administrators through in-country development institutes.

New Challenges:

- Academic Administration, Interdisciplinary Research Center Director,
- Supporting fast-developing professors
- Scaffolding to Reach Global Leadership

Stage 4 Dean: Key Performing Competencies, Desired Competencies, Development Initiatives, and Planned Outcomes

Table 5.

Key Performing Competencies Over and Professor	*Desired Competencies*	*Development Initiatives*	*Planned Outcomes*
Supportive Leadership [42][43][44]	Posssing outstanding leadership qualities	Proven track in human resource development	Transformative skills in global leadership
Skills in assessing growth based on new technologies [7]	Expertise in assessing the growth of disruptive technologies	Success in planning a range of new technology programs based on cutting-edge technologies	Capable of identifying and selecting promising technologies
Skills in planning cutting-edge programs around new technologies	Working with various regional and national development teams	Success in implementing cutting-edge technologies through developed faculty members and institutions	Capable of developing local experts to plan cutting-edge programs
Getting research and development funds from National Councils/Commissions, and Global Agencies	Developing award-winning and outstanding research and development projects under various agencies	Track record in getting needed funds from various global agencies	Developing local teams to prepare research proposals for getting funds
Member of Development Teams under IDAs, World Bank, Asian Development Bank, UNDP, UNESCO, USAID, etc.	Invited member of country-specific experts in planning and developing projects	Outstanding record of participating in various IDAs.	Planning and guiding new faculty members to work in various IDAs

New Challenges:

- Developing and Maintaining High-Performing Deans
- Exposure to Global Leadership
- Challenges
- Collaborating with International Development Agencies (IDAs) and Universities
- Bidding for Consultancy Projects under IDAs
- Improving Return on Investments (ROI)
- Establishing a Center for Diverse Global Faculty Development
- Conducting International Conferences, Workshops, Peripatetic Seminars, and Study Visits
- Building a Culture of Shared Equity Leadership
- Pathways to the Presidency

Stage 5 Directors/Vice-chancellors/ Presidents/Provosts: Key Performing Competencies, Desired Competencies, and Planned Outcomes

Table 6.

Key Performing Competencies	*Desired Competencies*	*Development Initiatives*	*Planned Outcomes*
Institutional Focus of Development	Global Focus [11][12]	Understanding of deficiencies in strategic planning in the institutes	Global Focus on Development
Regional Focus of Development	Global Focus [5][16][17]	Understanding deficits in strategic planning in the region	Engineering education without boundaries
National Focus of Development	Global Focus	Understanding the deficiencies in strategic planning at the national level	Formation of consortium for exchanging faculty members, starting global interdisciplinary research and development programs

New Roles of College Principals/Directors/Presidents:

- Administrative Acumen, Decentralizing administration, Empowerment of deans, and Fundraising Abilities
- Planning to Overcome Vulnerability, Uncertainty, Complexity, Ambiguity
- Strategic Planning to meet the challenges in the era of Disruptions
- Seeking Support from Academic Deans, Community, Alumni, Industries, Faculty Teams, Government, Funding Councils, Philanthropies, International Development Agencies, Social Media, Foreign Universities, Professional Associations, Global Universities,
- Continuous Assessment of Impacts of the Programs of the Institutes
- Establishing Centers of Excellence, Research Parks
- Collaboration with international clients
- Diverse Faculty Recruitment, Development, Scaffolding
- Global Consultancy Centers for Institutional Development
- Outstanding Leadership Skills, Creating Linkages with the Stakeholders[15][5][16]
- Fostering a Culture of Innovation
- Every Year Tactical Planning
- Create a Vision for Alignment with Innovative Leaders
- Linking Innovation to the Institution's Mission

5.10. Planning for Diverse Global Programs

Only a few of the Indian universities and Institutes of national importance have focused on diverse global faculty development programs. Since the National Education Policy 2020 suggested offering diverse global programs, there is a need for support from the Ministry of Education, Ministry of External Affairs, Ministry of Finance, and Indian Council for Cultural Relations. The Indian institutes have to improve their faculty members' vision and skills. Well-performing State Technical Universities and established Deemed to be Universities can also plan overseas campuses based on bilateral ties, funding from the local governments, soft loans from International development agencies, and local donors. They can collaborate with the existing well-developed universities, industries, and commercial organizations. They plan the best-needed institutions to meet global standards. Based on the local rules and regulations, these institutes can be registered. If there is a need, a consortium can be formed with other universities to share the academic programs.

5.11. Discussion

Till 2020, global programs had not been approved due to government policy, but TTTI Chennai systematically planned diverse global faculty development programs since 1980 under UNESCO's Asian Pacific Educational Innovation for Development. From 1982, diverse global faculty development programs were conducted under the Ministry of External Affairs, the Ministry of Finance, and the Indian Council for Cultural Affairs. The Ministry of Human Resource Development not only approved these programs but also advised the other three TTTIs in Bhopal, Chandigarh, and Kolkata to

implement them. Bhopal implemented some programs. The funds generated supplemented the grants-in-aid. Based on their experiences, the high-performing faculty members won many consultancy projects under various International Development Agencies (IDAs). Now, based on the National Education Policy 2020, most of the higher education institutes are focusing on diverse global programs. The need for developing faculty members arises. It is considered to offer needed faculty development programs to all tenured faculty members. Ultimately, their professional skills will increase, and they can bid for and undertake training and development projects under MNCs, IDAs, and the Indian corporate sector. This will bring substantial revenue and create collaboration for development. Based on the NEP 2020 [45], more high-performing institutes will plan many overseas institutes in various countries.

5.12. Validation

This model has been welcomed by various autonomous institutions, and the faculty members have been trained. However, it may take more time to create needed resources and outstanding faculty teams to practice. However, none of the national institutes or institutes of national importance has planned their methodology.

6. Conclusions

Initiatives taken by TTTIs have yielded substantial experiences, and the viability of planning and implementing diverse global faculty members. Now a large number of institutes of national importance will launch overseas campuses in Africa and Asia. The five-stage faculty development model will offer a systematic methodology to train and develop tenured faculty members. These models can also be replicated by various other countries. These will bring a reputation for the institutes and create substantial high-performing faculty members to assist many developing nations in improving their human capital. Further, this approach brings linkages with the corporate sector, MNCs, and IDAs. The graduates can become industry-ready and take up complex tasks easily. MNCs that establish their production units overseas will be assured of excellent engineering graduates for product design, manufacturing, and maintenance. Based on the liberal approval from the Government of India, more national institutes of importance would launch overseas centers, and countries in Asia, Africa, and Oceania will benefit. Meanwhile, the administrators have to develop their faculty to offer outstanding programs in overseas countries, select country-specific graduate programs, and offer outstanding programs. Ultimately, one can ensure engineers without borders.

6.4. Limitations of this Study

This study focused on diverse global faculty members undertaking consultancy projects under several IDAs and the Indian corporate sector. The duration of the programs varied from 8 weeks to 16 weeks. Only a very few overseas candidates have undergone long-term courses and interdisciplinary Ph.D. programs. Further, this institute conducted technical working group meetings in Asian countries under UNESCO’s APEID programs.

6.5. Suggestions for Future Study

It is recommended to take similar focused research work and modify it to suit the competencies of the local faculty members, culture, government policies, resources, instruction media, and the linkages with client institutions**.**

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