



*Higher Education
Institutions (HEIs) as
Catalysts for
Innovation,
Collaboration, and
Development*

Presenters



Karen A. Holbrook, Regional
Chancellor at the University of South
Florida (USF), Sarasota-Manatee



Kiki Caruson, AVP for Research,
Innovation, and Global Affairs for the
University of South Florida (USF) System



Clare Overmann, Head, Higher
Education Initiatives at the Institute
of International Education (IIE)

“Globalization has changed how nations and communities envision and support economic development in the world’s competitive landscape, how businesses seek talent, services and products across borders, how geopolitical power is redefined and knowledge is redistributed; how citizens perceive and expand their own opportunity and how universities refocus their efforts in all aspects of their missions and embrace both competition and collaboration and promote innovation in preparing our students for an ever changing world.”

Holbrook and Caruson, 2017

OUTLINE

Setting the Stage: The Centrality/Importance of Research

- To Nations
- To the University
- To national and global Innovation, Collaboration and Competition

The Impact of Partnerships

Measuring Success

- Global Rankings
- Publications

Incentivizing, Recognizing, and Rewarding Global Research and the Global Researcher

Setting the Stage: The Centrality/ Importance of Research

Higher Education Institutions (HEIs) as Catalysts for Innovation, Collaboration, and Development



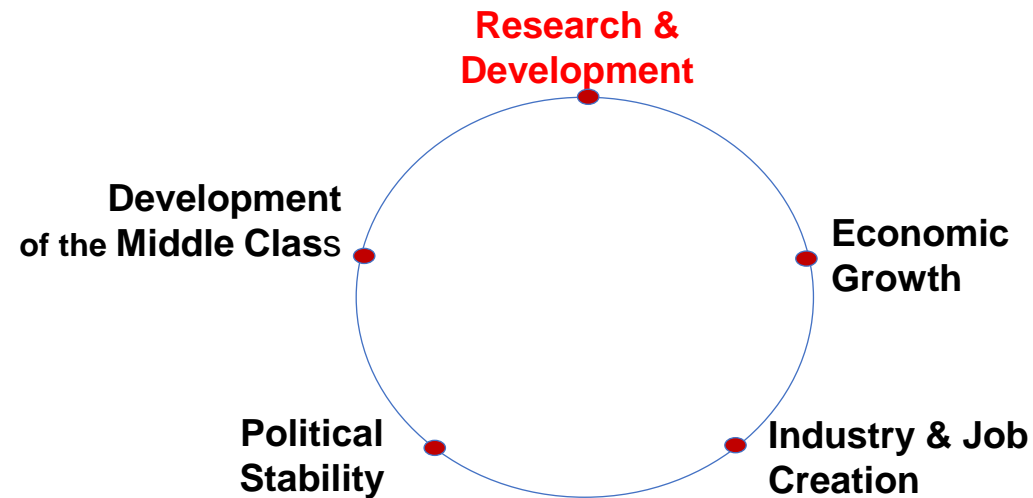
Setting the Stage: The Centrality of Research

“Somewhere, something incredible is waiting to be known.”

Carl Sagan, Astronomer

“Anything is possible through research and development. We can solve some of the most critical challenges by increasing our knowledge and understanding of the world.”

Battelle, 2014, R&D Funding Forecast, p. 3

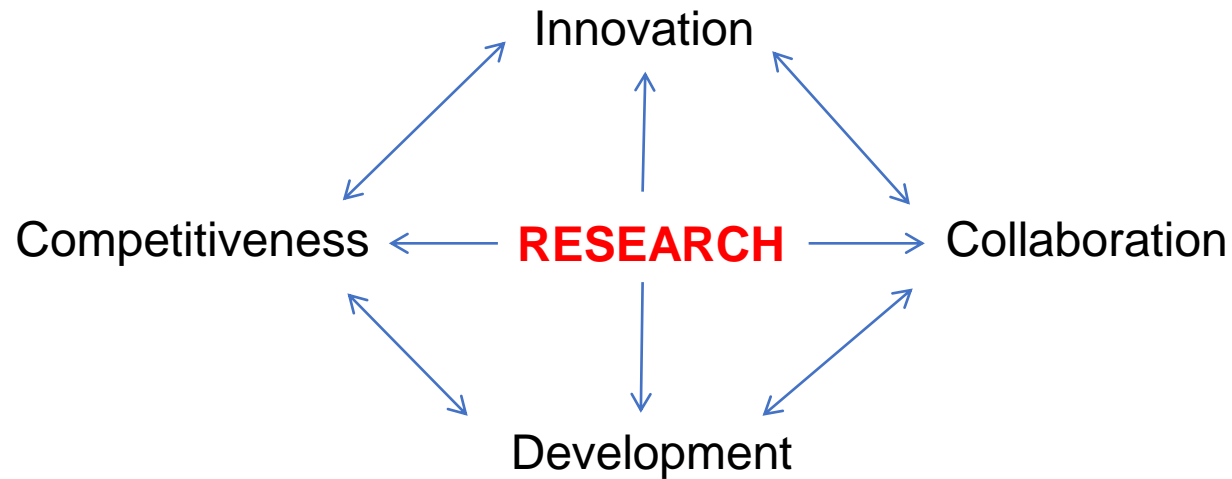


Setting the Stage: Why is Research Important to the University?

- It capitalizes on faculty passion.
- It creates an environment of innovation for students.
- It encourages innovation and entrepreneurship within the university.
- It can help provide solutions to local and regional (and global) problems.
- It enhances the reputation of the University.
- It can generate income.
- It can enhance economic development for the region.
- It can create jobs.
- It is valuable in the recruitment of industry to the region.
- It can help to grow business.



Setting the Stage: Innovation, Competition and Collaboration are the foundations for research at home and across the world.



A heightened focus on innovation and economic competitiveness demands advances in research.

Setting the Stage: The Importance of Innovation

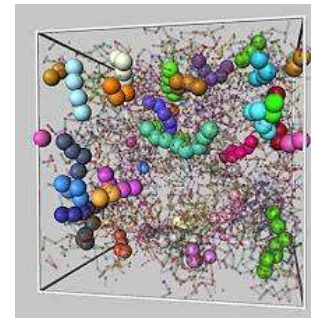
- **Innovation** is the key driver of global competitiveness, economic growth, national security and prosperity across the globe
- **Research and innovation** are key to solving the spiraling youth unemployment in many regions of the world
- **Successful innovation** is influenced by governmental policies and initiatives and the availability of an innovation infrastructure/ecosystem
 - **Innovation policies**
 - IP protection
 - R&D incentives
 - **Innovation resources**
 - Talent – S&T workforce
 - Funding for R&D and financial services
 - Access to universities and postgraduate education
 - Physical facilities and sophisticated ICT infrastructure



Setting the Stage: Innovation Sources

What are the primary sources of innovation to advance an innovation-based economy?

- Life Sciences – biomaterials, personal genomics, stem cell applications, biomedical devices surgical implants, molecular diagnostics, pharmaceuticals
- ICT (Information and Communication Technologies) – automation, artificial intelligence, machine learning, blockchain, data analytics, robotics, IoT...
- Energy – renewable, biofuels, hybrids, photovoltaics
- Chemicals and advanced materials and nanotechnology



Setting the Stage: National Innovation Systems – firms, government agencies and universities, and the relationships among them

“The future will belong to countries that are the engines of innovation.”

- Singapore.....National Innovation System – 1960’s – emphasized manufacturing and ICT
- China.....National Innovation System – 1979 – focus on universities
- India.....Decade of Innovation – 2010-2020
- UK.....Science and Innovation Investment Framework – 2004-2014
- Chile.....National Innovation Policy – 2010 to 2014
- France.....National Research and Innovation Strategy – 2009
- The EU.....Horizon 2020 Strategy
- UAE.....Vision 2021 – United in Ambition and Determination – 2010
- Saudi Arabia...National Science and Technology Innovation Plan (NSTIP) – 2013
- Colombia.....National System of Science, Technology and Innovation Project – 2010

Setting the Stage: Competitiveness

- Competition is not a challenge, but a strategy for how nations grow stronger and better.
- Competitiveness depends on the productivity with which a nation uses its human capital and physical resources.
- Competitiveness has become central to national economic policy agendas.
- What provides the competitive edge for a nation (or a university!)?
 - Innovation
 - Flexible workforce – global talent
 - Higher order educational attainment
 - Linkages between higher education and the private sector
 - Entrepreneurial culture; access to financing for start-up companies
- Tools of development, diplomacy, and defense
- Vibrant capital markets
- Strong IP protection and clear regulatory frameworks



Setting the Stage: The Global Competitiveness Report 2018

The World Economic Forum prepares a Global Competitiveness Report* annually that includes the *Competitiveness Index*. Countries are ranked using multiple variables under 12 pillars of competitiveness:

Enabling Environment



Pillar 1
Institutions



Pillar 2
Infrastructure



Pillar 3
ICT adoption



Pillar 4
Macroeconomic stability

Human Capital



Pillar 5
Health



Pillar 6
Skills

Markets



Pillar 7
Product market



Pillar 8
Labour market



Pillar 9
Financial system



Pillar 10
Market size

Innovation Ecosystem



Pillar 11
Business dynamism



Pillar 12
Innovation capability

*The GC Report assesses the ability of countries to provide high levels of prosperity to their citizens which depends upon how effectively a country uses its resources.

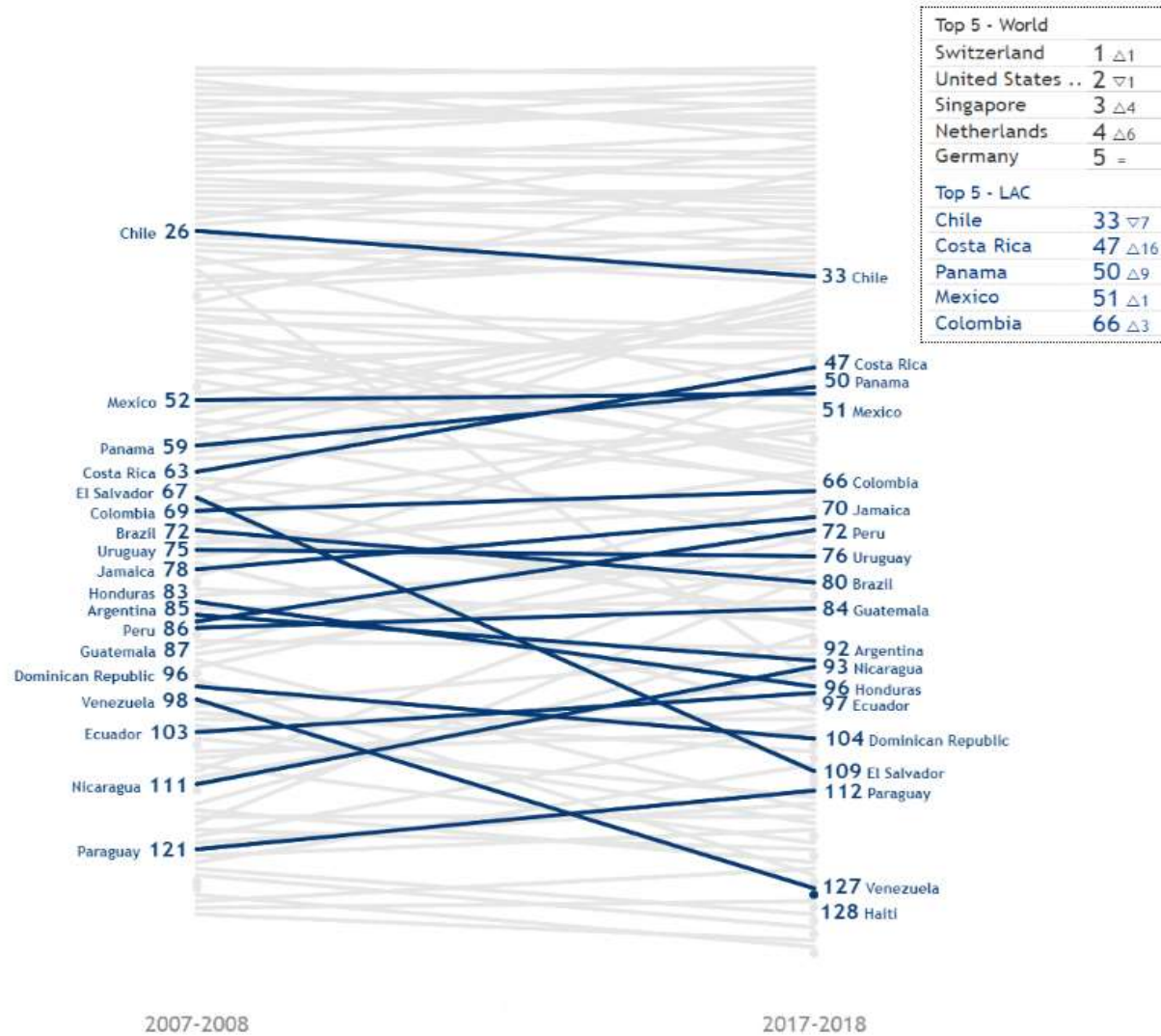


The Importance of Education

Latin America's labor markets are being challenged by technological disruption, demographic change and shifting business models. The region continues to perform in the lower middle range of the World Economic Forum Global Human Capital Index, held back by underperformance in secondary and tertiary education, along with gaps in achieving universal basic education.

Latin America also has one of the highest rates of youth not in employment, education or training. Among those looking for employment in the 15 to 24 age group, 17% are unemployed.

Innovative strategies are necessary to meet emerging talent needs and provide reskilling, upskilling, and job transition support to workers across the region. Students must be equipped with needed skills to advance the regions' workforce. http://www3.weforum.org/docs/WEF_LA18_Report.pdf



Top 5 - World	
Switzerland	1 Δ 1
United States ..	2 ∇ 1
Singapore	3 Δ 4
Netherlands	4 Δ 6
Germany	5 =
Top 5 - LAC	
Chile	33 ∇ 7
Costa Rica	47 Δ 16
Panama	50 Δ 9
Mexico	51 Δ 1
Colombia	66 Δ 3

The Impact of Partnerships

Why are Global Research Partnerships Valuable?

Building, creating, and enhancing research and educational opportunities for students, faculty, and staff that add value to the strategic direction of the university, enhance the outcomes for success, and contribute to the betterment of society.

- Provide a new source of funding
- Provide new venues for experimentation or field work
- Provide access to unique facilities and equipment
- Provide training experiences
- Provide a mechanism for exchanges of faculty/students

Global research issues are destabilizing and interrelated:

Food security, for example, is linked with poverty, sustainable agriculture, rural development, climate change, technology advancement, eco-system management, the energy crisis, population increases, trade practices and policies for national security – at a minimum.

Global research issues are transnational in nature and trans-institutional in situation.

They are “an inter-textural tangle of scientific, social and humanistic issues” that require a multifaceted, multidisciplinary, cross- cultural, interdependent and integrated approach.

“Globalization has made multi-disciplinary work essential. International cooperation is not a luxury, it is the foundation for the future.” Dr. Arden Bement, past Director of the U.S. National Science Foundation

Higher Education Institutions (HEIs) as Catalysts for Innovation, Collaboration, and Development



Collaborative Research

- **Academic Partners – Best Practices**
 - complementary discipline strengths
 - shared goals and mutually beneficial outcomes
 - resources dedicated from both/all partners
- **Non-academic Partners**
 - businesses and industry
 - civic organizations – engaged research including
 - community-based participatory research (CBPR)
 - professional organizations
 - academic societies
 - nongovernmental organizations (NGOs)
 - governments
- Relationships are established through agreements, personnel exchanges, access to facilities and sharing of unique equipment, student internships, and funded research.



In the United States, approximately one-fourth of all science and engineering articles were internationally coauthored in 2006. This number grew to 37 percent by 2016.



NAFSA INTERNATIONAL EDUCATOR NOVEMBER & DECEMBER 2018
http://www.nafsa.org/_/File/_/ie_novdec18_research.pdf

Higher Education Institutions (HEIs) as Catalysts for Innovation, Collaboration, and Development



Measuring Success

Research as a catalyst for global rankings and organizational reputation

Global Rankings have a significant impact on image and reputation and how your institution is perceived by:

- Students—the future innovators and members of the workforce
- Researchers and Faculty—the current innovators and contributors to knowledge development
- Partners and Collaborators—from business, industry, academia, government, and NGOs
- Government stakeholders—some countries limit partnerships and collaborations based on rankings
- Society—at home and abroad



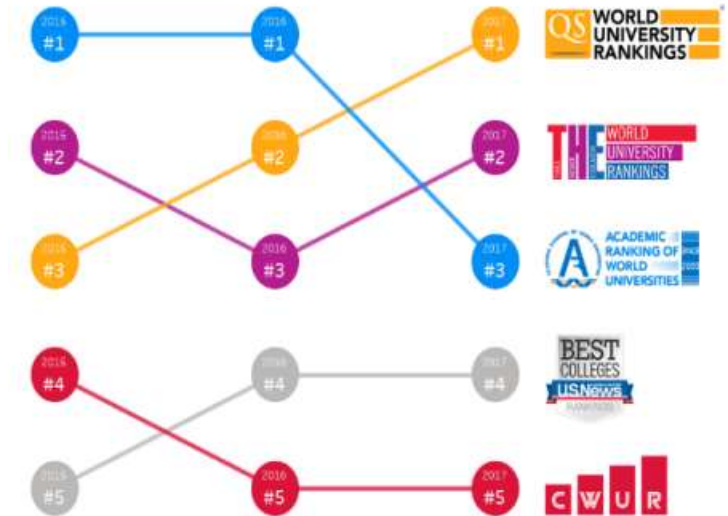
Universities Compete for Position in the Global Rankings

The top 500 universities are ranked annually by a number of systems. Rankings are a driver of the global competition and competitiveness of universities.

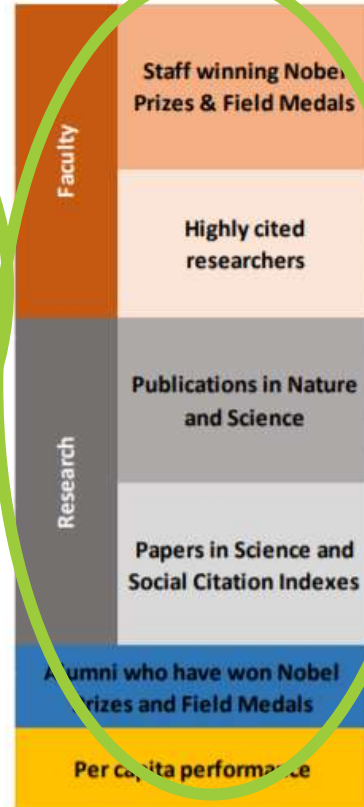
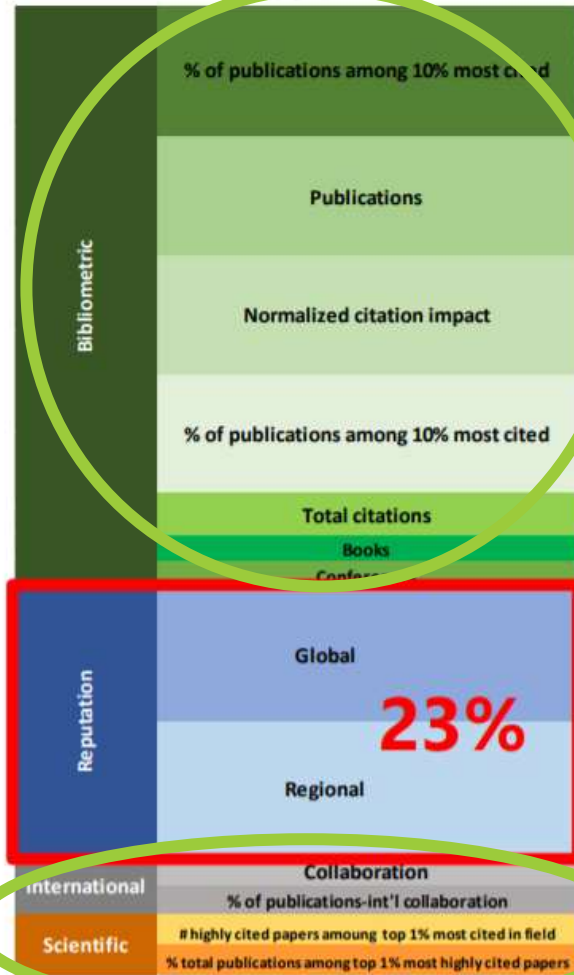
- Shanghai Jiao Tong (SJT) Academic Ranking of World Universities (ARWU)
- Quacquerelli Symonds (QS)
- Times Higher Education (THE)
- U.S. News and World Report
- Center for World University Rankings (CWUR)

Why these rankings matter

- Rankings influence university partnerships.
- Governments use the rankings to determine sites where students can use governmental scholarships.
- Some countries (Denmark and the Netherlands) prioritize immigrant status of individuals from top ranked universities.
- International students use the rankings to select sites for study abroad.



Higher Education Institutions (HEIs) as Catalysts for Innovation, Collaboration, and Development



The importance of **research** productivity, innovation, and collaboration for the top university rankings.

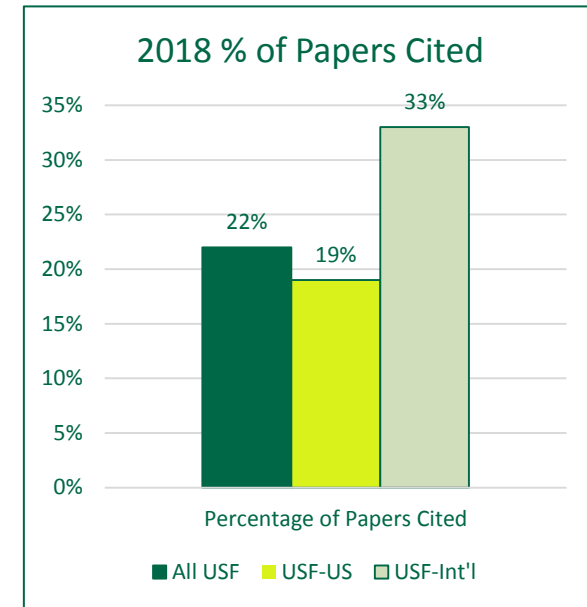
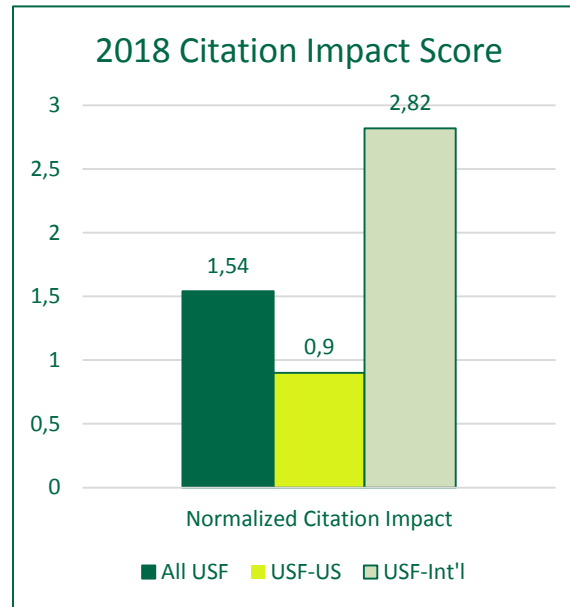
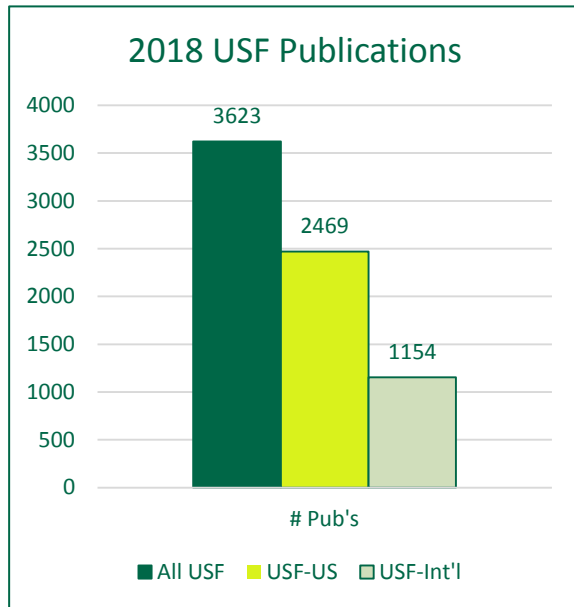


Graphic courtesy of QS.



An example of the power of internationally co-authored research:

In 2018, only 33% of the University of South Florida's (USF) publications involved an international collaborator, but this set of publications accounts for approximately half of all USF citations and has an average weighted citation index three times that of domestically co-authored publications.



Incentivizing, Recognizing, and Rewarding the Global Researcher

Best Practices: Incentivize and Support Research and the Researcher

- Release time (sabbatical) is a pre-requisite for other incentives to be effective. But release time alone does not promote research productivity.
- Financial incentives: salary, merit or bonus pay, profit sharing, internal funding programs to support research.
- Expanded criteria for career advancement. Encouraging collaborative research has a particularly strong correlation with increases in publications.
- A dedicated office to support international research efforts which often include an added level of complexity: payroll, taxes, purchasing, money transfers, reporting, travel, and other administrative and fiscal issues.
- Access to non-financial resources for research: equipment, facilities, technical support, graduate students.
- Support for innovation: entrepreneurship and technology transfer services, activities, and projects.

Best Practices for Research Recognition and Rewards

- Create Multiple University Awards for Excellence in Research
 - Career Achievement
 - Young “Stars” – Junior Faculty
 - Book or Publication
 - Innovation or Entrepreneurship
 - Mentorship of Undergraduate and Graduate Students
- Support Office for Applications for Prestigious Honors and Awards
- Gala Event for Achievement
- Letters of Recognition from Chancellor, Rector, or Equivalent

Celebrating Innovation: The National Academy of Inventors®

- Recognizes and encourages inventors who have a patent issued from the United States Patent and Trademark Office.
- Enhances the visibility of university and non-profit research institute technology and academic innovation.
- Encourages the disclosure of intellectual property.
- Educates and mentors innovative students.
- Encourages the translation of inventions to benefit society.



<http://www.academyofinventors.org/>

Innovation, based on new inventions and technologies, has proven to be a key factor in the industrial and economic development of the world. The support, encouragement and development of technology and innovation are fundamental to the success of a university.



Metrics for Evaluating International Research and Productivity

Personnel Mobility

- Number and percentage of faculty/researchers traveling internationally to (a) conduct research and (b) present research at a conference, symposium, or other academic/research setting
- Number and percentage of graduate and undergraduate students traveling internationally to (a) conduct research, and (b) present research at a conference, symposium, or other academic/research setting

Personnel Mobility

- Number and percentage of faculty/researchers actively engaged in international research projects
- Number and percentage of graduate and undergraduate students actively engaged in international research projects

Grants and Contracts

- Number and percentage of proposals (total and those with an international collaborator)
- Number and percentage of awards (total and those with an international collaborator)
- Number and percentage of awards from an international funding source, and/or award value of projects with an overseas component

Research Expenditures

- International research expenditures (total dollars and percentage of total)
- Value of research funded by foreign sponsors

More Metrics for Evaluating International Research and Productivity

Internationally Coauthored Publications and Citations

- Number and percentages of internationally coauthored publications
- Number of citations
- Normalized citation impact (field-weighted citation impact)
- Number of publication downloads or other alternative metrics

Patents

- Number and percentage of co-invented patent applications
- Number and percentage of co-invented patents issued

Prestigious Prizes

- Number of awards and prizes that are included in Association of American Universities (AAU) or Top American Research Universities (TARU) metrics – or other standard
- Number of high-caliber international awards and prizes
- Dollar value of international awards and prizes received

Partnerships

- Number of active partnerships or agreements that include an international research collaboration or project
- Number of researchers (inbound and outbound) to the partner university for research projects
- Research outputs (e.g., presentations, publications, funded grants, creative endeavors) from the partnership

Higher Education Institutions (HEIs) as Catalysts for Innovation, Collaboration, and Development



2004

"A Call to Leadership: The Presidential Role in Internationalizing the University"

2007

"A National Action Agenda for Internationalizing Higher Education"

2017

"Pervasive Internationalization: A Call for Renewed Leadership"

- Establish inclusive networks of stakeholders on campus
- Provide metrics and funding for documented goals
- Review undergraduate and graduate curricula
- Provide resources for new international research collaborations
- Include international students in enrollment management plans
- Balance the centralization of functions with the needs of colleges and centers
- Work with VPRs to promote innovative international research in an era of scarce resources
- Build discussion communities on campus
- Coordinate institutional governance structures for internationalization

<http://www.aplu.org/library/pervasive-internationalization-a-call-for-renewed-leadership/file>

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