US Agricultural Colleges' International Strategic Partnerships: Leadership's Critical Insights & Recommendations

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Abstract

Historically, U.S. colleges of agriculture have been leaders in generating, disseminating, and applying the latest science to address the needs of society, in educating the next generation of professionals and leaders, and in engaging in international partnerships. As these processes and goals become more global, strategic international partnerships become more critical. To understand how college leaders are approaching these critical relationships, deans of 33 leading U.S. colleges of agriculture were surveyed on key aspects of their international partnerships. The most frequently identified major goals were: 'enhancing the quality of research and scholarship'; and 'strengthening students' education'. However, more than half the deans noted four challenging issues for realizing productive partnerships: 'difference in educational quality and standards among partners'; 'incongruent expectations between the institutions'; 'language and cultural differences'; and 'different levels of institutional commitment'. Fewer than half the deans indicated that dedicated resources were allocated for the partnerships. Ten critical topics often identified by college strategic plans were seen by most of the deans as important for their college but not nearly as important for their international partnerships. Three quarters of the deans identified seven factors for future successful international partnerships, including: 'leadership at the program and college level'; and 'adequate resources, including funding, eligible faculty, facilities and space'. Several future research needs were identified: international strategic partnerships will require informed and creative college leadership and likely need to expand in scale, scope, diversity and complexity, draw successfully on the scientific knowledge worldwide, and carefully consider the wide, unique opportunities and challenges of these partnerships.

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Introduction

Historically and to date, institutions of higher education and especially their colleges of agriculture, environmental sciences, food, and community development[1] have played key roles in generating, disseminating and applying the latest scientific knowledge and technology to address global grand challenges and to educate the next generation of professionals, leaders, and engaged citizens. Around the world these colleges of agriculture, in large part through international partnerships, have helped transform rural societies, providing the foundation for productive, safe and sustainable food and natural resources systems, and successfully supporting the development of youth, families and communities. These international scientific partnerships have been an important part of U.S. research, education, and development for decades and particularly for food, agriculture, natural resources and community development (APLU, 2017; Busch & Lacy, 1983; Lacy, 2004; NSF, 2020; USAID, 2017, 2020; USDA, 2020). These partnerships take many forms, including agreements on cooperation, faculty and student exchanges and study abroad, dual degree programs, interdisciplinary joint research initiatives and centers, community and regional development activities, and networks, consortia and associations. Regardless of the specific nature of these international partnerships, they generally require formal institutional commitments, strong visionary leadership, adequate resources, clear and sound policies, open communication, and mutual benefit, reciprocity, respect and trust (AAA&S, 2020; Aaron et al., 2019; Altbach & de Wit, 2015; Deardorff & Charles, 2018; Dusdal & Powell, 2021; IIE, 2016; Ma & Montgomery, 2021; NSF, 2020; Sutton & Obst, 2011; Wohlert, 2020; Woldegivorgis et al. 2018; Zingerli, 2010).

Rebecca Keiser, Chief of Research Security, Strategy and Policy, and former leader of the U.S. National Science Foundation's Office of International Science and Engineering, noted that international collaboration ensures the U.S. science and engineering (S&E) community access to expertise, facilities, data, and research sites across the globe. Keeping the U.S. engaged with global research is critical to the health of our S&E enterprise. The National Science Foundation is committed to international cooperation in science, engineering and education research. Keiser pointed out: "We value our international partnerships around the globe and recognize that the most challenging science requires international cooperation" (NSF, 2018a, 2020).
Keiser further observed that large-scale research networks that connect U.S. researchers with partners in other countries will be key for tackling scientific grand challenges and pushing the frontiers of science in ways that are impossible for typical lab-to-lab collaborations. To meet this need, she announced an NSF program (Accelerating Research through International Network-to-Network Collaborations, or AccelNet) which aims to accelerate the process of scientific discovery and prepare the next generation of U.S. researchers for multi-team international collaborations. Among the projects to be funded are community-identified grand challenges to improve understanding of the organisms, systems and sustainability of our planet, as well as solutions to pressing problems related to the air we breathe and the food we produce (NSF, 2020). Similarly, the National Science Foundation's *Science & Engineering Indicators 2018* report (NSF, 2018b) asserted that for the U.S. to continue to act as a global economic, security, and scientific leader, its scientists and engineers must be increasingly involved in global collaborations.

A recent article in *Nature* (Crew, 2019) reported that, since 2004, the number of international scientific collaborations globally has tripled, as has the number of co-authored publications. From 2000 to 2015, the percentage of scientific publications produced by authors from two or more countries doubled, from 10.7% to 21.3%. Moreover, field-weighted citation analyses showed that the impact of these co-authored publications was considerably higher than those authored from only one country. (Ribeiro et al., 2018; Pan et al., 2012).
Many science, research and educational institutions have stressed the critical importance of international strategic partnerships and research collaborations (Chen et al., 2019; Kirstin et al., 2020; IIE, 2016). In late 2020, the American Academy of Arts & Sciences (AAA&S) published a key report entitled *America and the International Future of Science* as part of the project "Challenges for International Scientific Partnerships" (CISP)

[1] U.S. colleges of agriculture have many different names which include environmental sciences, natural resources, forestry, community development, food, health, and life sciences. In this paper college of agriculture is used to represent all variations.

(AAA&S, 2020). This report notes that international scientific collaborations have led to many groundbreaking scientific discoveries, such as the first image of a black hole, lifesaving vaccines and therapies, and new crops that help prevent famine. The CISP project's principal conclusion was that the benefits of international scientific collaborations for the United States and the world are substantial and growing, and far outweigh the risks they can present.

This project identified six key factors that are critical for the U.S. to continue and strengthen its investments and participation in international scientific collaborations. First, addressing broad societal needs and issues and advancing science and knowledge requires action beyond national boundaries. Second, it is imperative to have open, strong, and welcoming academic institutions and research organizations. Third, because of the significant decline in the U.S. portion of the world's research and development expenditures to about one-quarter of the total (Congressional Research Service, 2020), U.S. researchers should engage collaboratively with the global scientific community. Fourth, U.S. national security is increasingly dependent on scientific and technological developments occurring in other countries. Additionally, while addressing critical global challenges, like climate change, water quality, food security and poverty alleviation, scientific cooperation helps build the foundation for mutual trust. Fifth, international scientific partnerships facilitate the sharing of the increasing expense of conducting research and ensure the U.S. participation in large international projects. Finally, the U.S. should be a participant in the development of global ethical standards, norms and guidelines for science and scientific conduct within partnerships (AAA&S, 2020).

The emphasis on strategic international partnerships, particularly in the areas of food, natural resources and the environment, is reflected in *The 2030 Agenda for Sustainable Development,* adopted by all United Nations Member States in 2015. This report provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries – developed and developing – in a global partnership. Goal 17 is focused on strengthening the means of implementation and revitalization of the global partnerships for development, with an emphasis on strong, inclusive global coalitions and collaborations. Moreover, a significant number of the goals focus on global food and nutrition, insecurity, and natural resource and community sustainability, including the following: *Zero hunger; Good Health & Well Being; Clean Water & Sanitation; Affordable & Clean Energy; Sustainable Cities & Communities; Climate Action; and Life on Land.* With just under ten years left to achieve the Sustainable Development Goals, world leaders at the SDG Summit in September 2019 called for a Decade of Action and pledged to mobilize financing, enhance national implementation, and strengthen institutions to achieve the goals by the target date of 2030 (United Nations, 2020; Lacy et al., 2004; Loconto & Fouilleux, 2019).

The U.S. Agency for International Development (USAID) has also focused on the critical grand challenges related to agriculture, food, environment, and community development, and has a long and extensive history of international research and educational partnerships in these important development-related areas. A recent publication, entitled *USAID'S Legacy in Agricultural Development – 50 Years of Progress* (USAID, 2017), documents the impressive efforts and programs to innovatively develop, test, and advance best practices in agricultural and rural development. USAID has continually pioneered new approaches in agricultural science, education, economics and social organization to improve the earnings potential and standard of living of rural and urban households. The Agency has joined with many international partners to identify emerging issues and develop common solutions.

USAID has partnered with U.S. university scientists and host-country researchers to conduct research to boost crop and animal productivity, regenerate soils, manage pests, enhance nutrition, support science-based biotechnology, pioneer remote-sensing applications, and understand farming systems. In 1971, USAID and other organizations formed the Consultative Group on International Agricultural Research (CGIAR), a partnership

of international research centers. Over the years, USAID has provided more than $1.4 billion to fund the CGIAR's work, which is estimated to have lifted food production in developing countries by 7 to 8 percent. Over the last several decades, Feed the Future Innovation Labs for Collaborative Research Support Programs (CRSPs), a unique partnership between U.S. universities, developing country institutions, and USAID's other partners, have addressed issues of hunger and poverty through science and technology. Created in 1977, these long-term collaborative research programs have focused the scientific expertise of U.S. universities on improving agricultural productivity and marketing systems, and enhancing food security in both the U.S and in developing countries. Currently there are 23 interdisciplinary multi-state international programs working in Asia, Central America, and East, Southern and West Africa, nearly all of which are led by U.S. colleges of agriculture (USAID, 2020; Lacy, 1985; Rudnick et al., 2019).

Similarly, the United States Department of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA) recognized the mutual benefits derived from international cooperation in agriculture and has established meaningful partnerships with other countries and organizations. These include partnerships with USAID's Partnerships for Enhanced Engagement in Research (PEER) Program, International Wheat Yield Partnership (IWYP) Program, Binational Agricultural Research and Development Fund (BARD), the Food and Agriculture Research Initiative with Ireland and Northern Ireland, and several partnerships with the National Science Foundation, The Tropical Agricultural Research and Higher Education Center (CATIE) and CGIAR. The Center for International Programs facilitates linkages between NIFA-funded programs and these partners to achieve greater global impacts (USDA, 2020; Unnevehr et al., 2003).

The Association of Public and Land-grant Universities (APLU) which includes all the U.S. colleges of agriculture, recently released a report focused on addressing global food and nutrition insecurity. This *Challenge of Change Commission* report (APLU, 2017) defines seven challenges for pursuing these global issues. It also details the steps that public research universities, their colleges of agriculture, and their partners must take to address these challenges and to meet global food needs by 2050. The challenges are to: increase yields, profitability and environmental sustainability; develop the varieties and breeds for a sustainable food system; decrease food loss and waste; create and share resources that serve all populations; ensure inclusive and equitable food systems; address dual burdens of under-nutrition and obesity; and ensure a safe and secure food supply that protects and improves public health. The report includes a strong recommendation for more strategic collaborations with our colleagues in industry, academia and government around the world (APLU, 2017; Lacy et al., 2014, 2020; Welsh et al., 2008; Glenna et al., 2007; Payumo et al., 2019).

Complementing the importance of international partnerships for research and development, is the equally important role of these partnerships for the development of the citizens, professionals, and leaders of tomorrow (Marginson & Smolentseva, 2014; Marginson, 2017). As E. Gordon Gee, President of West Virginia University, recently noted:

> *"Globalization has helped create new demands for graduates who understand our world and can compete in an international workplace. It is our job, as leaders in higher education, to connect our students to the world and the world to them…. At this fragile time in our world, it is more important than ever to give our students the skills, experience, and knowledge that will help them pursue global opportunity, understanding and, ultimately, peace." (Deardorf & Charles, 2018: xi-xii).*

With these broad global agendas in mind, strategic international research and educational partner ships and collaborations have become particularly relevant for colleges of agriculture. The previous discussion of the reports and initiatives of NSF, AAA&S, USAID, USDA, APLU, and the UN SDG strongly indicate that the challenges of food security, safety and quality, environmental sustainability and climate change, and rural development are global, requiring strategic international collaborations. U.S. colleges of agriculture have

been leaders with a long history of successful research and educational and extension collaboration, and will need to enhance and continue to build on that foundation. In addition, unlike many other university units, U.S. colleges of agriculture have committed senior administrative leadership (Associate Deans and Directors) dedicated to international collaboration.

While this review has emphasized the research, educational, and outreach benefits of international strategic partnerships, as well as the critical role of U.S. colleges of agriculture, it is equally important to acknowledge that imbalances often exist in these relationships. Most international partnerships bring together institutions with different resources and capacities. The asymmetrical power relations that may impact the partnerships are at the center of the North-South[2] theoretical debate. In the global South, due to lack of resources, financial support, and human capital, many colleges of agricultures are unable to function as a true partner. This inequality may influence the outcomes and the course of decision making, goals and programs of these strategic partnerships.

Nonetheless, within this context, describing and understanding the leaders' perceptions and opinions on the nature and goals of these partnerships, their issues and challenges, as well as successful models, are essential to future success (Deardorf & Charles, 2018; Merkx & Nolan, 2015; Heyl & Hunter, 2019). How do college leaders see their role in these international and transnational partnerships? In many instances, deans, directors and university vice-presidents play a critical role in developing and maintaining strategic research and educational collaborations. Yet, we know little about how they see their role, and specifically their perceptions that tend to shape the outcomes of their college's partnerships. This study focuses on college of agriculture leaders' perceptions of their international partnerships, to better understand and enhance those relationships.

Study Design

This study focused on those U.S. colleges of agriculture which, in numerous international rankings, are among the top colleges of this type in the world. Two research-oriented world rankings were used: the QS World Rankings of Colleges of Agriculture and Forestry, and the Shanghai Ranking of Academic Subjects. In 2020 in both rankings, U.S. colleges of agriculture constituted one third of the top 25 and the top 50. For our research, colleges were selected according to their QS rankings. The QS subject rankings are compiled using four sources. The first two of these are QS's large global surveys of academics and employers, which are used to assess institutions' international reputation in each subject. Academics are asked to list up to 10 domestic and 30 international institutions which they consider to be excellent for research in the given area. They are not able to select their own institution. Similarly, employers are asked to identify up to 10 domestic and 30 international institutions which they consider to be excellent for the recruitment of graduates, and the disciplines from which they prefer to recruit. The second two indicators assess research impact, based on research citations per paper and h-index in the relevant subject. These are sourced from Elsevier's *Scopus* database, the world's most comprehensive research citations database (Craig, 2021; QS World University Rankings-Methodology, 2021). One of the key changes over the last decade has been the increased ranking of institutions outside the U.S. and their enhanced quality and productivity. Consequently, the opportunity and value in international partnerships and collaborations with colleges of agriculture outside the U.S. continues to grow.

A cover letter on a U.S. college of agricultural and environmental sciences letterhead was sent to 40 U.S. college of agriculture deans explaining the nature of the study and asking them or an appropriate designated senior administrator,[3] to complete a 14-question Qualtrics survey. The survey was developed from an exten-

[2] The North is mostly correlated with the Western World, while the South largely corresponds with the developing countries (previously called the "Third World"). The two groups are often defined in terms of their differing levels of wealth, economic development and income inequality.

[3] Since deans were asked to respond to the survey or designate their appropriate senior administrator as the respondent, this paper

sive review of the literature on international partnerships and several interviews with university leaders. The Qualtrics survey was chosen for its ease of administration and quality of data analysis. Thirty-three surveys were completed, with an 82.5% response rate.

The participating colleges represent a diverse group of institutions (Appendix A). Sixteen are ranked among the top 50 globally in the 2020 QS World Rankings of Colleges of Agriculture and Forestry, and all the institutions are among the top 350. In addition, fourteen of the colleges are located in universities that are among the best 66 research-one North American institutions as measured by membership of the Association of American Universities. They vary considerably in size. The largest colleges have over 7000 undergraduate students, over 1000 graduate students, over 350 faculty, more than 15 departments and an annual research budget in excess of $200 million. In contrast, the smallest colleges in the surveyed group have fewer than 1500 undergraduates, around 200 graduate students and 100 faculty, 6-8 departments, and modest annual research budgets. However, despite the very different sizes of the programs, all the colleges are public institutions, provide a diverse set of majors across the sciences in plants, animals, diseases, insects, natural resources, food, nutrition, economics, and communities, acknowledge the importance of globalization in their college plans, and have some international partnership agreements.

The focus of the survey was on the nature and goals of each college's international partnerships, addressing the following eight key aspects: 1. Purposes and criteria for developing the partnerships; 2. Types of existing partnerships; 3. Substantive topics important for the mission and goals of the college and for addressing grand challenges; 4. Importance of those substantive topics for the international partnerships; 5. Ways the college promotes/encourages/rewards international partnerships; 6. Challenges or issues faced in building and maintaining the partnerships; 7. Important considerations for developing successful partnerships; and 8. Suggestions to increase and enhance successful international partnerships. For each of the key aspects of their partnerships, the dean was provided with 9 to16 possible answers. The deans utilized a 5-point Likert scale to rate each possible answer within the eight key aspects, from 1=not important/never, 2=slightly important/rarely, 3=moderately important/occasionally, 4=very important/frequently, to 5=extremely important/always. After each question, they were also asked to identify other possible answers.

After responding to the eight questions on the key aspects of the partnerships, they were asked to think about an example of a particularly successful international collaboration, why it was a success, and if it was still ongoing. The respondents were also asked if they had a particularly challenging international collaboration that did not meet expectations, and if so, what the issues were and what they would consider or suggest doing differently. Finally, these college leaders were asked if they would like a copy of the report (all responded in the affirmative).

Results

Criteria for Developing International Partnerships

A fundamental question is the stated and/or unstated goals and reasons for investing personnel and resources in developing international partnerships. The deans were provided with nine possible goals and asked to rate each one, from 1=not a goal, to 3=moderate goal and 5=major goal. They were also invited to specify any additional goals. Despite the diversity of the colleges, a strong consensus on the top two goals for developing international collaborations existed, with all but two deans rating these goals as a 4 or 5 on the scale (Table 1). About three-quarters of the deans rated as a major goal (5) '*strengthening student's education and preparation for life in a multicultural world and global economy'*, while approximately two-thirds indicated that *'enhancing the quality of research and scholarship'* was a major goal (5). About half the deans also viewed

will utilize 'dean' as the source of the data.

'encourages mutual understanding and respect among students, faculty and staff of partner institutions' as a major goal. Although intellectual property and commercial products have increasingly been viewed as goals for U.S. universities, as reflected in the proliferation of campus patent offices, this was identified as a major goal by only 4 deans (Welsh et.al. 2008, Lacy et al. 2020). Finally, only two deans identified *'achieve university/college development goals (fund raising, gifts)'* as a major goal for the international partnership (Table 1). Three deans added other purposes: *'recruit top quality grad students', 'create long term collaborations with European universities'* and *'generate international endowments for student scholarship'.*

Table 1. Criteria for Developing International Partnerships*

Criteria	Mean*	% Major goal**
Strengthen students' education	4.7	73
Enhance research	4.6	64
Encourage understanding/respect	4.4	52
Enable extension/application	4.2	46
Advance international ranking	4.2	46
Generate new revenues	3.7	30
Promote peaceful solutions	3.6	27
Intellectual property/products	2.9	12
Fund raising/development	2.8	6

*N=33, 1=not a goal, 3=moderate goal, 5=major goal

** % of deans who consider a criterion very or extremely important

Number and country partners

While every college of agriculture had some partnership agreements, they differed significantly in the number of agreements and their primary partner countries. Nearly half (46%) reported 1-25 international agreements, 24% had 26-50 agreements, and 18% had 51-100. Two colleges reported over 200 agreements.

Partner institutions were located on all six continents and in 51 countries. China, with partnerships at 30 colleges, and Brazil, with 17 partnerships, were the countries most frequently identified, followed by Australia (6), India (6), and Mexico (5). Seven countries were identified as having four agreements: Chile, Ethiopia, Kenya, Netherlands, South Africa, Tanzania, and Thailand. In total, thirteen Latin American countries and eleven African countries were identified with institutional partnerships in U.S. colleges of agriculture.

Types of Partnerships

The large number of diverse existing partnerships was the major finding in this area. Two thirds of the colleges reported seven or more different types of relationships. Every college (33) had faculty engaged in collaborative research with international colleagues. Nearly all (32) had faculty/scholar exchanges and student exchanges. Other frequently occurring types of partnerships included: faculty activities (e.g., short and online courses, visiting lectures) (30); local and national development and outreach activities (25); non-funded faculty affiliate status (23); and university/government/private/NGO partnerships (23). About half the colleges reported joint or dual degrees (17) and organized programs/centers or institutes of collaborative research (16). Despite the recent emergence of international branch campuses, only one college reported a joint branch campus overseas (universities from 37 countries had a total of 306 international branch campuses in 2021 (Cross-Border Education Research Team, 2021).

Substantive Topics and Grand Challenges

For decades, colleges of agriculture have engaged in systematic strategic planning. These plans often include mission and vision statements, such as a focus on promoting agricultural, environmental, and social sustainability through research, teaching, and public engagement to meet global challenges. More specifically, they generally identify priority themes and critical topics. In the past, the scope of these themes was often narrow.

More recently, however, they have expanded to include topics such as: sustainable agriculture and food systems; equitable and healthy communities; ecosystem viability; and the challenges of climate change.
The deans in this study were asked two questions about ten critical topics or challenges. As noted above, many of these topics and goals are among those identified by USDA, USAID, APLU and the UN's 17 SDG. Specifically, the deans were asked: how important each topic was for the college's goals (1=not important, 2= slightly important, 3=moderately important, 4= very important, 5=extremely important); and how frequently each topic or challenge was part of their college's international partnerships (1=never, 2=rarely, 3=occasionally, 4=frequently, 5=always).

As Table 2 illustrates, despite some variation, all ten surveyed topics were viewed by at least 29 of the deans as extremely or very important for their college's goals. Over 70% of the deans rated four topics as extremely important (water resources, food and fiber production, food quality and nutrition, and food safely). In addition, over 60% of the deans rated the topics of land and soil and climate change as extremely important. However, the deans were evenly split between very important and extremely important in their ratings of energy issues, community development, economic development, and genetic resources and biodiversity. Other topics volunteered by a dean as very or extremely important were: '*government policy related to agriculture and environment'*, *'curriculum globalization'*, '*sustainability of materials and natural resources'*, '*tropical agriculture and soils', 'One Health',* and *'food security'*. It was unclear if these other topics were part of their partnerships.

In contrast, despite the view that all the critical topics were quite important for the college goals, these same topics were often not nearly as important a part of the college's international collaborations. This discrepancy was most apparent for energy issues, and genetic resources and biodiversity, and to a lesser extent for climate change, community development, food safety, and economic development. However, all ten topics were seen by fewer deans as frequent or always a part of their international collaborations than the number of deans viewing the same topics as important to the college mission. This gap was moreover significantly larger between the deans' ratings of topics as extremely important for their college goals, and their reporting of the same topics as always being a feature of their collaborations. Six of the ten topics (food safely, climate change, land and soil, energy issues, community development, and genetic resources and biodiversity) were seen as always, a part of their international partnerships by fewer than 20% of the deans. Given the importance and critical nature of these topics domestically and globally, and the significant and increasing role of international research for scientific advancement, this apparent discrepancy warrants further investigation.

Table 2. Critical Topics for Colleges of Agriculture and Their Partnerships

Critical Topic	College Mission	Partnership topic
	% Very/Extremely Important*	% Frequently/ Always**
Climate change	85	60
Community development	76	56
Economic development	89	68
Energy issues	85	38
Food & fiber production	91	85
Food quality & nutrition	91	82
Food safety	91	67
Genetic resources & biodiversity	85	47
Land & soil resources	94	76
Water resources	97	82

*% of deans who identified topics as important for college mission
** % of deans who identified topics as frequently/always part of their international partnerships

Support for Success

For international partnerships to be successful, several key factors need to be considered, including institutional support, leadership**,** and access to resources. Deans were asked to report on the extent to which their university/college promoted, encouraged or rewarded international collaborations. They evaluated ten possible ways in which their college supported these partnerships, from 1=not done, to 2=planning to do, 3=occasionally done, 4=usually done, and 5=always done. Nearly half the deans reported usually or always providing seven of the ten listed means of support (Table 3).

Table 3. Ways Colleges Encourage International Partnerships*

Support	Mean	% Usually/Always**
Provide quality communication facilities	4.2	88
Support student & scholar services	4.0	79
Publicize the partnerships	4.0	73
Publish with partners	3.5	58
Provide dedicated resources	3.3	49
Organize activities with the partner	3.4	46
Include collaboration in promotion criteria	3.2	45
Join organizations on global collaboration	3.1	33
Provide awards for collaboration	3.2	39
Establish collaborative institutions	3.0	27

* N=33, 1=not done, 2=planning to do, 3=occasionally done, 4=usually done, 5=always done

** % of deans indicating the college/university usually/always provides this support or encouragement to their faculty for their international activities and partnerships

Providing high quality access to international communication facilities and enabling regular communication is clearly important for establishing, maintaining and strengthening partnerships, and was the number one means of support. Services for students and scholars, including orientation, housing, and counseling, as well as the legal and visa support, provide a necessary foundation. Increasing the visibility of the partnerships and publicizing the relationships were also identified by nearly three quarters of the deans. Three fifths of the deans also indicated that their faculty edited and published in international journals with their partners. However, when it came to providing dedicated resources for the collaborations, organizing international activities with the partners, such as forums, conferences, and joint workshops, and rewarding the partnerships by including these relationships in promotion criteria and awards, fewer than half the deans indicated they usually or always did so (Table 3). If colleges wish to strengthen their international partnerships, they may need to take a harder look at the support available/offered at both the college and university level.

Potential Issues and Challenges

Domestic partnerships with other higher education institutions; federal, state and local governmental agencies; and private corporations and industries involve a number of complex organizational and logistical issues. International partnerships expand the scope and number of potential issues and challenges. The deans were provided with twelve possible issues their institutions may have faced in building and maintaining international partnerships and were then asked to rate the importance of each issue.

Every issue was identified by at least seven of the deans as a very important or extremely important issue for building their partnerships (Table 4). Moreover, all the issues were viewed as at least moderately important by more than half the deans. Over half the deans also indicated that four of the issues were very or extremely important to the collaborations. The two issues most frequently identified as problematic were:

> *'difference in educational quality and standards among partners' and 'incongruent expectations between the institutions'. Of nearly equal concern were 'language and cultural differences' and 'different levels of institutional commitment'.*

These findings suggest that, in addition to providing adequate financial and personnel support for successful partnerships, several important unique issues and challenges should also be addressed.

Table 4. Challenges or Issues

Issues	Mean*	% Extremely/Very Important**
Different educational quality	3.7	55
Incongruent expectations	3.6	55
Language & cultural differences	3.6	52
Different levels of institutional commitment	3.5	55
Unequal resource commitments	3.3	42
Academic freedom	3.2	39
Health & safety issues	3.1	33
Legal issues (e.g. liability, intellectual prop.)	3.0	36
Shifting institutional priorities	3.0	33
Change in government policies	3.0	27
Geographical distances	2.9	33
Export compliance issues	2.6	21

* N=33, 1=not important, 3=moderately important, 5=extremely important
** % of deans identifying very/extremely important issues facing their international partnerships

Important Considerations for Future Success

The earlier reported findings on support and issues strongly suggest the need to carefully consider a number of factors or components essential for establishing, maintaining and enhancing international partnerships. Some of these factors surfaced in the discussion on ways colleges support their partnerships or the issues that threaten successful implementation of international partnerships. The deans were provided with sixteen possible considerations for successful international partnerships and asked to indicate the importance of each one for making these partnerships work well.

Table 5. Considerations for Future Successful International Partnerships

Important considerations	Mean*	% Very/Extremely Important**
Committed leaders	4.7	100
Adequate resources	4.6	97
Common willingness	4.5	88
Potential for collaboration	4.2	88
Support from senior leadership	4.1	82
Respect for culture of partners	4.0	76
Clear and sound policies	3.9	76
Concordant mission & goals	3.9	73
Existing partnerships	3.8	67
Adequate communication skills	3.7	61
Supportive govt. policies	3.6	55
Complementary strengths	3.6	55
Good political relations	3.3	39
Comparable academic quality	3.2	33
Geographical distance	2.8	15
Similar structure of higher ed.	2.7	21

* N=33, 1=not important, 2=slightly important,3=moderately important,4=very important, 5=extremely important
** % of deans who see a consideration as very or extremely important

Strong agreement existed among the deans that many of these components or factors are very or extremely important (Table 5). Of the sixteen provided, over half the deans identified twelve components as very or extremely important. Moreover, three quarters of the deans indicated that seven of the considerations were very or extremely important. Leadership at the program and college level, as well as senior university leadership, was seen as very or extremely important. Unsurprisingly, all but one dean viewed *'adequate resources, including funding, eligible faculty and students, facilities and space'* as very or extremely important. The potential for collaboration, including appropriate programs and a willingness to collaborate, were also seen as key considerations. At the same time the deans recognized that the institutions are likely embedded in different cultures, politics, and economies, and that both an understanding and respect for those differences are important (76% of the deans saw this factor as very or extremely important). Other important considerations included institutional policies and supportive government policies on issues such as visas, intellectual property and employment. Factors that were not seen as important were similarities in the organization and structure of higher education, and comparable academic quality among the partners as measured by rankings, citations and funding

Conclusions & Future Research Needs

The insights of the college deans on international partnerships and collaborations highlight the continuing critical role of these relationships for colleges of agriculture in the U.S. and globally. To conclude the survey, the deans were given three open-ended questions: (1) identify a particularly successful collaboration and describe why it was a success; (2) identify a particularly challenging collaboration and describe why it did not meet expectations; and (3) share suggestions to better engage in these partnerships in the future. Several important observations and potentially useful suggestions from the leaders' responses are summarized below.

The deans generally agreed on the need to specify the rationale and choices for international partnerships to include goals, strategies, priorities, types of collaborations, and specific topics for the partnerships. They emphasized the value of creating clear policies and procedures for the partnerships, identifying appropriate leadership, and determining the degree of institutional commitment. Important administrative considerations included standardized general agreements (MOU, AOC), active working agreements (delineated goals, activities, responsibilities, resources), performance standards and assessment criteria, and established procedures for renewal/sunset. Several deans volunteered additional observations for reasons of their success, which included:

> *'institutional commitment, support and funding', 'involvement of both students and faculty', 'long-term multi-projects with significant funding and graduate student and faculty exchanges', 'shared common goals and benefits', 'mutual respect, mutual benefit', and 'mutual trust'.*

The deans' assessments of the goals, agendas, topics, issues and challenges, and key considerations identify some important issues and guidelines for developing successful partnerships. As outlined below, some findings, proposed changes, and further research needs stand out. The most frequently identified major goals of the partnerships are

> *'enhancing the quality of research and scholarship', and 'strengthening students' education and preparation for life in a multicultural world and global economy'.*

If colleges of agriculture wish to strengthen their international partnerships, they may need to take a harder look at the support available at both the college and university level. While *'high quality access to international communication facilities'* was the number one means of support, when it came to providing dedicated resources for the collaborations, organizing international activities with the partners, and rewarding the partnership, fewer than half the deans indicated that they usually or always did so.

International partnerships involve a number of complex organizational and logistical issues. Over half the deans indicated that four issues were very or extremely important: *'difference in educational quality and standards among partners', 'incongruent expectations between the institutions', 'language and cultural differences'* and *'different levels of institutional commitment'*. Successful international partnerships require attention to a number of issues unique to them. Additional research is needed on the real or perceived organizational constraints and their relative importance for achieving productive partnerships across diverse agendas and program areas.

Ten critical topics or challenges often identified by college strategic plans were also seen by most of the deans as very or extremely important for their college. However, these same topics were often not nearly as important a part of the college's international collaborations. Six of the ten topics (food safely, climate change, land & soil, energy issues, community development, and genetic resources and biodiversity) were seen by fewer than 20% of the deans as always being a part of their international partnerships. Given the importance and critical nature of these topics domestically and globally, and the significant and increasing role of international research for scientific advancement, this apparent discrepancy warrants further investigation and analysis.

This study strongly suggests the need to consider a number of important factors for establishing, maintaining and enhancing international partnerships. Of the 16 factors surveyed, three quarters of the deans indicated that seven of the factors were very or extremely important, including leadership at the program and college level (33 deans) and adequate resources, including funding, eligible faculty and students, facilities and space (32 deans). While the deans' perceptions are crucial, additional research needs to be conducted among the scientists, educators and extension professionals to elicit their perceptions and opinions. They constitute a diverse community of scholars with different disciplinary backgrounds and cultural histories, at different stages in their careers. Here, more research on these differences and implications for successful partnerships will be important.

Most international partnerships bring together institutions with different resources, capacities, agendas, and priorities. This is particularly the case in North-South educational and research partnerships. One example is the increasingly influential Food and Land Sovereignty movements and related social movements, composed of hundreds of millions of peasants, family farmers, pastoralists, farm workers, and Indigenous peoples, mobilized to challenge the destabilizing effect of trade liberalization on small producer cultures and ecosystems across the world. These movements often influence the priorities and agendas of colleges of agriculture in the South. These colleges and the related social movements seek to champion the rights of a multiplicity of diverse farming systems and food cultures to produce local food, and to protect farmers in the global South from Northern government-subsidized large-scale industrialized, energy-intensive, capital-intensive produced foods often sold at less than the market price in their markets. Additional research needs to be conducted on the unequal levels of power, resources and human capital in these partnerships, and the impact these trends and inequality may have on the success of the partnerships. Future research should include the perceptions and insights of the international partners (Holt-Giménez 2019; McMichael, 2013).

Several scholars have been analyzing academic capitalism and the neoliberal transformation of higher education (Bok, 2003; Busch 2017; Croucher & Lacy, 2021; Giroux, 2010; Slaughter & Rhodes, 2004). Through this transformation, many universities are becoming more market-oriented and are seen as a key driver in the knowledge economy. As a consequence, higher education institutions have been encouraged to develop links with industry and business in a series of new venture partnerships, and to establish university technology transfer offices which promote patenting and licensing technologies and discoveries (Lacy et al. 2020, Olssen & Peters, 2005). More research is needed to assess how these trends and transformations may affect the types, goals, and priorities of college of agriculture international strategic partnerships.

While this study focused exclusively on colleges of agriculture and included a diverse set of institutions, there may be significant differences among the colleges of agriculture and substantial differences among the other colleges in the university. Additional study and understanding of those potential differences would enhance the success of future international partnerships.

In conclusion, international partnerships are essential for the goals and missions of colleges of agriculture. In the past, colleges of agriculture have played key roles in generating, disseminating and applying the latest scientific knowledge and technology to address critical and grand challenges and to pursue global goals, thereby providing a productive, safe and sustainable food and natural resources system and successfully supporting the development of youth, families and communities. These priorities have consistently increased in importance. The critical international strategic partnerships to address these global challenges will require informed and creative college leadership, and will likely need to expand in scale, scope, diversity, and complexity, draw successfully on the scientific knowledge and wisdom worldwide, and carefully consider the wide and unique opportunities and challenges of these partnerships.

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APPENDIX A

College of Agriculture Participating Institutions*

U California, Davis ^ (2)**
Cornell U. ^ (5)
UW-Madison ^ (8)
Michigan St. U. ^ (11)
Iowa State U. ^ (16)
Purdue U. ^ (20)
Texas A&M U. ^ (21)
Oregon St. U. (Forestry) (24)
Penn St. U. ^ (31)
U. of Florida ^ (32)
N. Carolina St. U. (38)
N. Carolina St. U. (Nat. Resources) (38)
Ohio St. U ^. (40)
U. of Minnesota ^ (43)
Kansas St. U. (46)
Colorado St. U. (49)
U. of Georgia
U. California, Riverside
U. of Arizona ^
U. of Maryland, College Park ^
U. of Missouri, Columbia ^
Virginia Tech U.
Oklahoma State U.
U. of Tennessee, Knoxville
Utah St. U.
Louisiana St. U.
Louisiana St. U.- (Coast and Environment)
U. of Arkansas
U. of Hawai'i- Mañoa
U. of Kentucky
Auburn U.
U. of Vermont
U. of Delaware

*Ordered according to the 2020 QS World University Rankings by Subject-Agriculture & Forestry.
** Numbers in parentheses represent QS rankings of college globally. Other colleges were ranked in groups of 50 from 51-350.
^ Colleges at universities that are members of the Association of American Universities