Nurturing International Graduate Students for a More Diversified and Inclusive Extension Workforce

Yangxuan Liu, Wendong Zhang

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Center for Agricultural and Rural Development
Iowa State University
Ames, Iowa 50011-1070
www.card.iastate.edu

Yangxuan Liu is Assistant Professor, Department of Agricultural and Applied Economics, University of Georgia, Tifton, Georgia 31793. E-mail: Yangxuan.liu@uga.edu.

Wendong Zhang is Assistant Professor, Dyson School of Applied Economics and Management, Cornell University, Ithaca, New York 14850. E-mail: wendongz@cornell.edu. Associate Professor, Department of Economics, Iowa State University, Ames, Iowa 50010. E-mail: wdzhang@iastate.edu.

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For questions or comments about the contents of this paper, please contact Yangxuan Liu, Yangxuan.liu@uga.edu.

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Nurturing international graduate students for a more diversified and inclusive extension workforce

Yangxuan Liu*
Assistant Professor
Department of Agricultural and Applied Economics
University of Georgia
2360 Rainwater Road, Tifton, GA 31793
Yangxuan.liu@uga.edu
229-386-3512

Wendong Zhang
Assistant Professor, Dyson School of Applied Economics and Management, SC Johnson College of Business, Cornell University, wendongz@cornell.edu
Associate Professor, Department of Economics and Center for Agricultural and Rural Development, Iowa State University, wdzhang@iastate.edu

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*: Corresponding Author

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Nurturing international graduate students for a more diversified and inclusive extension workforce

Abstract

Over 20 percent of U.S. agricultural products are exported; thus, agricultural trade and understanding global markets and agricultural policies in partner countries are increasingly important for the continued success of the U.S. agricultural economy and farmers and ranchers. Heightened demand for trade-related knowledge has created new opportunities and challenges for Extension services—international graduate students represent a significant portion of the student population at many land grant universities; however, many are not exposed to Extension. We argue this creates an untapped resource to integrate graduate education and Extension services. The net effects of this untapped resource are Extension missing opportunities to recruit top talents to serve the agricultural industry and less job market success for international graduate students.

Leveraging a survey of department heads and Extension faculties in agricultural economics departments, our research helps document the status of international Extension professionals in our profession, helps identify hidden and perceived barriers for international students pursuing academic Extension careers, and provides insights into appropriate education and training programs in university graduate curricula to increase the awareness and interests of international students in Extension.

Keywords

Extension; Land Grant university; international graduate student; economic education; diversity; graduate education

JEL Codes

A23, Q16, Q18
1. Introduction

With the United States exporting more than 20 percent of its agricultural products (USDA-FAS 2018), agricultural trade is increasingly important for the wellbeing of the U.S. agricultural economy and farmers and ranchers. International markets have provided additional market opportunities for many U.S. agricultural products. Understanding global markets and consequential agricultural policies in key partner countries is important for the continued success of the U.S. agricultural industry.

This heightened demand for trade-related knowledge has created new opportunities and challenges for the land grant university Extension services. Extension has served as the media of non-formal education and provided learning opportunities to the general public, including farmers, and rural and urban residents (Lawrence et al. 2019). It takes knowledge gained through research and brings it directly to its target audiences. With globalization becoming increasingly important for U.S. agriculture, the need for talents to facilitate this exchange of information is rising for the U.S. Extension services. Integration of graduate education and Extension is a relatively understudied topic albeit Extension’s critical role for the Land Grant Universities (Bagdonis and Dodd 2010). Despite the rising importance of international graduate students in many agricultural economics departments, consideration of international graduate student education and Extension has been even more inadequate.

We argue that integrating graduate education and Extension services at land-grant universities is a critical untapped resource. On the one hand, international graduate students represent a significant and sometimes dominant portion of the graduate student population in both agricultural economics and economics departments at many land-grant universities (FWD 2021). However, many international graduate students are not exposed to or simply unaware of Extension throughout their studies, despite the fact that Extension is arguably the hallmark of the tripartite goals of U.S. land-grant universities (Taylor and Zhang 2019). We argue that the net effect is missed opportunities for U.S. Extension services to recruit top talents to serve the needs of the agricultural industry, especially in the areas of trade, nutrition and health, and agriculture and the environment. This missed opportunity also results in less job market success for international graduate students in U.S. academia.

Leveraging two separate surveys of department heads and extension faculties in agricultural economics departments, our research helps document the status of international Extension professionals in our profession, helps identify the hidden and perceived barriers for international students pursuing academic careers involving Extension and helps provide insights into the appropriate education and training programs in university graduate curricula to increase international students’ awareness and interest in Extension. The increased interests of international students in Extension could bring the workforce needed by the land grant universities to continue serving the extension purposes of the land grant mission, which would also benefit the U.S. agriculture industry in better understanding the global market.
2. Explaining the Profession of Extension in Agricultural Economics to International Graduate Students

Land Grant Universities and Colleges were established by the Morrill Act of 1862 and 1890. In 1914, the Smith-Lever Act created the U.S. agricultural Cooperative Extension Systems, which is a partnership among federal partners (the U.S. Department of Agriculture), state partners (Land Grant Universities and State Governments), and local partners (city or county governments) (Wang 2014). In 1994, tribal colleges and universities were added to the land grant systems. The Land-Grant University (LGU) System in the U.S. includes 112 Universities or colleges, including 57 units of the 1862 public universities, 19 units of 1890 historically black colleges and universities (HBCU), and 36 units of the 1994 tribal colleges and universities. The tripartite mission of land-grant universities includes research, teaching, and extension, which is transformed into teaching excellence, conducting relevant research, and engaging with stakeholders and the general public.

Of the tripartite mission of land-grant universities, extension directly interacts with the general public, bringing vital and practical knowledge gained through research and education to people to address public needs and create positive changes (Taylor and Zhang 2019). The mission of extension requires extension professionals to translate science or research findings into understandable and applicable formats that the general public uses to improve their lives and/or livelihoods (ECOP 2015). The Land Grant University Cooperative Extension Service usually includes extension specialists (faculty members, researchers, regional educators, etc.), and county extension agents and staff. Extension in agricultural economics works closely with agricultural producers, agribusiness, policymakers, natural resources, and communities to provide scientific research-based information and education and deliver timely and accurate economic analysis in a variety of topics and formats.

2.1 What are the job responsibilities of Extension Professionals?

Agricultural and applied economics Extension covers a wide array of issues from production and consumption, development, risk management, trade, policy, insurance, macrconomics policy implications, environmental and resource issues, agribusiness, finance, farm management, to rural communities and development. The primary role of extension is to provide information to improve producer decision-making and skills needed to improve profitability. Extension professionals work together with a diverse set of audiences and stakeholders, including producers, agribusiness professionals, policymakers, and other researchers.

Extension professionals develop the programs needed by their target audiences and depending on the target audiences, these programs are usually held at the off-season of the target audiences, such as during the winter season when crop producers are less busy. Extension as informal teaching, the teaching models developed need to have sufficient understandings of how producers learn to build farmers' capacity and serve educational purposes. Working in extension is a highly rewarding career. Extension professionals are able to develop long-term relationships and networks with stakeholders. Extension professionals developed self-satisfaction through meeting the needs of their stakeholders and helping people.
Extension emphasis on accountability and being a trusted source of information for their target audiences, being able to respond quickly to emerging issues. An analogy used very often by extension professionals, extension professionals oftentimes are fire fighters, whenever there is an emerging need that is critical to the livelihood of people, extension professionals need to respond quickly and provide the information needed by their target audiences. This requires extension professionals to have a broad base of knowledge and their knowledge base has mirrored the evolving needs of stakeholders (Burkhart-Krjesel et al. 2019). There are always new topics that extension professionals need to address. For the field of agricultural and applied economics, the economy changes constantly, any types of events happening from home or abroad can induce new emerging needs by stakeholders. A lot of times, extension professionals are expected to be able to educate themselves with a new topic on the first day, build the PowerPoint materials, and present to the audiences the next day.

Traveling and in-person training has been and still is a major tool extension professionals use in delivering materials to stakeholders. However, new communication technologies have lowered barriers to information dissemination and made information more accessible to farmers (Norton and Alwang 2020). In the modern era, education and applied research programs are delivered to clientele and stakeholders through multiple delivery mechanisms, such as presentations at the county, state, national, international, and industry meetings, extension and journal article publications, web-based materials, video recordings, PowerPoint slide sets, and computerized decision aids. The county delivery systems in extension are a powerful tool for extension professionals, where the information is disseminated through county extension agents to the general public.

In addition to working closely with county Extension educators and agents to meet local needs, many Agricultural Economics Extension faculty hold classroom teaching and research appointments. Extension faculty use their Extension experiences to bring real-life examples of economic principles into classroom teaching and conduct applied research to answer relevant questions which are virtual to the stakeholders. Applied researches are conducted by extension professionals in extension with a bottom-up approach, where extension faculty identify the research questions through the discussion with stakeholders and use scientific research methods to answer the questions from stakeholders. Extension professionals utilize a timely research-based method to address relevant, critical, and emerging issues to meet the needs of stakeholders and engage with the industry. Extension professionals in agricultural economics applied research programs integrate economic concepts and methods to solve the real-world challenges that agricultural stakeholders face. The goal of this applied researches is to integrate research/extension programs that empower producers and policymakers to make more economically informed decisions and improve the resilience of agricultural operations.

2.2 Challenges in Recruiting Talents by Extension in Agricultural Economics

The changing times and landscapes in the global economy signify the importance of public scholarship and engagement for the future of higher education institutions. Agricultural economists should consider how to continue attracting talents needed to fulfill the mission of land-grant universities to meet the needs of its partners and stakeholders. With the change in
focus of the land grant mission more towards research and teaching, extension suffers from
disciplinary divisions, and downsizing (McDowell 2001). Oftentimes, extension faculty feel left
out or less appreciated by their peers in their institution. Moreover, graduate education is focused
almost exclusively on teaching and research. Less focus has been put in training on translating
and disseminating the results of research to the general public and involving graduate students in
extension efforts (Bagdonis and Dodd 2010). This brings a challenge for continuing nurturing
talents to fill the needs of land grant extension systems for the field of agricultural economics
(Lawrence et al. 2021).

In addition, domestic American students' interest in pursuing a Ph.D. degree in agricultural
economics has been declining. Many domestic students choose to join the workforce after
receiving their master’s degree and forgo pursuing a Ph.D. degree in agricultural economics. In
addition, facing many career choices after graduation and oftentimes with better pay and less
stress than working in academia, many domestic American students with a doctoral degree
choose to work in nonacademic settings. Competing of talents from the agribusiness industry,
land grant universities face the challenge in recruiting talents in the field of agricultural and
applied economics. Consequently, universities have the challenge of filling the vacant of
extension professionals with a limited of applicants and a lot of times not qualified applicants.

3. Methods

Our data were collected using an online survey instrument to department heads and extension
faculties in agricultural economics at Land Grant Universities in the United States during
December 1 - 21, 2021. We conducted two rounds of surveys, first with department heads from
land grant university about their department resources in Extension and how they incorporate
Extension into their graduate programs. Followed by an in-depth survey of extension
professionals within the land grant university for their insight about the extension resources
within the department and students' involvements in Extension. This study aims to compare the
insight from the department heads and faculty members in bringing more international students'
interests in Extension and prepare them in the skills needed by Land Grant Extension systems.

The first round of surveys was sent to 59 department heads with 22 valid responses. Email
contact of the department heads of Land Grant Universities in the U.S. was collected through
searching of agricultural economics programs at the 1862 public universities, 1890 historically
black colleges and universities (HBCU), and the 1994 tribal colleges and universities. In addition
to standard demographic data, the survey collected information about the current number of
faculty with or without extension appointments, the number of faculty coming from an
international background, and also the current number of graduate students with or without
international background. We also asked about how many graduate students were placed in
extension positions in the past five years, the strength of the extension program, and the action
taken in training graduate students pursuing a career in extension.

The second round of surveys was sent via a generic link to the listserv distribution of extension
professionals within the agricultural and applied economics organizations. In total, we collected
54 valid responses from extension faculties with formal extension responsibilities. We asked the
appointment split among research, teaching, and extension, graduate students advised with and without international background, and job placement in extension for graduate students. We also asked the insight from extension faculty about the strength of extension programs in their department, the training taken to prepare graduate students in extension, and the role international students could play in extension.

4. Results

4.1 Descriptive Statistics of the Sample

22 out of the 55 department heads at Land Grant Universities with agricultural or applied economics departments responded to our survey, resulting in a 40% response rate. All surveyed respondents reported that they obtained their terminal degrees in the United States, with 17 from land grant universities. Of the 18 department heads who reported demographic information, four identify as women, and three are not White or Caucasian.

Table 1 presents the summary statistics of the quantitative questions of the survey. In particular, it shows the relative share of extension faculty or staff in the department, the international backgrounds of extension faculty, and gender of extension faculty, as well as the departmental track record in placing Ph.D. or M.S. students in faculty or staff positions with extension responsibilities. On average, there are 20 tenure-track faculty positions in a Land Grant University, with 4.4 (21%) having a formal extension appointment. In addition, on average, there are 4.5 non-tenure-track faculty with 1.1 (22%) non-tenure-track faculty with extension appointments, and 7 professional or scientific staff with 1.6 (33%) professional or scientific staff having an extension appointment. For those tenure-track extension faculties, on average, 23% are female, and only 13% have international backgrounds, 71% have extension as their primary responsibility. Females tend to work more as extension staff than tenure-track or non-tenure-track extension faculty members, with over half of extension staff being female. International scholars, working in extension, are a small set of the workforce of extension professionals, and they work more in the tenure-track faculty positions, than non-tenure-track positions, or extension staff positions.
Table 1. Results of the Survey of Department Heads

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>mean</th>
<th>sd</th>
<th>min</th>
<th>p25</th>
<th>p50</th>
<th>p75</th>
<th>max</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of tenure-track faculty having extension appointment</td>
<td>22</td>
<td>21%</td>
<td>16%</td>
<td>0%</td>
<td>12%</td>
<td>17%</td>
<td>25%</td>
<td>52%</td>
</tr>
<tr>
<td>% of non-tenure-track faculty having extension appointment</td>
<td>19</td>
<td>22%</td>
<td>29%</td>
<td>0%</td>
<td>0%</td>
<td>14%</td>
<td>33%</td>
<td>100%</td>
</tr>
<tr>
<td>% of staff having extension appointment</td>
<td>14</td>
<td>33%</td>
<td>40%</td>
<td>0%</td>
<td>0%</td>
<td>18%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>% of tenure-track extension faculty is female</td>
<td>20</td>
<td>23%</td>
<td>33%</td>
<td>0%</td>
<td>0%</td>
<td>15%</td>
<td>33%</td>
<td>100%</td>
</tr>
<tr>
<td>% of non-tenure-track extension faculty is female</td>
<td>10</td>
<td>38%</td>
<td>40%</td>
<td>0%</td>
<td>0%</td>
<td>33%</td>
<td>67%</td>
<td>100%</td>
</tr>
<tr>
<td>% of extension staff is female</td>
<td>10</td>
<td>52%</td>
<td>42%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>% of extension staff has an international background</td>
<td>9</td>
<td>8%</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td>% of tenure-track extension faculty having a primary extension appointment</td>
<td>20</td>
<td>71%</td>
<td>35%</td>
<td>0%</td>
<td>0%</td>
<td>93%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>% of non-tenure-track extension faculty having a primary extension appointment</td>
<td>10</td>
<td>73%</td>
<td>42%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>% of extension staff having a primary extension appointment</td>
<td>10</td>
<td>39%</td>
<td>23%</td>
<td>5%</td>
<td>22%</td>
<td>38%</td>
<td>50%</td>
<td>87%</td>
</tr>
</tbody>
</table>
% of non-economics MS students are international | 4 | 37% | 40% | 0% | 3% | 36% | 71% | 75%
- % of economics PhD students are international | 13 | 71% | 20% | 22% | 60% | 73% | 87% | 94%
- Number of PhD students placed with an extension position in the past five years | 18 | 0.4 | 0.7 | 0 | 0 | 0 | 1 | 2
- Number of MS students placed with an extension position in the past five years | 21 | 0.3 | 0.7 | 0 | 0 | 0 | 0 | 2
- Age | 16 | 57.4 | 7.7 | 43 | 53 | 58 | 63 | 71
- Experience as chair at current institution | 21 | 4.6 | 3.9 | 0 | 2 | 4 | 6 | 14

Note: sd, p25 p50, and p75 represents the standard deviation, 25th percentile, median and 75th percentile of the responses.

54 extension faculties responded to our survey. Of the 43 who provided demographics information, 26 identify as man, and 34 reported white or Caucasian as their race. The vast majority of respondents obtained their terminal degrees in the U.S., with three exceptions reporting obtaining Ph.D. from Africa, Canada or Europe. In contrast, eight of 44 reported obtaining undergraduate degrees from outside the United States. Among the 54 extension faculty who responded with their split between research, teaching, and extension, 24% (13 respondents) indicated that they have 100% extension appointments, 22% (12 respondents) indicated that they have extension and research two-way split, and 12% (12 respondents) indicated that they have extension and teaching two way split, and 26% (14 respondents) indicated that they have extension, research, and teaching three way split. Some faculty without formal research appointments mentioned that research is expected in their job responsibilities.

Table 2 shows the results of the survey of extension faculty. On average, they have already accumulated 11 years of experience at their current department. Out of the 54 respondents, 38-39 are currently advising economics MS or PhD students, and over 20 extension faculties also advise non-economics graduate students as well as undergraduate students. Eight and eleven surveyed faculties also reported that they successfully placed Ph.D. or Masters students with extension faculty or staff positions, respectively.
<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>mean</th>
<th>sd</th>
<th>min</th>
<th>p25</th>
<th>p50</th>
<th>p75</th>
<th>max</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Extension Appointment</td>
<td>54</td>
<td>70%</td>
<td>24%</td>
<td>10%</td>
<td>55%</td>
<td>73%</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td># advised economics MS students</td>
<td>38</td>
<td>1.5</td>
<td>2.0</td>
<td>0.0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td># advised non-economics MS students</td>
<td>24</td>
<td>0.9</td>
<td>1.9</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>0.5</td>
<td>7</td>
</tr>
<tr>
<td># advised economics PhD students</td>
<td>39</td>
<td>0.7</td>
<td>1.0</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td># advised non-economics PhD students</td>
<td>26</td>
<td>0.2</td>
<td>0.4</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td># advised undergraduate students</td>
<td>27</td>
<td>3.6</td>
<td>7.9</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>33</td>
</tr>
<tr>
<td># PhD students placed with extension positions</td>
<td>8</td>
<td>1.1</td>
<td>0.8</td>
<td>0.0</td>
<td>0.5</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td># MS students placed with extension positions</td>
<td>11</td>
<td>2.6</td>
<td>2.0</td>
<td>0.0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>% of advised economics MS students is international</td>
<td>22</td>
<td>38%</td>
<td>42%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>32%</td>
<td>100%</td>
</tr>
<tr>
<td>% of advised non-economics MS students is international</td>
<td>5</td>
<td>3%</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>14%</td>
</tr>
<tr>
<td>% of advised economics PhD students is international</td>
<td>17</td>
<td>65%</td>
<td>43%</td>
<td>0%</td>
<td>25%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>% of advised non-economics PhD students is international</td>
<td>2</td>
<td>50%</td>
<td>71%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Age</td>
<td>37</td>
<td>46</td>
<td>10</td>
<td>29</td>
<td>38</td>
<td>43</td>
<td>54</td>
<td>66</td>
</tr>
<tr>
<td>Experience at current institution</td>
<td>54</td>
<td>12</td>
<td>11</td>
<td>0</td>
<td>3</td>
<td>9</td>
<td>20</td>
<td>42</td>
</tr>
</tbody>
</table>

Note: sd, p25, p50, and p75 represents the standard deviation, 25th percentile, median and 75th percentile of the responses.
Compare the statistics from Table 1 and Table 2, 71% of Ph.D. students in the field of agricultural and applied economics are international students. 65% of the Ph.D. students advised by extension faculty in the fields of agricultural and applied economics are international students. The proposition of international students in the master’s program is significantly lower, with an average of 39% in the field of agricultural and applied economics, and 38% master students mentored by extension faculty. This shows that the potential workforce for extension professionals and partially explains the challenges of recruiting tenure-track or non-tenure-track faculty positions by Land Grant Universities in the field of agricultural and applied economics. The recruiting efforts for extension faculty at Land Grant University needs to be adjusted from mainly focused on recruiting domestic Ph.D. students to a more diverse pool of international students.

We noticed from the results that the percentage of international graduate students in the field of agricultural and applied economics is higher than the percentage of international graduate students mentored by extension faculty. This implies that there are fewer international students working with extension faculty and getting exposed to extension. This could be caused by the self-selection of international students in more of a research advisor instead of an extension advisor or could result from extension faculty tending to work more with domestic students for their better understanding of U.S. agriculture. Even with the lower percentage of international students mentored by extension faculty, they still consist on average with 65% of the entire Ph.D. student mentee population by extension faculty. Mentorship and apprenticeship are important factors for career trajectory. As a profession, we are training the future workforce of extension faculty with international students. But mystery stills exists about the job placement of these international students. Only 8 extension faculty responded that in their career they have successfully placed their Ph.D. student in extension positions, and 11 extension faculty responded that they have successfully placed their master students in extension positions.

4.2 Current Employment Situation in the Profession of Agricultural Economics

Figure 1 builds on Tables 1 and 2, and further shows the distribution of the share of extension faculty in each department and the share of their extension appointment. It shows that in most departments, tenure-track faculties with formal extension appointments account for less than 20% of the total tenure-track faculties in the department. Figure 1b) also reveals that at some departments, there are non-tenure-track faculty or staff who assist in the extension mission area as well. As shown in Figure 1 c), for those who have extension appointments, they often have extension as their predominant responsibility with extension accounting for at least half of their appointment.
Figure 1. Extension faculty and their appointment: (a) distribution of the percent of tenure-track faculty in each department having an extension appointment; (b) distribution of percent non-tenure-track faculty and staff in each department having an extension appointment; (c) percent of extension appointment reported by extension faculty.
Figure 2 shows that in 60% of surveyed departments, all current tenure-track extension faculty are domestic with none having an international background. For the departments with international extension faculty, they account for 20-45% of all tenure-track extension faculties. Similarly, 80% of department heads reported no international non-tenure-track extension faculties.

The statistics revealed from Figure 2 highlights the missed opportunities for U.S. land grant universities to leverage and utilize the talents of international graduate students in fulfilling the mission of extension. This creates additional challenges for international graduate students in the U.S. job market: although they account for the majority of graduate students in many agricultural economics departments, many international graduate students did not receive the training and mentoring to effectively compete the extension faculty or staff positions in the job market. In many departments, extension faculties do not necessarily teach in graduate classes, and sometimes are detached from the research and teaching functions of the departments. For international graduate students graduated from land grant universities, many never had a chance to know what extension is, let alone participated in extension presentations or other activities. In addition, this means that the departments and universities underutilize the talents and experiences of international graduate students to help create an inclusive and enriching experience for them. International graduate students not only could help provide unique perspectives on international trade and international agriculture as the U.S. agriculture increasingly rely on global markets, they are often well-versed in burgeoning research and extension topics such as climate change and carbon policies, local and sustainable food, adoption of technologies such as precision agriculture, and innovation and entrepreneurship in U.S. agriculture.
Figure 2. Extension faculty & staff having an international background
4.3 Current Graduate Student Pool in the Field of Agricultural Economics

Figure 3 shows the current graduate student pool in the field of agricultural economics and the potential of training international graduate students for careers with a component of extension and outreach. It shows that while there is a larger variation in the share of Master's students with an international background, in most departments over 60% of economics or applied economics Ph.D. students are international. The proportion of international students in the Ph.D. program is higher than what in the master's program as reported by department heads in the field of agricultural and applied economics. Even for the graduate students advised by the extension faculty, two-thirds of the respondents reported that over half of their Ph.D. advisees have an international background; and one-third of the respondents reported that half of their Master's advisees are also from outside the United States. It is also worth noticing that the proportion of international students advised by extension faculty, Ph.D. students is higher than the master's program. On average, 65% of Ph.D. students and 38% of master's students advised by extension faculty are international, and over 50% of extension faculty reported that all their Ph.D. students are international.

Figure 4 shows that very few extension faculties reported past successes in placing graduate students in positions with extension appointments. With a low success rate in training and placing graduate students in extension, better training in exposing graduate students in extension is needed.

**Figure 3. Graduate Students with an International Background**

![Bar chart showing the percentage of respondents with masters and PhD international background.](Image)
Figure 4. The number of graduate students placed with an extension position responded by
extension faculty.
4.4 Efforts Taken in Expose Graduate Students in Extension

In our surveys of the department heads and extension faculties, we also specifically asked the strength of the extension from in their departments and the efforts the departments have taken to help graduate students pursue a career in Extension. When we surveyed the extension faculty, we also asked them the share their thoughts about the changes that they would like to see in their department to further help graduate students pursue a career in extension.

Table 3 summarizes the categories considered as the strength of extension programs by both department heads and extension faculty. Similar viewpoints were observed between extension faculty and departments, while extension faculty stressed the strong support from the college and university and funding support in extension as the strength of their extension program. Some department heads reported that they have a strong extension program supported by a large number of extension faculty, allowing them to cover all the important subject areas needed by their stakeholders. However, other department heads shared their current challenges in extension are either lack of extension positions to support the extension efforts, or the loss of extension positions at their university. Some extension faculty shared the topic areas as the strength of their extension programs. These topics include land management, socially disadvantaged and minority farmers, crop and livestock marketing, environmental externalities, legal issues, agricultural policy, farm management, business planning, agricultural finance, risk management, economic development, leadership, and succession planning. Trust and relationship are very important in extension as one extension faculty shared “Extension is a trusted source of information, distributed through a diverse network of individuals, organizations, and businesses.”

Both department heads and extension faculties stressed the importance of allowing and encouraging graduate students to present at extension or stakeholder meetings and publish extension output. Some departments reported funding graduate student participation in Agricultural and Applied Economics Association (AAEA) extension graduate competition, and some potentially offer extension-track graduate assistantships.

However, both department heads and extension faculty reported the lack of a systematic program to expose graduate students to career opportunities in extension. Seven of the 17 department heads who responded to this question stated that they currently don’t have a systematic program to expose graduate students to career opportunities in extension. Three department heads shared that they have started putting more effort in exposing graduate students to extension, these efforts ranging from a formal class, extension-based track graduate program, and more targeted and individualized mentoring of the graduate student. Sixteen of the 37 extension faculty responded to this question reported that there is no formal training happens at the department level in training graduate students towards a career in extension. Extension faculty also made suggestions about what changes that they would like to see at the department level in training graduate students in pursuing a career in extension as shown in Table 5.
Table 3. Categories Considered as the Strength of Extension Program by Department Heads and Extension Faculty

Department Head Reported the Strength of their Extension Program

Relevance and visibility to the industry in the state, addressing real-world and community-based programs and local issues, close connection and support of stakeholders, engage and collaboration with county agents, modern communication and information dissemination method in extension, scholar basis of the extension program, strong and active research programs in support of extension efforts, multi-state programs in extension and research, interdisciplinary projects and programs, sponsored funding support for the extension, real-world credibility in teaching by extension faculty, the informal line between extension and outreach/engagement, strong extension program supported by a large number of extension faculty.

Extension Faculty Reported the Strength of their Extension Program

Good relationship with growers and industry partners, stakeholder engagement, strong reputation across the state, knowledge of the agricultural systems, strong ties with agricultural producers to address relevant issues, a critical mass of faculty to develop in-depth programs, specializations in extension topics, strong relationship with county extension agents to meet the local needs, strong support for extension across the college and university, strong funding support in extension at the college level, integration of the land grant mission (research, extension, and teaching), strong and active research programs in support of extension efforts, multidiscipline collaboration, branding of extension program supported by a hosting website and strong online presents, a mix of online deliverables with in-person meetings.

Table 4. Efforts Taken at the Department Level in Training Graduate Students in Pursuing a Career in Extension Reported by Department Heads and Extension Faculty

Department Head Reported Efforts in Training Graduate Students

Student present at extension meetings, student publish extension output, student participation in the editing process of extension publication, mentorship and collaboration with extension faculty, encourage and fund participation students in AAEA extension competition.

Extension Faculty Reported Efforts in Training Graduate Students

Involve students in extension and outreach projects, take students on extension events and field trips, student present at extension events, mentorship and collaboration with extension faculty, extension assistantships and professional development grants, curriculum development focused on extension, incorporating extension focused topics in thesis/dissertation, extension internship programs.
Table 5. Suggested Changes at the Department Level in Training Graduate Students in Pursuing a Career in Extension Reported by Extension Faculty

Extension Faculty Suggested Changes in Training Graduate Students

Invite graduate students in extension programs and events, offer seminars or courses on extension work and methods, more exposure of graduate students with extension faculty, continued and/or expanded graduate student funding in extension, emphasize the need in the dissemination of research results, formal extension track for graduate programs, involve graduate students in applied research with extension outreach and stakeholder engagement opportunity, educate students in translating research in layman’s terms, more active recruiting of graduate students interested in extension, networking opportunities for extension, opportunities to publish extension publication and present at extension events.

Selected Quotes from Extension Faculty

“I think we need to invest in communication skills and training for our international students. That is often their biggest hurdle -- language and communication skills.”

"More work study students”

“Stipends for graduate students through Extension"

“Offer a seminar on extension work”

"More participation in the AAEA extension competition”

Our survey also reveals an interesting gap in the challenges reported by department chairs and extension faculties as shown in Table 6. In particular, the department heads noted the challenges in recruiting extension faculty and how to balance the need to meet stakeholder needs and the integration with research and teaching functions of land grant universities. Similar to the observation by at least one department chair of “leaving extension faculty on an island”, many surveyed extension faculty commented that extension and their own work are often undervalued in their department and across the land grant universities. This underappreciation of extension faculty makes it less appealing in attracting talented graduate students in extension, which could create a challenge in filling the future positions in extension. One department head recognized the importance of valuing of their extension faculty as “We strive for a culture in which Extension faculty are treated and considered as equals with teaching/research faculty.”
Table 6. Selected Comments from the Department Head and Extension Faculty about Challenges Faced by Extension Professionals

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**Selected Comments from the Department Head**

“At many universities, extension can be overly bureaucratic and tradition-bound to be truly relevant to the modern needs of stakeholder groups; at other places it is often too disassociated with the main research and teaching missions of the university, leaving extension faculty on an island.”

“This is an important issue. Finding applicants for Extension faculty positions who understand Extension and U.S. agricultural/rural institutions has become a significant challenge.”

**Selected Comments from the Extension Faculty**

“It is challenging to cultivate future Extension professionals when there are many states/institutions with either limited agricultural economics extension programs or limited graduate programs. There are relatively few with both a strong, vibrant grad program and a strong, productive cohort of Extension agricultural economists.”

“I was a domestic Ph.D. student with no farm background when I graduated. I knew very little about what our Extension faculty did since I never saw them in class nor read their materials. So it’s not just foreign students who lack awareness. I’d say most graduate students are not exposed to Extension programming.”

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4.5 International Students’ Role in Extension

The surveyed extension faculties were also asked to share thoughts on their perceived roles international graduate students could play in Extension for the land grant mission, and offer advice for graduate students, especially international graduate students, interested in careers in Extension. 15 out of 34 extension faculty responded stated that international students could play the same role as domestic students in extension. However, extension faculty did recognize the lack of expressed interest by international students who want to work in extension, making it difficult to identify and cultivate potential future extension professionals.

Extension faculty also recognized the challenges international students face from being less familiar with agricultural practices and agricultural community systems, limited by language, culture, lack of knowledge of basic local/state/federal institutions, and lack of knowledge of law and regulation in the United States. Several also noted that currently many international graduate students, especially international students, lack a general understanding of the U.S., let alone
state, agricultural practices as well as the relevant regulations and institutions. This is particularly important because many extension positions expect the successful candidates to bring impact to the farmers and the agricultural or food sector stakeholders in that particular state or region.

Table 7. The Roles that International Students could Play in Extension Responded by Extension Faculty

<table>
<thead>
<tr>
<th>Role of International Students can Play in Extension</th>
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<tbody>
<tr>
<td>Innovation in applied research that is relevant to producers, serving growers from different culture and language backgrounds, providing insight and lessons from other countries for the U.S. agriculture, bringing different perspectives in engaging diverse audiences, extension programs focus on trade and international agriculture, assisting in extension publication and data analysis, potential partnerships and market channels at the international level for U.S. agriculture.</td>
</tr>
</tbody>
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Selected Quotes from Extension Faculty

“Extension work comes down to personality more than anything and the ability to make a connection with stakeholders.”

“The key variable is whether any student, foreign or domestic, has a background in agricultural production and/or working with agricultural producers.”

“International students can be just as competitive as domestic students for extension jobs as the most important defining characteristic of extension training is assisting with the development of an ag background.”

“As many lack any experience and understanding of U.S. (let alone state) agriculture and farming practices as well as the laws, regulation, and code. It is one thing to be taught the theory and even using case studies surrounding the fundamentals of agribusiness and economics, it becomes more difficult for them to handle the application to U.S. farms and those farms within the state. This severely limits their usefulness to bringing impact to the state’s farmers and ag/farming industry.”

“Having graduate students receive training from Extension faculty would help them understand US ag better. This training could occur by having graduate students go with Extension faculty to educational meetings. During these meetings, the international students could provide some perspective by giving an international perspective or by teaching on some of the latest economic ideas.”
5. Tips for International Graduate Students Interested in Careers in Extension

As for tips for international graduate students interested in careers with Extension, first many extension faculties stressed the importance of understanding U.S. agriculture and production systems to be able to meet the needs of stakeholders of the agricultural community. Extension faculty suggested that increasing the interaction and involvement of international students with stakeholders, can help increase the understanding of U.S. agriculture, and training needed for international students in handling the application of economic theory to U.S. farms. Extension faculty also suggested exploring international students in the extension activities to increase international students’ understanding of U.S. agriculture and extension functions, such as writing extension publications, going on field trips, presenting at count production meetings, and facilitating workshops. Graduate students can actively seek the opportunity to collaborate with extension faculty in these efforts. Expressing the interests in extension by graduate students to extension faculty will enable personalized mentoring and coaching.

The extension faculty particularly noted the importance of investing in communication skills and training for international graduate students. Many noted the significance of good oral and written English communication skills overall, and the value of face-to-face interaction with stakeholders. Communication skills are the key to the success of extension professionals. It is important for extension professionals to be able to talk to and relate to target audiences and adjust their delivery methods to meet the needs of clientele and achieve education purposes.

Working in extension, interpersonal skills are critical. Extension professionals are the liaison between academic, government, and private industry. Interpersonal skills will increase the success and effectiveness with stakeholders, collaborate with research colleagues to conduct researches to address the needs of stakeholders, and create value for the agricultural community. The ability to build strong personal relationships with stakeholders is needed for being a trusted source of information and increasing the success of building and delivering extension programs.

It is also important for international students to acquire key skillset in applied economic research, which would facilitate the ability to respond rapidly to important issues from stakeholders. Facing multiple sources of sometimes conflicting information, stakeholders seek unbiased, research-based information from creditable sources (Taylor and Zhang 2019). Extension professionals can provide unbiased research and Extension programming, which will help producers and consumers make informed decisions. Stakeholder engagement is a good venue for research to identify and define researchable questions with real life application, pilot appropriate test tools, engage in data collections, and receiving constructive feedbacks (Monroe et al. 2015). Oftentimes, to address the needs of stakeholders, extension professionals need to assemble research groups, working with researchers both within the discipline and cross-disciplines. The ability to work with a diverse group of researchers and be a part of multistate or multidisciplinary teams to tackle the complexity of the agricultural production systems is also needed.

As noted by several extension faculties, unfortunately bias will be present and probably more salient for female, minority and international extension professionals. Many respondents also stressed the importance of assembling and showcasing the “right signals” for international
graduate students when pursuing a position with extension responsibility at job market. The suite of “right signals” include knowledge of what Extension is and is not, evidence-based understanding of the agricultural and food sector in the U.S. and preferably a region or state, solid oral and written English communication skills, strong interpersonal skills, and experiences in presenting at extension meetings and/or writing extension publications.

6. Discussion and Conclusion

Our research leveraged two surveys of department heads and Extension faculties in agricultural economics departments, with the goal of understanding the current challenges faced by extension and the methods in training talents for the future workforce in extension. Even though extension is a critical part of the land grant mission, fewer efforts have been put in training graduate students in extension. Sixteen of the 37 extension faculty expressed the challenges in the graduate education program that there is no formal training that happens at the department level in training graduate students towards a career in extension. This brings a challenge for continuing nurturing talents to fill the needs of land grant extension systems for the field of agricultural economics.

In addition, the student population in terms of domestic and international students changed a lot, and currently, the proportion of international students in the graduate programs in the field of agricultural economics outnumbered domestic students. Even though a large proportion of graduate students in the field of agricultural and applied economics are international, on average, only 13% of the extension faculty at land grant universities have international backgrounds. Our research identified the need in changing perception in involving international students in extension and providing career opportunities for international graduate students in extension.

Over 50% of extension faculty reported that all their Ph.D. students are international students, and many of these graduate students are currently heavily involved with extension, from participating in workshops, writing extension publications, to facilitating extension events.

Our research also identified the hidden and perceived barriers for international students pursuing academic Extension careers, and provides tips into appropriate education and training programs in university graduate curricula to increase the awareness and interests of international students in Extension. 15 out of 34 extension faculty responded stated that international students could play the same role as domestic students in extension. The challenges faced by international students for successful job placement in extension range from lack of understanding of U.S. agricultural practices and agricultural community systems, limited by language, culture, lack of knowledge of basic local/state/federal institutions, and lack of knowledge of U.S. law and regulation. Extension faculty suggested efforts could be taken to explore international graduate students in extension opportunities to increase their understanding of U.S. agriculture and productions systems, training students in handling the application of economic theory to U.S. agriculture, and exploring students in the extension activities to increase international students’ understanding extension functions. These efforts will increase the awareness of international
graduate students in extension and provide possible extension career opportunities for international students.
References


