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Bridging Agricultural Extension Education and Employability: A Modified Delphi Study of Graduate Competencies in Bangladesh

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Abstract

Agricultural extension systems are evolving towards more knowledge-intensive, digital, and market-oriented models, requiring graduates to possess technical, analytical, and interpersonal competencies. In Bangladesh, persistent unemployment among extension graduates indicates a gap between university training and labor market demands. This study identified and prioritized the knowledge, skills, and abilities (KSAs) required for extension graduates in Bangladesh to succeed in contemporary employment contexts. Using a modified Delphi method, 84 stakeholders, including university faculty, graduate students, and employers participated in three rounds of data collection to develop consensus on essential competencies. Findings revealed strong consensus on digital literacy, data management, innovation diffusion, extension program management, and communication skills. Differences across stakeholder groups highlighted a disconnect between academic preparation and employer expectations, particularly regarding market-oriented and applied competencies. Findings suggested that agricultural universities should adopt competency-based curricula, strengthen experiential learning opportunities, and develop stronger university-industry partnerships to improve graduate employability and support the evolving role of agricultural extension systems in Bangladesh.

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Introduction and Problem Statement

Higher education institutions play a critical role in a vibrant agricultural system by developing human capital and generating research for stakeholders across food and fiber value chains (Rama Rao et al., 1997; Ramesh et al., 2019). Increased attention has focused on post-graduation employment gaps among tertiary level agricultural students (Bermeo Córdova et al., 2020; Seti et al., 2025; Wilkes & Burns, 2019).

Agricultural extension plays a central role in Bangladesh's agricultural development system (Chowdhury, et al., 2014). The Department of Agricultural Extension (DAE), under the Ministry of Agriculture, is the country's primary public extension organization and provides advisory services through district- and sub-district level offices nationwide (Karim & Noman, 2018). In addition to government agencies, extension and rural advisory services are increasingly delivered through NGOs, development projects, producer organizations, and private agribusiness firms (Afrad et al., 2019). Agricultural extension education is primarily offered through 8 public universities in Bangladesh, where graduates are prepared for careers in extension, rural development, agribusiness, research, and agricultural service organizations. As Bangladesh's agricultural sector becomes increasingly market-oriented, climate-responsive, and digitally connected, extension professionals are expected to possess broader competencies including ICT skills, communication, data management, entrepreneurship, and stakeholder coordination.

Graduate employability remains a persistent challenge globally due to skill mismatches and shifting labor market demands (Brown et al., 2022; Rae, 2007). Universities are increasingly called to align curricula with workforce expectations. In agriculture, these challenges intensify as extension systems evolve toward knowledge-intensive, digital, and climate-responsive models, shifting the role of extension professionals from technology transmitters to facilitators within agricultural systems (Davis & Sulaiman, 2014; Davis et al., 2021). Accordingly, competency-based education aligned with employer-demanded knowledge, skills, and abilities (KSAs) has gained global traction (Shimali et al., 2021).

Bangladesh reflects the global pattern of employability challenges facing university graduates (Akhtar, 2025; Asonitou, 2015). Despite reshaping curricula and teaching practices in the agricultural universities (Kuri et al., 2023; Permani et al., 2025), unemployment among agricultural graduates exceeds 20%, indicating a persistent academia-industry disconnect (Akhtar, 2025). A World Bank (2019) review of Bangladesh's education system indicated a gap in academic preparation and the job market needs. To address this gap, this study used a modified Delphi technique to identify and prioritize competencies needed by extension graduates in Bangladesh.

Theoretical and Conceptual Framework

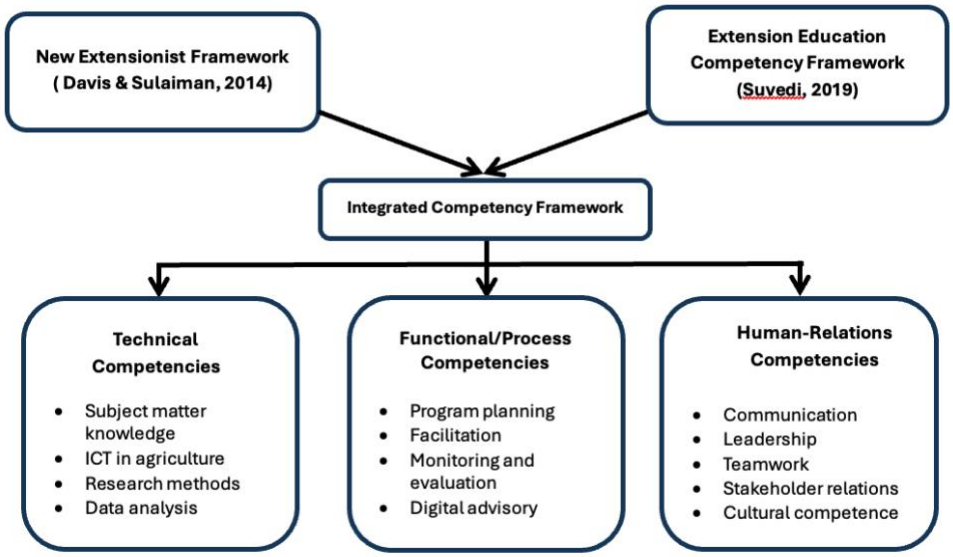
This study is guided by an integrated competency framework that draws on the New Extensionist Framework (Davis & Sulaiman, 2014) and the Extension Education Competency

Framework (Suvedi, 2019). When combined, these frameworks provide a structure for understanding the knowledge, skills, and abilities required of contemporary agricultural extension professionals and serve as the basis for organizing and assessing the competencies identified in this study.

The New Extensionist Framework positions extension agents as facilitators rather than merely technology disseminators (Davis et al., 2021). It emphasizes capacities across three levels such as individual, organizational, and system by highlighting functional competencies such as communication, digital literacy, facilitation, networking, and adaptive leadership. In contrast, Suvedi's competency framework focuses more directly on extension training and curriculum design, outlining specific technical, process-oriented, and human-relations competencies that can be intentionally developed through university programs (Ghimire & Suvedi, 2017; Suvedi, 2019). Agricultural extension roles have shifted from primarily transferring technology to facilitating learning and innovation among diverse actors in agricultural systems (K. E. Davis et al., 2021). Integrating the two frameworks captures both the broader, systemic capacities extension professional must demonstrate, as well as the more specific, trainable competencies that can be embedded into curricula. Although the integrated competency framework informed competency identification and interpretation, competencies were ultimately classified and reported as knowledge, skills, and abilities (KSAs) to align with the study objectives. Functional/process competencies were not treated as a separate reporting category because many overlapped conceptually with human-relations competencies and were captured within the final KSA classifications. As such, functional/process competencies served as a cross-cutting dimension that was expressed through multiple KSA categories rather than as a stand-alone reporting category.

Figure 1

Integrated Competency Framework



Purpose

Bangladesh does not have a nationally standardized agricultural extension curriculum. Agricultural universities vary in their course offerings and competency emphases based on institutional priorities, faculty expertise, and stakeholder needs. Common topics in agricultural extension curricula include extension teaching methods and aids, agricultural leadership, rural development, program planning and implementation, research methods, extension communication, diffusion and adoption of innovations, human resource development, extension project management, etc. but these vary widely by institution. Thus, there is a need for an evidence-based assessment to evaluate whether agricultural extension education programs effectively develop graduates' competencies. Identifying essential knowledge, skills, and abilities (KSAs) is crucial for evaluating the relevance of existing curricula and guiding future improvements. This study aimed to determine the competencies essential for agricultural extension graduates to succeed in the job market. The research objectives were to: (a) identify the top knowledge items that agricultural extension education graduates need for employment; (b) identify the top skills that agricultural extension graduates need for employment; and (c) identify the top abilities that agricultural extension graduates need for employment.

Methods

This study employed a modified Delphi approach to identify, refine and prioritize the KSAs required for agricultural extension graduates in Bangladesh (Dalkey & Helmer, 1963).

Panel Selection

Purposive sampling was used to recruit three stakeholder groups with direct experience in agricultural extension and employment contexts in Bangladesh: (a) faculty from four major public agricultural universities; (b) graduate students in agricultural extension programs from those universities; and (c) employers from different organizations that hire those graduates. The Round 1 panel included 84 participants (25 faculty, 43 graduate students, and 16 employers). Seventy-four panelists participated in Round 2 (21 faculty, 42 graduate students, and 11 employers), and 70 panelists completed Round 3 (18 faculty, 41 graduate students, and 11 employers), representing approximately 80-90% retention across rounds. Employers were recruited from organizations that regularly employ agricultural extension graduates in Bangladesh. These include public extension agencies, nongovernmental organizations (NGOs), agricultural development projects, seed/fertilizer companies, and agribusiness firms or advisory organizations. It is important to note that the employer panel was smaller because the number of individuals directly involved in recruiting and supervising extension graduates is comparatively specialized and limited. Participation was also voluntary and required commitment across multiple Delphi rounds. Previous Delphi studies have demonstrated that smaller panels are acceptable when participants possess relevant expertise and experience (Keeney et al., 2011).

Graduate students were included in the stakeholder panel for two primary reasons: (a) to gain a clear understanding of their perceptions of career preparation in agricultural and extension education, and (b) to compare and contrast the student responses with the faculty and employer groups for a more complete understanding of intersections and gaps in academic and industry perspectives regarding career readiness. Including the perspective of students in Delphi studies regarding career development has been used in previous research (Collins, 2010).

Data Collection

Data were collected online using Qualtrics between November 16, 2024, and June 30, 2025, across three rounds (Linstone & Turoff, 1979). Panelists received personalized invites and reminders with links to instruments every four days through email. All participants provided informed consent prior to participation, and study procedures were approved by the Texas Tech University institutional review board (IRB2024-1016). All three rounds followed Dillman et al. (2014)'s guidelines on the timing of pre-notice, notice, and follow-up electronic correspondence.

Round 1: Item Generation

In Round 1, panelists responded to three open-ended questions asking them to identify the top 10 knowledge, skills and abilities (KSAs) they believed Bangladeshi agricultural extension graduates should possess. Content analysis techniques were used to examine the qualitative data (Fraenkel et al., 2018; Keeney et al., 2011) and overlapping statements were consolidated into single competency items to reduce redundancy (Conner et al., 2013). Each item was evaluated against established definitions of KSAs to ensure conceptual alignment. For this study, knowledge was defined as an organized body of information supported by professionally acceptable theory and research (Zins, 2007). Skills were defined as the effective application of knowledge to complete a task and represent proficiencies developed through training, practice, or experience (Cornford & Athanasou, 1995). Abilities were defined as innate or acquired capacities that enable individuals to perform tasks or behaviors effectively across contexts (Ericsson, 2003). During content analysis, competency statements generated by panelists were reviewed and classified into knowledge, skill, or ability categories based on these operational definitions. Then those competencies were categorized into either technical or human-relations categories based on agricultural extension competency frameworks (K. Davis & Sulaiman, 2014; Suvedi, 2019).

Round 2: Consensus on Competency Items

Round 2 was aimed to assess panelist agreement on competencies identified in Round 1. Panelists rated each KSAs using a four-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree). This scale was intentionally used to eliminate a neutral option and encourage decisive judgments. A priori consensus criteria were established where competencies rated as *agree or strongly agree* by at least two-thirds (67%) of the panelists were retained for Round 3 (Harder et al., 2010). Items falling below the threshold were

removed from consideration. Panelists could suggest revisions or new items, but none were submitted.

Round 3: Prioritization of Competencies

The purpose of Round 3 was to determine the relative importance of the KSA items that achieved consensus in Round 2. Panelists rated each retained item using a four-point Likert scale (1 = not at all important, 2 = unimportant, 3 = important, 4 = absolutely essential). A stricter consensus threshold was used in this final round: at least two-thirds (67%) of the panelists were required to rate an item *as important or absolutely essential* for inclusion in the final competency framework. Items falling below this threshold were eliminated. The outcome of Round 3 was a final and prioritized list of competencies reflecting stakeholder consensus on the KSAs.

Findings

This study used a modified Delphi approach to identify and prioritize KSAs required for extension graduates in Bangladesh. Three expert panels (faculty, graduates, and employers) were engaged to capture perspectives from academia, emerging professionals, and the job market.

Round 1: Identification of Competencies

In Round 1, 84 participants (25 faculty, 43 graduate students, and 16 employers) provided open-ended responses, generating over 2,100 individual statements. Researchers reviewed and consolidated similar items and removed those not aligned with predefined KSA descriptions. The remaining items were categorized into technical and human relations competencies, following established extension frameworks (K. Davis & Sulaiman, 2014; Suvedi, 2019). Technical competencies included Information and Communication Technology (ICT) use, data management, and agricultural value chains, while human relations competencies included teamwork, negotiation, and leadership. Table 1 presents a summary of items retained after Round 1 and these were included in the Round 2 questionnaire.

Table 1

Summary of Knowledge, Skills, And Abilities (KSAs) Items Finalized After Delphi Round 1

KSA Categories	Description of categories	Faculty (*n* = 25)	Graduate students (*n* = 43)	Employer (*n* = 16)	Total
Technical knowledge	Subject-matter and disciplinary knowledge required for extension practice	13	18	16	47
Human-relation knowledge	Knowledge related to communication, leadership, group processes, and stakeholder engagement	23	19	15	57
Technical skills	Proficiencies related to technical and professional tasks	12	7	8	27
Human-relation skills	Interpersonal and communication proficiencies used in working with others	29	25	18	72
Technical abilities	Capacities to perform technical and analytical functions effectively	7	5	11	23
Human-relation abilities	Capacities related to teamwork, adaptability, leadership, and collaboration	33	31	28	92
Total		117	105	96	318

Round 2: Building Consensus and Refining Categories

In Round 2, 74 panelists (21 faculty, 42 graduate students, 11 employers) rated the importance of the competency items derived from Round 1. The purpose of this round was to refine the competency list and establish consensus regarding item importance. Items receiving agreement of at least 75% (*agree* or *strongly agree*) were retained. Panelists were also invited to reword items, suggest reclassification of items, or recommend additional items. Table 2 summarizes the number of KSA items retained after Round 2.

Table 2

Summary of Knowledge, Skills, And Abilities (KSAs) Items Finalized After Delphi Round 2

KSA Categories	Faculty (*n* = 21)	Graduate students (*n* = 42)	Employer (*n* = 11)	Total
Technical knowledge	9	12	11	32
Human-relation knowledge	11	12	8	31
Technical skills	9	7	8	24
Human-relation skills	20	21	10	51
Technical abilities	6	4	11	21
Human-relation abilities	26	19	21	66
Total	81	75	69	225

Analysis of Round 2 data revealed several emerging trends. All panels prioritized competencies related to digital and analytical skills, reflecting the growing role of information and technology management in Bangladeshi agricultural extension. Differences among panels also became apparent. Employers emphasized market-oriented skills like agribusiness and marketing, while faculty and students emphasized research, communication, and leadership competencies. By the end of Round 2, 225 items met the minimum threshold for consensus.

Round 3: Prioritization and Final Consensus

Round 3 focused on prioritizing items that achieved consensus in Round 2. A total of 71 panelists (19 faculty, 41 students, 11 employers) participated in this round. Panelists rated each competency item based on importance, and only those items rated as *important* or *absolutely essential* by at least 80% of respondents were retained. Panelists could also suggest revisions, though few changes were made. Faculty retained 51 competencies, emphasizing research methodology, digital literacy, communication, project management, and leadership. Graduate students retained 50 competencies, focusing on ICT proficiency, data analysis, teamwork, and adaptability. Employers retained 34 competencies, prioritizing multitasking, market analysis, product marketing, and problem-solving under field conditions. Table 3 provides a summary of the final number of KSA items retained by each panel in Round 3.

Table 3

Summary of Knowledge, Skills, And Abilities (KSAs) Items Finalized After Delphi Round 3

KSA Categories	Faculty (*n* = 19)	Graduate students (*n* = 41)	Employer (*n* = 11)	Total
Technical knowledge	5	7	2	14
Human-relation knowledge	6	9	4	19
Technical skills	7	6	7	20
Human-relation skills	12	12	5	29
Technical abilities	5	3	6	14
Human-relation abilities	16	13	10	39
Total	51	50	34	135

Tables 4, 5, and 6 present the percent agreement for retained KSA items among faculty, graduate students, and employers, respectively. Among faculty, all 5 retained technical knowledge items achieved 100% agreement. Human relations competencies were also strongly endorsed, with 8 of the 12 items achieving agreement levels over 90%.

Table 4

Percent of Agreement on the KSA Items by the Faculty Members in Round 3 (n = 19)

Technical Knowledge	**Percentage (%)**
Research methods and statistics	100
Digital literacy and ICT application in agriculture	100
Human resource management/development	100
Food and nutritional security	100
Scientific publication	100
Human Relation Knowledge	**Percentage (%)**
Extension communication, networking, and outreach activities	100
Extension program, project, and organization management	100
Entrepreneurship and agricultural marketing	100
Diffusion and adoption of agricultural innovations	100
Farmers behavior/psychology and needs assessment	100
Team management and group dynamics	94
Technical Skills	**Percentage (%)**
Agricultural research and data management	100
Digital literacy	100
New idea generation	100
Scientific article preparation	100
Human resource management	94
Marketing	89
Report writing	83
Human Relation Skills	**Percentage (%)**
Effective communication, networking, and collaboration with stakeholders	100
Public speaking and presentation	100
Extension program and project management	100
Time management	100
Creativity and simplifying complex things	100
Entrepreneurship development	100
Office management	94
Leading a team	94
Motivating others	94
Cultural competence	89
Flexibility in work	89
Hardworking	89
Technical Abilities	**Percentage (%)**
Data collection and analysis	100
Ability to do research and translate it into practice	100
Technological integration and digital literacy	100
Software running	100
Managing human resources	94

Human Relation Abilities	Percentage (%)
Decision making	100
Teamwork/groupwork	100
Collaboration/networking with multiple stakeholders	100
Ability to complete work on time/time management	100
Outspoken	100
Observation ability	100
Risk taking	100
Training and capacity building	100
Ability to innovate	100
Creativity	100
Active listening	100
Critical thinking and problem solving	94
Multitasking	94
Ability to motivate others	94
Situation/stress management	94
Quick learning/understanding	89

Graduate students demonstrated similarly high levels of agreement, particularly for competencies related to ICT use, research and data analysis, teamwork, and critical thinking. All retained technical ability items among graduate students received 100% agreement.

Table 5

Percent Agreement on KSA Items by Graduate Students in Round 3 (n = 41)

Technical Knowledge	Percentage (%)
Crop production	100
Use of ICTs in agricultural extension	100
Research methods and data analysis in social sciences	100
Animal breeding, nutrition and management	98
Agribusiness, marketing, and entrepreneurship	98
Fisheries science	95
Human resource development and management	90
Human Relation Knowledge	**Percentage (%)**
Extension communication and leadership	100
Extension teaching and training methods and aids	98
Diffusion and adoption of agricultural innovations	98
Extension organization management	98
Group dynamics	98
Extension program and project management	95
Supervision	90
Rural Sociology and community development	88
Capacity building	88

Technical Skills	**Percentage (%)**
Research and analytical skills	100
Digital literacy and ICT skill	100
Data collection and management	98
Software running (SPSS, R, Minitab)	98
Entrepreneurship and agribusiness development	95
Human resource development	93
Human Relation Skills	**Percentage (%)**
Leading a team	100
Effective communication and negotiation with farmers/clients	100
Presentation and public speaking	100
Time management	100
Collaboration/networking with partners/stakeholders	100
Teaching, training and facilitation	100
Hardworking	100
Multitasking	98
Program planning and implementation	98
Capacity building	98
Project monitoring, evaluation and financial management	95
Persuading others	88
Technical Abilities	**Percentage (%)**
Technological ability and using ICT tools	100
Ability to collect, analyze and manage data	100
Ability to do research and translate it into practice	100
Human Relation Abilities	**Percentage (%)**
Critical thinking and problem solving	100
Time management	100
Collaboration/networking with multiple stakeholders	100
Adaptability to diverse environment	98
Decision making	98
Teamwork/groupwork	98
Hardworking ability	98
Presenting and public speaking for sharing knowledge	98
Ability to motivate and persuade people	98
Learning new things quickly	98
Ability to do multiple tasks	98
Ability to take risk	95
Project monitoring, evaluation and management	95

Employers showed strong consensus around practical and field-oriented items such as problem-solving, technology adoptions, multitasking, and capacity development.

Table 6

Percent of Agreement on KSA Items by Employers in Round 3 (n = 11)

Technical Knowledge	**Percentage (%)**
Human resource development	91
ICTs in agriculture	82
Human Relation Knowledge	**Percentage (%)**
Agricultural policy, regulations, and governance	100
Extension program and project management	100
Extension communication	91
Adoption of agricultural innovations	91
Technical Skills	**Percentage (%)**
Data collection and analysis	100
New idea generation	100
Digital proficiency/ IT skills	100
Software for data analysis (SPSS/R)	100
Agribusiness	100
Agricultural research	91
Multitasking	91
Human Relation Skills	**Percentage (%)**
Effective communication, networking and relation building	100
Product marketing and advertising	100
Leadership, motivation, and team management	100
Public speaking and presentation	82
Understanding consumers' preferences and negotiating with them	82
Technical Abilities	**Percentage (%)**
Multitasking in regular works	100
Data analysis and presentation	100
Generating new idea	100
Running different computer software	100
Ability to utilize technology in extension work	100
Research development and application/implementation	91
Human Relation Abilities	**Percentage (%)**
Problem solving and critical thinking	100
Adopting new technique/technology	100
Capacity development	100
Ability to drive a skilled field force/leading a team	91
Adaptability to diverse/changing environment	91
Effective communication and collaboration across discipline/stakeholder	91
Time management	91
Customers' mind reading	91
Ability to work in remote areas	91
Ability to understand and simplify complex tasks	82

Despite differences in focus across the experts, 14 competency items achieved universal consensus and presented in Table 7. These competencies were grouped into four broad categories: digital and data-driven competency; innovation and knowledge translation;

program and organizational management; and communication and collaborative skills. These represent the core pillars of employability for agricultural extension graduates in Bangladesh.

Table 7

Categorization of Competencies with Universal Consensus in Round 3 (n = 135)

Broad KSA Categories	Individual Items
Digital and data-driven competency	ICTs / Digital literacy in agriculture
	Digital literacy/ICT skills
	Technological integration/ICT use
	Data collection & analysis
	Data collection, analysis & presentation
Innovation and knowledge translation	Diffusion and adoption of agricultural innovations
	Research development and translation into practice
	Entrepreneurship/agribusiness development
Program and organizational management	Extension program/organization management
	Multitasking
	Time management
Communication and collaborative skills	Collaboration & networking
	Public speaking and presentation
	Critical thinking and problem solving

Comparisons Across Panels

Comparing the panels revealed both convergence and divergence in competency priorities. All three groups identified digital literacy as a foundational competency, though its perceived function differed: faculty and graduate students emphasized its role in education and research, while employers focused on business operations and analytics. There was also consensus on interpersonal and adaptive skills such as critical thinking, adaptability, teamwork, and communication, indicating that extension professionals are expected to act as facilitators and change agents, not just technical instructors. Notable gaps emerged between employers and academia. Employers prioritized market-oriented and operational skills such as marketing, agribusiness, and agricultural policy, while faculty and students emphasized research and analysis. This divergence highlights the need for enhanced university-industry linkages and better curriculum alignment to meet labor market expectations in Bangladesh. Overall, while disciplinary knowledge remains important, there is a growing need for digitally skilled, industry-responsive, and interpersonally competent agricultural extension professionals in Bangladesh.

Conclusions, Discussion, and Recommendations

This modified Delphi study identified the key knowledge, skills, and abilities (KSAs) required for agricultural extension graduates in Bangladesh based on input from graduate students, faculty members, and employers, revealing both consensus and divergence across stakeholder groups. All groups agreed on the importance of digital literacy and ICT skills, diffusion and adoption of agricultural innovations, data collection and analysis, and extension program and project

management. However, graduate students and faculty emphasized research, analytical skills, communication, and leadership, while employers prioritized applied, market-oriented skills such as agribusiness, marketing, multitasking, and decision-making under pressure.

Despite these differences, all panels recognized the importance of ICT integration, communication, and problem-solving abilities, highlighting the need for urgent curricula that balance technical and human-relation skills. Gaps between academic focus and employer expectations, especially in agribusiness, consumer behavior, and team management indicate a disconnect between university training and labor market needs. Overall, preparing competitive agricultural extension graduates in Bangladesh requires a holistic competency framework integrating technical, interpersonal, and market-driven competencies.

Existing curricula were not examined in this study because Bangladesh does not have a nationally standardized agricultural extension curriculum; universities determine the subjects to be included in their curricula. However, the findings of this study provide potential areas for curriculum review. The strong emphasis placed by stakeholders on digital literacy, ICT integration, data management, agribusiness, communication, and stakeholder engagement may indicate competencies that warrant greater attention when universities evaluate the alignment of their programs with contemporary workforce needs. Stakeholder consensus suggests that these competencies may deserve greater emphasis in future curriculum review processes.

These findings have key implications for agricultural extension education, curriculum design, and workforce development in Bangladesh. Universities should better align curricula with labor market needs by integrating ICT and digital literacy, ensuring proficiency in data management and technology-based extension practices. Emphasis on experiential learning such as internships and field projects can help bridge theory and practice. Embedding soft skills like communication, leadership, teamwork, and negotiation into curricula is also essential to meet employer expectations and support the evolving role of extension professionals.

To address the growing demand for market-oriented competencies, extension programs should include targeted content in agribusiness, consumer behavior, and entrepreneurship. Developing and sustaining university-industry linkages can further support curriculum relevance by facilitating employer engagement in curriculum development, guest instruction, and training opportunities. Finally, continuous professional development for faculty and students is critical to keep pace with emerging technologies, extension approaches, and practices. Collectively, these steps can help agricultural universities in Bangladesh close competency gaps, enhance graduate employability, and strengthen agricultural extension’s contribution to national development.

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References

Afrad, S. I., Wadud, F., & Babu, S. C. (2019). Reforms in agricultural extension service system in Bangladesh. In *Agricultural Extension Reforms in South Asia* (pp. 13-40). Academic Press. https://doi.org/10.1016/B978-0-12-818752-4.00002-3

Akhtar, S. (2025, April 29). *Jobs scarce for our agriculture graduates*. The Daily Observer. https://www.observerbd.com/news/523221

Asonitou, S. (2015). Employability skills in higher education and the case of Greece. *Procedia-Social and Behavioral Sciences*, *175*, 283-290. https://doi.org/10.1016/j.sbspro.2015.01.1202

Bermeo Córdova, B., Yagüe Blanco, J. L., Satama, M., & Jara, C. (2020). Identification of variables that cause agricultural graduates not to return to the rural sector in Ecuador: Application of fuzzy cognitive maps. *Sustainability*, *12*(10), 4270. https://doi.org/10.3390/su12104270

Brown, J. L., Hammer, S. J., Perera, H. N., & McIlveen, P. (2022). Relations between graduates' learning experiences and employment outcomes: A cautionary note for institutional performance indicators. *International Journal for Educational and Vocational Guidance, 22*(1), 137-156. https://doi.org/10.1007/s10775-021-09477-0

Chowdhury, A. H., Hambly Odame, H., & Leeuwis, C. (2014). Transforming the roles of a public extension agency to strengthen innovation: Lessons from the National Agricultural Extension Project in Bangladesh. *The Journal of Agricultural Education and Extension*, *20*(1), 7-25. https://doi.org/10.1080/1389224X.2013.803990

Collins, N. C. (2010). *A conceptual model of career development to enhance academic motivation* (Publication No. 3407392) [Doctoral dissertation, Old Dominion University]. ProQuest Dissertations and Theses Global.

Conner, N., Roberts, G., & Harder, A. (2013). Competencies and experiences needed by entry-level international agricultural development practitioners. *Journal of International Agricultural and Extension Education, 20*(1). https://doi.org/10.5191/jiaee.2013.20102

Cornford, I., & Athanasou, J. (1995). Developing expertise through training. *Industrial and Commercial Training*, *27*(2), 10-18. https://doi.org/10.1108/00197859510082861

Dalkey, N., & Helmer, O. (1963). An experimental application of the Delphi method to the use of experts. *Management Science, 9*(3), 458–467. https://doi.org/10.1287/mnsc.9.3.458

Davis, K. E., Joseph, J., Barry, T., von Maltitz, L., Van Niekerk, J., Ngomane, T., & Rasoanindrainy, A. (2021). *Global agricultural extension staff functional competencies*. International Food Policy Research Institute (IFPRI). https://doi.org/10.2499/p15738coll2.134857

Davis, K., & Sulaiman, R. (2014). The new extensionist: Roles and capacities to strengthen extension and advisory services. *Journal of International Agricultural and Extension Education, 21*(3), 6-18. https://doi.org/10.5191/jiaee.2014.21301

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method* (4th edition). John Wiley & Sons, Incorporated.

Ericsson, K. A. (2003). The search for general abilities and basic capacities. *The psychology of abilities, competencies, and expertise*. Cambridge University Press. 93-125. http://www.cambridge.org/9780521809887

Fraenkel, J., Wallen, N., & Hyun, H. (2018). *How to design and evaluate research in education* (10th edition). McGraw-Hill Education.

Ghimire, R. P., & Suvedi, M. (2017). A qualitative study examining core competency needs of agricultural extension professionals in Nepal. *Asian Journal of Agricultural Extension, Economics & Sociology, 18*(3), 1-12. https://doi.org/10.9734/AJAEES/2017/34517

Harder, A., Place, N., & Scheer, S. (2010). Towards a competency-based extension education curriculum: A Delphi study. *Journal of Agricultural Education, 51*(3), 44–52. https://doi.org/10.5032/jae.2010.03044

Karim, M. R., & Noman, M. R. A. F. (2018). Effectiveness of agricultural extension system in the implementation of relevant policies of Bangladesh. In *Bangladesh: Economic, Political and Social Issues*. Nova Science Publishers, Inc. (pp. 65-93).

Keeney, S., McKenna, H., & Hasson, F. (2011). *The Delphi technique in nursing and health research*. Wiley-Blackwell. https://doi.org/10.1002/9781444392029

Kuri, S. K., Vines, K. A., Crowder, L. V., & Abaye, O. A. (2023). Exploring the level of teaching practices of the agricultural education at Bangladesh Agricultural University (BAU). *Social Sciences & Humanities Open, 8*(1), 100563. https://doi.org/10.1016/j.ssaho.2023.100563

Linstone, H., & Turoff, M. (Eds.). (1979). *The Delphi method: Techniques and applications.* Addison-Wesley Reading.

Permani, R., Hidayatullah Basir, M. K., Winarno, K., & Dewan, B. (2025). Integrating Agricultural Research into undergraduate work integrated learning (WIL) courses. *Applied Economics Teaching Resources, 7*(2). https://doi.org/10.71162/aetr.769581

Rae, D. (2007). Connecting enterprise and graduate employability: Challenges to the higher education culture and curriculum? *Education+ Training, 49*(8-9), 605-619. https://doi.org/10.1108/00400910710834049

Rama Rao, D., Muralidhar, U., & Kalla, J. C. (1997). Planning agricultural education in India. *European Journal of Agricultural Education & Extension*, *4*(1), 67-80. https://doi.org/10.1080/13892249785300161

Ramesh, P., Raju, D. T., Reddy, K. M., Krishnan, P., Biswas, A., & Umamaheshwari, T. (2019). Perception of teaching competencies by administrators, faculty and students of Indian agricultural universities: An assessment of faculty training needs. *Journal of Agricultural and Extension Education*, *25*(4), 337-359. https://doi.org/10.1080/1389224X.2019.1609997

Seti, T. M., Ngqulana, A., & Sindesi, O. A. (2025). Industry perceptions of employability skills for agricultural graduates in the fourth industrial revolution. *SA Journal of Industrial Psychology, 51*(1), https://doi.org/10.4102/sajip.v51i0.2214

Shimali, F., Mangheni, M. N., & Kabahenda, M. (2021). Nutrition education competencies of agricultural extension workers in Uganda. *Journal of Agricultural Education & Extension*, *27*(4), 535-552. https://doi.org/10.1080/1389224X.2021.1880451

Suvedi, M. (2019). Global need for revitalization of agricultural extension training. *Journal of Extension Education, 31*(3), 6306. https://doi.org/10.26725/JEE.2019.3.31.6306-6319

Wilkes, J., & Burns, A. (2019). A decade of agriculture graduates' employability and career pathways. *International Journal of Innovation in Science and Mathematics* Education, 27(4). https://doi.org/10.30722/IJISME.27.04.001

World Bank. (2019). *Bangladesh tertiary education sector review: Skills and innovation for growth*. (No. AUS0000659). https://documents1.worldbank.org/curated/en/303961553747212653/txt/Bangladesh-Tertiary-Education-Sector-Review-Skills-and-Innovation-for-Growth.txt

Zins, C. (2007). Conceptual approaches for defining data, information, and knowledge. *Journal of the American Society for Information Science and Technology*, *58*(4), 479-493. https://doi.org/10.1002/asi.20508