Research Article

# Developing a Framework for the Implementation and Evaluation of Agricultural Innovation Incubators among Rural Youth in Iraq

**Mohammed Talib Alabboodi*[1] and Ahmed Hamdan Lafta[1]**

*[1]Department of Agricultural Extension and Technology Transfer, College of Agricultural Engineering Sciences, University of Baghdad, Baghdad, Iraq.*

**Abstract** | Agricultural innovations incubators have emerged as one of the powerful catalysts for providing a nurturing environment for startups to develop, test and upscale agriculture related ideas. It has become an important tool for encouraging rural youth for fostering innovation and creating employment opportunities. Like other regions of the developing world, agriculture in Iraq remains a significant sector for economic growth. There has been little attention to develop structured approach for the establishment and assessment of agricultural innovation incubators. To fill this gap, current research study was planned in order to propose a framework for implementing and evaluating agricultural innovation incubators for rural youth in Iraq. Data were collected by employing descriptive survey research design involving all the major stakeholders. Structured questionnaire was developed as data collection instrument and analyzed using descriptive analysis. Results indicate that there is strong support from all the stakeholders for implementing proposed framework for dissemination among rural youth in Iraq with an overall weighted percentage of 80.51% showing high level of agreement. Similarly, the evaluation domain showed an overall mean score of 2.45/4.00 and a weighted percentage of 81.49%, reflecting strong stakeholder endorsement. This has been concluded from the results that the proposed framework is highly acceptable to all the related stakeholders and offers a practical foundation for the establishment, dissemination, and assessment of agricultural innovation incubators targeting rural youth in Iraq.

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***Correspondence** | Mohammed Talib Alabboodi, Department of Agricultural Extension and Technology Transfer, College of Agricultural Engineering Sciences, University of Baghdad, Baghdad, Iraq; **Email:** mohammed.hadi2309p@coagri.uobaghdad.edu.iq
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## Introduction

Agriculture sector in the global world is increasingly recognized as an important engine for economic growth through sustainable rural development with the inclusion of innovation oriented initiatives and employment opportunities especially for rural youth (World Bank, 2023). This has been reported that youth aged 15-24 years account for nearly 1.2 billion in the world. A large majority (88%) of these young people are residing in developing countries including Iraq (IFAD, 2019). Furthermore, around half of the world's youth lives in rural areas. And more than 60% of these young people belong to

developing and low-income countries (Knobloch *et al*., 2020). Development agencies reported that with the said demographic trends, creating efficient and productive employment opportunities for rural youth belonging to developing countries has become a main development priority and concern for development practitioners. Development agencies increasingly highlight the significance of rural youth engagement in agriculture and food systems (OECD, 2023). According to FAO, rural youth are the stewards and agents of sustainable agricultural growth highlighting innovation, technology development & dissemination, human capital and institutional growth as key indicators of rural transformation (FAO, 2023). Likewise, one of the important development organizations working in Arab countries (Arab Organization for Agricultural Development – AOAD) highlighted the inclusion of rural youth in mainstream agriculture. The agency incorporated rural youth empowerment and entrepreneurship in Sustainable Arab Agricultural Development (2020-2030) strategy. This reflecting the rising Arab regional commitments for fostering sustainable and resilient agriculture sector (El-Dukheri and Amer, 2024).

Like other regions of the Arab world, in Iraq agriculture is the most important and strategically most influential sector of national economy that contribute significantly towards national food security, employment and economic growth (Ramadan and Lafta, 2023). Around 1/5$^{th}$ of the total national workforce is engaged in this sector and serves as the main source for rural livelihoods. National development plan for Iraq identifies agriculture as the major sector that has the sufficient potential for economic growth and generating employment opportunities especially to the bulk of rural youth (SAAVI, 2022). Despite of this sufficient potential, rural youth in Iraq is facing a number of barriers including limited access to land, micro-finance, agricultural technology development, training opportunities and outreach/extension advisory services (Knobloch *et al*., 2020; Barman *et al*., 2024; Al-Hafidh and Lafta, 2024).

Research studies reported that majority of the rural youth in Iraq is not preferring to adopt agriculture as occupation. They perceive that agriculture is a risky profession and often rating it as last career opportunity (Gandure *et al*., 2013; Chipfupa and Tagwi, 2021). To address these issues state authorities launched different policies and programs for rural youth that promote agricultural entrepreneurship, capacity building and agricultural innovation development & dissemination as effective mechanism for attracting rural youth in agriculture sector (Adeyanju *et al*., 2021; Henning *et al*., 2022). Among these plans and initiatives, agricultural innovation incubators have emerged as favorable institutional platforms that provide training, business development services, access to financial institutions and extension services (Ouko *et al*., 2022).

Agricultural innovation incubators play an important role in fostering rural entrepreneurship and technology transfer among rural youth. Growing adoption of agricultural innovation incubators globally reflects the recognition of their contribution towards employment generating opportunities and sustainable development of agriculture food systems. This ultimately contributes towards national economic development (Farsani *et al*., 2024). Despite of all these efforts, the idea of Agricultural innovation incubators remains relatively underdeveloped in Iraq due to limited institutional experiences in this regard and weak entrepreneurial mechanism (Lafta, 2026). There is lack of comprehensive frameworks to guide the implementation and evaluation of agricultural innovation incubators targeting rural youth.

Therefore, this study seeks to develop and validate a proposed framework for the implementation and evaluation of agricultural innovation incubators among rural youth in Iraq. By identifying key implementation and evaluation components and assessing stakeholder agreement with the proposed framework, the study aims to contribute to the development of evidence-based strategies that promote youth entrepreneurship, agricultural innovation, and sustainable rural development.

## Materials and Methods

The current research employed descriptive research design commonly used in survey research studies. Targeted population for this research study included all the governorates of Iraq (Mosul, Baghdad, Maysan, Dhi Qar and Basra) except the governorates of the Kurdistan region. All the trainers (148) working in public sector institutions serve as the respondents for this research study. A structured questionnaire was developed keeping in mind the objectives of the study and by reviewing relevant literature as well as

by consulting experts and specialists from academic teaching and researchers. In order to verify the apparent validity of the tool and the validity of the content, the questionnaire was presented in its initial form to a group of 17 experts and specialists in the field of agricultural extension and business incubators. A 4 point judgment scale was used to get feedback from the respondents.

A pre-test of the study questionnaire was conducted in July, 2025, with a pilot sample of 30 respondents from the Agricultural Research Department/ Ministry of Agriculture (excluding the sample). The overall reliability of the scale was calculated using Cronbach's alpha coefficient via statistical analysis software SPSS and yielded a value of 0.95, indicating the acceptableness of the scale for data collection in this study. Data was then collected from a representative sample of the research population, as previously defined and outlined in the research methodology, during the period from August, 2025, to November, 2025.

## Results and Discussion

To get acquainted with the approval of the respondents on the proposed conception of the process of Implementation and Evaluation the deployment of agricultural innovation incubators among rural youth in Iraq, to identify the purpose of the study, the following areas were presented:

*Process of implementation the spreading of agricultural innovation incubators among rural youth in iraq*

The research results showed that the axes of the process of Implementation the dissemination of agricultural innovation incubators among rural youth in Iraq, the (5) axes included (12) paragraphs distributed on a quadratic scale obtained a general arithmetic mean rate of (2.42) degrees, a general standard deviation of (0.61) degrees, a general weighted average of (2.42) degrees, and a percentage weight of (80.51) degrees, as shown in Table 1.

*(Values in parenthesis are the percentages)*

It is clear from the above table 1 that the axis (training and awareness of young people to spread agricultural innovation incubators) obtained the highest weighted average of (2.47) degrees with a standard deviation of (0.58) degrees and the highest percentage weight of (82.2) degrees, this is because the knowledge gap is the biggest obstacle to agricultural transformation in Iraq, as innovation begins with the human element and respondents. Realize that introducing any innovation will not achieve the desired results unless rural youth are qualified in terms of knowledge and skills. It is also necessary to focus on building an entrepreneurial mindset in agricultural innovation incubators so that young people become agricultural entrepreneurs who manage productive projects, while raising awareness among young people of the usefulness of innovation incubators and encouraging them to participate in them, one of the main conditions for government

**Table 1:** *Distribution of respondents according to the rates of the axes of the field of Implementation process for the deployment of agricultural innovation incubators*

| Themes | Strongly agree | Agree | Somewhat agree | Disa-gree | Mean | SD | Weight % | Interpretation |
|---|---|---|---|---|---|---|---|---|
| Agricultural innovation incubator spread development application | 76 (51.37) | 63.66 (43.03) | 8.33 (5.63) | 0 (0.00) | 2.45 | 0.60 | 81.77 | Strong Agreement |
| Training and raising awareness among youth for Spread regarding agricultural innovation incubators | 76 (51.35) | 65 (43.90) | 7 (4.75) | 0 (0.00) | 2.47 | 0.58 | 82.20 | Strong Agreement |
| Providing support and services for Spread agricultural innovation incubators | 75.33 (50.90) | 63.67 (43.00) | 9 (6.10) | 0 (0.00) | 2.44 | 0.60 | 81.43 | Strong Agreement |
| The Following up on for Spread of agricultural innovation incubators | 64 (43.25) | 71.5 (48.30) | 12.5 (8.45) | 0 (0.00) | 2.35 | 0.63 | 78.15 | Strong Agreement |
| Communicating with stakeholders to promote Spread agricultural innovation incubators | 66.5 (44.95) | 71 (47.95) | 10 (6.75) | 1 (0.70) | 2.37 | 0.63 | 79.00 | Strong Agreement |
| Overall Average | | | | | 2.42 | 0.61 | 80.51 | Strong Agreement |

initiatives in the field of entrepreneurship is that young people receive intensive training as a prerequisite for obtaining a loan, In addition, training is a means of transferring expertise from research centers and universities directly to the rural field (Alabboodi, 2026).

The result is consistent with previous studies emphasizing that inadequate knowledge, skills, and entrepreneurial competencies constitute major barriers to youth participation in agricultural innovation and agribusiness development (Adeyanju *et al*., 2021; Henning *et al*., 2022). Furthermore, FAO (2023) highlights that investment in youth skills, innovation, and entrepreneurship is essential for transforming agriculture sector and enhancing employment opportunities for rural youth. Training programs facilitate the transfer of knowledge from research institutions and universities to rural communities, improve entrepreneurial competencies, and reduce the risk of business failure among young entrepreneurs (Wale *et al*., 2021; Ouko *et al*., 2022). In addition, awareness campaigns help rural youth recognize the opportunities offered by agricultural innovation incubators and encourage their participation in innovation-driven agricultural enterprises. Consequently, investing in human capital development remains one of the most effective and sustainable approaches for promoting agricultural innovation and rural development (World Bank, 2023).

Furthermore, training reduces the failure rate of small projects, this encourages banks and funding agencies to provide financing based on the innovator's technical competence, through training, the success stories of their peers can be shared to motivate them to embark on their agricultural careers. Investing in the mindset of rural youth is the surest and least costly path to spreading innovation, no administrative structure or financial funding will achieve its goals without a conscious and professionally trained human resource base. Meanwhile, (the "Follow-up for Spreading Agricultural Innovation Incubators) axis received the lowest weighted score of (2.35) with a standard deviation of (0.63) and a percentage weight of (78.15) degree, this is attributed to the fact that, despite the respondents' approval of the follow-up axis, it ranked last because they believe that follow-up still relies on traditional methods, which are incompatible with the nature of innovation, quantitative follow-up, such as the number of incubators or the number of young people registered in an incubator, is considered, while qualitative follow-up focuses on the sustainability of projects established by young people and their economic impact on individuals and society, as well as electronic follow-up systems (Al Karoot, 2026).

Furthermore, the follow-up process, It requires experts in agricultural entrepreneurship, while those currently working in most governorates are specialists in agricultural extension who may not realize the technical complexities of innovative projects. In addition, the lack of centralization in collecting follow-up data makes it difficult to form an accurate picture of the success or failure of the initiative in general, due to the multiplicity of entities supervising the incubators. In addition, follow-up without the authority to correct mistakes , this axis reduces its value in the eyes of the respondents, showing positive results to satisfy senior management makes respondents less confident in follow-up axis as a real tool for correction, therefore, work must be done to develop an intelligent and independent follow-up system based on real field data and with the necessary powers to ensure that the financial and training efforts made in deploying incubators are not wasted, the rest of the axes within the field (the process of implementing the deployment of agricultural innovation incubators) ranged between a weighted average of (2.37 - 2.45) degrees and a percentage weight between (79 - 81.77) degrees, it is clear that the respondents agreed on a four-point scale, ranging from agree to strongly agree, on all items in the area of (the process of implementing the dissemination of agricultural innovation incubators), as they obtained a weighted average higher than the hypothetical average of (1.5) degrees.

*Evaluation the spreading of agricultural innovation incubators among rural youth in iraq*

The research results showed that the axes of the field of Evaluation the deployment of agricultural innovation incubators among rural youth in Iraq, which numbered (6) axes, included (14) items distributed on a four-point scale that obtained a general arithmetic mean rate of (2.45) points, a general standard deviation of (0.62) points, a general weighted rate of (2.45) points, and a general percentage weight of (81.49) points As shown in Table 2.

*(Values in parenthesis are the percentages)*

It is clear from the above table that the axis (Follow-


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**Table 2:** *Distribution of respondents according to the rates of the axes of the Evaluation process field for deploying agricultural innovation incubators*

| Themes | Strongly agree | Agree | Somewhat agree | Disagree | Mean | SD | Weight % | Interpretation |
|---|---|---|---|---|---|---|---|---|
| Overall performance evaluation | 67.5 (45.60) | 74.5 (50.35) | 5.5 (3.70) | 1.0 (0.70) | 2.41 | 0.58 | 80.30 | Strong agreement |
| Data collection and analysis | 73.0(49.30) | 64.67(43.70) | 9.67 (6.53) | 1.0 (0.70) | 2.42 | 0.63 | 80.57 | Strong agreement |
| Review of results and work programs | 79.0 (53.37) | 61.0 (41.23) | 7.67 (5.20) | 1.0 (0.70) | 2.47 | 0.60 | 82.57 | Strong agreement |
| Discovering strengths and weaknesses | 78.0 (52.70) | 59.5 (40.20) | 9.0 (6.10) | 1.5 (1.05) | 2.44 | 0.66 | 81.35 | Strong agreement |
| Providing recommendations and amendments | 77.5 (52.35) | 59.0 (39.85) | 10.5 (7.10) | 1.0 (0.70) | 2.44 | 0.65 | 81.15 | Strong agreement |
| Follow up on the implementation of the recommendations | 79.5 (53.75) | 62.0 (41.90) | 6.0 (4.10) | 1.0 (0.70) | 2.49 | 0.59 | 83.00 | Strong agreement |
| Overall Average | | | | | 2.45 | 0.62 | 81.49 | Strong agreement |

up on Recommendation Implementation) axis received the highest weighted score of (2.49) degrees with a standard deviation of (0.59) degrees and a percentage weight of (83) degrees, this is attributed to the respondents' belief that the recommendations resulting from the evaluation process help correct the course and address errors or problems that may hinder rural youth's access to innovation and entrepreneurship incubators. They also ensure that administrative or technical errors are not repeated, furthermore, these recommendations act as a means of exerting pressure on implementing bodies (government institutions, the private sector, and development organizations) to adhere to established timelines and technical standards, the axis also emphasizes the principle of transparency and ensures that incubators comply with modern scientific standards in their projects, thus improving the quality of agricultural outputs. This, in turn, strengthens researchers' confidence that their recommendations are being implemented, increasing their motivation to provide more innovative solutions for young people. In light of all this, and given the ongoing administrative changes, respondents believe that following up on the implementation of recommendations is what guarantees the project's continuity, regardless of changes in leadership positions. This achieves stability in the vision of innovation incubators (OECD, 2023).

Meanwhile, the "General Performance Evaluation" axis received the lowest weighted score was (2.41) with a standard deviation of (0.58) and a minimum percentage weight of (80.3). This is attributed to the respondents' agreement, as performance evaluation lacks a scientific basis, there are no unified national standards for the performance of agricultural incubators in Iraq, making evaluation a subjective process based on administrative interpretations rather than digital data, current evaluation tools are copied from international experiences or other sectors and do not take into account the unique challenges of rural areas, furthermore, overall performance evaluation often ignores influential external factors, the evaluation may show a poor incubator performance, while the real reason is legislative or financial obstacles beyond its control, making it an unfair evaluation (Henning *et al.*, 2022; Ouko *et al.*, 2022). The respondents also believe that the incubator sector in Iraq is still in establishment process, and that conducting a general and comprehensive performance evaluation at this early stage could be misleading or discouraging, unless it is a developmental evaluation. The remaining axes within the domain (evaluation process for the deployment of agricultural innovation incubators) ranged between (2.44 - 2.47) degrees on a weighted scale, with a percentage weighting between (81.15 - 82.57) degrees, it is clear that the respondents agreed on a four-point scale, ranging from agree to strongly agree, on all items in the field (the process of evaluating the dissemination of agricultural innovation incubators), as they obtained a weighted average higher than the hypothetical average of (1.5) degrees.

## Conclusions and Recommendations

Based on the findings, the study concludes that


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agricultural innovation incubators play a significant role in supporting agricultural development through the dissemination of innovative practices, capacity building, and stakeholder engagement. Respondents demonstrated a high level of agreement regarding the effectiveness of incubator activities, particularly in raising awareness among youth, supporting innovation initiatives, and facilitating the spread of agricultural innovations. These findings indicate that agricultural innovation incubators are perceived as valuable mechanisms for enhancing knowledge transfer and encouraging innovation within the agricultural sector.

The results further reveal that the performance evaluation processes associated with agricultural innovation incubators are effective and well-received by respondents. High levels of agreement were observed across all evaluation dimensions, particularly in reviewing work programs and following up on the implementation of recommendations. This suggests that evaluation practices contribute positively to organizational learning, accountability, and continuous improvement. The predominance of positive responses and the relatively low variation in opinions indicate a strong consensus among respondents regarding the effectiveness of both agricultural innovation incubator activities and their evaluation mechanisms. The overall weighted averages exceeding 80% demonstrate that respondents generally perceive these initiatives as successful in achieving their intended objectives. The study therefore concludes that agricultural innovation incubators contribute substantially to the promotion and adoption of agricultural innovations, while effective performance evaluation systems strengthen their impact by identifying strengths, addressing weaknesses, and ensuring the implementation of improvement measures. However, continued efforts to enhance follow-up activities, stakeholder communication, and support services would further improve the effectiveness and sustainability of agricultural innovation incubator programs.

Based on the findings of this study, following recommendations are hereby proposed.

- Stronger follow-up mechanisms should be established to ensure that innovation initiatives are successfully implemented and continue to generate long-term benefits to the end users.
- Coordination among stakeholders should be strengthened to broaden the reach and impact of agricultural innovation incubators.
- Continuous investment in youth training and awareness programs is essential to ensure sustainability. Regular performance evaluation should also be institutionalized as a core component of incubator operations.

## Novelty Statement

Current research study is among the first to develop a comprehensive implementation and evaluation framework for agricultural innovation incubators specifically targeting rural youth in Iraq. Furthermore, the proposed framework was empirically validated through stakeholder assessment, and provide a practical model for fostering agricultural entrepreneurship, innovation dissemination, and rural development.

## Author's Contribution

**Mohammed Talib Alabboodi**: Conceptualization, methodology, investigation, data curation, formal analysis, writing—original draft, and project administration.
**Ahmed Hamdan Lafta**: Supervision, validation, methodology, writing, review and editing, visualization, and final approval of the manuscript.
Both authors contributed substantially to the study, read and approved the final manuscript, and agreed to be accountable for all aspects of the work.

*Generative AI and AI-assisted technology statement*
The authors declare that no generative AI and AI assisted technology was used in the creation of this manuscript.

*Conflict of interest*
The authors have declared no conflict of interest.

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