



Article

Evaluation of Wheat Marketing and Storage Mechanisms in Iraq from the Perspective of Agricultural Employees in Babylon, Najaf, and Wasit Governorates

Ahmed Dhahir Al-janabi*¹, Asmaa Zuhair Al-Hafidh², Mahdi Najm Rkheet³

1. Collage of food science, Al-Qasim Green University Babylon, Iraq
2. Collage of Agriculture and Forestry, University of Mosul, Mosul, Iraq
3. Collage of Agriculture Karbala University, Karbala, Iraq

*Correspondence: ahmeddhahir@fosci.uoqasim.edu.iq

Abstract: In this study, we intended to evaluate the current state of wheat marketing and storage mechanisms in three Iraqi Governorates (Babylon, Najaf and Wasit) based on the perspective of workers employed with agricultural directorates and extension centers. A descriptive analytical approach was adopted using a questionnaire that contained forty items divided into four areas of study: collection and transportation procedures; storage infrastructure; efficiency of marketing mechanisms; and institutional and logistical constraints.

Descriptive and inferential statistics, including ANOVA, independent samples t-test, and Pearson Correlation Coefficient, were applied to the data collected as a result of a disproportionately stratified random sample of a total of 180 employees (60 from each governorate).

According to the findings, the marketing function's overall performance is viewed subjectively at a moderate level ($M=3.02$, $SD=0.61$). Nonetheless, there were deficiencies related to the physical environment for storage as reflected in an overall evaluation for storage facilities that was rated relatively low at below average ($M=2.71$, $SD=0.74$). This indicated that the area's deficient aspects were due to insufficient ventilation, humidity control, and inadequate storage capacity. In addition, when infrastructure evaluations between governorates were analyzed with an ANOVA, statistically significant differences were found ($F(2, 177) = 5.12$, $P=0.007$). More specifically, Babylon outperformed both the Najaf and Wasit governorates regarding storage infrastructure.

The conclusion of the report indicates that an upgrade to both technical aspects of storage facilities and ongoing staff training programs will be necessary in addition to enhancing the logistics involved in collecting and transporting wheat. Also included in the conclusion was the recommendation to develop a computerized tracking system for wheat inflow and outflow as well as improving government procurement processes to enhance transparency.

Keywords: Agricultural extension, wheat storage, institutional constraints.

Citation: Al-janabi A. D., Al-Hafidh A. X., Rkheet M. N. Evaluation of Wheat Marketing and Storage Mechanisms in Iraq from the Perspective of Agricultural Employees in Babylon, Najaf, and Wasit Governorates. Journal of Agriculture and Urbanization 2026, 5(3), 5-10.

Received: 10th Feb 2026

Revised: 11th Mar 2026

Accepted: 24th Apr 2026

Published: 20th May 2026



Copyright: © 2026 by the authors. Submitted for open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>)

Introduction

Wheat has been viewed as one of the most significant (nationally and globally) strategic crops due to its role as a basic-building block of food security and economic stability; this is especially so for developing countries, where a large portion of their population relies upon cereals as their major source of energy and plant-protein [1], [2]. Recent research studies indicate that improving food and market production sustainability (including the marketing system) will be an important factor in decreasing susceptibility to food and economic shock through high imports or government reliance [3], [4].

Wheat has a prominent status in Iraq's agricultural and food policy, because it is a primary food source and is directly impacted by government actions such as subsidized marketing, strategic storage, and stock-management systems, which are designed to achieve greater national food security [5]. The efficiency of managing these policies impacts the degree to which local producers can be supported and, therefore, the effective use of government funds.

The effectiveness of the marketing and storage process for wheat is one of the main factors impacting the success of the agricultural value chain. Simply producing more of it, however, is only half the battle; there remains an enormous gap in food security that can be closed by lowering post-harvest losses and improving the quality of marketed and stored grain. Studies have indicated that the prevalence of improper marketing and storage systems hath resulted in a higher number both quantitative and qualitative post-harvest loss, resulting not only in wastage of resources but also economic returns to farmers as well as the country. Global level studies show that in countries with poor storage and logistics, the loss of grain after harvest can reach 15% to even 25% [6].

Iraq's Wheat marketing and storage systems are characterized by chronic structural weaknesses, exemplified by very low availability of modern storage facilities as a factor in ever-present spatial imbalances of transportation, procurement and marketing organization efficiency or an excessive dependence on traditional types of natural structures without precisely managed temperature/humidity over long periods. Grain storage systems already need to cope with problems associated with climate change, as higher temperature and moisture content are shown to have direct impacts on wheat quality and susceptibility to infection by mycotoxin-producing fungi or insect damage. This requires the use of state-of-the-art storage technologies and accurate environmental monitoring systems[7], [8].

However, modern technologies that may include ventilation systems and digital sensors for monitoring humidity and temperature were found to minimize storage losses and improve grain quality in recent studies [9], [10].

Indeed, marketing and storage mechanisms efficiency are also determined by a human factor. Studies shows that experience levels of agricultural workers, the amount of training received, and clearness with respect to organizational procedure have direct impacts on reduced losses, improved grain quality and facility performance [11], [12].

Most of the studies have focused on wheat production factors, while there is a visible gap in relation to wheat marketing and storage mechanisms from the view point of field-level agricultural staff in the main producing governorates such as Babylon, Najaf and Wasit.

Research Problem

Due to post-harvest losses, long delays in procurement schedules and the lack of sufficient storage capacity to maintain good quality grains over time, wheat marketing and storage mechanisms in Iraq remain highly unproductive despite government intervention and procurement policies. These problems have a direct impact on the incomes of farmers and the food security stability of producing regions.

Main Research Question:

What is the perception of agricultural workers towards wheat marketing and storage mechanisms in Babylon, Najaf and Wasit?

Sub-questions:

- How far have you gone with collection and transportation?
- What is the state of storage infrastructure and its adherence to standards?
- What is the efficiency of working marketing mechanisms and how timely do you price?
- What is your main institutional and logistical constrains?

Research Objectives

General Objective:

To assess the marketing and storage mechanisms of wheat in Babylon, Najaf, and Wasit from the point of view of workers in agriculture.

Specific Objectives:

- Expand demographic information for the sample.
- Compare storage infrastructure with technical benchmarks.
- Evaluate the efficiency of marketing mechanisms.
- Analyze differences between governorates.

Methodology

A descriptive-analytical study was carried out regarding agricultural value chains, post-harvest management and the role of agricultural extension in technology transfer.

- Dependent variable: Marketing and storage efficiency
- Independent variables: infrastructure, training, field practices and institutional support

Study Population:

Workers in Agricultural Directorates and extension centers of the three governorates

Sample:

Disproportionate stratified random sampling of 180 employees (60 per governorate).

Research Instrument:

40 item questionnaire across four domains, high validity (Cronbach's alpha = 0.87).

Statistical Analysis:

Data were analyzed by using SPSS for ANOVA between groups and Pearson correlation (frequencies, percentages, means, standard deviations).

Results and Discussion

(A) General Descriptive Analysis

Table 1. Demographic Characteristics of the Sample (N = 180).

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	144	80.0
	Female	36	20.0
Educational Qualification	Diploma/Technical	32	17.8
	Bachelor's	108	60.0
	Postgraduate	40	22.2
Years of Experience	<5	28	15.6
	5–10	60	33.3
	11–20	62	34.4
	>20	30	16.7

The data on gender presented in Table 1 showed that the majority of respondents are males (80%) and only a minority being females (20%), which could demonstrate lower females involvement at agricultural institutions [14].

In terms of educational background, the largest percentage of employees with bachelor's degrees is (60%), while those with postgraduate degrees are 22.2%, meaning that the majority of employees are relatively well qualified [15], [16].

When it comes to experience, most respondents have between 5–20 years, which indicates a reasonable level of professionalism that could help them diagnose issues and make recommendations [17].

(B) Descriptive Statistics of the Main Domains

Table 2. Means and Standard Deviations of Study Domains.

Domain	No. of Items	Mean (M)	Std. Dev. (SD)
Institutional & Logistical Constraints	8	4.02	0.53
Collection & Transport Practices	10	3.41	0.68
Marketing Efficiency	10	3.02	0.61
Storage Infrastructure	12	2.71	0.74

In table 2, institutional and logistical constraints had the highest mean ($M = 4.02$), which means that respondents were in strong agreement about how severe these constraints are. This mirrors the administrative barriers (delays, weak coordination, scarcity of resources, complex procedures).

In contrast storage infrastructure in particular ventilation, temperature and humidity controls along with insufficient storeroom space scored the lowest overall mean ($M = 2.71$). This points to urgent needs in both process and financial action.

(C) Differences Between Governorates (ANOVA)

Table 3. ANOVA Results.

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.53	2	3.265	5.12	0.007
Within Groups	112.89	177	0.638		
Total	119.42	179			

The ANOVA results in storage infrastructure assessments among the governorates ($F = 5.12$, $p = 0.007 < 0.05$).

This indicates that most of the incoherence lies on province instead of individual level. Conclusions The results highlight the importance of spatial and institutional parameters for enhancing storage efficiency.

They build on prior work showing spatial disparities in storage infrastructure, as it relates to post-harvest loss and strategic crop management [6], [13].

This leads us to reject the null hypothesis and accept that real differences do exist between the governorates.

(D) Pearson Correlation Analysis

Table 4. Pearson Correlation Results.

Variable 1	Variable 2	R	Sig.
------------	------------	---	------

Years of Experience	Storage Infrastructure Evaluation	0.42	0.001
Training (No. of Courses)	Marketing Efficiency	0.51	0.000
Storage Capacity (tons)	Storage Quality Evaluation	0.38	0.002

Results of the random forest analysis showed that years in practice have a weak correlation for their evaluation of storage infrastructure ($r=0.42$), indicating that with long experience, employees are able to better assess the situation of storages.

Additionally, a correlation ($r = 0.51$) was found between training and marketing efficiency, suggesting that the institution should focus on teaching employees how to market successfully their respective institutions.

Storage capacity is also significantly correlated with storage quality ($r = 0.38$), which suggests that larger scale storage facilities have a better infrastructural & technical capacity as well.

These results in combination signal the importance of efforts that blend investments to upgrade wheat processing capacity with investments to improve infrastructure to ready wheat for market and for storage.

Conclusions

1. Its data storage infrastructure is basic, and lacks airflow, humidity control or even capacity.
2. It also plays a major role at the institutional as well logistical level, affecting both marketing and storage efficiency.
3. Training almost is the greatest positive index of best starting process.
4. Not all governorates are equal - Babylon is doing better than Najaf and Wasit on their data.

Recommendations

1. **Technical Upgrades:** Next is pump-storage and high levels of ventilation followed by humidity, then provide more storage to the top.
2. **Customized training programs:** Structured & customized field learning programs on methods, of storage management practices, marketing processes for upgrading technical skill competencies of agricultural stakeholders and information communication systems in time based up on domains/avenues of technology transfers.
3. **Logistical Organization:** Designed the collection and transportation operations of incentives to prevent state-of-the-art process loss.
4. **Digital Transformation:** Digitizing in-Flows and Out-flows of wheat to track status
5. **Policy Transparency:** Enhance the price given to consumers and the timing of expenditure and at the same time enhance agriculture growth as a share of GDP.

REFERENCES

- [1] B. Shiferaw, M. Smale, H. J. Braun, E. Duveiller, M. Reynolds, and G. Muricho, "Crops that feed the world 10: Past successes and future challenges to the role played by wheat in global food security," *Food Security*, vol. 5, no. 3, pp. 291–317, 2013, doi: 10.1007/s12571-013-0263-y.
- [2] S. Zorya and D. Ilina, *Making Farmland Work for Economic Development in Uzbekistan*. Washington, DC, USA: World Bank, 2019.

- [3] T. Reardon et al., "Rapid transformation of food systems in developing regions: Highlighting the role of agricultural research & innovations," *Agricultural Systems*, vol. 172, pp. 47–59, 2019, doi: 10.1016/j.agsy.2018.01.022.
- [4] B. Minten, S. Tamiru, E. Engida, and T. Kuma, *Ethiopia's Value Chains on the Move: The Case of Teff*, ESSP II Working Paper 52. Washington, DC, USA: International Food Policy Research Institute (IFPRI), 2013.
- [5] A. Dorward, "Agricultural labour productivity, food prices and sustainable development impacts and indicators," *Food Policy*, vol. 61, pp. 245–255, 2016, doi: 10.1016/j.foodpol.2012.12.003.
- [6] T. Stathers et al., "A scoping review of interventions for crop postharvest loss reduction in sub-Saharan Africa and South Asia," *Global Food Security*, vol. 27, p. 100455, 2020, doi: 10.1038/s41893-020-00622-1.
- [7] S. S. Myers et al., "Climate change and global food systems: Potential impacts on food security," *Annual Review of Environment and Resources*, vol. 42, pp. 701–730, 2017, doi: 10.1146/annurev-publhealth-031816-044356.
- [8] J. I. Pitt and A. D. Hocking, *Fungi and Food Spoilage*, 3rd ed. New York, NY, USA: Springer, 2009, doi: 10.1007/978-0-387-92207-2.
- [9] U. L. Opara, "Traceability in agriculture and food supply chain: A review of basic concepts, technological implications, and future prospects," *Biosystems Engineering*, vol. 106, no. 3, pp. 205–217, 2010.
- [10] D. Kumar and P. Kalita, "Reducing postharvest losses during storage of grain crops to strengthen food security in developing countries," *Foods*, vol. 6, no. 1, p. 8, 2017, doi: 10.3390/foods6010008.
- [11] J. R. Anderson and G. Feder, "Agricultural extension," in *Handbook of Agricultural Economics*, vol. 3, Elsevier, 2007, pp. 2343–2378, doi: 10.1016/S1574-0072(06)03044-1.
- [12] Food and Agriculture Organization of the United Nations (FAO), *The State of Food and Agriculture 2019: Moving Forward on Food Loss and Waste Reduction*. Rome, Italy: FAO, 2019, doi: 10.4060/ca6030en.
- [13] H. Affognon, C. Mutungi, P. Sanginga, and C. Borgemeister, "Unpacking postharvest losses in sub-Saharan Africa: A meta-analysis," *World Development*, vol. 66, pp. 49–68, 2015, doi: 10.1016/j.worlddev.2014.08.002.
- [14] L. W. Muhammad, I. N. Maina, and B. Pelletier, "A participatory and integrated agricultural extension approach to enhancing farm resilience through innovation and gender equity," in *Food Security, Gender and Resilience*, Routledge, 2016, pp. 35–61.
- [15] K. Anderson, G. Rausser, and J. Swinnen, "Political economy of public policies: Insights from distortions to agricultural and food markets," *Journal of Economic Literature*, vol. 51, no. 2, pp. 423–477, 2013, doi: 10.1257/jel.51.2.423.
- [16] D. W. Hagstrum, T. W. Phillips, and G. Cuperus, *Stored Product Protection*. Manhattan, KS, USA: Kansas State University, 2012.
- [17] S. Zorya, N. Morgan, L. D. Rios, R. Hodges, J. Bennett, T. Stathers, A. Mude, and J. Lamb, *Missing Food: The Case of Postharvest Grain Losses in Sub-Saharan Africa*. Washington, DC, USA: World Bank, 2019.