Bilim
Innovatsiya
Barqaror rivojlanish

Sentabr
№9, 2026

# AGROBIZNES, FAN VA TEXNOLOGIYALAR

ILMIY-AMALIY
ELEKTRON
JURNALI

Агробизнес, наука и технологии

*Agribusiness, science and technology*

№ 083688

ISSN:
3060-5245

Toshkent-2026

Platform & workflow by
OJS / PKP

**MUASSIS**
Toshkent davlat agrar universiteti

**ALOQA UCHUN MA’LUMOTLAR**
Manzil: Toshkent viloyati, Qibray tumani, Universitet ko‘chasi, 2-uy.
Jurnalning telegram manzili: t.me/agrobiznes_elektronjurnal
E-mail: licht-1989@mail.ru
Jurnalning rasmiy sayti: https://www.agrobiznesjournal.uz
Tel: +(998) 93 439 30 00

**JURNALNING ILMIYLIGI:**

Ma’lumot uchun, OAK Rayosatining 30.11.2024-yildagi №364/5-sonli qarori bilan 08.00.00-Iqtisodiyot fanlari bo‘yicha, 08.05.2025-yildagi №370/5-sonli qarori bilan 06.00.00-Qishloq xo‘jaligi fanlari bo‘yicha “Dissertatsiyalar asosiy ilmiy natijalarini chop etish tavsiya etilgan milliy ilmiy nashrlar ro‘yxati”ga kiritilgan.

**Elektron nashr,** 226-sahifa.
2026-yil, sentabr.

# MUNDARIJA

## IQTISODIYOT FANLARI

2026-yil, sentabr.
№9-son.
ISSN: 3060-5245

2026-yil, sentabr.
№9-son.
ISSN: 3060-5245

# THE ECONOMICS OF DIGITAL WATER MANAGEMENT: A CRITICAL REVIEW

**BAXSHULLOYEV FERUZBEK**
MSc, Assistant Teacher, International Agriculture University (IAU)
Royal Agricultural University (RAU)
E-mail: Feruzbek.Baxshulloyev@rau.ac.uk
ORCID: 0009-0003-9693-5408

Abstract. The economic value of digital water-management technologies in agriculture is more often assumed than demonstrated: technical water-saving performance is treated as equivalent to farm-level economic benefit. This article presents a critical review of the literature on the chain linking digital technology adoption, farmer water-use decisions, water-use efficiency and farm economic performance. It examines five core empirical studies together with the broader irrigation-economics and rebound-effect literature. The analysis shows a fragmented evidence base: adoption determinants and the efficiency-to-performance link are studied separately, but no study traces the complete chain within a single causal design, and no verified study examines the rebound effect for a specifically digital technology. The contribution is to specify the evidence gap precisely and to justify a research agenda for Uzbekistan and comparable arid agricultural economies.
Keywords: digital agriculture, technology adoption, water-use efficiency, water productivity, farm profitability, irrigation economics, precision irrigation, rebound effect, Uzbekistan, agricultural economics.

Annotatsiya. Qishloq xo‘jaligida raqamli suv boshqaruvi texnologiyalarining iqtisodiy qiymati ko‘pincha isbotlanmasdan taxmin qilinadi: texnik suv tejash ko‘rsatkichi fermer xo‘jaligi darajasidagi iqtisodiy foyda bilan tenglashtiriladi. Maqolada raqamli texnologiyalarni qabul qilish, suvdan foydalanish samaradorligi va fermer xo‘jaligi iqtisodiy natijalarini bog‘lovchi zanjir bo‘yicha adabiyotlarning tanqidiy tahlili taqdim etiladi. Tadqiqot beshta asosiy empirik tadqiqotni va irrigatsiya iqtisodiyoti bo‘yicha kengroq adabiyotlarni qamrab oladi. Tahlil dalillar bazasining parchalanganligini ko‘rsatadi: qabul qilish determinantlari va samaradorlik–natija bog‘liqligi alohida o‘rganilgan, biroq hech bir tadqiqot to‘liq zanjirni yagona sabab-oqibat tahlili doirasida kuzatmaydi. Raqamli texnologiyalar uchun “qaytish effekti” bo‘yicha tasdiqlangan tadqiqot topilmadi. Maqolaning ilmiy hissasi — dalillar bo‘shlig‘ini aniq ko‘rsatish va O‘zbekiston uchun tadqiqot yo‘nalishini asoslash.
Kalit so‘zlar: raqamli qishloq xo‘jaligi, texnologiyani qabul qilish, suvdan foydalanish samaradorligi, suv unumdorligi, fermer xo‘jaligi rentabelligi, irrigatsiya iqtisodiyoti, aniqlik irrigatsiyasi, qaytish effekti, O‘zbekiston, qishloq xo‘jaligi iqtisodiyoti.

Аннотация. Экономическая ценность цифровых технологий управления водой в сельском хозяйстве чаще предполагается, чем доказывается: техническая экономия воды приравнивается к выгоде на уровне хозяйства. В статье представлен критический анализ литературы по цепочке, связывающей внедрение цифровых технологий, эффективность использования воды и экономические результаты фермерских хозяйств. Рассмотрены пять основных эмпирических исследований и более широкая литература по экономике орошения. Анализ показывает фрагментированность доказательной базы: детерминанты принятия и связь эффективности с результатом изучаются отдельно, но ни одно исследование не охватывает всю цепочку. Подтверждённых исследований эффекта отдачи для цифровых технологий не найдено. Вклад статьи — точное определение исследовательского разрыва и обоснование направления исследований для Узбекистана.
Ключевые слова: цифровое сельское хозяйство, принятие технологий, эффективность использования воды, продуктивность воды, рентабельность фермерских хозяйств, экономика орошения, точное орошение, эффект отдачи, Узбекистан, аграрная экономика.

2026-yil, sentabr.
№9-son.
ISSN: 3060-5245

## INTRODUCTION

Agriculture uses roughly seventy per cent of the world's freshwater withdrawals. It is no surprise, then, that digital tools for managing that water — soil-moisture sensors, automated irrigation controllers, decision-support systems, remote sensing, mobile advisory platforms — are being pushed hard as a way to save water and raise farm income at the same time. For policymakers in arid economies the appeal is obvious: it looks like a way out of a genuine trade-off, where farmers would earn more precisely because they use less.

That promise depends on three things happening in sequence. Farmers have to adopt the technology and genuinely change how they decide when and how much to irrigate. That changed behaviour has to show up as a measurable gain in water-use efficiency. And that efficiency gain has to leave the farmer better off financially once the cost of buying, running and maintaining the technology is subtracted. Each of these is an economic question, not a technical one, and each can fail on its own, independently of the others.

The literature does not test this sequence as a whole. Reviews of digital water technologies are thorough on what the technologies can do and largely descriptive on barriers, without synthesising farm-level profitability or adoption econometrics. The mature resource-economics literature on the so-called irrigation efficiency paradox studies what happens after a technology is adopted, but almost entirely for conventional irrigation hardware rather than a digital information layer. The two bodies of work barely cite each other, and neither asks the question this article is built around: does digitalisation change the economic logic of irrigation modernisation, or does the same logic hold regardless of whether the technology is a sensor or a length of drip tape?

That is the gap this article addresses. The aim is not to conclude that digital water management works or does not; it is to say plainly what the evidence currently supports for each link of the chain, why studies disagree where they do, and where the chain has simply never been tested. For Uzbekistan, where agriculture uses about ninety per cent of national water, irrigation infrastructure is old, and water-saving technology is actively subsidised, the answer is not an academic curiosity.

## LITERATURE REVIEW

The relevant literature splits into five clusters. Each addresses a different segment of the chain, and they rarely speak to one another.

Technology-capability reviews. Parra-López and colleagues offer the most thorough recent map of digital technologies in agricultural water management — remote sensing, artificial intelligence, the Internet of Things, big data, robotics, smart sensors, blockchain — and identify cost, limited expertise and poor connectivity as the main barriers to uptake [9]. Abdelmoneim and colleagues do something similar for Internet-of-Things applications in irrigation specifically [1]. Both are strong on what these technologies can do. Neither says what they cost a farmer or models the decision to adopt them, so both define the first node of the chain without actually stepping into it.

2026-yil, sentabr.
№9-son.
ISSN: 3060-5245

Adoption economics of digital water technologies. Agricultural technology adoption is usually framed as an investment decision made under risk, credit constraints and incomplete information, with diffusion theory the dominant empirical lens [11], supplemented by behavioural models such as the Technology Acceptance Model [3] and the Unified Theory of Acceptance and Use of Technology [15]. Applied specifically to digital irrigation, the empirical work is recent and uses quite different methods from one study to the next: structural equation modelling of adoption intentions among Albanian smallholders [13], regression on self-reported adoption in Saudi Arabia [7], contingent valuation of willingness to pay for a system that does not yet exist in northern Ghana [5]. A broader meta-analysis of digital agricultural technology adoption finds income and education among the strongest predictors [2]. One pattern is worth flagging: in the studies that test both, social and informational factors outweigh perceived economic benefit as drivers of adoption — which sits uneasily with a purely investment-theoretic account of why farmers adopt.

Farm-level performance of digital irrigation scheduling. A smaller set of studies looks at what actually happens on farms using digital scheduling. El Amami and colleagues compare farms advised by a decision-support model — weather stations, soil sensors, a crop-water-balance algorithm — against conventionally scheduled farms in arid central Tunisia, across seven crops and two seasons [4]. Mambetnazarov and colleagues compare technical efficiency between digitally oriented and conventional smallholdings in the Aral Sea region using data envelopment analysis [8]. Both studies find digital management performs better. Neither explains how farmers ended up in one group or the other, and that is exactly where selection bias enters.

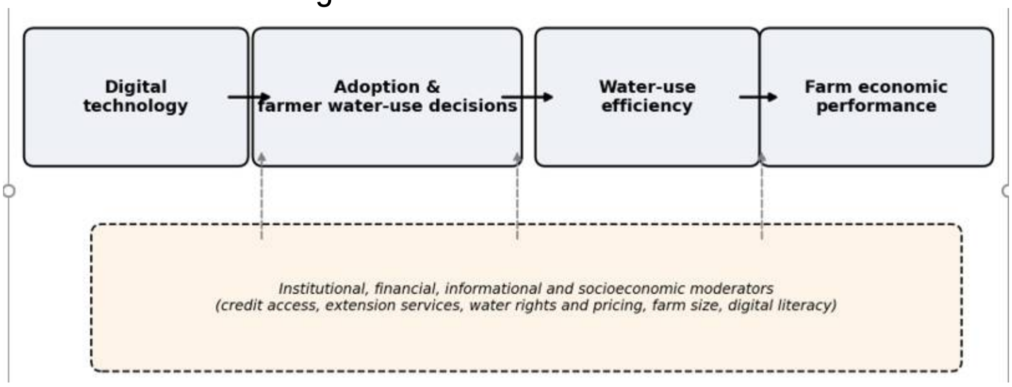
Irrigation efficiency, water accounting and the rebound effect. The most developed body of theory concerns what happens to efficiency gains once they leave the farm. Grafton and colleagues gave this phenomenon its name — the irrigation efficiency paradox: on-farm savings reduce return flows and tend to trigger area expansion or a shift to thirstier crops, so consumption at the basin scale can rise even as application per hectare falls [6]. Perry and colleagues reach much the same conclusion in a review for the Food and Agriculture Organization [10]; Perez-Blanco and colleagues survey the theoretical and empirical evidence more broadly [18]. The empirical record backs this up repeatedly. In Kansas, subsidised conversion to efficient centre-pivot systems increased groundwater extraction rather than reducing it [21]. In the Murray–Darling basin, subsidised upgrades raised extraction among the farmers who received them [22]. In the Hetao district of the Yellow River basin, most of the water that should have been saved was instead absorbed by area expansion [17]. The same pattern shows up in micro-irrigation across four Indian states [14] and in Moroccan drip-irrigation subsidies of up to 100 per cent, which were followed by higher water consumption, not lower [20]. Berbel and colleagues supply the microeconomic mechanism: efficiency improvements cut withdrawal but barely touch consumption unless something else constrains it, so the rebound comes from area, crop mix and market forces, not from efficiency as such [19]. Yao and colleagues, in a recent critical synthesis, point to behavioural economics and political economy as the field's biggest blind spots [16]. Not one study in this cluster looks at a digital technology specifically.

Central Asia and Uzbekistan. For Uzbekistan, Hamidov and colleagues use structured stakeholder interviews to assess rebound potential from water-saving irrigation technologies, and conclude that expected savings will likely be substantially eroded by expanded cultivation of water-short crops, area growth and crop-mix shifts unless policy intervenes [12]. Bekchanov and colleagues model basin-scale efficiency gains for the Aral Sea basin [23]. The World Bank, for its part, documents the scale of the underlying problem: agriculture accounts for about ninety per cent of national water use, and fifty-six per cent of irrigated land depends on pumping [24]. None of this touches a digital technology at farm level.

## RESEARCH METHODOLOGY

This is a critical, theoretically structured literature review, not a completed systematic review — a distinction worth stating outright rather than leaving implied. The literature was found through targeted searches of publisher platforms and academic search engines, and through tracing citations from key reviews. A full protocol-driven search of Scopus and Web of Science, with documented retrieval counts, deduplication and a screening flow, has not been carried out. No such numbers appear here, and the sources discussed should not be mistaken for an exhaustive census of the field.

Two rules governed what counted as core evidence. First, a study had to treat a digital technology — sensor-based data collection, computational decision support, automated actuation, or a digital platform mediating water decisions — as a substantive part of the intervention, the decision process, or the adoption analysis, and it had to report an economic or adoption outcome. Studies of conventional drip, sprinkler or canal-lining technology were excluded on this basis even where they deal directly with water saving and profitability; they appear instead as theoretical and contextual background. Second, rebound-effect studies counted as core evidence only where the technology whose rebound was being measured was itself digital.




Source: developed by the author.

**Figure 1. The adoption–efficiency–performance chain in digital agricultural water management**

2026-yil, sentabr.
№9-son.
ISSN: 3060-5245

Every core study was then classified two ways: which segment of the chain in Figure 1 it actually tests — adoption only, adoption to efficiency, efficiency to performance, or the whole chain — and how strong its causal claim is, from bare description through correlation to designs offering something closer to genuine identification. Full texts were read, not just abstracts, and figures are reported as published, inconsistencies included.

## ANALYSIS AND RESULTS

The evidence base by chain position. Table 1 lists the five core empirical studies, and the pattern is immediately visible. Three establish adoption determinants and stop there, without measuring any downstream outcome. One measures efficiency and profitability but never models the adoption decision. One measures technical efficiency alone. Nothing spans the full chain, and nothing offers causal identification: no matching, no panel estimation, no instrumental variables, no randomised assignment.

**Table 1**

**Core empirical studies on digital agricultural water management, by chain position**

| Study, country | Digital technology | Sample and method | Adoption outcome | Water and economic outcome | Chain position | Causal status and main limitation |
|---|---|---|---|---|---|---|
| Sosoli et al., 2026 Albania | IoT soil-moisture sensors, automated drip controllers, mobile apps | 368 farmers; PLS-SEM (TAM/UTAUT) | Intention to use; social influence strongest predictor; attitude–intention path not significant | Not reported | Adoption only | Correlational; measures intention, not behaviour |
| Gulzar et al., 2025 Saudi Arabia | IoT sensors and smart irrigation techniques | 600 farmers; separate bivariate regressions | Self-reported adoption; awareness strongest, perceived economic benefit weakest | Not reported | Adoption only | Correlational; predictors not modelled jointly; adoption unverified |
| Gadafi et al., 2025 Ghana | Sensor-based smart irrigation (hypothetical, not deployed) | 375 respondents, 125 households; contingent valuation, probit | Maximum willingness to pay GHS 628; income the strongest determinant | Not reported | Adoption only | Stated preference for an unavailable technology |
| El Amami et al., 2026 Tunisia | MOPECO decision-support system with weather stations and soil sensors | 27 farms, 7 crops, 2 seasons; two-group comparison | Not modelled; leader farmers purposively recruited | Water productivity +26% (range +2% to +65%); gross margin +26% per abstract, +35% income per conclusion | Efficiency → performance | Non-randomised; farmer skill confounded with technology effect |
| Mambetnazarov et al., 2026 Uzbekistan | Digital irrigation and farm-management practices (unspecified) | 120 dehkan farms, 1 season; data envelopment analysis | Not modelled; binary adopter classification | Higher technical efficiency for adopters; effect size not reported | Partial adoption → efficiency | Descriptive; single season and district; conference paper |

Source: developed by the author.

Why the chain cannot be assembled from its parts. It is tempting to put the adoption studies next to the performance study and call the mechanism supported. That move does not hold up. The adoption evidence and the performance evidence come from different countries, different farm structures and different technologies; the two populations simply are not comparable. There is a deeper problem, too. The Tunisian comparison, the only study with a profitability figure, contrasts farmers deliberately recruited for their skill against an average-farmer control group. The gross-margin advantage it finds could just as easily reflect the skill of the people using the decision-support system as the system itself — exactly the selection problem an adoption model would need to untangle, and one that no study here addresses.

Table 2 places each literature cluster against the chain and spells out what it leaves untested. Put side by side, the clusters simply do not overlap: one characterises the technology without touching economics, one models the adoption decision without outcomes, one measures outcomes without the decision, and one analyses basin-scale consequences for an entirely different class of technology.

**Table 2**

**Literature clusters and their position relative to the economic chain**

| Cluster | Sources | What it establishes | What it leaves untested |
|---|---|---|---|
| Technology-capability reviews | [9], [1] | Technical functions of sensing, decision support and automation; descriptive barrier taxonomy (cost, expertise, connectivity) | No farm-level economic outcomes, no adoption estimation, no basin-scale accounting |
| Adoption economics of digital water technologies | [13], [7], [5], [2], [3], [11], [15] | Determinants of adoption, intention and willingness to pay; social and informational factors dominate perceived economic benefit | Whether adoption changes water-use behaviour, and whether it yields efficiency or profit |
| Farm performance of digital scheduling | [4], [8] | Water productivity, gross margin and technical-efficiency advantages for digitally managed farms | The adoption decision itself; selection between adopters and non-adopters; causal identification |
| Irrigation efficiency and the rebound effect | [6], [10], [18], [19], [16], [17], [14], [21], [22], [20] | That farm-level savings frequently do not become basin-level savings; mechanisms of area, crop-mix and intensity response | Whether a digital information layer amplifies, dampens or leaves unchanged the rebound response |
| Central Asia and Uzbekistan | [12], [23], [24] | Institutional setting, scale of water dependence, expert expectation of substantial rebound | Farm-level economics of digital adoption in the region; almost no primary evidence |

Source: developed by the author.

Distinctions that the evidence requires. Making sense of this literature means holding onto distinctions that get blurred constantly in less careful writing. Technical effectiveness is not economic viability: the Tunisian water-productivity gain runs from two per cent for maize to sixty-five per cent for onion, so a single pooled average hides the cases where the technology achieves nothing. Water-use efficiency is not water consumption: none of the core studies traces farm-level savings to what happens at the basin, which is exactly where the rebound literature says the real question lies. Water productivity is not water saving: the Tunisian numbers combine higher output with lower application, and the two can move apart. Yield is not profitability: part of that same gross-margin gain comes from lower irrigation and energy cost, not higher output alone. Technical efficiency is not economic efficiency: a data envelopment score is an input–output measure, not a profit measure. Adoption intention is not adoption behaviour, as the Albanian study concedes about its own data. Availability is not accessibility: the Ghanaian study prices a system that does not yet exist locally, and the Tunisian study records weather-station equipment costing seventeen to twenty thousand Tunisian dinars, out of reach for most smallholders without some form of cost-sharing. Private benefit is not social benefit: every profitability figure in this evidence base is private and farm-level. And short-run is not long-run: no core study runs past two seasons, so the recurring costs of subscription, maintenance and replacement simply have not been observed yet.

The rebound effect for digital technologies: an untested question. The rebound-effect literature is theoretically well developed and empirically substantial — for conventional efficiency hardware. Whether digitalisation changes that logic is a genuinely open question, and the argument could go either way. Digital systems might dampen the rebound, because volumetric metering, remote monitoring and enforceable consumption caps become technically possible for the first time, which is precisely the institutional fix this literature keeps calling for. Or they might make it worse: precise scheduling lowers the managerial cost of expanding irrigated area or switching to a more demanding crop, and labour-saving automation removes exactly the constraint that used to limit expansion. Nothing in this review settles the question. It is reported here as a gap, not as evidence of no effect.

Implications for Uzbekistan. Uzbekistan is where this question matters most and where the evidence is thinnest — both at once. Agriculture uses roughly ninety per cent of national water; about 2.4 million hectares, fifty-six per cent of irrigated land, depend on pumping stations that consume around sixteen per cent of national electricity [24]. Water-saving technology is subsidised, and the programme is expanding. Yet the only study of digital water technology at farm level in the country is a single-season comparison of 120 farms in one district, measuring technical efficiency and nothing else [8]; the country-specific rebound assessment [12] concerns conventional technology and relies on expert judgement rather than farm-level data. None of this means digital adoption does not work in Uzbekistan. It means the farm-level economics simply has not been established — and the institutional features most likely to decide the outcome, land tenure, water-user-association allocation, the design of subsidies, are exactly what the international literature has nothing to say about.

## CONCLUSIONS AND RECOMMENDATIONS

The economic case for digital water management is neither established nor refuted — it is unfinished. There is credible evidence that adoption follows a systematic pattern, and credible evidence that digitally scheduled farms do better on water productivity and gross margin than conventionally scheduled ones. There is no evidence that the second follows from the first. The chain, as it stands, is held together by argument, not by data.

Three things follow from this. For research, the single most valuable next step would be a study that follows one population of adopting and non-adopting

2026-yil, sentabr.
№9-son.
ISSN: 3060-5245

farmers from the adoption decision through to measured water use and measured economic performance — panel data with staggered adoption, a matched comparison with proper pre-treatment balance testing, or a policy discontinuity usable for identification. Cost measurement should go beyond the initial outlay to cover subscription, maintenance and replacement across a full investment cycle.

For Uzbekistan specifically, the absence of farm-level economic evidence, in a country where irrigation dominates water use and water-saving technology is publicly subsidised, is a real research priority, not a footnote. Subsidy programmes are being designed right now without knowing whether adoption actually pays off at farm level, for which farm sizes, or under which institutional arrangements.

For policy, the technical performance of these technologies has run ahead of the economic and hydrological evidence for their broader value. Any programme promoting digital irrigation on the assumption that it delivers both farm profitability and basin-scale conservation should be honest that the first is weakly evidenced and the second, for digital technologies specifically, has not been tested at all. The rebound literature is clear that conservation depends on binding limits on consumption and well-defined water rights, not on efficiency improvements by themselves. Digital metering could make such limits enforceable — but only if they are actually put in place.

This article is a critical review built on targeted rather than exhaustive searching, and its conclusions should be checked against a full, protocol-driven search of Scopus and Web of Science once that becomes possible. That verification, together with the primary farm-level study this gap analysis points toward, is the author's intended next step.

## REFERENCES

1. A.A.Abdelmoneim, H.N.Kimaita, C.M.Al Kalaany, B.Derardja, G.Dragonetti, R.Khadra. IoT sensing for advanced irrigation management: A systematic review of trends, challenges, and future prospects. Sensors, 2025 - Vol. 25 - №7 - Art. 2291. https://doi.org/10.3390/s25072291

2. R.Amoussouhoui, A.Arouna, S.Ruzzante, J.Banout. Adoption of ICT4D and its determinants: A systematic review and meta-analysis. Heliyon, 2024 - Vol. 10 - №9 - Art. e30210. https://doi.org/10.1016/j.heliyon.2024.e30210

3. F.D.Davis. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 1989 - Vol. 13 - №3 - B. 319-340. https://doi.org/10.2307/249008

4. H.El Amami, A.Domínguez, C.Muanda, Á.Martínez-Romero, J.A.Martínez-López, N.R.Dalezios, N.Dercas, I.Faraslis, M.Spiliotopoulos, R.Nsiri. The impact of scientific irrigation scheduling on water use efficiency, energy productivity and economic profitability: Analysis at the farm level in Tunisia. Water, 2026 - Vol. 18 - №6 - Art. 655. https://doi.org/10.3390/w18060655

5. T.M.Gadafi, D.Liang, A.P.Darko. Two stages method-based on Africa smart irrigation system assessment for willingness to pay: A case of Ghana Northern

Region. Socio-Economic Planning Sciences, 2025 - Vol. 102 - Art. 102318. https://doi.org/10.1016/j.seps.2025.102318

6. R.Q.Grafton, J.Williams, C.J.Perry, F.Molle, C.Ringler, P.Steduto, B.Udall, S.A.Wheeler, Y.Wang, D.Garrick va boshq. The paradox of irrigation efficiency. Science, 2018 - Vol. 361 - №6404 - B. 748-750. https://doi.org/10.1126/science.aat9314

7. Y.Gulzar, F.A.Reegu, A.B.Soomro, M.S.Mir, A.Zahir, C.W.Onn. Exploring the economic implications of IoT adoption in agriculture: A cost-benefit study in Jazan, Saudi Arabia. Sarhad Journal of Agriculture, 2025 - Vol. 41 - №1 - B. 51-65. https://doi.org/10.17582/journal.sja/2025/41.1.51.65

8. B.Mambetnazarov, D.Jumaniyazov, A.Jusupova, S.Ibragimova, B.Seylbekov, R.Tlewbergenov, E.Madenova, A.Shamshetov. Farm-level efficiency of digital agri-food technologies under water scarcity: Evidence from the Aral Sea Region. BIO Web of Conferences, 2026 - Vol. 239 - Art. 04004. https://doi.org/10.1051/bioconf/202623904004

9. C.Parra-López, S.Ben Abdallah, G.Garcia-Garcia, A.Hassoun, H.Trollman, S.Jagtap, S.Gupta, A.Aït-Kaddour, S.Makmuang, C.Carmona-Torres. Digital technologies for water use and management in agriculture: Recent applications and future outlook. Agricultural Water Management, 2025 - Vol. 309 - Art. 109347. https://doi.org/10.1016/j.agwat.2025.109347

10. C.Perry, P.Steduto, F.Karajeh. Does improved irrigation technology save water? A review of the evidence. Food and Agriculture Organization of the United Nations (FAO), Cairo, 2017 - 57 b.

11. E.M.Rogers. Diffusion of innovations. 5th ed. – New York: Free Press, 2003.

12. A.Hamidov, U.Kasymov, K.Djumaboev, C.Paul. Rebound effects in irrigated agriculture in Uzbekistan: A stakeholder-based assessment. Sustainability, 2022 - Vol. 14 - №14 - Art. 8375. https://doi.org/10.3390/su14148375

13. I.Sosoli, I.Vejsiu, E.Mançellari, G.Çera, I.Lushi. Smart irrigation adoption intentions in a post-communist transition economy: The role of social influence, self-efficacy and task-technology fit. Agriculture, 2026 - Vol. 16 - №15 - Art. 1592. https://doi.org/10.3390/agriculture16151592

14. G.Singh, V.P.Gandhi, D.Jain. Micro-irrigation adoption and the Jevons' Paradox: A study from four states of India. Agricultural Water Management, 2024 - Vol. 303 - Art. 109040. https://doi.org/10.1016/j.agwat.2024.109040

15. V.Venkatesh, M.G.Morris, G.B.Davis, F.D.Davis. User acceptance of information technology: Toward a unified view. MIS Quarterly, 2003 - Vol. 27 - №3 - B. 425-478. https://doi.org/10.2307/30036540

16. J.Yao, W.Zhang, S.Li, P.Xiao, J.Berbel. The irrigation efficiency paradox: A critical synthesis of the rebound effect from hydrological mechanisms to transformative governance. Water, 2026 - Vol. 18 - №7 - Art. 802. https://doi.org/10.3390/w18070802

17. H.Xu, J.Song. Drivers of the irrigation water rebound effect: A case study of Hetao irrigation district in Yellow River basin, China. Agricultural Water Management, 2022 - Vol. 266 - Art. 107567. https://doi.org/10.1016/j.agwat.2022.107567

18. C.D.Perez-Blanco, A.Hrast-Essenfelder, C.Perry. Irrigation technology and water conservation: A review of the theory and evidence. Review of Environmental Economics and Policy, 2020 - Vol. 14 - №2 - B. 216-239.

19. J.Berbel, C.Gutiérrez-Martín, A.Expósito. Microeconomic analysis of irrigation efficiency improvement in water use and water consumption. Agricultural Water Management, 2018 - Vol. 203 - B. 423-429. https://doi.org/10.1016/j.agwat.2018.02.026

20. F.Molle, O.Tanouti. Squaring the circle: Agricultural intensification vs. water conservation in Morocco. Agricultural Water Management, 2017 - Vol. 192 - B. 170-179. https://doi.org/10.1016/j.agwat.2017.07.009

21. L.Pfeiffer, C.-Y.C.Lin. Does efficient irrigation technology lead to reduced groundwater extraction? Empirical evidence. Journal of Environmental Economics and Management, 2014 - Vol. 67 - №2 - B. 189-208.

22. S.A.Wheeler, E.Carmody, R.Q.Grafton, R.T.Kingsford, A.Zuo. The rebound effect on water extraction from subsidising irrigation infrastructure in Australia. Resources, Conservation and Recycling, 2020 - Vol. 159 - Art. 104755. https://doi.org/10.1016/j.resconrec.2020.104755

23. M.Bekchanov, C.Ringler, A.Bhaduri, M.Jeuland. Optimizing irrigation efficiency improvements in the Aral Sea Basin. Water Resources and Economics, 2016.

24. World Bank. Uzbekistan to modernize its irrigation infrastructure with World Bank support. Press release, Washington, D.C., 21.05.2025. https://www.worldbank.org/en/news/press-release/2025/05/21/uzbekistan-to-modernize-its-irrigation-infrastructure-with-world-bank-support

2026-yil, sentabr. №9-son.

**Mas'ul muharrir:** Beglayev Uchqun
**Musahhih:** Boltayev Nurali
**Sahifalovchi va dizaynerlar:** Normurodov Sarvar,
Sharipov Shoxruh



Mazkur jurnalda maqolalar chop etish uchun quyidagi havolalarga murojaat qilish mumkin. Ilmiy maqolalar, reklama, hikoya va boshqa ilmiy-ijodiy materiallar yuborishingiz mumkin. Materiallar va reklamalar pullik asosda chop etiladi.

**Elektron pochta:** licht-1989@mail.ru
**Jurnalning telegram manzili:** t.me/agrobiznes_elektronjournal
**Telefon raqami: +998939018320, +998934393000**
**Jurnal rasmiy sayti:** https://www.agrobiznesjournal.uz

"Agrobiznes, fan va texnologiyalar" ilmiy-amaliy elektron jurnali O'zbekiston Respublikasi Oliy ta'lim, fan va innovatsiyalar vazirligi huzuridagi Oliy attestatsiya komissiyasi rayosatining 30.11.2024-yildagi №364/5-sonli qarori bilan 08.00.00-Iqtisodiyot fanlari bo'yicha, 08.05.2025-yildagi №370/5-sonli qarori bilan 06.00.00-Qishloq xo'jaligi fanlari bo'yicha "Dissertatsiyalar asosiy ilmiy natijalarini chop etish tavsiya etilgan milliy ilmiy nashrlar ro'yxati"ga kiritilgan.

"Agrobiznes, fan va texnologiyalar" ilmiy-amaliy elektron jurnali 2023-yil 23-maydan O'zbekiston Respublikasi Prezidenti Administratsiyasi huzuridagi Axborot va ommaviy kommunikatsiyalar agentligi tomonidan **C-5669225** reyestr raqami tartibi bo'yicha ro'yxatdan o'tkazilgan.
**Litsenziya raqami: №083688**

**Manzilimiz: Toshkent viloyati, Qibray tumani, Universitet ko'chasi, 2-uy**