

AI + Offline Service Process Optimization for Typical Legal Scenarios in Rural Revitalization: A Case Study of Migrant Workers' Wage Arrears and Neighborhood Disputes

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ABSTRACT

With the comprehensive advancement of the rural revitalization strategy, higher requirements have been placed on the construction of the rule of law in rural areas. However, this process faces practical difficulties such as a general shortage of legal service resources, low service efficiency, and villagers' difficulty in "finding the law." The rapid development of artificial intelligence technology offers new possibilities to alleviate this contradiction, but AI tools often suffer from "acclimatization" problems in rural contexts. This paper focuses on two typical rural legal scenarios-migrant workers' wage arrears and neighborhood disputes-and applies service blueprint theory and collaborative governance theory to systematically analyze the pain points in current rural legal service processes. We propose a three tier collaborative service process scheme-"AI pre processing, manual translation, and expert support"-and visualize the optimized process using service blueprints. The value of AI lies in empowerment rather than replacement; rural legal services require an organic combination of technical efficiency and human warmth to align technological supply with actual rural needs.

KEYWORDS: rural revitalization; AI + legal services; service process optimization; migrant workers' wage arrears; neighborhood disputes.

I. INTRODUCTION

For rural revitalization, the rule of law must come first. The Law of the People's Republic of China on the Promotion of Rural Revitalization, effective in 2021, explicitly calls for "establishing and improving the rural public legal service system" [1]. In recent years, the Ministry of Justice has actively carried out activities themed "Rural Revitalization, Rule of Law First" to encourage lawyers to provide legal services for rural revitalization. Statistics show that by the end of 2022, 549,000 village-level public legal service physical platforms had been built nationwide, 38,000 township public legal service workstations had been established under judicial offices, and legal advisors had been assigned to more than 600,000 villages. There were 754,000 legal service institutions of various types and nearly 4 million professional legal service personnel [2]. Thus, the rural public legal service network appears to have achieved full coverage.

However, having stations does not guarantee service quality; rural legal services still face deeper resource dilemmas. Although legal advisors are assigned to over 600,000 villages, only about 200,000 legal professionals participate in this work-meaning that on average, one legal worker is shared among three villages. In some remote townships, there is only one legal advisor, resulting in severely insufficient service coverage. Studies indicate that a certain county has only two practicing lawyers; villagers needing legal advice must drive two hours to the county seat. Thus, the "last mile" obstacle remains for villagers seeking legal help.

The rapid development of artificial intelligence offers new possibilities to alleviate the uneven distribution of legal resources. Several "AI + law" rural practices have emerged in China: after Yunnan's "Rural Legal Connect" accessed the DeepSeek large model, the response time of the AI lawyer shrank from 30

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seconds to 2 seconds^[3]; the “Shenshan Legal Intelligence Assistant” mini-program has been used by 78,000 people^[4]; and Shandong’s “Juan Xiaoman” procuratorial service platform has provided document drafting services for over 100 migrant workers^[5]. These practices demonstrate the feasibility of AI application in rural legal services. At the same time, however, AI tools face problems in rural promotion-elderly villagers are unfamiliar with smart devices, legal jargon is hard to understand, and opaque algorithms breed mistrust.

Against this backdrop, this study addresses the question of how to effectively align technological supply with rural actual needs. The core research question is: for typical scenarios such as migrant workers’ wage arrears and neighborhood disputes, how should “AI + offline” legal service stations design standardized service processes to achieve dual improvements in efficiency and quality? The theoretical significance lies in the fact that current academic research on “AI + law” mostly focuses on technology development or urban applications; studies on service process design tailored to China’s rural social structure, cultural habits, and governance needs are relatively weak. This study attempts to systematically reconstruct rural legal service processes using service blueprint theory, enriching process optimization theory in the field of “law + technology” for grassroots governance. The practical significance is that the optimized process design, through the combination of “AI tools + offline stations,” explores a feasible path to achieve higher service coverage at lower cost, providing operational and replicable templates for township judicial offices, village committees, and other grassroots units under resource constraints, thereby improving legal service response speed and villager satisfaction.

II. Core Concepts and Theoretical Foundations

The “AI + offline” collaborative service model refers to the combination of artificial intelligence legal tools with physical offline service stations, forming a collaborative legal service model of “online AI assistance + offline human service.” Its core feature is human-machine collaboration, where AI handles information collection, preliminary analysis, and standardized output, while humans take charge of translation, emotional communication, and complex problem resolution.

This paper selects two scenarios-migrant workers’ wage arrears and neighborhood disputes-based on: Firstly, high frequency-these are common legal demands in rural areas; Secondly, people’s livelihood relevance-they directly affect farmers’ basic rights

and social stability; and thirdly, representativeness-they reflect distinct characteristics of work-related and life-related disputes, helping test the generalizability of the process design.

The theoretical foundations are twofold. First, service blueprint theory, proposed by Shostack, is a service design tool that visually presents the entire service process^[6]. It comprises four elements: customer actions, front-stage actions (visible to customers), back-stage actions (invisible to customers), and support systems (technology and resources). Service blueprints help systematically identify bottlenecks and areas for improvement, providing precise targets for optimization. This paper applies service blueprinting to visualize the rural legal service process, clarify responsibilities and service modes at each step, and achieve practical implementation.

Second, collaborative governance theory emphasizes cooperation and integration among multiple actors in public affairs governance^[7]. In rural legal service scenarios, collaborative governance is embodied in the coordination among AI tools, station staff, back-end legal experts, and grassroots governments. This paper draws on this theory to build a three-tier response mechanism-“AI pre-processing, manual translation, and expert support”-clarifying responsibilities and collaborative functions at each level.

Existing research has two shortcomings: Firstly, most studies focus on technology development or macro-model discussions, lacking micro-level process design for specific service scenarios; besides, the key issue of “how to deeply integrate AI with rural offline service scenarios” has not been systematically investigated. This paper fills these gaps by focusing on micro-level process optimization for typical rural legal scenarios.

III. Current Service Status and Problem Analysis for Typical Rural Legal Scenarios

3.1. Selection of Typical Scenarios and Legal Characteristics

This paper selects migrant workers’ wage arrears and neighborhood disputes as research subjects. These two types of disputes occur frequently in rural areas and are closely related to villagers’ vital interests. Migrant workers who fail to receive wages and boundary or land-use conflicts among neighbors are among the most common cases handled by township judicial offices^[8]. In terms of legal relationships, wage arrears mostly involve labor or employment relations, entailing claims for remuneration and liability for breach of contract; neighborhood disputes mainly involve property rights or tort issues, such as homestead encroachment, lighting, and drainage,

often intertwined with local customs, so mediation plays a significant role^[9].

3.2. Actual Behavioral Patterns of Villagers Seeking Legal Services

When ordinary villagers encounter problems, their typical path for rights protection is: first, informal negotiation; if that fails, they turn to village cadres or township staff for help; only when these efforts fail do they consider legal services^[10]. However, many obstacles exist: many villagers lack legal knowledge and are unaware of their rights; they do not know where to seek help; many elderly villagers cannot use online legal mini-programs. Even if they seek legal aid, traveling back and forth to the township or county seat costs time and money. The overall help-seeking chain is long, and villagers often do not know the first step to take.

3.3. Current Traditional Service Process and Existing Pain Points

Currently, most rural legal services follow a purely manual offline model: villagers come to the service station, wait on site, are received by staff, explain their situation, receive advice, and complex cases are guided toward mediation or litigation. The entire process relies entirely on human effort^[11]. Based on actual conditions, the existing problems can be summarized as follows:

3.3.1. Slow response and excessive waiting

Township legal service personnel are limited; during peak consultation hours, villagers queue and cannot receive immediate answers^[12].

3.3.2. Unstable service quality

Service effectiveness heavily depends on the individual staff member's competence. Different staff have varying legal knowledge and experience, leading to inconsistent quality and a lack of standardized procedures^[12].

3.3.3. Insufficient resource supply

In remote villages, professional legal talent is scarce; a township often has only one or two legal advisors, who are overstretched and cannot attend to every villager^{[13][15]}.

3.3.4. Messy information recording

Most interactions rely on oral communication and paper records. Information is easily omitted, and when cases are handed over to different staff, villagers must repeat their story, causing extra burden^[14].

3.3.5. Online tools "acclimatize" poorly

Existing AI legal consultation software uses overly formal legal language and jargon. Middle-aged and elderly rural residents cannot understand or trust

"cold" machines; purely online AI cannot independently complete rural legal services.

IV. DESIGN OF THE "AI + OFFLINE" SERVICE PROCESS OPTIMIZATION SCHEME

4.1. Optimization Objectives and Design Principles

4.1.1. Optimization objectives

First, improve efficiency by using AI to handle basic consultations, reducing waiting time and relieving repetitive work pressure on offline staff. Second, ensure standardized service quality by turning high-frequency problem responses into formalized procedures, avoiding widely differing advice from different staff^[16]. Third, reduce costs-without needing to hire many full-time lawyers, technology compensates for the shortage of rural legal talent. Fourth, adapt to rural realities so that villagers are willing to accept and trust the services.

4.1.2. Design principles

AI's role is technical assistance, not complete replacement. AI only collects information and performs preliminary legal retrieval; critical legal judgments remain with offline staff. A balance between standardization and flexibility is needed: routine matters follow standardized procedures, while complex, custom-laden disputes leave room for flexible human handling. Human-machine collaboration is essential, with clear division of labor and mutual coordination between online AI and offline station staff, matching villagers' usage habits.

4.2. Service Process Redesign (Exemplified by Migrant Workers' Wage Arrears)

The overall process consists of: request initiation → AI pre-processing → manual intervention/translation → tiered response → follow-up and archiving, forming a complete closed loop.

4.2.1. Request initiation

Villagers come to the offline service station or use a simple mini-program to submit their problem and initiate consultation.

4.2.2. AI pre-processing

Station staff guide the parties to use the AI tool. The AI asks structured questions to collect key case information: when, what work was done, how much is owed, whether there is an IOU, the counterparty's identity, etc. It automatically retrieves relevant legal provisions and generates a preliminary consultation report.

4.2.3. Manual intervention/translation

Offline staff receive the AI-organized materials. They translate the professional legal language into plain, local vernacular for the villager, confirm the party's

true demands, and verify that the AI-collected information is correct. This step is critical-it compensates for AI's deficiencies in understanding local customs and contextual nuances.

4.2.4. Tiered response and handling.

For simple cases (clear-cut wage arrears), AI generates standardized document templates (complaint applications, mediation applications); staff make minor modifications and provide them to villagers, while informing them of the complaint channels to labor departments. Medium-complexity cases, staff conduct on-site mediation, using the AI-sorted facts to facilitate negotiation. And complex and difficult cases (beyond station capacity), people should coordinate with external resources online-contact township legal advisors or external legal experts for remote consultation, guiding villagers toward arbitration or litigation.

4.2.5. Follow-up and archiving

After the process, the system automatically saves all case records and generates a work order. Simple follow-up calls track progress, and all materials are retained for archiving, avoiding repeated retelling^[17].

4.3. Key Supporting Mechanism Design

4.3.1. Division of responsibilities

Clarify the roles of AI, offline station staff, and external legal advisors: AI handles information collection and retrieval; staff handle communication with parties and information verification; experts provide quality control for difficult cases. Clear duties and responsibilities.

4.3.2. Human-machine error-correction mechanism

All AI-generated content must be manually reviewed before being delivered to villagers. If AI misinterprets or cites wrong laws, staff correct it promptly. Mutual verification prevents AI errors from misleading villagers.

4.3.3. Risk notification and liability attribution

Clearly inform villagers that AI output is for reference only and does not constitute formal legal advice, with appropriate disclaimers. Ultimate legal service liability rests with the offline service staff, mitigating legal risks from AI errors^[18].

V. Expected Effects and Feasibility Analysis of the Optimizes Process

Whether the designed service process can truly be implemented and function effectively requires assessment from both effect expectations and feasibility. The following evaluation is based mainly on indirect evidence from existing domestic practices and logical deduction.

5.1. Expected Effects

Addressing the previously mentioned problems-slow response, unstable quality, fragmented information, and tool incompatibility-the expected improvements are as follows:

For migrant workers' wage arrears consultations, under the traditional process, villagers register at the station, then contact county-level legal advisors through multiple layers; simply transmitting information and scheduling appointments takes three to five days. According to a report in Legal Daily, after Cao County, Shandong, introduced an AI-assisted system, grassroots staff reduced time spent on repetitive document sorting and information retrieval by an average of 60%^[19]. Based on this, the first response time for wage-arrears consultations can be shortened from "days" to "minutes," and the overall cycle reduced by 40%-60%, directly alleviating the slow-response issue.

Service quality improvement is equally notable. Reports from "Law Enriches Jiangsu" show that grassroots mediators' accuracy in applying the law is typically only about 68%, and similar disputes may lead to different outcomes due to mediators' cognitive differences^[20]. The practice in Taixing City's legal popularization platform offers a comparison: after using a "smart think-tank" system, mediators' legal application accuracy rose to 92%, and the success rate for resolving complex disputes increased by 27% year-on-year. In wage-arrears disputes, the AI system can automatically identify easily overlooked violations such as "unpaid overtime wages" or "social insurance not paid during probation," generating risk assessment reports that provide clear references for station staff. The "AI + human" combination preserves human experience while compensating for information gaps, thus improving unstable quality and messy recording.

Villagers' user experience is enhanced at a more subtle level. Previously, villagers often could not articulate exactly what they needed, and station staff lacked effective communication guidance tools. In the optimized process, the AI system guides villagers through structured questionnaires to input information, and station staff translate the system-generated legal opinions into plain language. The approach of Gaoyou City's "AI + Dispute Resolution Studio" is worth emulating-both parties and mediators jointly participate in case entry and analysis, so parties can see how their case is progressively analyzed, building trust through transparency^[21]. This addresses the tool-acclimatization problem through "translation,"

gradually dispelling doubts among middle-aged and elderly villagers.

5.2. Feasibility Assessment

Regarding insufficient resource supply and tool incompatibility, this study adopts an “application” path: existing products such as “Xiaofabo” and “Nongfa Qianwen 1.0” can be directly accessed, requiring no new R&D, thus keeping entry barriers low.

Operational feasibility is also supported by practical evidence. Station staff only need to guide data entry, translate dialects, and perform preliminary classification-skills that match the capabilities of existing judicial office personnel. Short-term training suffices, alleviating talent shortages. The “Rural Legal Connect” system in Chaoyang, Liaoning, has been running in 164 township service stations, with equipment online rates stable above 98%^[22]. Yuhang District’s “Huanghu AI Mediation” explores a trinity model of “mediator + AI large model + village-based lawyer”^[23]; Fengcheng, Jiangxi, launched the “Digital Intelligence Protects Agriculture” dispute resolution brand^[24]. These cases show that the “AI + offline” model does not require distant technological breakthroughs or talent reserves to be implemented in rural areas.

Regarding the general shortage of legal professionals in rural areas, Li Yanyan’s research on rural revitalization systems provides an important observation: due to the scarcity of practicing lawyers in rural areas, many cases requiring professional legal support cannot receive timely assistance; therefore, building a public legal service system based on informatization and using AI to compensate for talent shortages is a viable way out^[25]. This precisely highlights a deeper value of the process designed in this study-introducing AI is not solely for efficiency optimization but also, to some extent, an inevitable choice under the constraints of rural human resources. Domestic research has also focused on how to use AI to alleviate the urban-rural disparity in legal service resources. Fu Xing and Biligtu’s article in *Legal and Business Review* points out that AI technology offers new possibilities for solving the chronic shortage of rural legal service personnel^[26]. Li Hengcheng’s study on AI applications in grassroots legal services discusses practical innovations in intelligent consultation, document generation, and service supervision^[27].

Given that technical conditions are met, risks still exist and require proactive countermeasures. AI may occasionally produce inaccurate outputs; large language models can generate factual errors. A double-check mechanism can be established: all

AI-generated content must be reviewed by station staff or back-end experts before being provided to villagers, and generated content should clearly state “for reference only, not formal legal advice.” For data privacy, villagers’ consultation content may involve sensitive personal information, so operational guidelines must define the boundaries of data collection and use, with sensitive data not uploaded to the cloud. To address system failures or technology dependence, the station should retain a manual backup service plan to ensure service continuity when equipment malfunctions.

VI. Conclusion

Starting from the practical difficulties of rural legal services in the context of rural revitalization, this paper selects two typical scenarios-migrant workers’ wage arrears and neighborhood disputes-and uses service blueprint methodology to map out the bottlenecks in existing service processes. We propose an “AI + offline” collaborative optimization scheme and provide preliminary assessments of expected effects and feasibility.

In terms of typical scenario selection, legal service demands in rural grassroots governance-such as wage arrears and land-transfer disputes-are extremely urgent and complex, and traditional approaches alone can no longer effectively address them. These two scenarios represent two typical forms of rural legal disputes: rights-based disputes involving external labor relations and mediation-oriented disputes involving internal acquaintanceship networks. They impose different requirements on service processes: the former requires AI to provide precise legal bases and document assistance, while the latter benefits more from AI’s help in identifying dispute focal points and matching similar case mediation solutions.

The most prominent problem in current rural legal services is not the absence of institutional arrangements, but the significant gap between institutional supply and actual operation. Due to the long-term impact of the urban-rural dual structure, rural areas still suffer from insufficient supply, low service quality, and poor channel connectivity; village legal advisors often cannot be substantively integrated into grassroots governance. Meanwhile, although rural areas have initially established three major platforms-physical, hotline, and online-they lack effective data sharing and business coordination, leading to loose connections between physical stations and online channels, and villagers often face repetitive operations and information transmission barriers^[28].

The “AI + offline” model in this project offers a possibility to bridge the above gaps: AI handles

standardized tasks-information collection, legal retrieval, document generation-while station staff undertake more human-oriented work-guidance, explanation, coordination. Each plays its proper role, forming a division pattern of “front-end intelligent, mid-end humanized, back-end professionalized.” The fundamental goal of building a public legal service system covering both urban and rural areas is to safeguard and improve people’s livelihoods and promote modernization of grassroots social governance, especially to enable vulnerable groups-migrant workers, left-behind populations-to obtain tangible legal support through digital empowerment. The “AI + offline” rural legal service station offers precisely such a possible path that balances efficiency and warmth.

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