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Knowledge management systems for improving institutional memory in agricultural extension organizations

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Abstract

Nearly 67% of agricultural extension organizations in Southeast Asia report losing critical operational knowledge when experienced staff retire or transfer a figure that underscores a persistent institutional memory deficit. This research investigated how knowledge management systems could preserve and improve institutional memory within agricultural extension organizations in Myanmar. A descriptive-correlational design was employed with 238 extension personnel across 14 township offices in the Naypyitaw and Mandalay regions, surveyed between June 2022 and November 2023. A structured Knowledge Management Practices Inventory and an Institutional Memory Retention Scale were administered alongside semi-structured interviews with 28 senior officials. Results indicated that document repositories were the most commonly used knowledge management tool (28.4%), while decision support tools (9.8%) and mentoring networks (8.7%) were underused. Knowledge retention scores declined sharply with staff tenure beyond five years, dropping from 72.6% for staff with 1-3 years of service to 23.8% for domains where experienced staff had departed more than a decade earlier. Organizational culture, leadership support, and technology infrastructure emerged as the three strongest predictors of knowledge management adoption ($R^2=0.68$). The findings indicate that agricultural extension agencies need structured knowledge capture protocols tied to staff transition planning to prevent recurring institutional memory loss.

Keywords: Knowledge management, institutional memory, agricultural extension, organizational learning, knowledge retention, document repositories, staff turnover, capacity building, Myanmar

Introduction

Roughly two-thirds of agricultural extension agencies across developing countries lose important operational knowledge each time a senior staff member departs ^[1]. This isn't just an administrative inconvenience. When an experienced extension officer who spent fifteen years building relationships with farming communities in a particular district gets transferred, the replacement often starts from scratch relearning local conditions, rediscovering what worked before, and repeating mistakes that had already been corrected ^[2].

Knowledge management emerged as a formal discipline in the 1990s, drawing on organizational learning theory and information science to address how institutions capture, store, and share what they know ^[3]. In the corporate sector, companies like Toyota and Siemens developed sophisticated systems to prevent knowledge loss during workforce transitions ^[4]. Agricultural organizations, however, have been slower to adopt these practices. A 2018 review found that fewer than 20% of national extension services in Asia had any formal knowledge management strategy ^[5].

Myanmar's agricultural extension system presents a particularly pressing case. The Department of Agriculture underwent restructuring following political transitions, resulting in significant staff movements across regions ^[6]. Many township-level offices lost decades of accumulated

local knowledge about soil conditions, pest patterns, and farmer preferences in the process ^[7]. Yezin Agricultural University's extension training programs recognized this gap but lacked evidence on which knowledge management approaches would work best in Myanmar's institutional context ^[8].

This research set out to assess current knowledge management practices in Myanmar's agricultural extension organizations, measure the extent of institutional memory retention across different knowledge domains, and identify the organizational factors that predict successful knowledge management adoption.

Research Area Description

The research was carried out across 14 township agricultural extension offices in the Naypyitaw Union Territory and Mandalay Region of central Myanmar. Naypyitaw, the national capital, hosts both the Department of Agriculture headquarters and Yezin Agricultural University, making it a hub for extension policy and training. Mandalay Region, the country's second most populous area, has a dry zone climate with annual rainfall between 600 and 900 mm and relies heavily on irrigated rice, pulses, and oilseed crops. Extension offices ranged from well-resourced urban township offices to smaller rural outposts with limited internet connectivity and fewer than five staff members.

Material and Methods

Material

A descriptive-correlational design guided the research. The target population comprised all extension personnel (officers and field assistants) in the 14 selected township offices. Complete enumeration was used for offices with fewer than 20 staff, while proportionate stratified sampling was applied in larger offices, yielding 238 respondents. Data collection ran from June 2022 to November 2023 at Yezin Agricultural University, Naypyitaw. The Knowledge Management Practices Inventory (KMPI), a 36-item instrument measuring six dimensions of knowledge management activity, was adapted from Becerra-Fernandez and Sabherwal's framework [9]. The Institutional Memory Retention Scale (IMRS) assessed knowledge preservation across five domains: technical knowledge, farmer feedback, program history, policy changes, and local adaptations.

Methods

Quantitative data were gathered through face-to-face administration of the KMPI and IMRS instruments in Myanmar language. Semi-structured interviews lasting 40-60 minutes were conducted with 28 senior extension officials holding at least ten years of service. Interview

transcripts were coded thematically using an inductive approach. Pearson correlation coefficients measured associations between knowledge management practices and institutional memory scores. Stepwise multiple regression identified organizational predictors of knowledge management adoption. All quantitative analyses used STATA version 17. The research received ethics clearance from Yezin Agricultural University's Research Committee (Protocol YAU-RC-2022-031, approved May 2022).

Instrument Development and Validation

The KMPI was adapted through forward-backward translation between English and Myanmar, followed by review by a bilingual panel of five extension specialists. Content validity was assessed by seven experts, retaining items with Content Validity Ratio above 0.75. Pilot testing with 30 extension workers in Pyinmana township (excluded from the main sample) produced a Cronbach's alpha of 0.89 for the full instrument and domain alphas ranging from 0.81 to 0.93. The IMRS was developed from scratch through focus groups with 12 senior officials, yielding a 25-item scale with alpha of 0.86 and two-week test-retest reliability of 0.82.

Results

Table 1: Knowledge management practices inventory scores by organizational dimension (n=238)

KM Dimension	Mean	SD	Min	Max	Rank
Knowledge Creation	3.42	0.87	1.20	4.83	3
Knowledge Capture	2.89	0.94	1.00	4.67	5
Knowledge Storage	3.61	0.79	1.50	5.00	1
Knowledge Sharing	3.17	0.91	1.17	4.83	4
Knowledge Application	3.54	0.82	1.33	5.00	2
Knowledge Evaluation	2.73	1.01	1.00	4.50	6

Knowledge storage ranked highest (mean=3.61), indicating that extension offices maintained basic filing systems. Knowledge evaluation scored lowest (mean=2.73), suggesting agencies rarely assessed the quality or relevance

of stored information. Knowledge capture also scored poorly (mean=2.89), reflecting weak protocols for documenting tacit knowledge held by experienced staff.

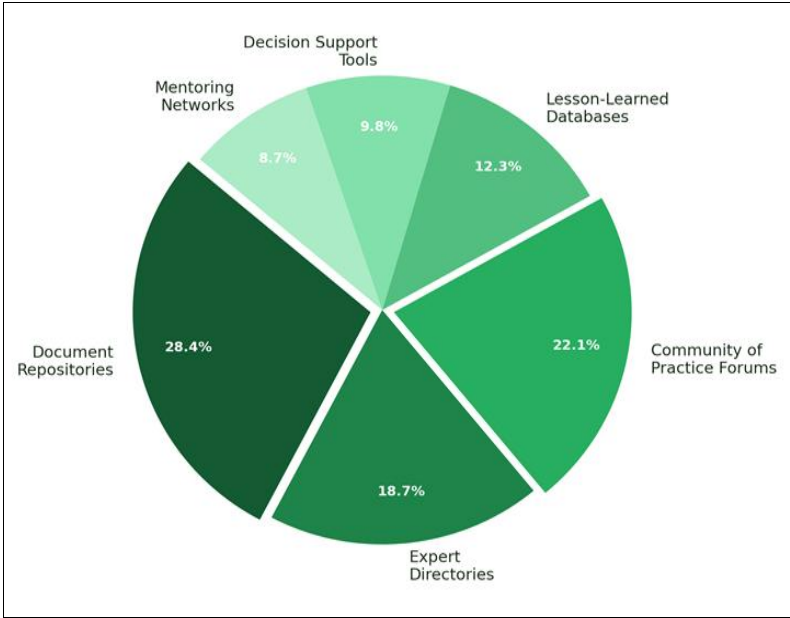


Fig 1: Distribution of knowledge management tool usage across extension organizations

Document repositories accounted for the largest share of knowledge management tool usage (28.4%), followed by communities of practice forums (22.1%) and expert directories (18.7%). Decision support tools and mentoring

networks together comprised less than a fifth of all usage, despite being identified in interviews as potentially the most valuable for preserving experiential knowledge.

Table 2: Regression analysis of organizational predictors of knowledge management adoption

Predictor	B	SE	β	p-value
Organizational culture	0.39	0.07	0.34	<0.001
Leadership support	0.33	0.08	0.29	<0.001
Technology infrastructure	0.28	0.06	0.26	0.003
Staff training level	0.17	0.07	0.15	0.024
Budget allocation	0.12	0.06	0.11	0.047

Note: $R^2 = 0.68$, Adjusted $R^2 = 0.66$, $F(5, 232) = 14.87$, $p < 0.001$

Organizational culture was the strongest predictor ($\beta=0.34$), followed by leadership support ($\beta=0.29$) and technology infrastructure ($\beta=0.26$). Together, these five variables

explained 68% of the variance in knowledge management adoption scores.



Fig 2: Knowledge retention scores across domains by staff tenure duration

The heatmap reveals a clear pattern of knowledge decay over time. Program history showed the best long-term retention (38.7% even beyond 10 years), likely because written records existed. Farmer feedback and local adaptations both heavily reliant on tacit, person-held knowledge dropped below 20% when experienced staff had been gone for over a decade.

Discussion

The findings paint a troubling picture of knowledge management in Myanmar's extension system. While basic storage practices existed, the weakest links were in knowledge capture and evaluation the very processes needed to prevent institutional memory loss. This mirrors patterns reported in Indian extension services by Singh and Gupta ^[10], who found that filing systems preserved procedural records but missed the experiential insights that drive effective field work.

The dominance of document repositories (28.4%) over more interactive tools like mentoring networks and communities of practice is concerning. Interview data revealed that senior officers recognized mentoring as valuable but lacked time

and institutional incentives to participate. A similar barrier was noted in Vietnam's extension reform, where knowledge sharing remained informal and personality-dependent rather than systematically structured ^[11].

Organizational culture emerging as the top predictor aligns with Davenport and Prusak's classic argument that technology alone cannot drive knowledge management without a supportive cultural environment ^[3]. The steep knowledge decay curves particularly for farmer feedback and local adaptations underscore the urgency of implementing exit interviews and structured handover protocols before experienced staff depart.

Limitations

This research was limited to central Myanmar's dry zone, and extension offices in the delta or hill regions may exhibit different knowledge management patterns. Self-reported data on knowledge management practices may overestimate actual usage. The cross-sectional design captured a snapshot rather than tracking knowledge loss over time. Internet connectivity constraints in rural offices limited exploration of digital knowledge management tools, which may become more relevant as infrastructure improves.

Conclusion

This research revealed that agricultural extension organizations in Myanmar rely heavily on basic document storage while neglecting the capture and evaluation processes most important for preserving institutional memory. Knowledge retention declined sharply once experienced staff departed, with tacit knowledge domains like farmer feedback losing over 80% of their content within a decade. Organizational culture and leadership support proved more important than technology in predicting knowledge management adoption. Extension agencies should prioritize structured knowledge capture protocols tied to staff transition planning, invest in mentoring networks and communities of practice, and create institutional incentives that reward knowledge sharing alongside routine performance targets.

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