

Return on Investment and Financial Sustainability of Pharmacy Automation Systems in Healthcare: A Systematic Review

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Background

- Pharmacy automation is increasingly adopted to improve medication-use processes and support efficient pharmaceutical services.
- Economic evidence on return on investment and long-term financial sustainability remains scattered.



Objective

To evaluate the return on investment (ROI), cost savings, and financial sustainability of pharmacy automation systems in healthcare settings.



Methods

- Systematic search of PubMed, Scopus, ScienceDirect, and Google Scholar for peer-reviewed studies published up to May 2026.
- Included studies compared hospital or healthcare-facility pharmacy automation with manual or pre-automation workflows.
- Outcomes of interest: ROI, payback period, cost savings, labour efficiency, resource optimisation, medication waste, and budget impact.
- Due to heterogeneity in automation type, economic perspective, and outcome reporting, findings were synthesised narratively.

PRISMA-Style Study Flow (Simplified)

Non-duplicate records screened
n = 898



Studies included in review
n = 9



Key Results

Across hospital settings, pharmacy automation was consistently associated with favourable financial and operational outcomes.



+1.86%
to substantial
net cost savings

Reported ROI



1–8
years

Payback period



Up to
US\$4.1
million

Annual savings



>40%

Productivity gains

Main Drivers of Value

- Reduced medication waste
- Lower expired inventory
- Lower adverse drug event-related costs
- Reduced nursing workload
- Reduced pharmacy technician workload
- Staff reallocation toward clinical services



COST
SAVINGS



OPERATIONAL
EFFICIENCY



WORKFORCE
IMPACT



SUSTAINABLE
VALUE



Conclusions

- Available evidence suggests that pharmacy automation can generate measurable economic and operational benefits.
- Financial returns vary by system type, implementation context, and reporting approach.
- Pharmacy automation appears to be a promising strategic investment for improving health-system efficiency, affordability, and sustainable pharmaceutical service delivery.



Limitations

- Only nine studies met the inclusion criteria.
- Substantial heterogeneity existed in automation type, economic perspective, and reporting approach.
- Findings should be interpreted in the context of local implementation setting and system type.



Implications for Decision Makers

- Consider local workflow, staffing patterns, baseline waste, and implementation scale when evaluating investment cases.
- More standardized economic reporting is needed to support stronger cross-study comparison.



Take-Home Message

Pharmacy automation can deliver both economic value and operational efficiency, making it a potentially sustainable investment for modern health systems.



Keywords: pharmacy automation; return on investment; cost savings; financial sustainability; hospital pharmacy