

# The Profitability of Investment in Automated Dispensing Drug System in Jordanian Hospital Pharmacies

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## Introduction

Automated Drug Dispensing System (ADDS) is an emerging technology positively impacts drug dispensing efficiency and improves patient safety by minimizing medication errors. ADDS implementation has an initial substantial cost that must be balanced against its profitability.

## Objective

We aim to evaluate the profitability of investing in Automated Drug Dispensing Systems (ADDS) in Jordanian hospital outpatient pharmacies by analyzing the Net Present Value (NPV) and Internal Rate of Return (IRR) of cash flows.

## How ADDS works:



## Method:

The analysis includes the investment cost and cost-savings of preventing severe dispensing errors in outpatient hospital settings over 5 years. We calculated the net present value (NPV) and internal return rate (IRR) of cash flows.

| Investment Cost over 5 years                         | Cost-Savings over 5 years   |
|--|---|
| Cost of Machine Purchase                             | Prevention of Hospital Admissions due to Severe Medication Errors |
| Cost of Repairs (covered by the supplier)            |   |
| Cost of System Upgrading (covered by the supplier)   |   |
| Cost of Technical Training (covered by the supplier) |   |

The cost of investment included only the cost of machine purchase (estimated 700,000 JOD), other costs such as the costs of repairs, system upgrading, and technical training were assumed to be 100% insured by supplier over 5 years.

The cost-savings were evaluated from the prevention of hospital admissions due to severe medication errors.

|  |            |  |
|--|------------|--|
| Estimated Daily Number Of Prescriptions  | 857        | Real World Data From A Public hospital |
| Annual Number Of Prescriptions In Outpatient Pharmacies  | 257,142    | Real World Data From A Public Hospital |
| Percentage Of Manual Dispensing Errors In Outpatient Pharmacy In A Teaching Hospital In Jordan | 16%        | Ababneh et al                          |
| Percentage Of Dispensing Errors Causing Severe Harm*   | 1.1%       | Elliott RA et al                       |
| Mean Length Of Hospital Stay Due To Avoidable Severe Medication Errors                         | 5 days     | Elliott RA et al<br>Hammad EA et al    |
| Hospitalization Cost Per Inpatient Day   | JOD 138.31 | Hammad EA et al                        |

\*Severity of harm was assessed using the Harm Associated with Medication Errors Classification (HAMEC) tool.

## Results

| Time Horizon= 5 years  |     |            |
|--|-----|------------|
| Investment cost over 5 years= Cost of purchase of the machine                                    | JOD | 700,000.00 |
| Annual savings from eliminating severe dispensing errors   | JOD | 312,966.62 |
| **We assumed that no severe dispensing errors will be reported during the post-automation period |     |            |

We assumed that the investment return rate will be the interest rate (5%) as reported by the Central Bank of Jordan in June 2024.

| NPV Calculation    | Today |              |
|--------------------|-------|--------------|
| Cost of Investment | JOD   | (700,000.00) |
| Benefits           | JOD   | 298,063.45   |
| Benefits           | JOD   | 283,869.95   |
| Benefits           | JOD   | 270,352.34   |
| Benefits           | JOD   | 257,478.42   |
| Benefits           | JOD   | 245,217.54   |
| NPV in 5 years     | JOD   | 654,981.70   |
| IRR in 5 years     |       | 28%          |

NPV for ADDS investment is positive (+654,981.7 JOD) with IRR value of (28%) in 5 years. We found that the payback will be after 3 years of ADDS implementation with an estimated IRR of 21.7%.

## Conclusion:

ADDS systems are worthwhile investments and primarily improve the quality and safety of the medication process. Our findings may contribute to faster adoption of these technologies by Jordanian hospitals.

## References:

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