

A Cost-Benefit Analysis on Digitization of Water Treatment Systems in Renal Care Delivery: The Impact on Organizational, Environmental and Cost Outcomes

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INTRODUCTION

Water Treatment Systems (WTS) used in renal care delivery are critical in ensuring the availability of clean and safe water for hemodialysis. The quality of water produced by WTS is subject to regular monitoring, documentation, and auditing to safeguard patients.

Efficiently managing the associated operational costs is ever more important in times of budget scarcity and nurse shortages.

OBJECTIVE

This study aims to evaluate the potential economic benefits of operating digitized WTS compared to conventional ones by exploring:

- The organizational impact
- The environmental impact
- The economic impact

METHOD

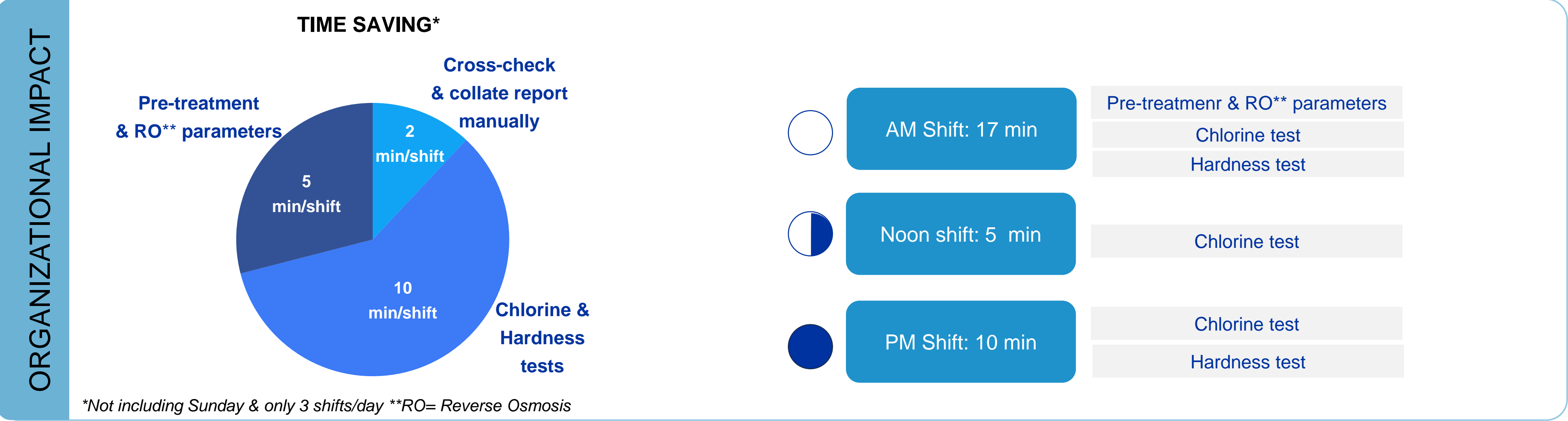
A cost analysis was performed using operational consumption and workflow data from two dialysis clinics in Singapore.

Data collected on the costs of managing WTS included:

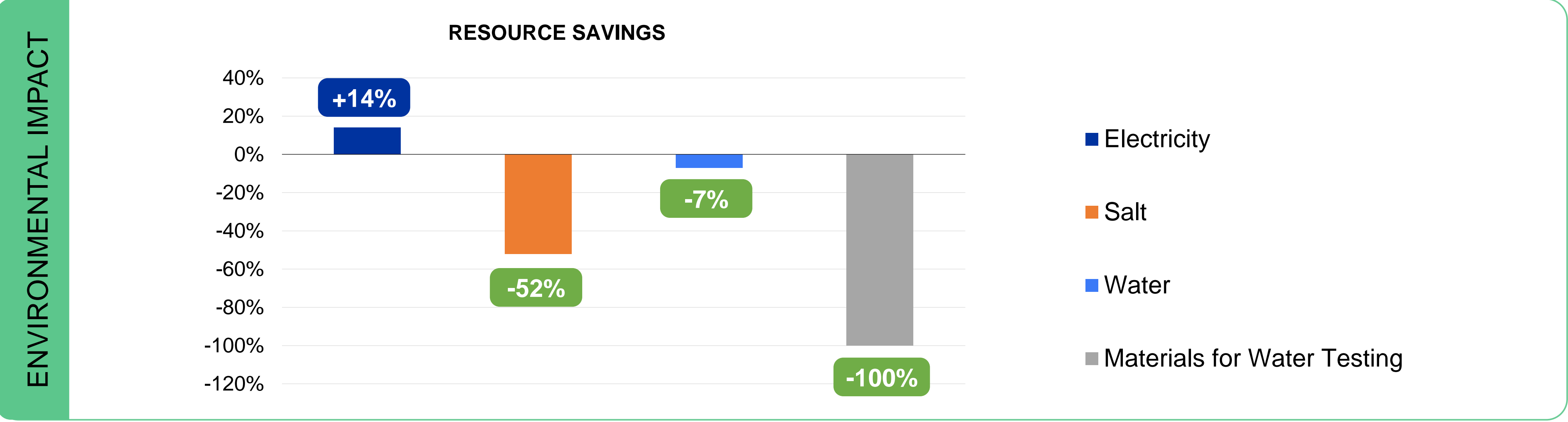
- Utility consumption (water, electricity)
- Consumable usage (salt, filters, hardness / chlorine tests).

A process mapping was carried out to assess the time and labor costs incurred; supplemented by site-surveys and in-depth interviews to observe workflows.

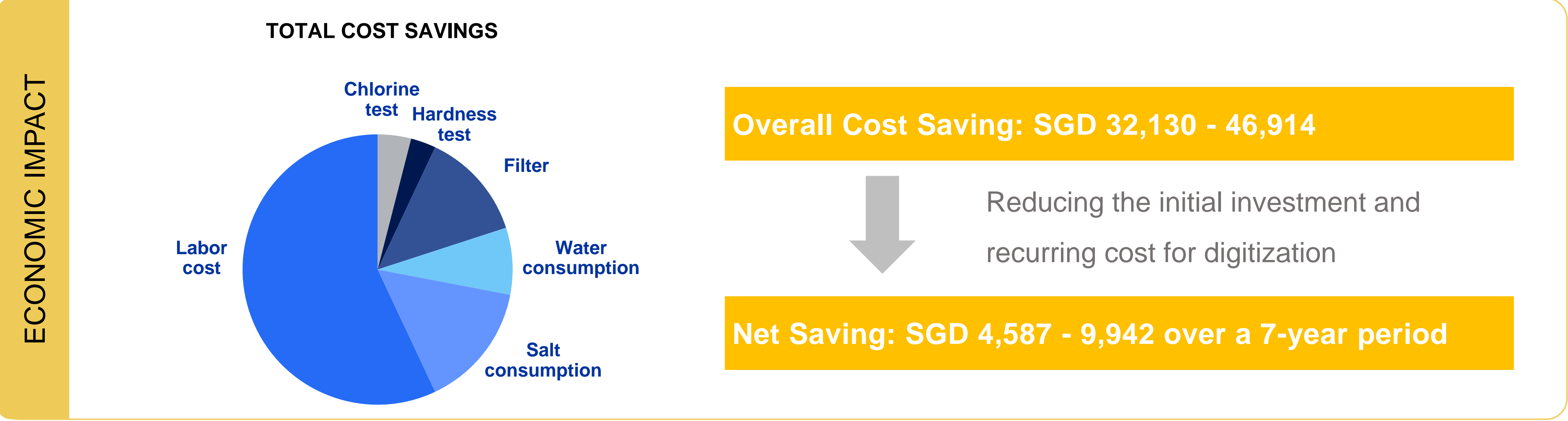
RESULTS



The analysis showed that **81-95% of manual steps can be reduced**, translating into **153h saved annually (1,071h over machine lifetime)**.



Whilst electricity consumption increased by 14%, **consumption of salt (-52%), water (-7%) and the materials for chlorine/water hardness testing (-100%) was significantly reduced.**



Overall, the application of a digitized WTS was associated with a **cost saving of SGD 32,130 - 46,914 and a net saving (after deducting the initial investment and recurring cost for digitization) of SGD 4,587 - 9,942 over a 7-year period.**

CONCLUSIONS

Appropriate water quality is key in ensuring the safe and effective delivery of hemodialysis. This research shows that operational efficiencies and cost-savings - both from a societal and a payer perspective - can be realized by managing WTS in dialysis clinics through digitization compared to conventional processes.

The results of this analysis reinforce the findings of Garcia-Lorenzo et al. (PloS One 2021; 25:16(2), e0247450), showing that the methodology applied is robust and scalable.

CONTACT INFORMATION

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