Small-scale sanitation systems (4S) in Nepal: Evaluation results and conclusions

Jagam Shrestha

Research Goal

To provide evidence-based policy recommendations for improved system design and operations and maintenance to inform strategic financial decision making and, thus, accelerate access to treatment of wastewater and sludge

Research Objectives

- To explore current status of small-scale sanitation (SSS) systems in the country.
- To explore capacities, technologies and context of application of SSS systems.
- To explore major stakeholders engaged in implementation, management, operation and monitoring.
- To assess the performance on quality of treated wastewater from SSS systems.
- To assess the socio-cultural acceptance of different technologies.

Methodology

Landscaping

Capacity: 5 -700 m3/day
Operate for: at least 2 years
Industrial Systems: Excluded

Questionnaire Survey

- Total Installations
- Context
- Technology

Selection Criteria

30 SSSs Selected

Manager

Caretaker

User

Direct Observation

Selection Criteria

Accessible for sampling

Various Context & Technology

5 SSSs Selected

Wastewater Sampling & Analysis

Institutional Analysis


BLACK WATER SEPTIC TANK

What influences the long term performance of SSS systems?

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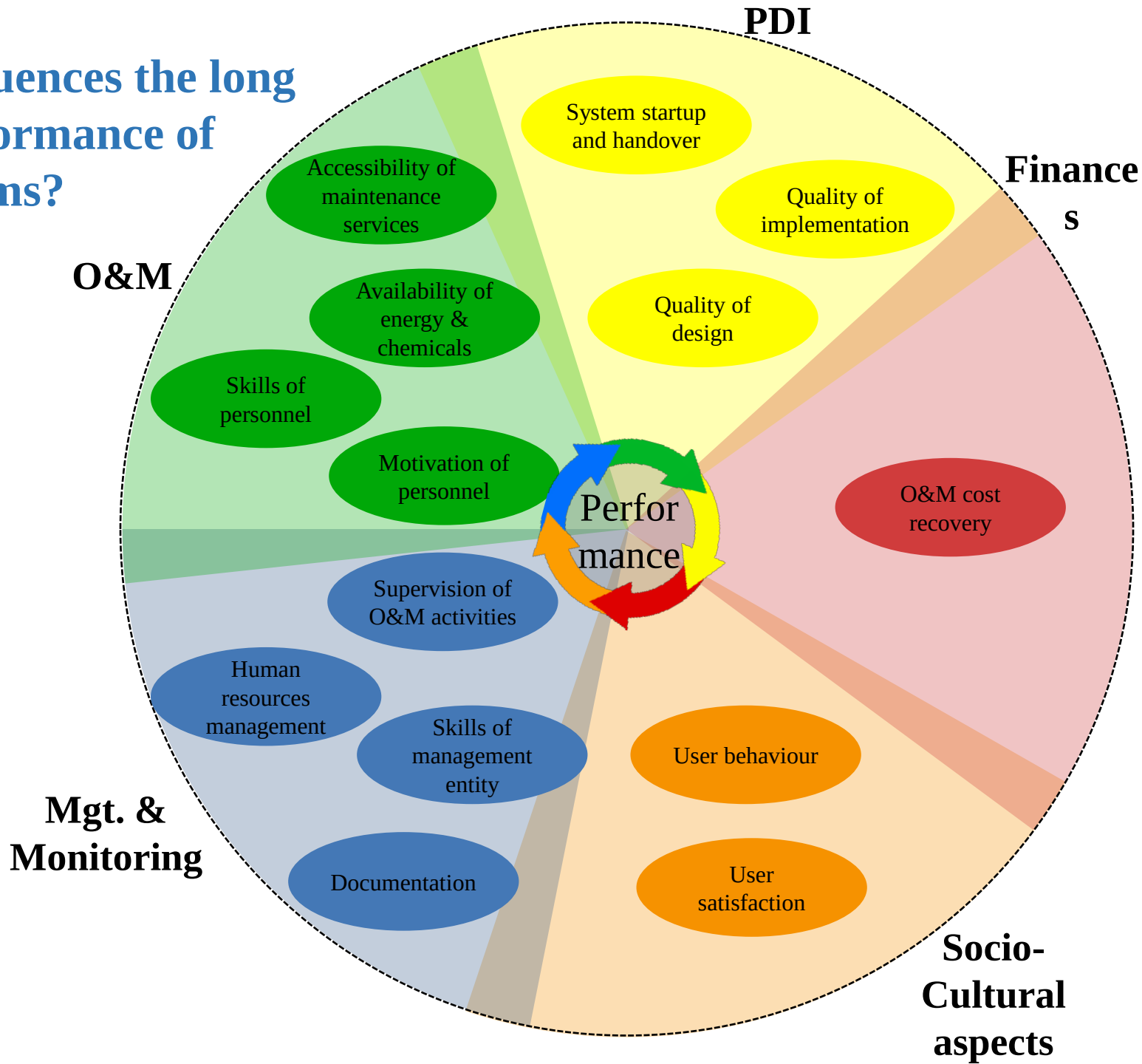
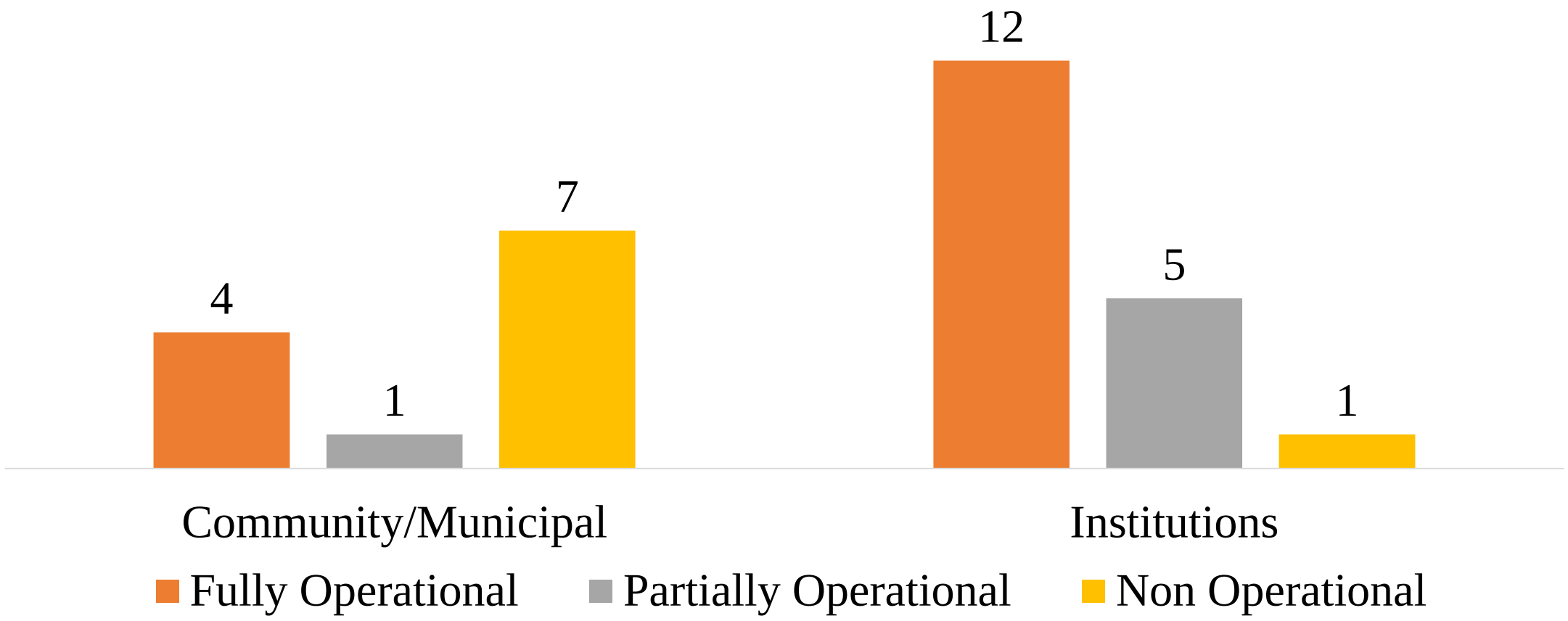


Traffic Signal
Good
Caution
Insufficient
NA

Results and Discussion

Fulfillment of success factors

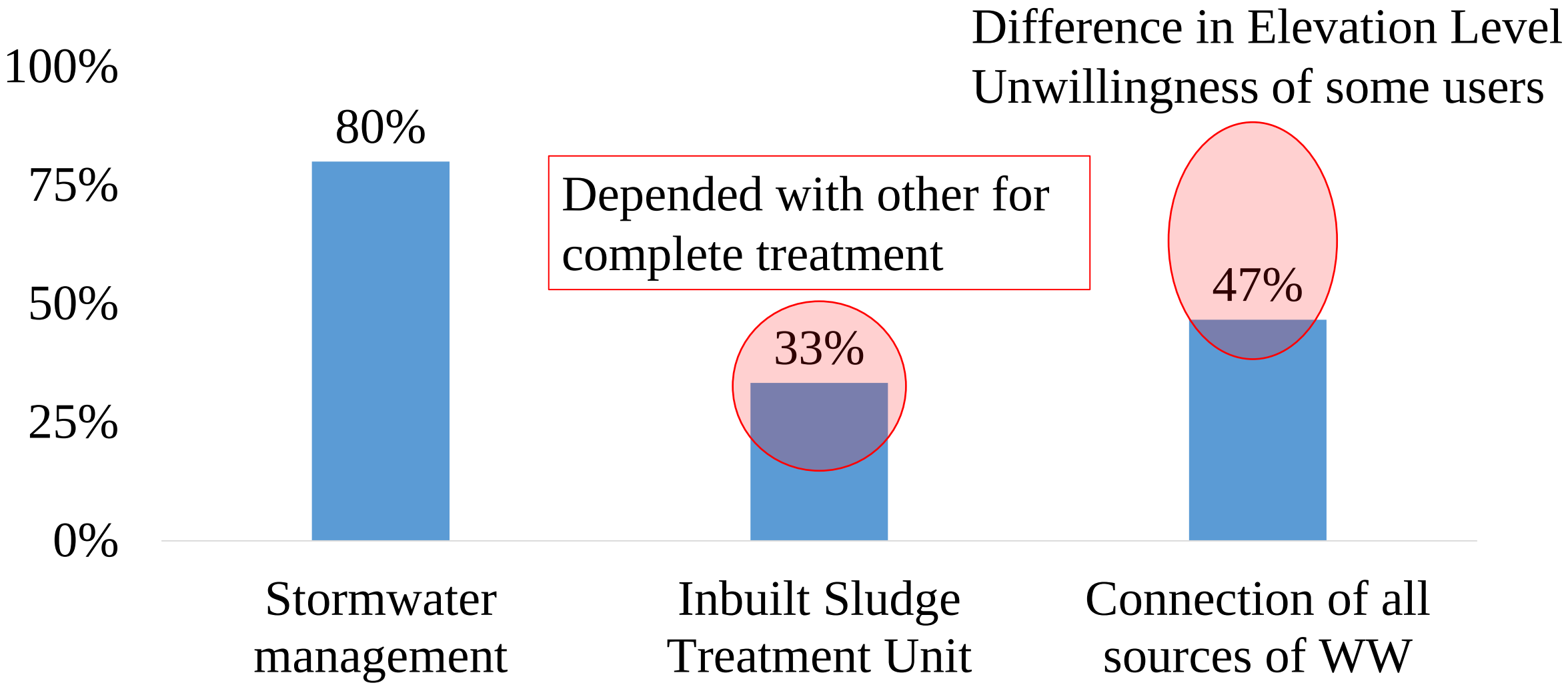
Operational Status of Selected SSSs



Status on Planning

Descriptions	Community/Municipal	Institutional
Objectives	Environmental Protection	Water Reclamation Energy Generation
Initiators	GoN or I/NGO	Demand Driven
User's Participation	6 (50%) during Initiation Phase	Conception Phase
Role in Technology Selection	No role	Approval

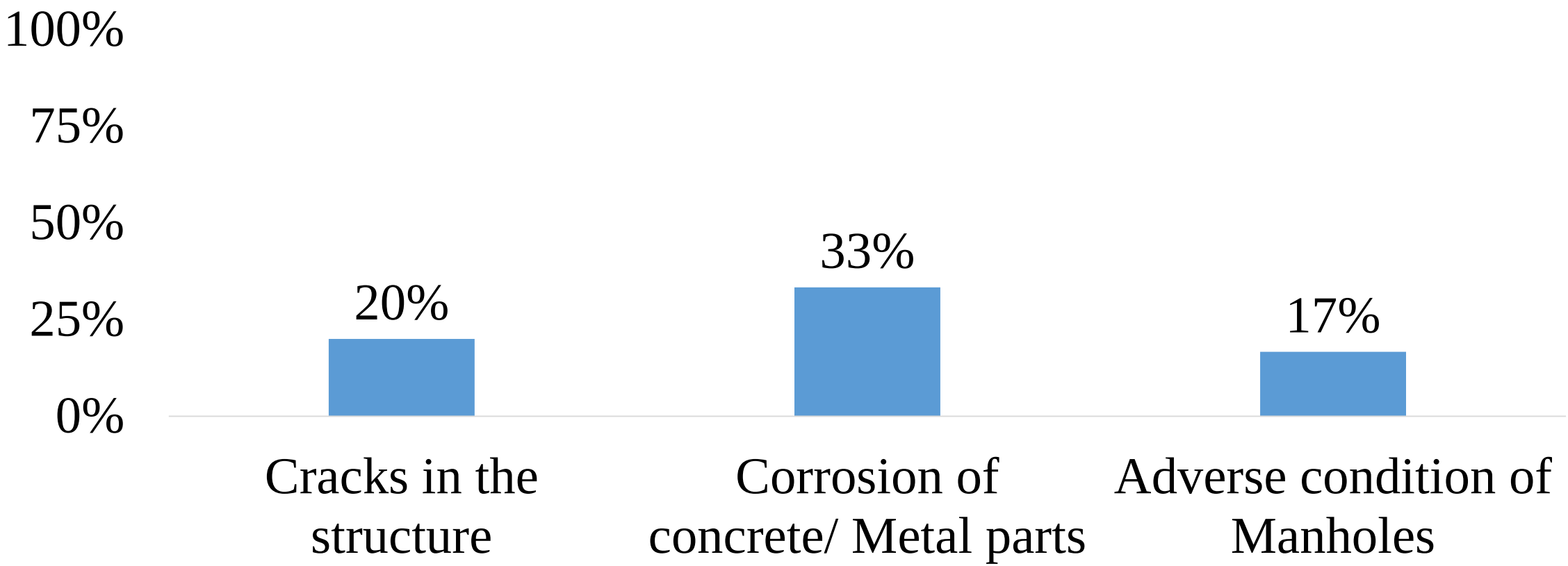
Status on Quality of Design



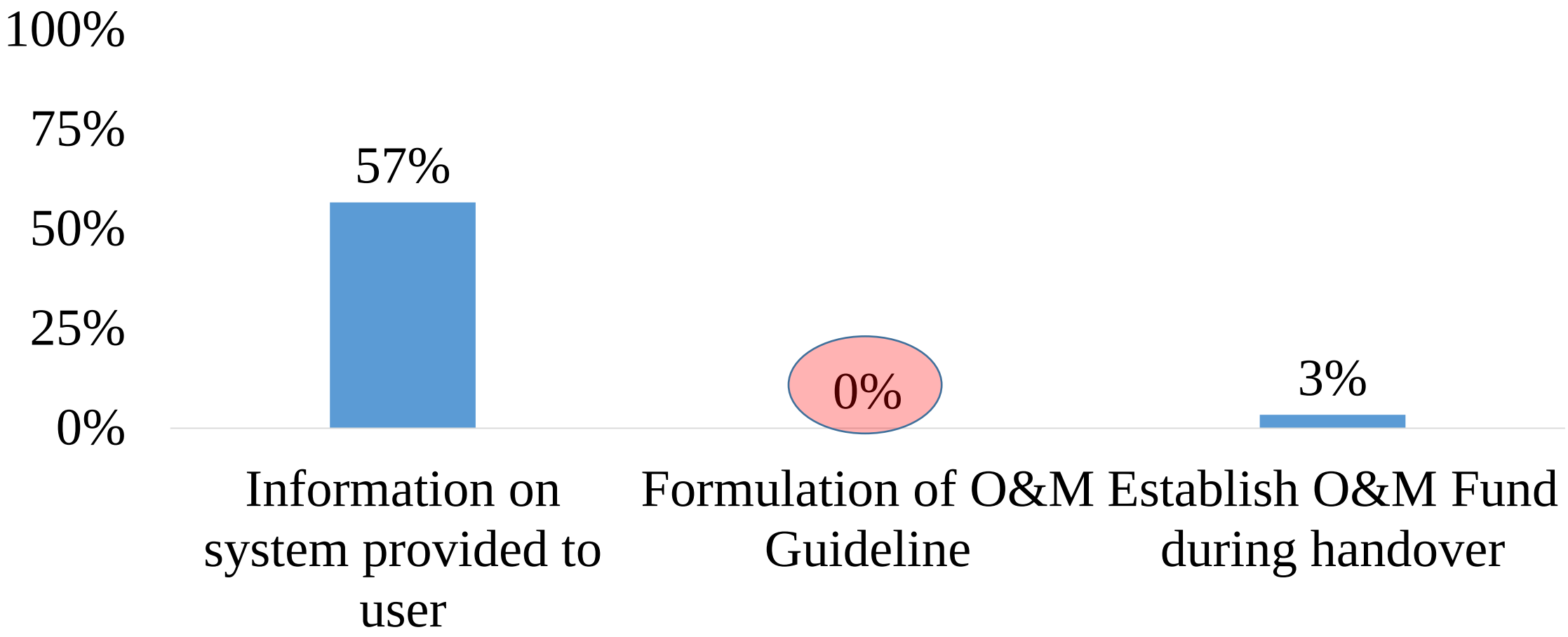
Separate Stormwater Management System

Dried Sludge in SDB

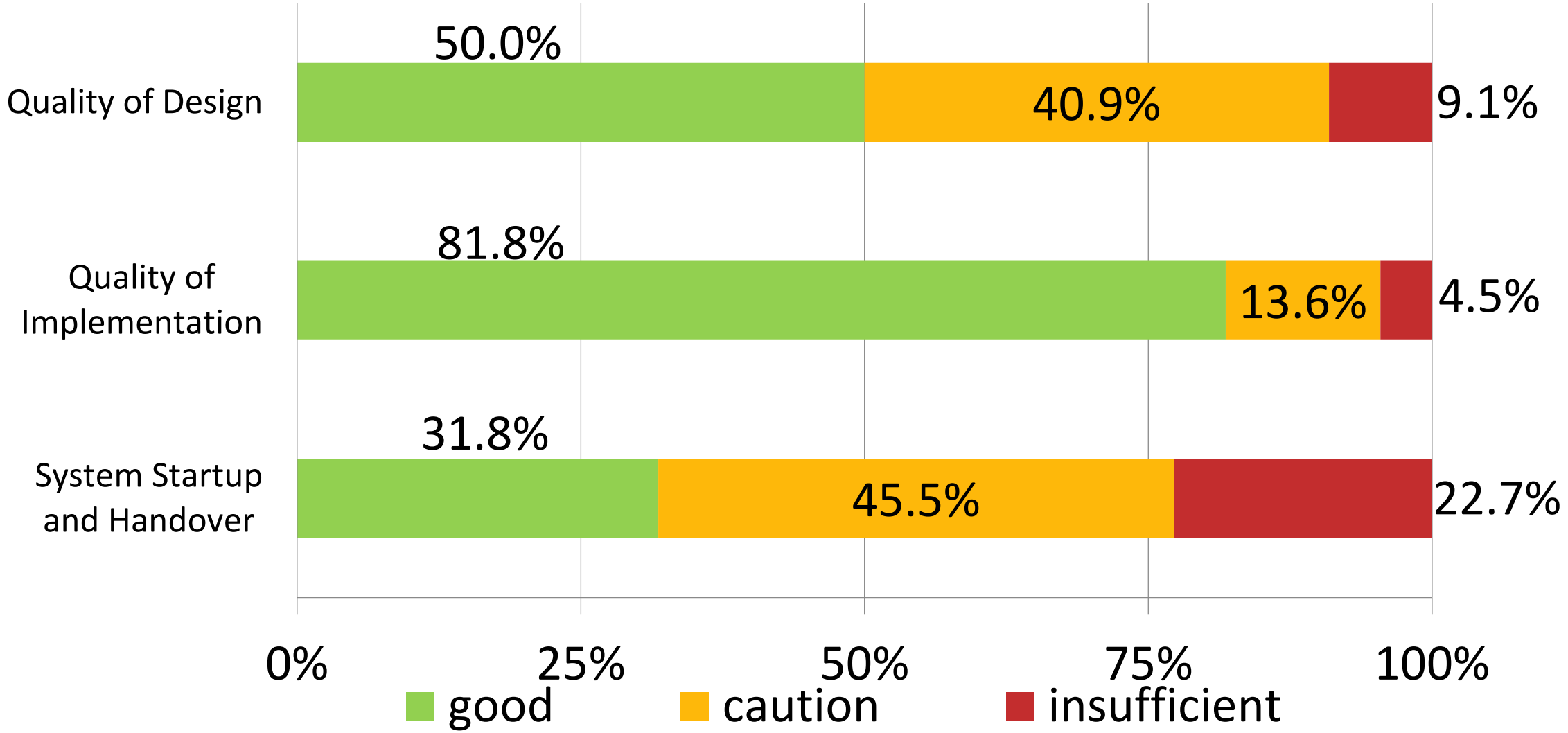
Quality Of Implementation



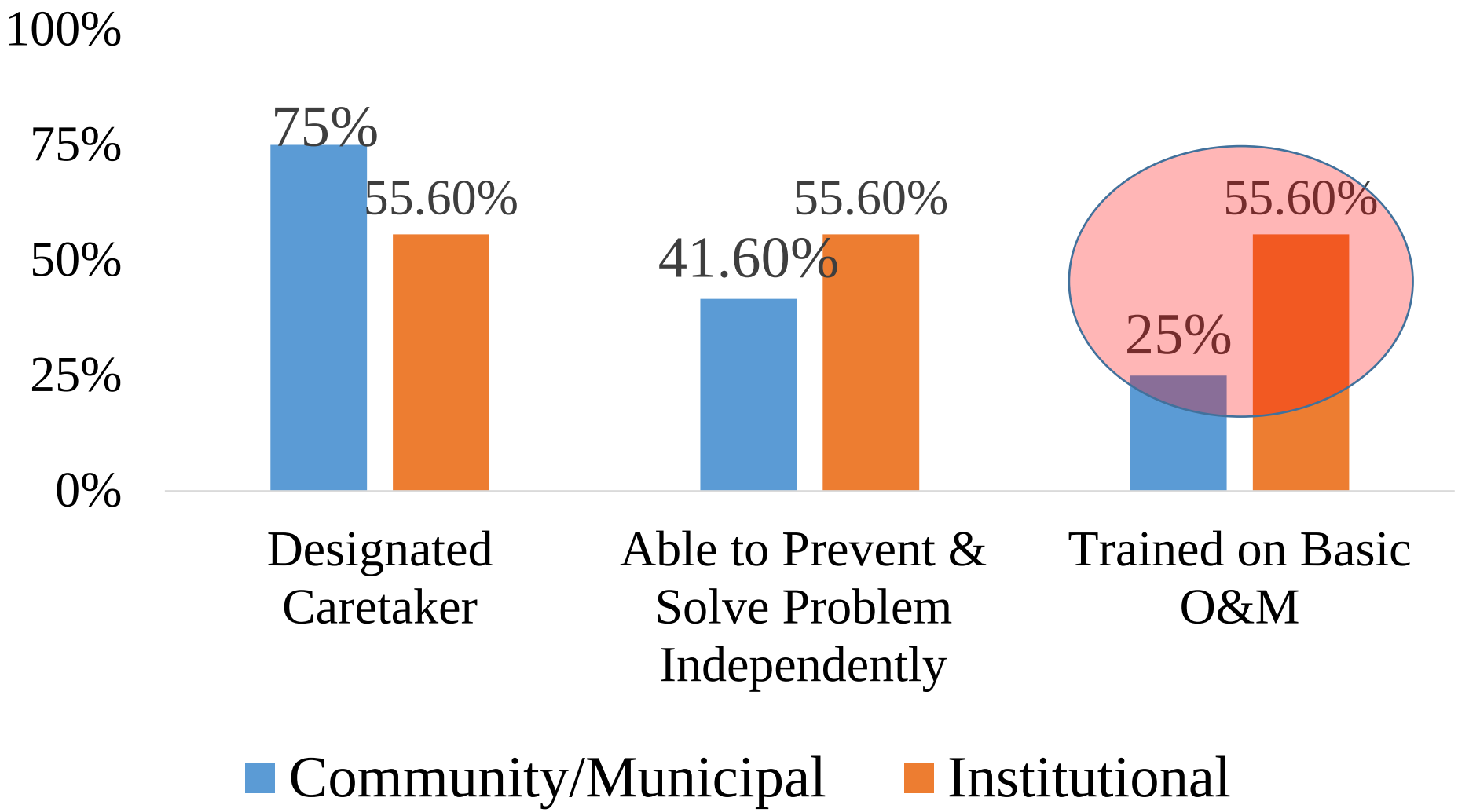
System Startup and Handover



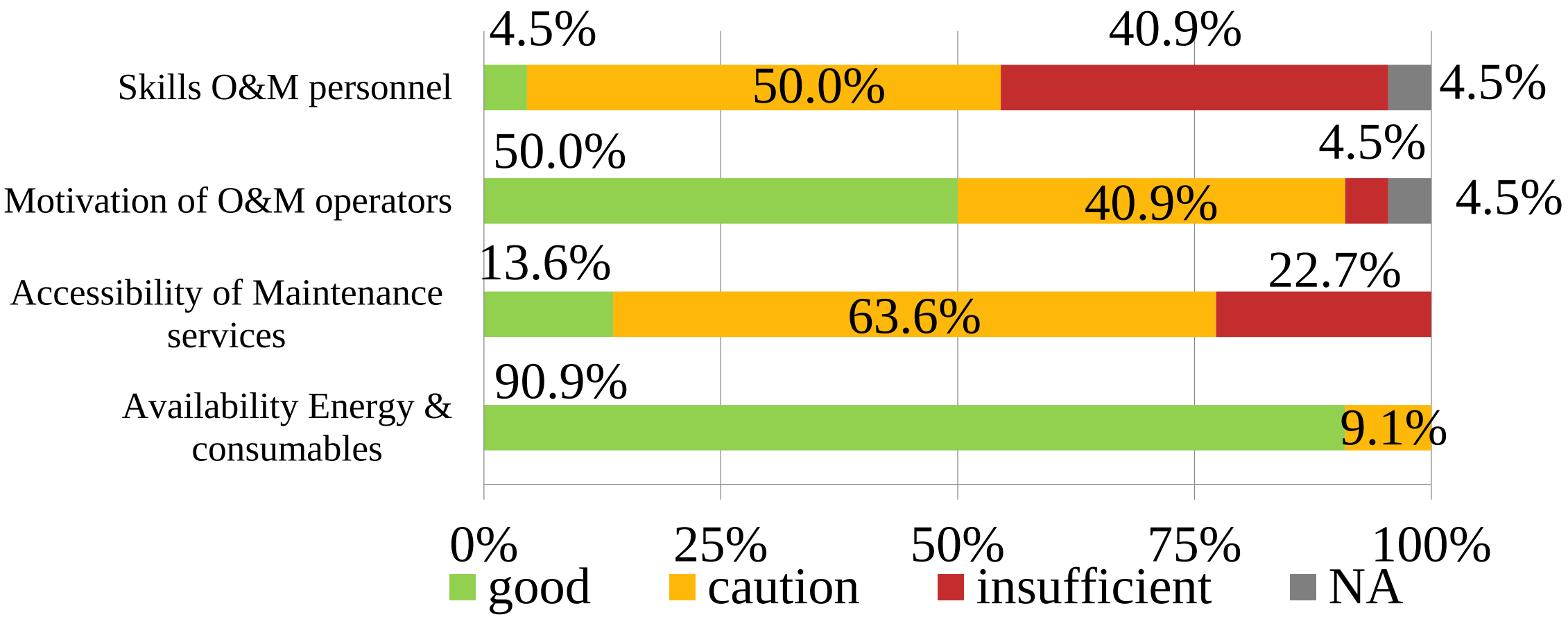
Critical Success Factor (CSF) Evaluation: Planning, Design & Implementation



Status on O&M Personnel & Capacity



CSF Result for O&M



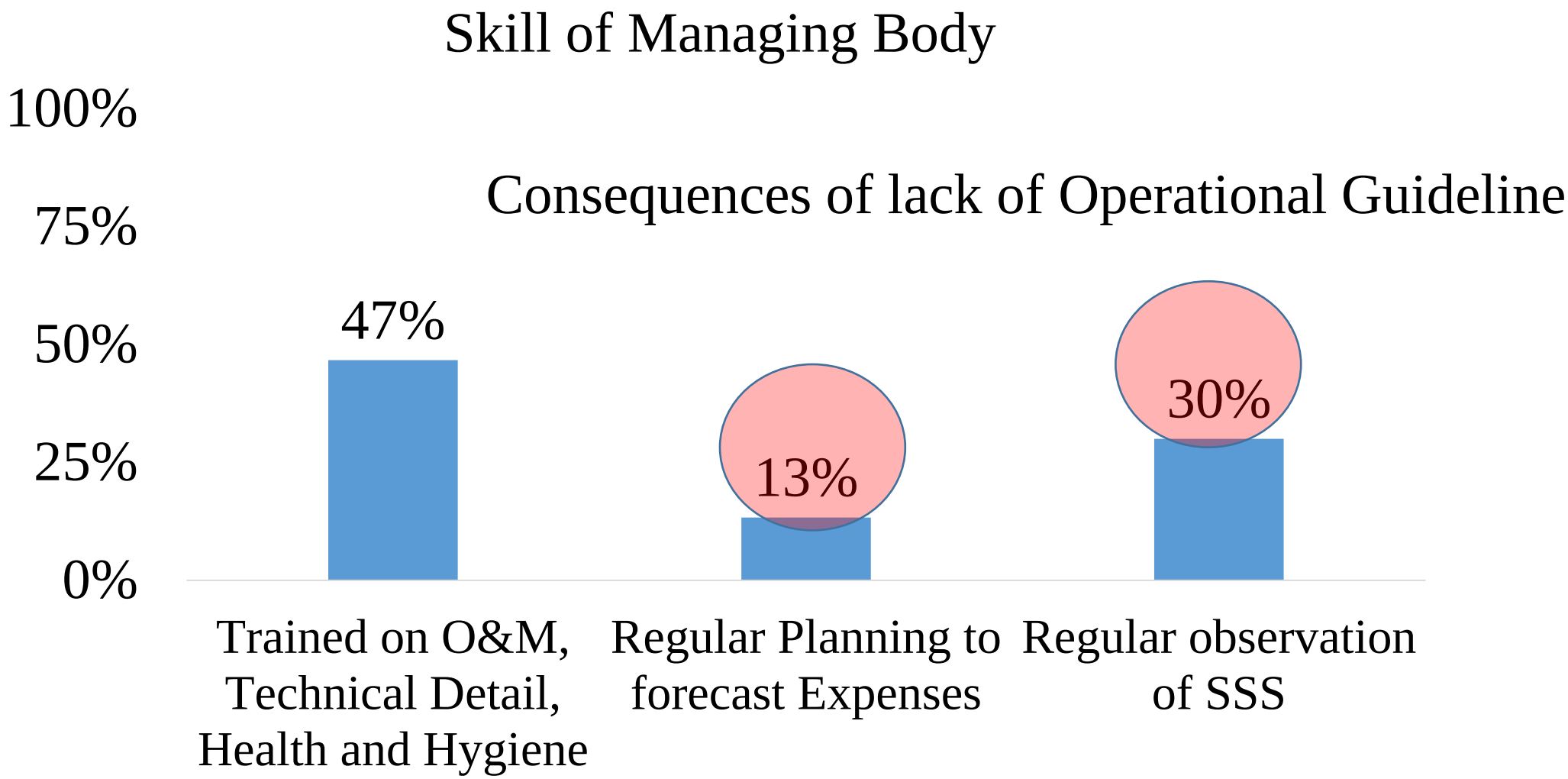
HFB is clean shows high motivation but due to lack of O&M knowledge WW is fed from only one end

Manual Desludging

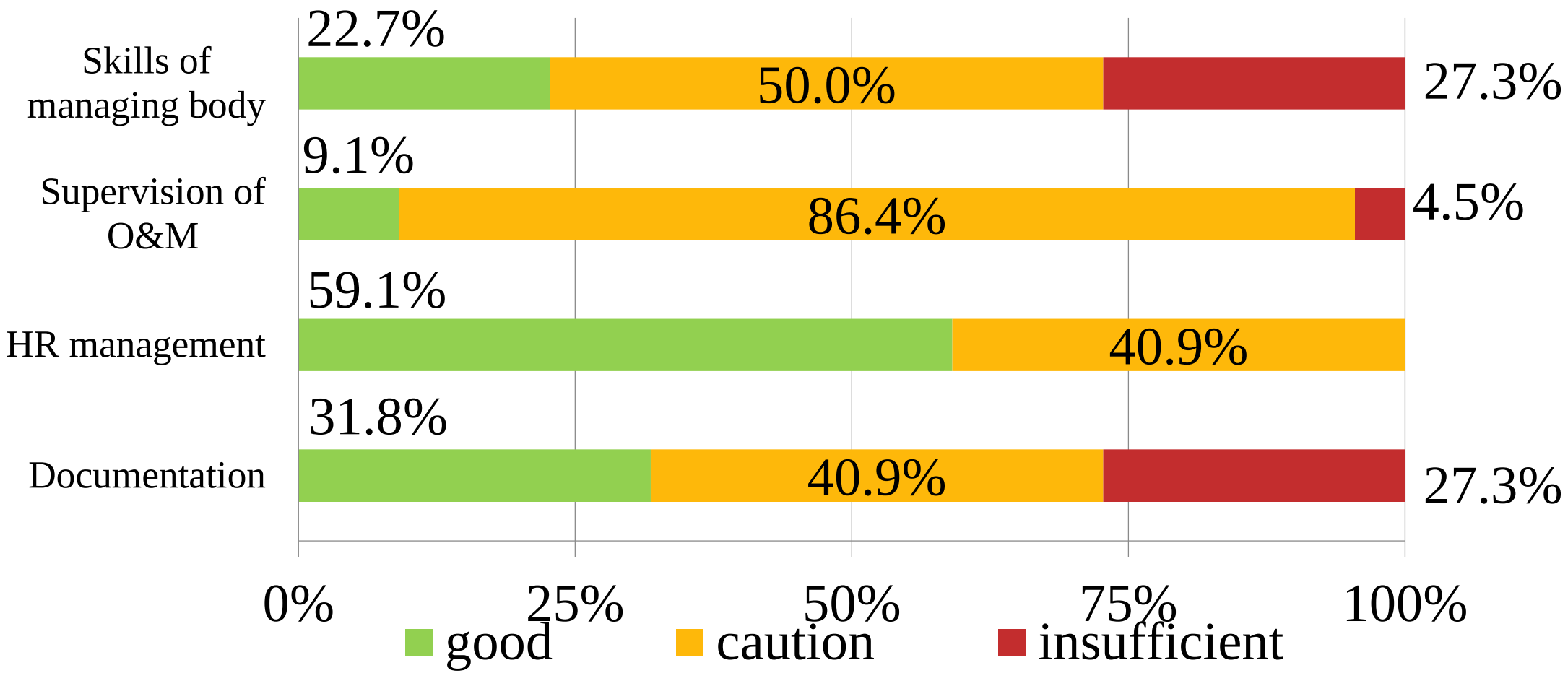
Loading for Transport

Treatment / disposal?

Status on Management Setup



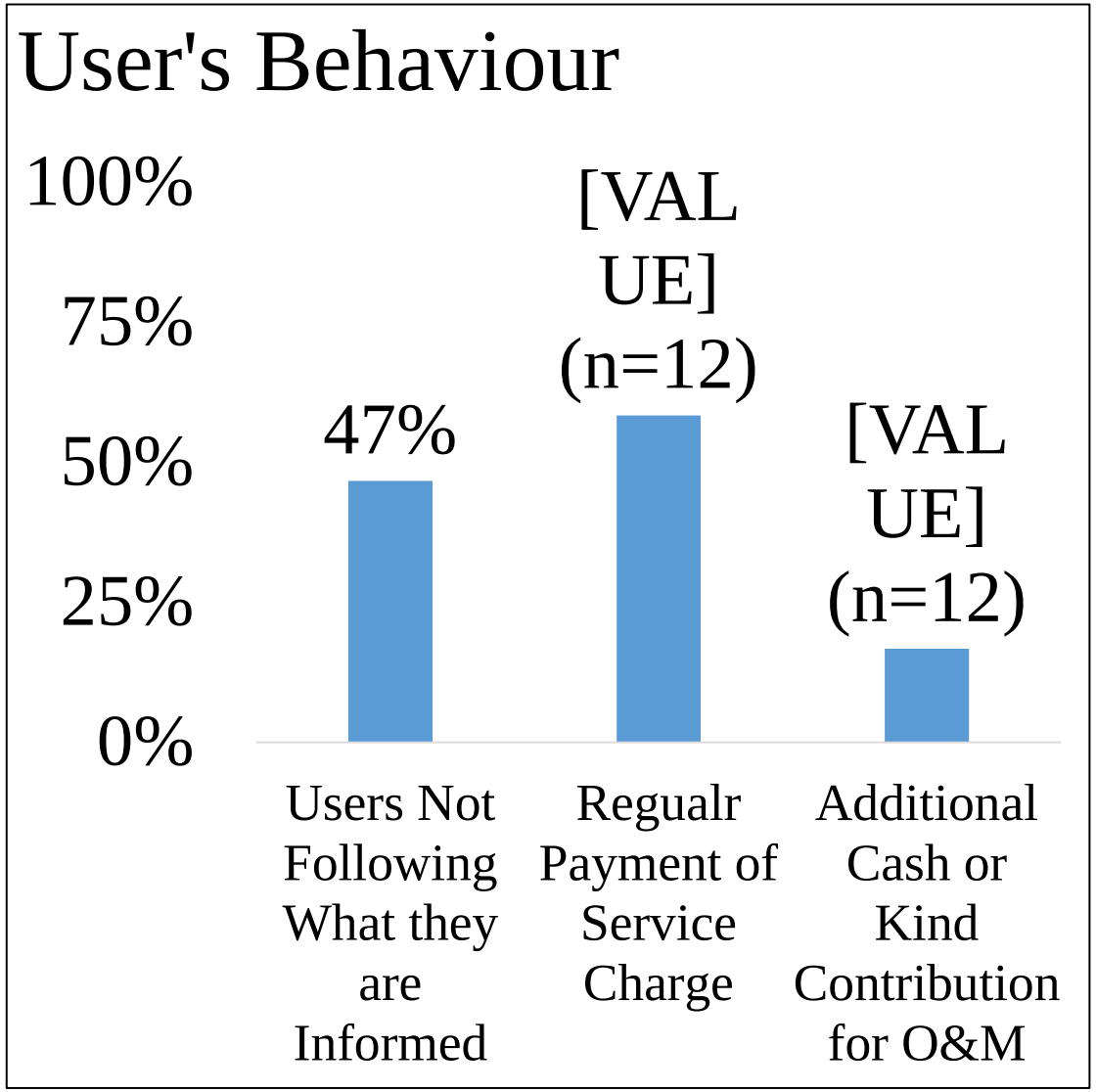
CSF Result for Management Setup

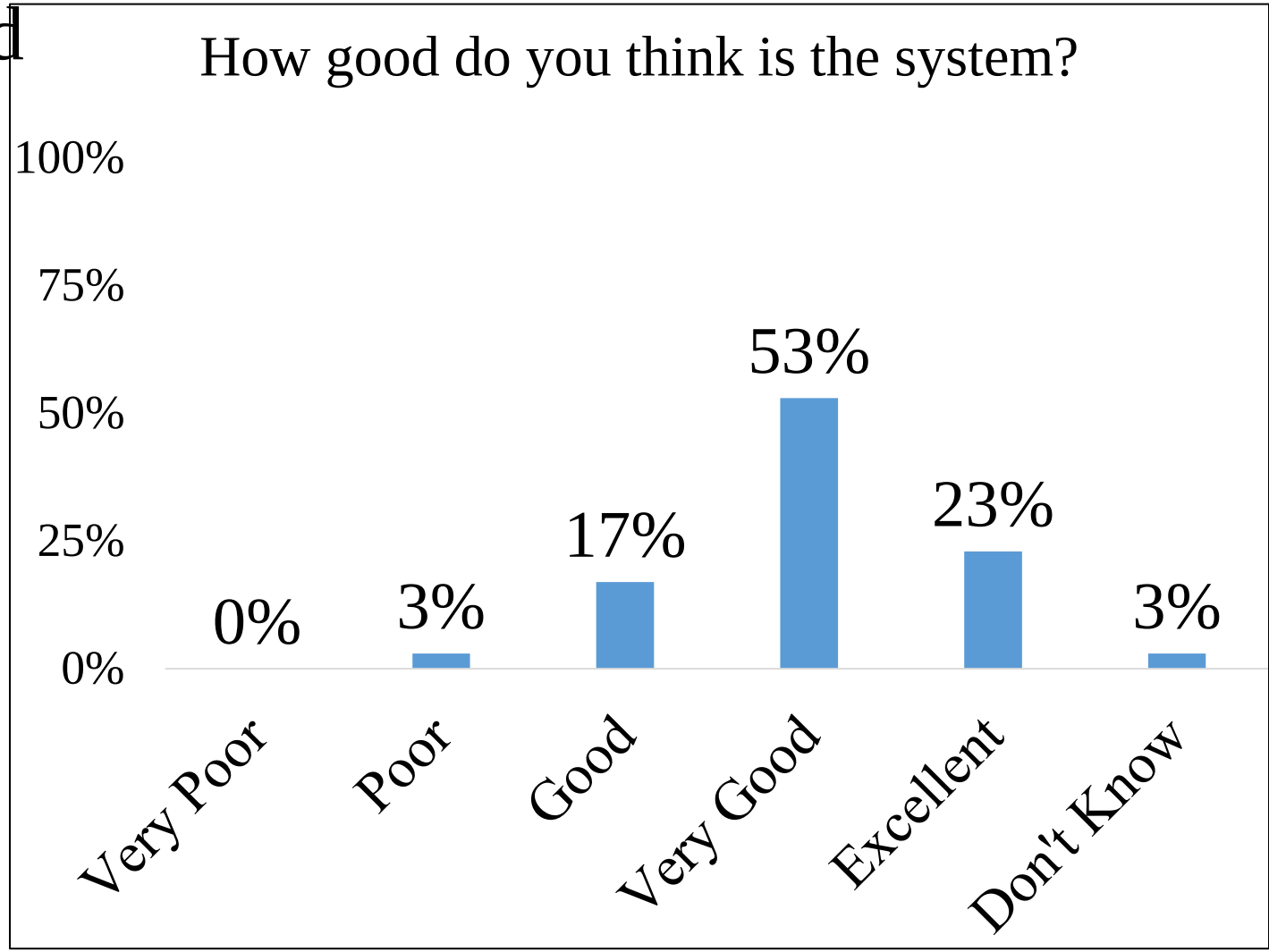


Then and Now

Alternative Use of VFB???

Socio-cultural Aspect: Good Acceptance

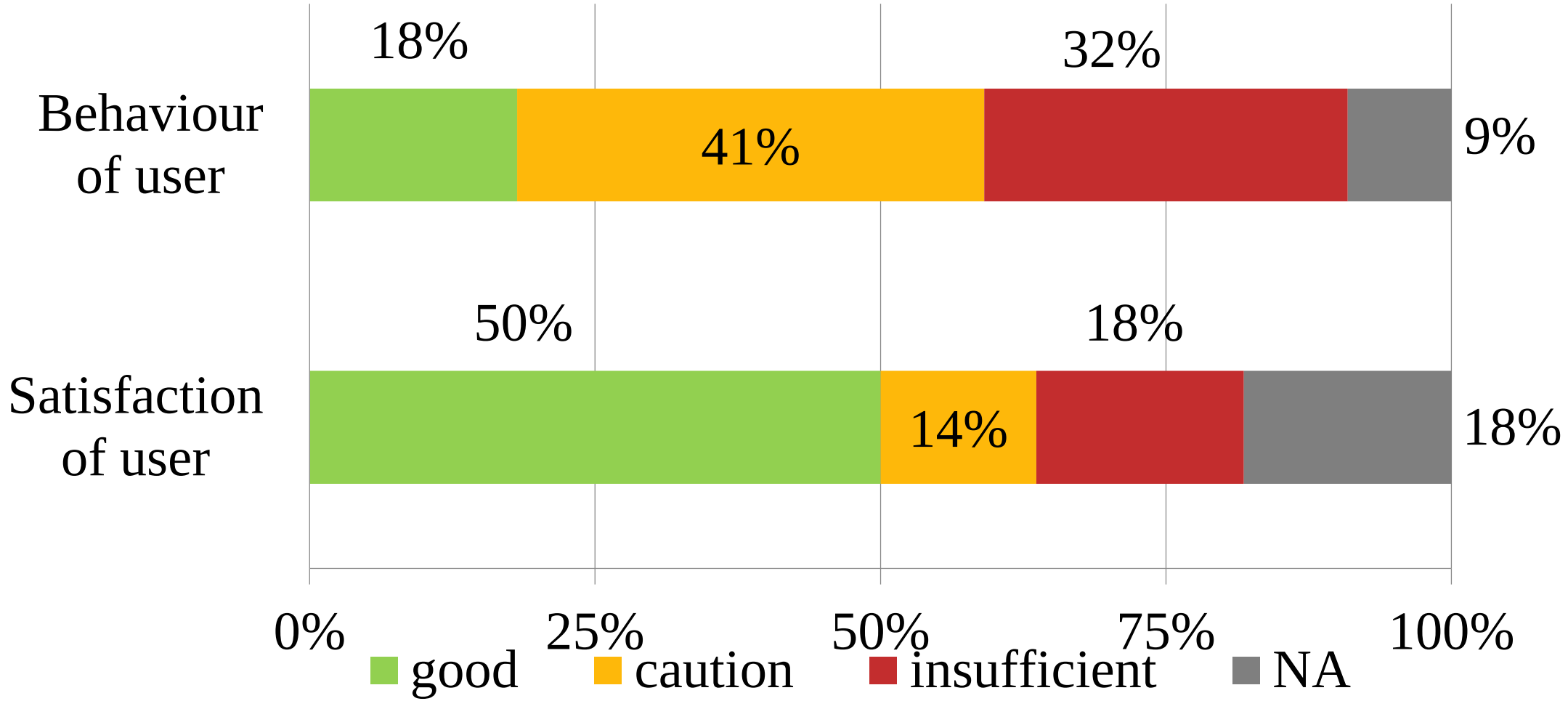




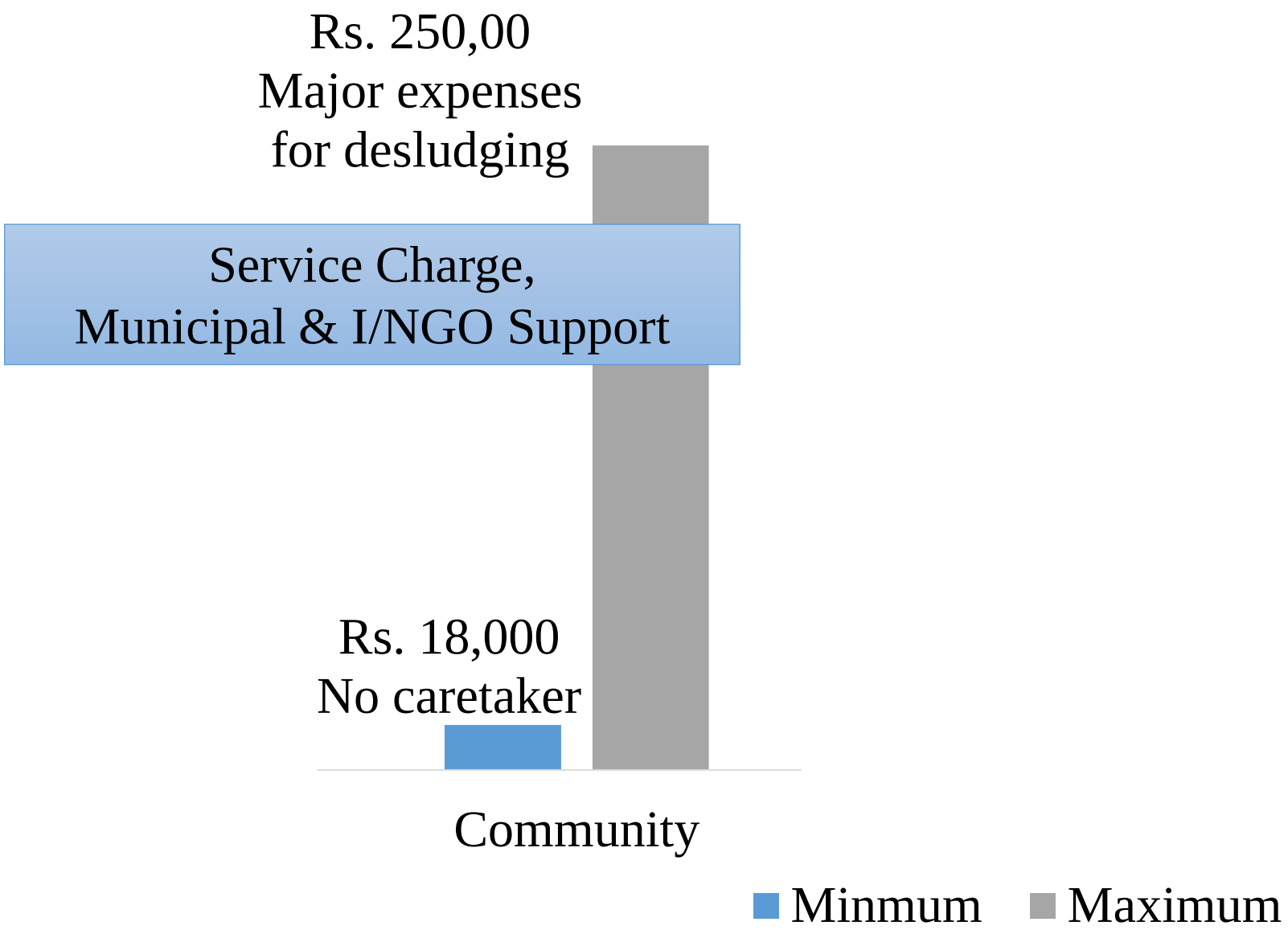
Lack of User’s Awareness

Lack of User’s Commitment

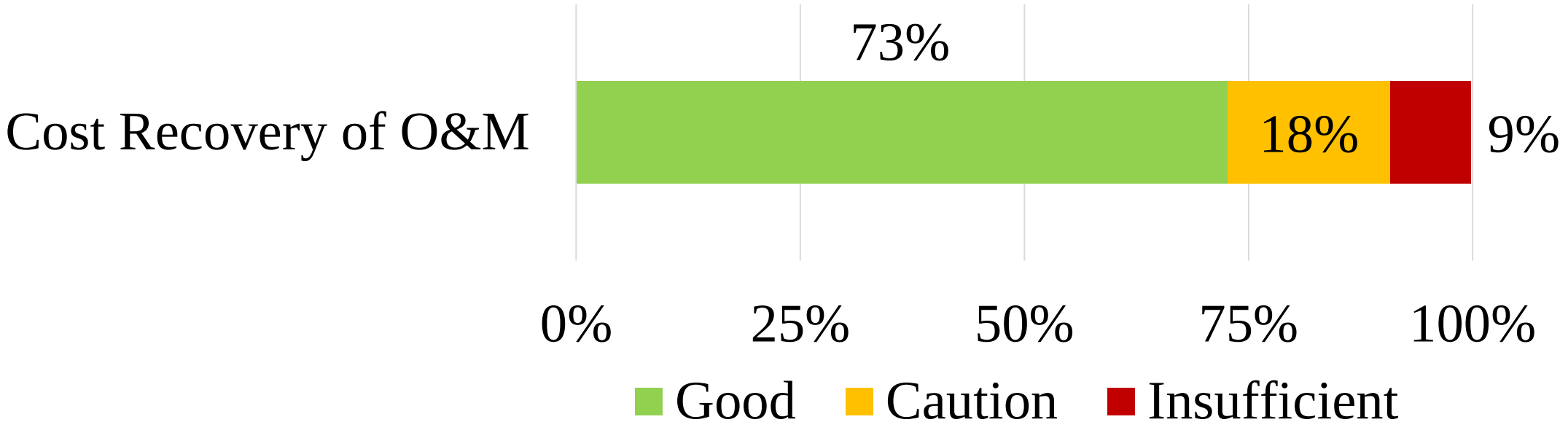
CSF Result for Socio-cultural Aspect



Status of Financial Aspect



CSF Result for Financial Aspect



Budget Allocation is limited to only Basic O&M – No budget for major repair and maintenance

Performance of Systems

What is the performance of a SSS system?

Wastewater Treatment

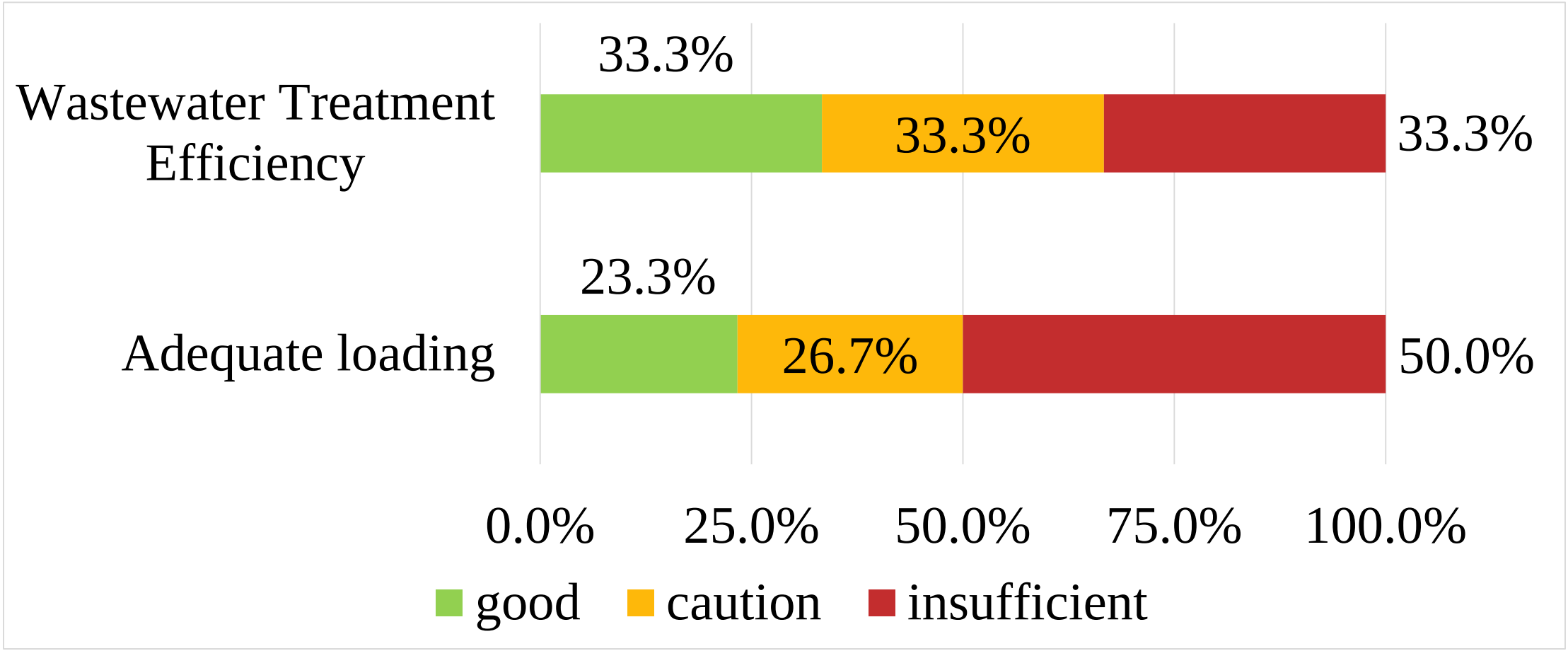
- Treatment effectiveness
- Adequate loading

Resource Recovery

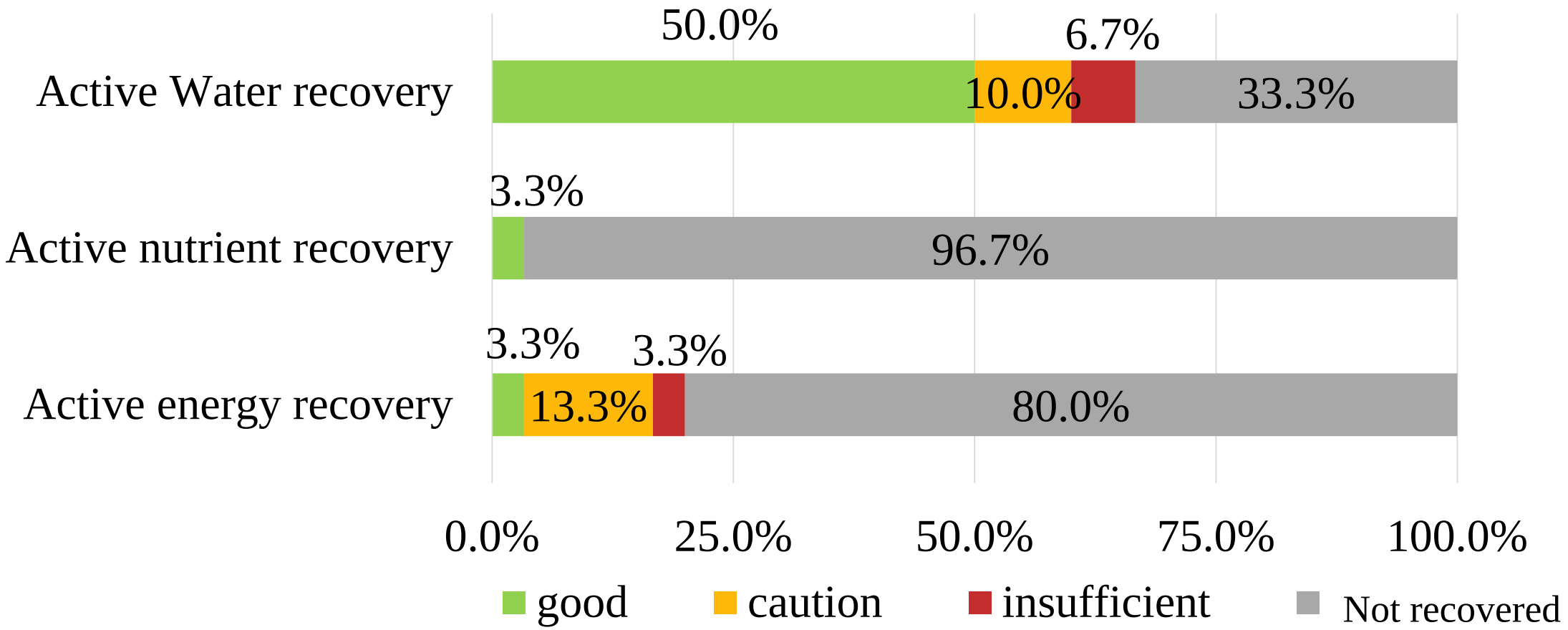
- Water reuse
- Nutrient recovery
- Energy recovery

Proper Solids Management

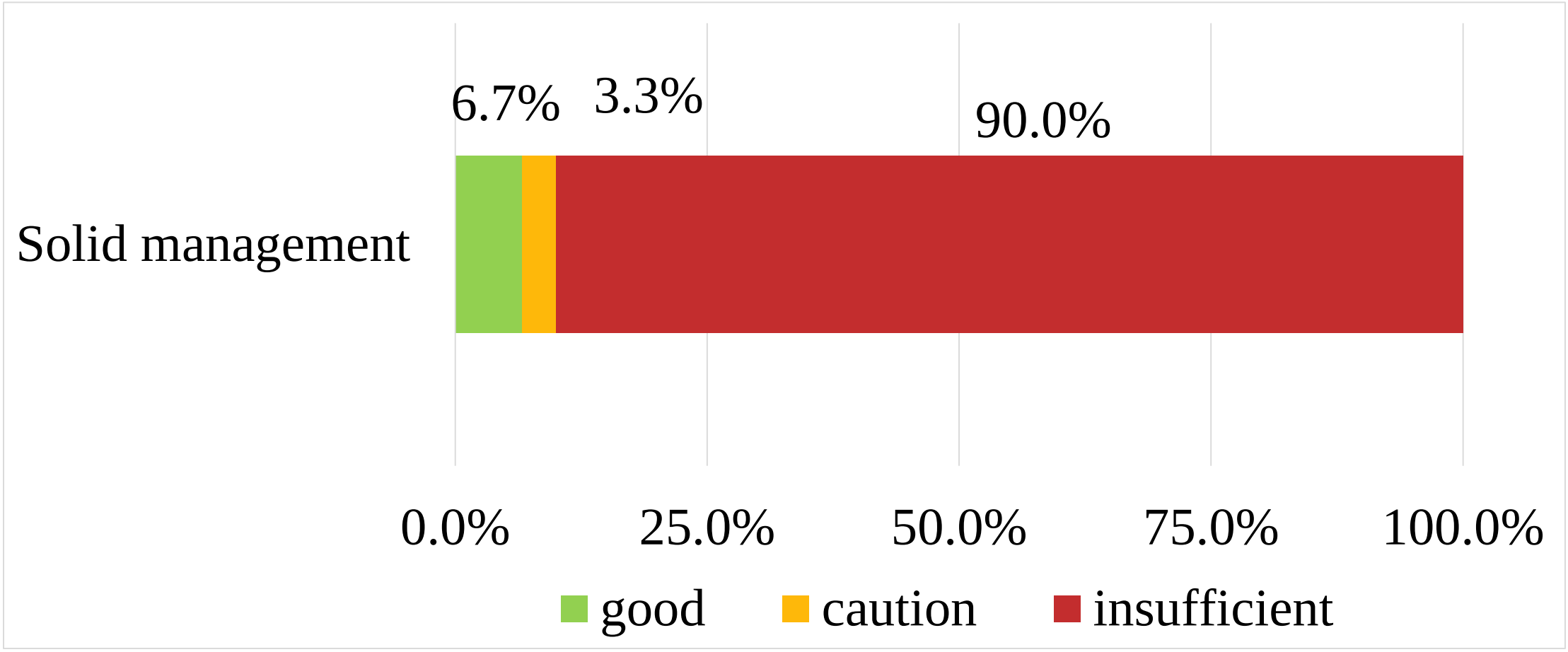
Qualitative Performance Observation Result for Wastewater Treatment



Qualitative Performance Observation Result for Reuse Opportunities



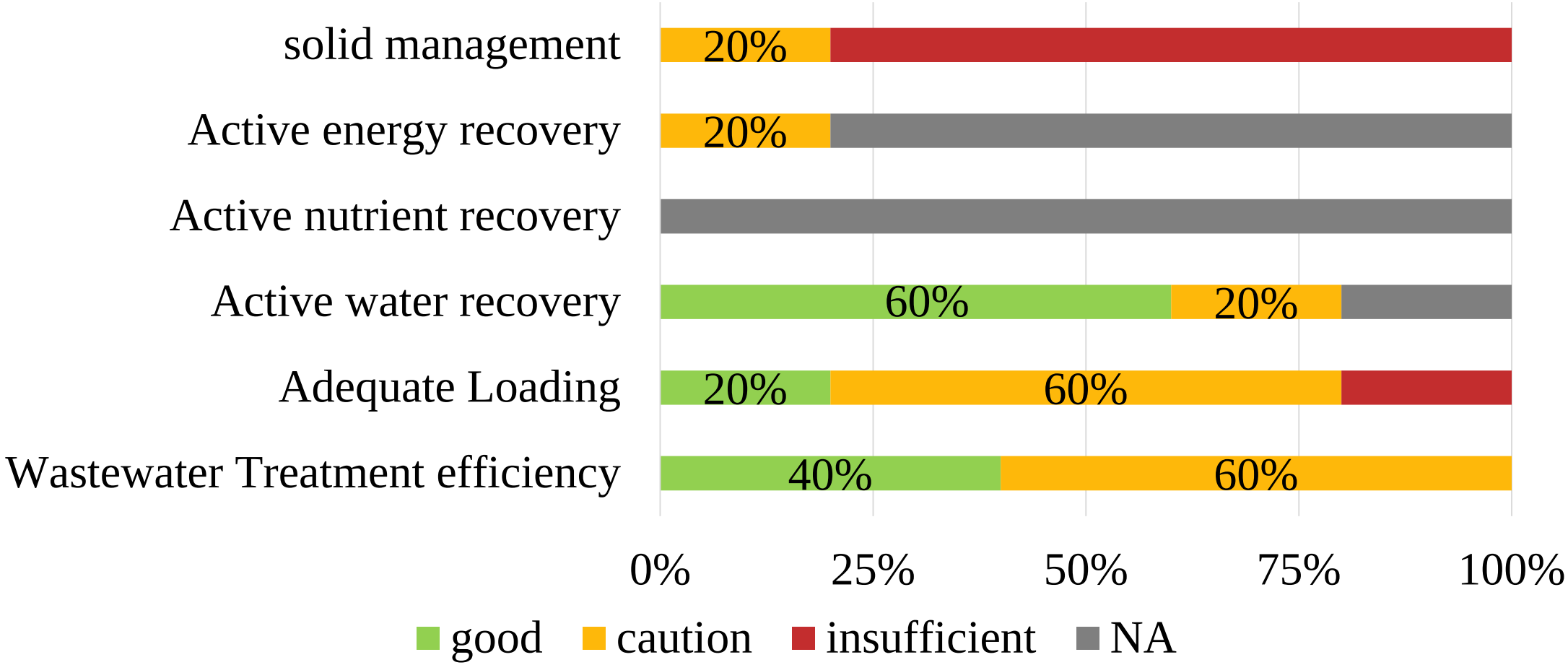
Qualitative Performance Observation Result for Solid Management (Sludge & Scum)



Description on Selected Systems for In-depth Sampling

S.N.	Code	Context	Components
1	CW-Mun	Community Level	BD_6 Parallel HFBs
2	ABR-based-Mun	Municipal Level	ST-AF-2 Parallel HFBs
3	ABR-based-Com	Institutional (Hotel)	Integrated ST with ABR–HFB
4	CW-Inst	Institutional (Hospital)	ST-HFB- 2 VFB in series
5	ABR-based-Inst	Institutional (School)	Integrated ST with ABR–HFB–VFB –PP

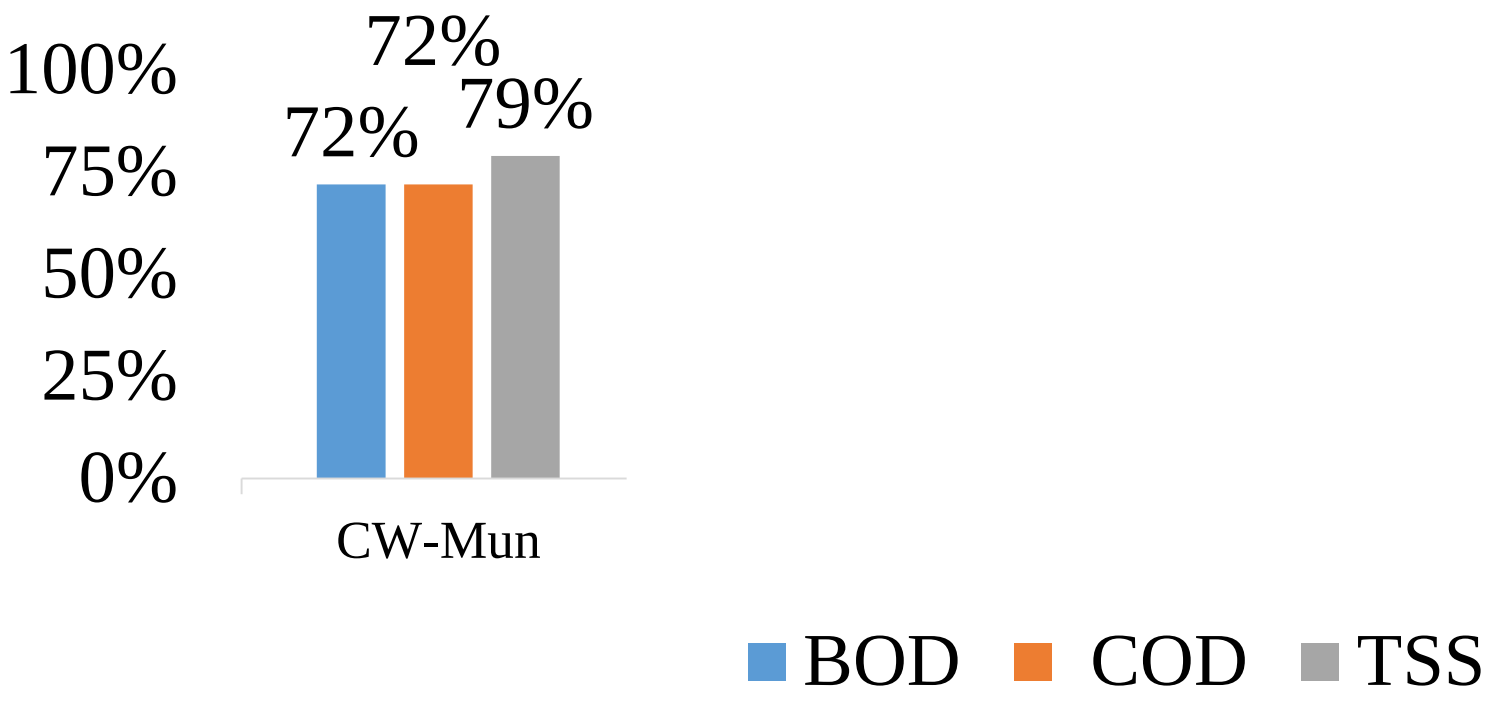
Qualitative Performance Observation Result for these Systems



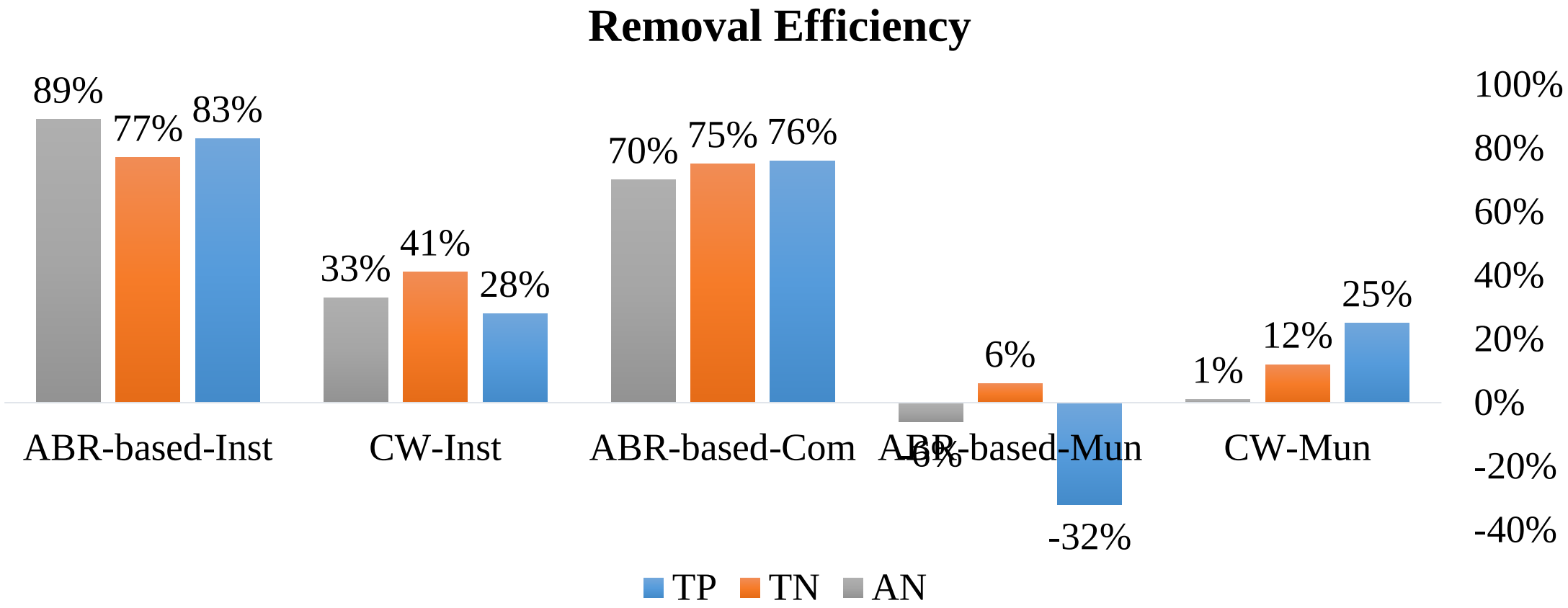
Removal Efficiency

Installations in Institutional Level has good Removal Efficiency

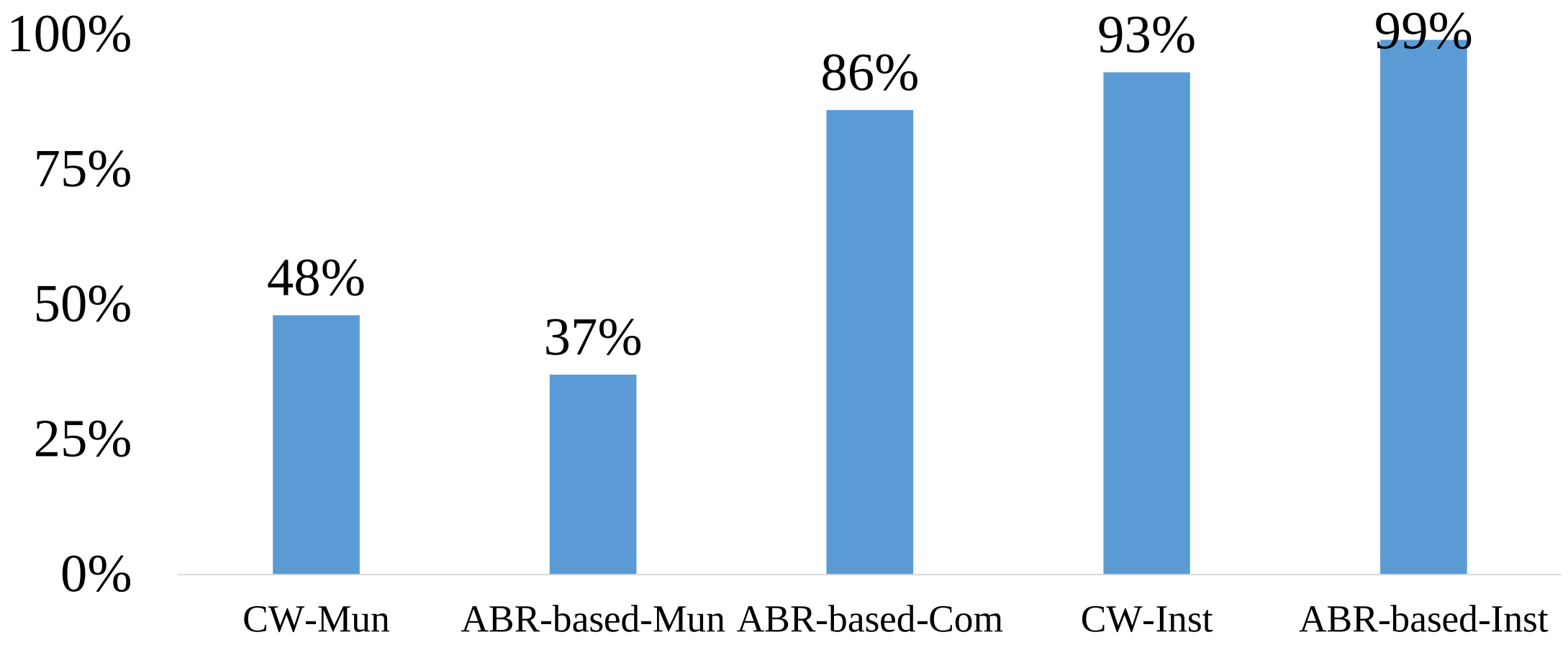
Contain VFB, Much Effective



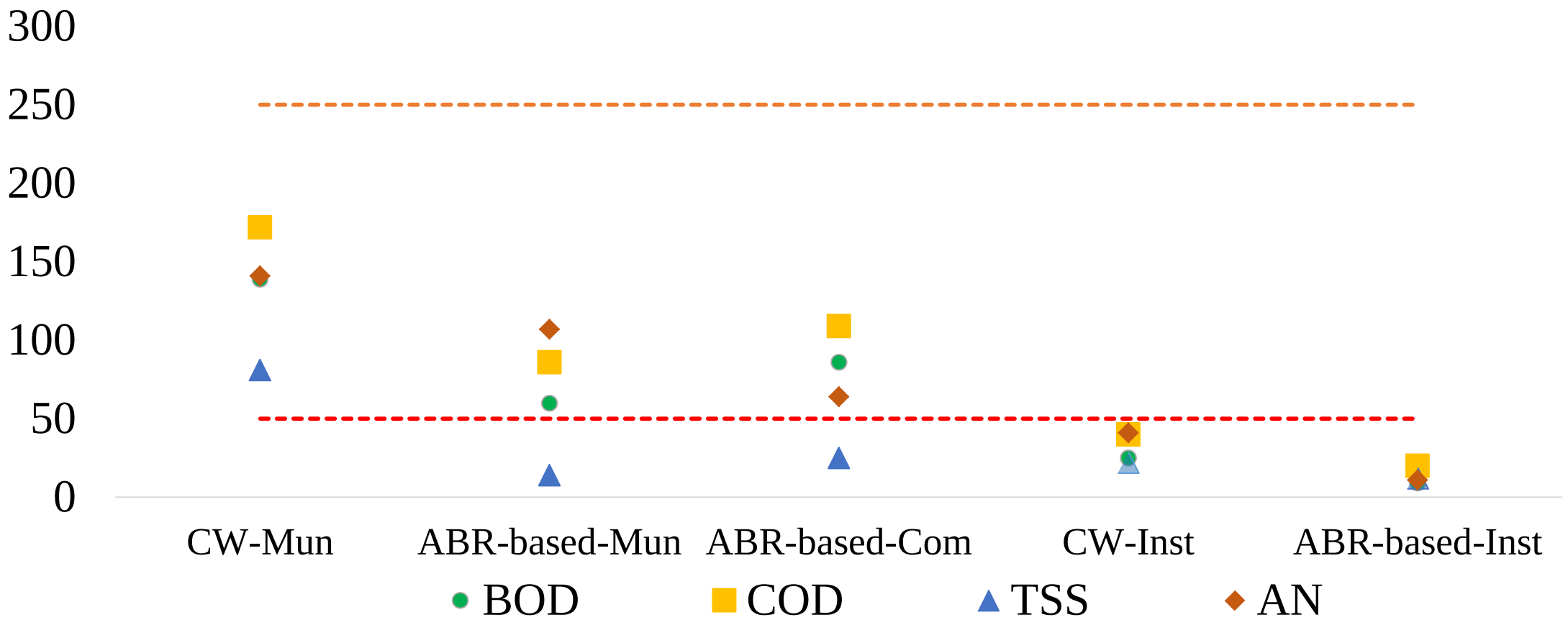
Removal Efficiency of Nutrient



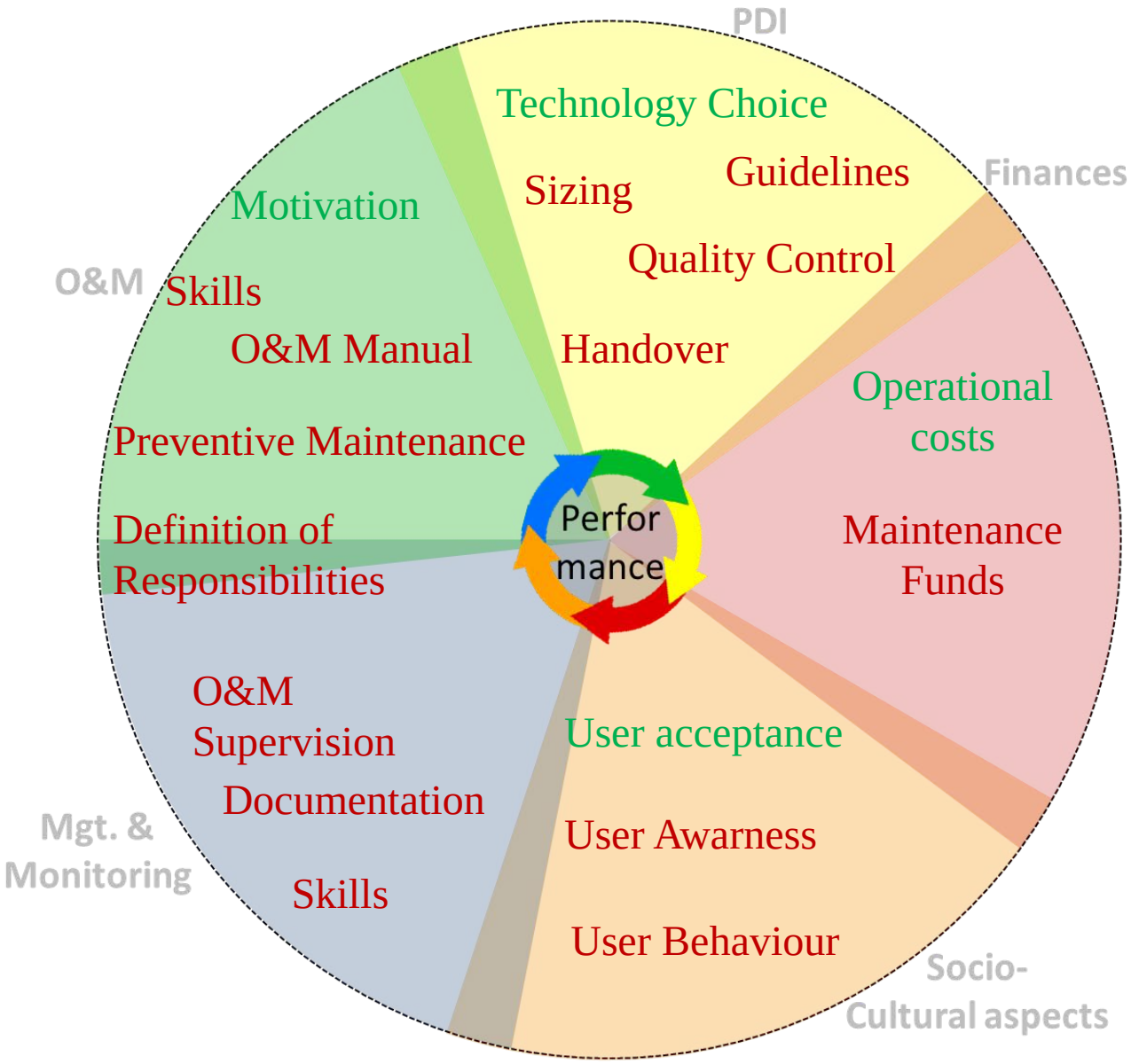
Removal Efficiency of Fecal Coliform



Quality of Effluent



Conclusions



Wastewater Treatment

Treatment Effectiveness

Loading

Resource Recovery

Water

Nutrient and Energy

Proper Solids Management

Sludge Management


Thank You