



Toward Developing Key Performance Indicators (KPIs) for Desalination Processes

Prof. Ibrahim S. Al-Mutaz

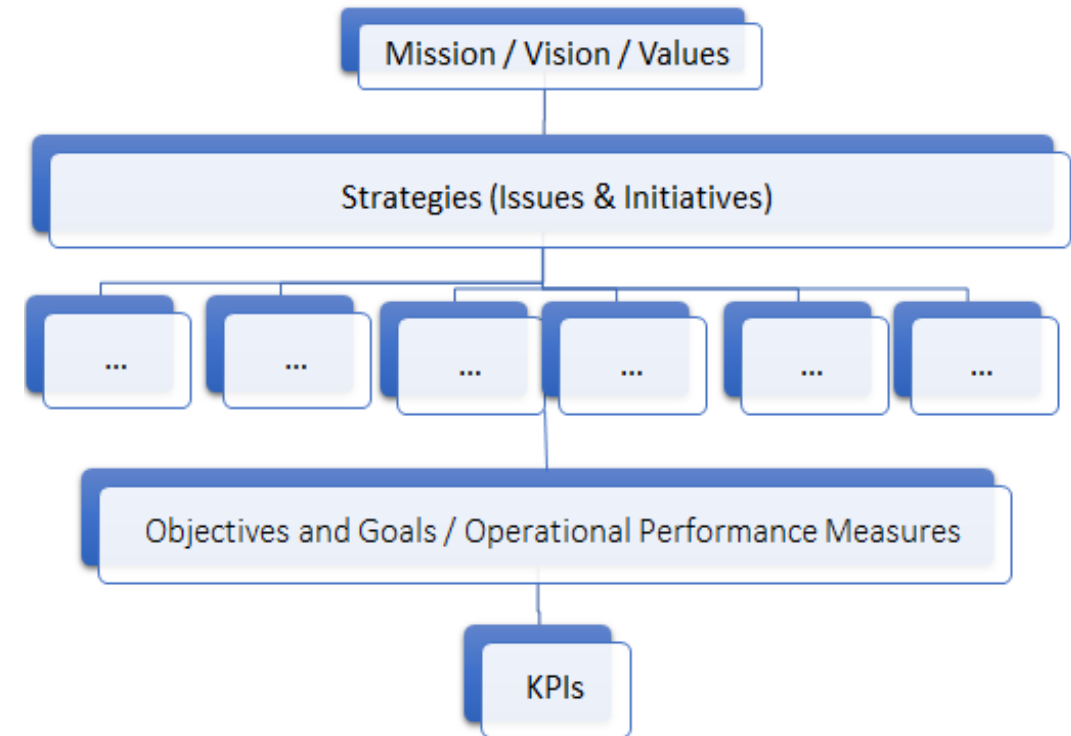
Chemical Engineering Dept., College of Engineering,
King Saud University

e-mail: almutaz@ksu.edu.sa, ialmutaz@gmail.com

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The Aim of This Work

- Introduce the KPIs principles.
- Utilize the strategic objectives and goals for operating desalination plants in effective manner
 - to develop viable strategic plan,
 - set initiatives and programs
 - to achieve certain objectives and goals in the field of water desalination.
- Use operational performance measures to identify the applicable and appropriate KPIs.



Overview

- Introduction
- Development of Strategic Plan
- Desalination Issues / Saudi National Water Plans
- Development of Desalination KPIs
- Conclusions



Introduction

- KPI is a key part of a strategic management system.
- KPIs provide information into whether strategies are working, and programs, objectives and goals are accomplished
- KPI can be defined as a measurable value that is used to demonstrate how effectively strategic goals or objectives are achieved.
- Characteristics of KPI:
 - Counted (number, percentage or currency, ...).
 - Compared (optimal, acceptable or unacceptable, benchmark, ...).
 - Evidence (clear with specific meaning, ...).
 - Specified time.

Introduction

- Successful KPIs rely on effective objectives and goals.
- Objectives and goals need to be SMART to be effective.
SMART **s**pecific, **m**easurable, **a**chievable, **r**elevant, and **t**ime-bound.
- Such as:
 - **S**pecific (simple, sensible, significant).
 - **M**easurable (meaningful, motivating).
 - **A**chievable (agreed, attainable).
 - **R**elevant (reasonable, realistic, and resourced, results-based).
 - **T**ime bound (time-based, time limited, time/cost limited, timely, time-sensitive).



Development of Strategic Plan

- The basic aim of strategic planning is to establish definitively the nature and character of an organization and the sector that it represents and to manage its future development.
- **A strategic plan:** integrated set of strategic goals and operational objectives and activities needed to achieve a desired result: an organization's "mission" or "vision".
- Characteristics of strategic planning:
 - It considers the environment in which an institution operates.
 - Provides a mid-term framework for the organization's operation.
 - It is a dynamic process.
 - It is the basis for the allocation of resources.



Development of Strategic Plan

- Strategic Planning vs. Long-range Planning
- Long-range planning = development of a plan of action to accomplish a goal or set of goals over a period of **several years**.

Strategic Planning vs. Conventional Long Range Plan

Strategic Planning	Conventional Planning
External focus.	Internal focus by the chief procurement officer (CPO).
Process oriented- a stream decisions by the chief executive officer (CEO).	Product oriented- e.g. the approved Master Plan.
Dynamic and change oriented.	Emphasizes stability.
Innovation and creativity.	Relies on tried and tested .
Vision of the future that guides decision-making.	Blueprint for the future that is to be carried out.

Development of Strategic Plan

- SWOT analysis is used to assess the strengths, weaknesses, opportunities, and threats that are strategically important to the organization.
- SWOT analysis is included in the strategic plan as supporting documentation.
- The strategic planning process steps are outlined as in the Table.

Steps	Actions
Setting strategic issues	<ul style="list-style-type: none"> • Setting strategic (priority) issues. • Consolidating a list of strategic issues.
Establishing strategic goals	<ul style="list-style-type: none"> • One strategic goal to be determined for each of the strategic issues. • To analyze each of the strategic goals against SMART criteria. • Development of a final strategic goals list (up to 3-5 goals max.).
Establishing strategic programs	<ul style="list-style-type: none"> • To establish a list of programs/activities needed to realize the goal. • To determine carriers and deadlines/dates of implementation for each of the programs/activities.
Determining priorities	<ul style="list-style-type: none"> • Determining prioritization criteria. • Sorting programs/activities in accordance with the criteria established. • Determining of the final programs/activities list according to priorities.

Desalination Issues / Saudi National Water Plans

- An early "Assessment and Strategic Plan" of the water sector was carried by Ministry of Economy and Planning in 2010 in collaboration with GTZ International services/Dornier Consulting.
- National Water Strategy 2014 (NWS 2014) - the ministry of Water and Electricity (MOWE) with technical assistance provided by The World Bank.
The National Water Strategy of 2014 was not officially approved.
- Unified Water Strategy (UWS) for the GCC countries for the Years 2015-2035.
 - To develop a comprehensive and unified water strategy for the GCC countries for the next twenty years.
 - To establish an office of strategic management in the GCC countries to implement, update the unified water strategy.

Desalination Issues / Saudi National Water Plans

- The [Saudi Arabia National Water Strategy 2030](#) was prepared by Booz Allen Hamilton. It is composed of a vision, strategic objectives, programs, and associated initiatives.
- This vision statement can be further detailed into five strategic objectives, as follows.
 - **Ensure** continuous access to adequate quantities of safe water, under normal operations and during emergency situations.
 - **Enhance** water demand management across all uses.
 - **Deliver** cost-effective and high-quality water and wastewater services, accounting for affordability.
 - **Safeguard** and optimize the use of water resources, while preserving the local environment for the highest benefit of the Saudi society in this generation and the future.
 - **Ensure** water sector competitiveness and positive contribution to the national economy through promoting effective governance, private sector participation, localization of capabilities and innovation.

Desalination Issues / Saudi National Water Plans

- Saline Water Conversion Corporation (SWCC) Strategic Goals
 1. **Customer Service**: Satisfy the needs of our clients by supplying them with desalinated seawater and electricity and deliver reliable services with the highest quality.
 2. **Financial Sustainability**: achieve the highest economic return by increasing revenues and reducing cost.
 3. **Operational Effectiveness**: Ensure quality and efficiency in terms of production and operations.
 4. **Human Resources**: Develop, motivate, and build national competencies within a work environment characterized by fairness, teamwork, responsibility and loyalty.
 5. **Economic Development**: Contribute effectively in developing and indigenizing know how in the field of desalination.
 6. **Safety And Security**: Comply with the best practices of safety and security.
 7. **Environmental Sustainability**: Comply with environmental rules and regulations.

Development of Desalination KPIs

- The performance of a given desalination plant is a measure of its efficiency for producing water.
- It is a measure of how efficient and economical the plant is in meeting its objective in producing the design quantity and quality of water by using specific indicators.
- However, there are no standard indicators for evaluating desalination plants performance.
- KPI should reflect how efficient and economic a plant is in meeting its objective in producing the design quantity and quality of water. This may include:
 - Availability Factor.
 - Reliability.
 - Unit product cost.
 - Capacity Factor (CF).
 - Thermal efficiency.
 - Recovery Ratio.
 - Product quality.



Development of Desalination KPIs

- The following indicators and criteria offer practical measures for the evaluation of the efficient operation of desalination plants.

KPI	Criteria
Plant life	Commercial operation date and condition indicator.
Product Quality	Quality parameters including turbidity, pH, hardness, TDS and chloride.
Plant Availability	Percentage of time at which the plant is available for operation.
Production Capacity	Plant's ability in meeting annual demand.
Gain Output Ratio (MSF)	Energy efficiency indicator.
Loss Time injury Frequency Rate (Safety)	Rate of occurrence of workplace incidents that result in lost time.
PM-CM Ratio	Preventive Maintenance (PM) hours / Corrective Maintenance (CM) hours.
Non-Fuel O&M Costs	Costs / m ³ (manpower, chemicals, maintenance, spare parts etc.).
Environnemental legislation	Environmental preparedness, indicator.

Conclusions

- KPIs are part of a strategic management system. KPIs provide information whether strategies are working, and programs, objectives and goals are accomplished.
- Strategic plan identifies goals, strategies, objectives and key performance indicators.
- General overview of desalination issues which were indicated in various Saudi national water plans were highlighted.
- Eventually desalination KPIs were listed which include and not limited to: *Availability Factor, Capacity Factor, Recovery Ratio, Reliability, Thermal Efficiency, Product Quality and Unit Product Cost.*
- In the development of key performance indicators (KPIs) for desalination processes, benchmarks and targets should be specified.
- Targets must be specific and time-bound.

Thank You