

PROCESS INNOVATION CAPABILITIES AND ORGANIZATIONAL PERFORMANCE: CASE STUDY OF DEVELOPING NOVEL PRODUCTION PROCESS

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ABSTRACT

This case study has been conducted for the purpose of examining the innovative abilities of internal research and development. An empirical technological procedure advancement analysis has been introduced that concentrates on the issues encountered the business sectors of a Saudi firm and the performance of organizational performance. What is revealed in this case study is that the abilities of process Innovation have an important positive impact upon the organization. Lastly, the empirical study has been given including discussions and conclusions. The study provides insight into Process Innovation Capabilities and Organizational Performance, in a *self-governing organization in Riyadh, Saudi Arabia*.

Keywords: *Innovation, Technological Innovation Capability, Organizational Performance, Production Process*

INTRODUCTION

The significance of innovation capability in offering brand new innovations is well known to everyone nowadays; since the focus of many organizations was on their innovation abilities in its rival more than that on their cost-effective or physical resources to generate modern innovations.

Process innovation Capability is one of the main elements in innovation capabilities, which depend on it (Ho, 2011; Abereijo, 2009). As procedure

innovations take place as normal in a producing company, technological innovation can be further refined to technological product and procedure innovation. Technological process innovation of a firm is one that has carried out importantly technologically enhanced techniques during the time under review (Garcia-Muina, 2007; Guan and Chen, 2010). Additionally, within the field of production industry; technological procedure innovation abilities are deemed as the basis of enhancing performance at manufacturing plants and play a main role in reinforcing their performance (Chen, 2009, Liu, Baskaran, and Li, S. (2009). Technical procedure innovations are characterized by being more efficient or productive oriented reforms. Consequently, the expectations of process innovations exist for having better performance in productivity.

This case study deals with the innovation capability issue practically technological process innovation capability and the relationship between the organization's innovation capabilities and its performance (Osman, Ba-Mardouf, Al-Washmi, Al-Shail, Al-Otaibi and Al-Wadie, 2004),. This case study is conducted for the purpose of showing empirically that the technological process innovation capability has an important effect on performance. Moreover, a situation of nano-filtration pre-treatment as a novel technological procedure innovation which developed through R&D center is offered to basically show the important effect of this technique innovation on the regular water manufacturing plant performance for an organization in Saudi Arabia (Zahrani, Ajlan, and Jordan, 1993). Relying on this study, how the innovation capability enhanced the organization which was recovering from major issues impacting its outcomes will be disclosed. To make sure the confidentiality of the data of the firm, the firm's name has been changed to avoid impacting the company's management (Hassan, 1998).

BACKGROUND OF COMPANY

Al Soud International, is a self-governing organization established in 1974 with headquarter situated in Riyadh, Saudi Arabia. The company is involved in the operation and maintenance of desalination and power creation plants and the regular water transmitting systems. The company, through more than 30 ideal company plants in the Eastern and West-coast of the country, is the main water desalinated and electrical power provider throughout Saudi Arabia with an everyday capacity of 3,000,000 cubic meters of safe and clean water (1,095,000,000 cubic meters of safe and clean water annually). Approximately, half of the 6,400,000 cubic meters used by the Kingdom's 27 million people. Moreover, the

organization with its staff and employees of 11,000 employees, most of them were engineers in the plants is deemed the desalinated market-leader.

The aim of the company is to meet Saudi Arabia's water requirements which are growing. Expectation for the company to pioneer the sea water desalination growth and transmitting while its mission is to fulfill the kingdom's desalination water need and participate in cost-effective and social growth through effective cost-effective commitment in human and physical source resources.

The main purpose of the organization as mentioned in its bylaws approved by royal decree was help natural water resources by means of sea water desalination along with electrical power creation centered on technological and cost-effective conditions. Through its R&D middle, the organization is also involved in analysis and growth activities related to the growth and improvement of desalination technologies to experience the master ideal plans of the organization. The R&D center together with the Engineering Divisions, in Eastern and Western Shorelines cooperated in many important used research projects. These used research projects continued the improvement of position growth performance. R&D center has done several research projects to be able to cope the main complications knowledgeable the company's segments basically feature divisions.

The key specific challenge encountering the organization in the near future was decommissioning of existing plants in coming next years. Moreover, the organization had to get rid of some of its costs of operation of its plants because of the huge cost-operational commitment opportunities required in plant projects. The operational costs of the company unit's were the main monetary challenges. Furthermore, the growing gap between water need and the quantity provided in the most important cities due to the quick growth of their people and in per-capita consumption was one of the obvious central complications.

The company knowledgeable serious effective restrictions were impressive in reducing the water manufacturing and enhancing plants operational costs. The following part of this case implies the importance of these issues.

DILEMMA OF THE COMPANY'S STRATEGIC BUSINESS UNITS

The ideal company unit's plants of the company faced several problems due to operational restrictions. The operational restrictions which were

reasons of plants troubleshooting produced various position growth restrictions and had obvious outcomes of the performance as well as of water growth units. Although the present budget and innovation abilities lack exist, the R&D of the organization had to make ideal specific procedure innovation to control these problems. Below table. 1 shows the important issues confronted by the organization plants in places of operational performance, growth, and cost and promotion situation before Saline Water Desalination Research Institute developed a novel technological innovation which resulted in improving plant's capacity.

Table 1

Demonstrates the important issues exist in the company's plants

Areas	Problems Discretion
Operation efficiency	<p>Operation is limited to specific operation circumstances:</p> <ol style="list-style-type: none"> <li>1. The plant operation has the lowest normal water restoration rate. <li>2. The plant operation confronted issues in the seawater desalination consumption such as measuring, fouling such as biofouling, great power and substances requirement as well as deterioration of the desalination equipment. As a result of these main issues the plant performance considerably decreased. <li>3. It tends to require comprehensive pretreatment, especially if the feed is taken from an open sea seawater intake.
Production Level	<ol style="list-style-type: none"> <li>1. The plant's development capabilities could not reach to full load. <li>2. Input seawater reduced and lack in plant performance as mentioned above. <li>3. Moreover, due to the company plants useful lives were nearly obtained up to the end the plants had poor efficiency. <li>4. The company plants managed with old and ineffective operation system with to manufacture water.

(Continued)

Areas	Problems Discretion
Financial conditions	<p>Finding ways to decrease operating expenses is typically a priority for the company. It has to save its great expense due to the large investments required to build new strategic business unit projects. The company device's functional expenses established the main monetary difficulties.</p> <p>The major causes of improving plant functional expenses were because of process complication and the seawater intake function which is recognized by having:</p> <ol style="list-style-type: none"> <li>1. High degree of hardness <li>2. Varying levels of turbidity and microorganism content <li>3. High total dissolved salt at normal operating conditions. <li>4. Also great power and substances consuming, less plants' resource usage, and low development which led to the plant's function price increase to inquired level
Marketing situation	<ol style="list-style-type: none"> <li>1. Increasing market share is one of the most important goals of the company to be obtained through improving its development potential and decreasing the comprehensive plants functional expense. <li>2. The lack in the water development potentiality to the company clients runs the company to difficulties in meeting their clients' total requirement on time. <li>3. Because of this promotion circumstance, the most apparent stakeholder groups put demands for liability management on the company. <li>4. The capability of the company could not accomplish its target business stage due to less everyday water development.

The performance of the company has announced effects on these places because of the main issues in specific means of growing plants.

THE PROBLEM STATEMENT

The problem statement of this study was that 'the effect of technological innovation abilities of the water manufacturing plants is on its performance through making a novel ideal solution'.

THE COMPANY'S CRITERIA OF ALTERNATIVE OPTIONS TO STRATEGIC SOLUTION

The company's decision makers had recognized the issues and accordingly formed various appropriate criteria alternatives to choose for them that support to solve these serious issues. Details of the three alternative options criteria are explained in table 2. The management required to decide which option of these alternative proposals should be taken. The first alternative of these choices was to sign a contract agreement with the main plant producers. Depending on this contract agreement, the producers of the plants would analysis the plant design conditions and suggest new modification to get over these issues. This project option was eliminated due to the outstanding cost of the agreement and the longer length to get the result.

The second alternative choice was to authorize their analysis activities with worldwide company corporations which have R&D centers with advanced abilities. To be able to keep the initiative and specific authority, the company's option makers desired to strengthen the company's in-house analysis features and maintain its competitive advantages. Moreover to the point that innovative abilities depend on the capability to apply inner knowledge and on in-house R&D efforts, the company also excluded this option.

After discussing the third alternative with R&D center management, plants management and engineering divisions, the top management of the organization had selected the ideal alternative which was assigning the process to the organization R&D middle. The third option was the appropriate one with respect to the company's criteria alternative options (see as table 2). This different overcame all disadvantages of the other available choices. The company's inner R&D center was the less expensive proposal to adopt as well as the smallest threat regarding maintaining industry authority and competitive advantages. Moreover, the organization through this option allowed to apply inner knowledge and on in-house R&D efforts. Although the project schedule length of

the third choice was not the shortest among the other projects, the option was the first classification in criteria matrix of alternative options and so that it was chosen. The following table shows the three alternative choices standard.

Table 2

Demonstrates the company's criteria matrix of alternative options

Project Options	Alternative criteria options			Options Category
	Total Investment required	Project Timeline Duration	Maintaining market leadership	
The plant manufacturers	High Investment	Long-Duration	Medium Risk	Third- Option
International consultancy R&D centers	Medium Investment	<u>Short-Duration</u>	High Risk	Second- Option
The company's internal R&D center	<u>Low Investment</u>	Medium-Duration	<u>Low Risk</u>	<u>First-Option</u>

As soon as the management had made the decision to determine this task to the company R&D center to be able to tackle the situation, the expert team connections were recognized to apply the action option.

THE STRATEGIC SOLUTIONS THROUGH TECHNOLOGICAL PROCESS INNOVATION CAPABILITIES OF INTERNAL R&D CENTER

Relying on the acceptance of the company's decision makers, the R&D center together with the Engineering Departments, in both Shorelines locations prepared efficient team connections for carrying out a used analysis research. The main purpose of the project was to analyze and search the major causes of these issues which confronted the plants to be able to make a new technological procedure innovation to develop the plant performance.

The project teamwork first began their assignment by studying the reason behind the above issues. The team found that both the outstanding

staff of firmness and outstanding finish melt sodium placed limits on product the regular water recovery. The team also discovered that the position with its current procedure tends to degrade its performance due to the presence of huge turbidity which must be to remove. Using of antiscalants in preventing range formation and coagulation-filtration procedure do not remove the very outstanding contaminants which made the important issues.

The project team connections focused their studies on this critical place. After several trial and field works, the team had developed specific procedure advancement. The specific procedure advancement was a novel nanofiltration for the regular water growth position techniques to remove very outstanding contaminants from sea regular water (Hassan, Farooque and Al-Amodi, 1999). Through this important advancement procedure, the sea regular water feed prior to its entry to the water manufacturing plants is originally pretreated by the nanofiltration cells aspect procedure. The new nanofiltration cells aspect pretreatment overcomes the important issues knowledgeable by the various traditional water manufacturing plant's procedures. From initial outcomes, it can be seen that not only position operate performance was significantly enhanced but also growth quantity was enhanced and effective cost was significantly decreased. The performance stage was the important stage to make sure and evaluate the pilot studies.

THE IMPLEMENTING OF THE NEW SIGNIFICANTLY PROCESS INNOVATION

All practical works were done first on a pilot plant range in the company's R&D center with originally low growth prospective of the team. The pre-treatment device in this brand-new advancement includes seawater system, double media filter followed by a good sand filter, outstanding cartridge filter and feed tank. The nanofiltration device includes the underhand pump and three nanofiltration modules arranged in series, each containing two expert nanofiltration cells aspect elements in the demonstration device. The next step was scaled up from the pilot plant range to demonstration units.

Based on the outcomes acquired from both pilot and demonstration plants, the project teamwork had acceptance from top management of the organization to apply the new procedure design and operate of the nanofiltration design by the conversion procedure at an actual size of the regular water growth position (Hassan et. al., 2002). In performance

stage, the project team connections transferred the effective system to an experienced growth plant after creating and applying efficiently the process at the cause and demonstration position stages at the company's R&D center.

The next step has offered the new maximum procedure design to various plants. Use of this importantly reinforced procedure was used in other manufacturing plants efficiently by the organization project teamwork and resulted in eventually to get over important issues confronted the organization plants.

Production plant performance was enhanced to more than 40% compared with former times because of transforming these plants to new nanofiltration operation. The operational performance of the plants which changed to new operating techniques also amounted to new levels. Water recovery quantity of these growth units attained to 56% from 28% evaluating with working in the traditional procedure. The above deficiencies in plants were corrected as a result of transforming growth units to new nanofiltration operation technique. The company acquired outstanding outcomes through utilizing its inner R&D center abilities which developed a new significantly enhanced procedure advancement.

The below points summarize the fundamental outcomes acquired by the organization R&D center:

- Comparing the plants working on the maximum new specific procedure advancement technique to operate in regular operate technique, the finish position growth prospective was significantly enhanced with more than double.
- Although the plants were in operate for quite a while, the plants shut down to maintain and the other and cleaning walls were not required. As a result, the organization plants minimized overall effective costs through the new procedure advancement technique by reducing the downtime involved in position shutdowns and simultaneously reducing the overall average alternative quantity.
- The new procedure innovation allowed the company to fulfill the growing need from their clients. This procedure also ensured the organization durability and response to customer need on the brief period of your power and effort. The company also enhanced its company to planned stage because due to enhancing everyday growth prospective. The following place presents a conversation in accordance with the information offered from the above case study.