

## Water Senegal, Senegal

**Country:** Senegal

**ISO member body:** Standardization Association of Senegal (ASN)

**Project team:**

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**Duration of the study:** July – December 2011

## 10.1 Objectives

The assessment of the economic benefits of standards is extremely important for tracking and prioritizing standardization activities. It aims to raise awareness and improve communication, while promoting the use of standards and encouraging stakeholder participation. The assessment of the economic benefits of standards is designed to:

- Allow stakeholders from private and public sectors to better appreciate the economic and social impact of voluntary consensus standards
- Sensitize policy makers and business leaders to the importance of standardization

This report presents the result of a project that took place from July to December 2011 with the collaboration of la *Sénégalaise des Eaux* (SDE), the Polytechnic School of Thièse, the ISO member for Senegal – the Senegalese Association for Standardization (l'Association Sénégalaise de Normalisation (ASN), and ISO.

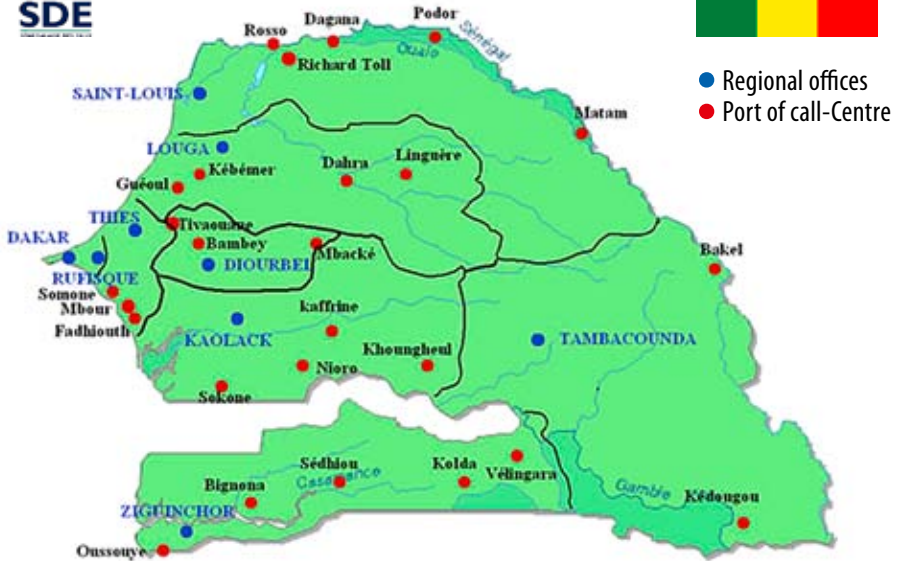
## 10.2 The selected company

### 10.2.1 SDE in summary

Recognized internationally, SDE is a reference in Africa for the management of drinking water services. Its successful performance has greatly contributed to the viability of Senegal's urban drinking water.



## Geographic distribution of regional plants



**Figure 1** – Geographic distribution of regional plants

SDE operates in the institutional framework described below:

- The State of Senegal defines the global policy
- The National Water Company of Senegal (SONES) is responsible for asset management, for project management of renewal and extension works on the infrastructure, and for quality control operations
- SDE is responsible for operations
- The National Sanitation Office (ONAS) is responsible for sanitation operations

Founded in December, 1995, and situated in Dakar, Senegal's capital, SDE is a private limited company with a capital of XOF 3 billion (CFA<sup>1)</sup> Francs), distributed as follows:

- 58 % for the company *Finagestion*, a subsidiary of the French group Bouygues
- 32 % for private Senegalese investors
- 5 % for the State of Senegal
- 5 % for company staff

As a national company, SDE is composed of regional offices across the country that report to the head office in Dakar.

SDE is responsible for:

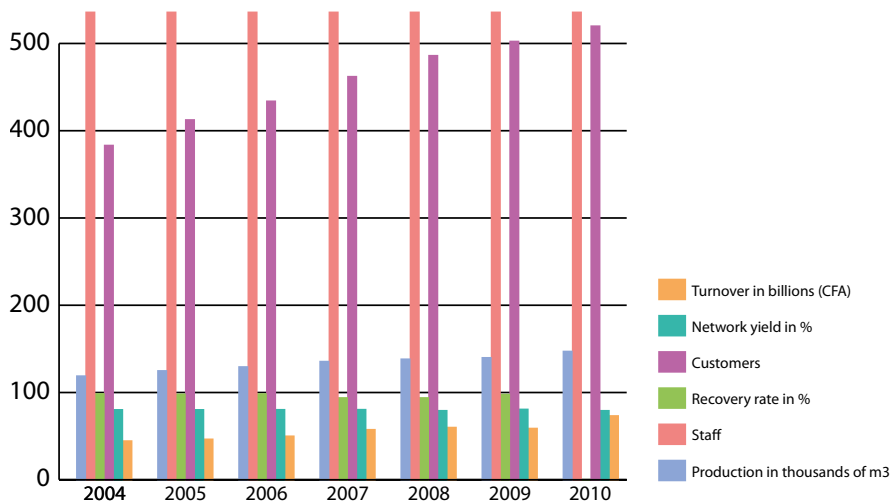
- Operations and maintenance of infrastructure and equipment
- Renewal of operational equipment
- Contractual renewal of networks, connections, meters and electromechanical equipment
- Network extensions financed by third parties
- Study and justification of renewal work and infrastructure expansion
- Billing and receipt of payment for drinking water and sanitation
- Communication and customer relations

SDE has managed the production and distribution of drinking water for Senegal's 56 largest urban sites since April 1996. In 2010, its turnover was XOF 73.1 billion on production of 146 million cubic meters of drinking water, an increase of 5.3 % compared to 2009. It serves 520 000 customers representing 5 million people, and has 1 139 employees (as at 31 December 2010).

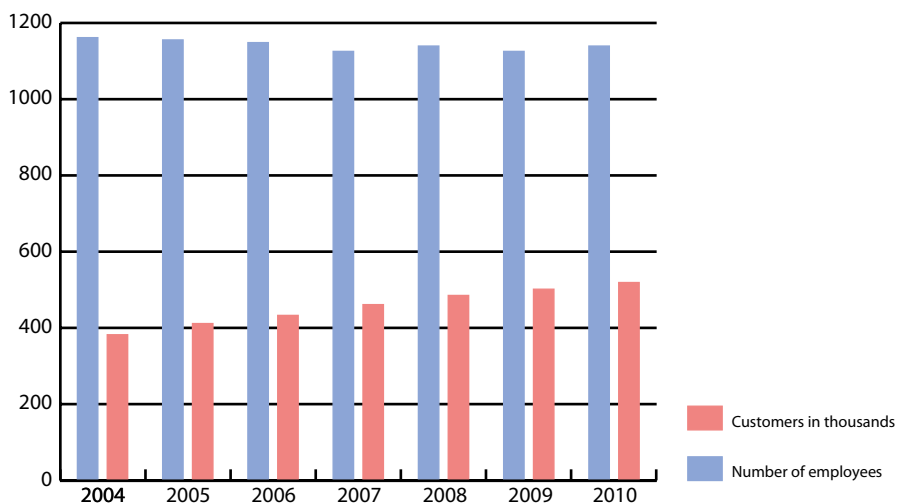
Some key SDE statistics are given in **Figure 2** and **Figure 3**:

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1) Fixed exchange rate with the Euro: 1 Euro is equal to XOF 655.957 (CFA Franc BEAC) and XOF 1 is equal to 0.001524 Euro.



**Figure 2** – Statistical evolution of SDE in key indicators



**Figure 3 – Evolution of SDE customers and employees**

### 10.2.2 SDE and its partnerships

SDE maintains a corporate citizen profile by conducting numerous activities at the national level. An approach integrating drinking water, education, health and sanitation is typical of the projects that fit within its framework of sustainable development.

At the international level, specific partnerships are established with African water companies to improve benchmarking measures and support in specific areas. Agreements with French companies exist to support the implementation of new tools and the development of staff skills.

SDE is bound to SONES by a performance contract concerning the technical and financial performance to be achieved. The contract aims to improve the public water sector through:

- Quality of service
- Continuity of service
- Quality of water
- Transparency of billing
- Reduction in water losses
- Recovery rate performance from all subscribers

The performance contract is reviewed at intervals with a view to finding solutions that safeguard the interests of each entity and of shareholders.

Technical meetings are routinely held between managers of SDE and the staff of SONES to deal with specific subjects such as production orders, the contract renewal programme, the five-year plan, the annual fee, billing, collecting of payments, etc.

### **10.2.3 SDE and consumer organizations**

SDE favours good relations with consumer organizations and has established a permanent dialogue with these organizations and with its clients in order to efficiently manage quality of service, requests and claims.

### **10.2.4 SDE and its suppliers**

Special conditions are applied to the purchase of products, services and outsourcing that have a direct impact on service quality. SDE evaluates its suppliers/service providers and subcontractors, and selects and defines specific terms to be fulfilled before purchasing.

For outsourced services SDE has designed strict rules to be applied for the control of its activities, tailored to the risk involved.

Moreover, SDE aims to develop the skills of its sub-contractors in the fields of safety and the environment through awareness of its QSE (quality, safety, environmental) policy and by encouraging them to comply with statutory and regulatory requirements, particularly with regard to markup, wearing of personal protective equipment (PPE), etc.

### **10.3 Attitude of the company towards standardization**

#### **10.3.1 Commitment towards standardization**

SDE has become a driver for standardization by helping ASN to popularize the use of standards and to educate people through increased training. The attitude of SDE to standardization is illustrated by its certifications :

- ISO 9001:2008, *Quality management systems – Requirements*, providing a model for quality assurance in design/development, production, installation and servicing for its entire area and activities
- ISO 14001:2004, *Environmental management systems – Requirements with guidance for use*, providing specifications with guidance for use for its entire area and activities (with the exception of the factory at Khor)
- OHSAS 18001, *Occupational health and safety management systems – Requirements*, covering its entire area and activities.

SDE encourages its sub-contractors to comply with standards for the occupational safety of their employees (compliance with PPE equipment, vehicles, prevention plans, certification to OHSAS 18 001) and this requirement is gradually being introduced into new contracts.



### 10.3.2 The strategic role of the quality policy

After a successful start in 1996, SDE faced numerous problems in 2000:

- Despite a rapid increase, performance did not meet contractual targets, and penalties were imposed in line with its performance contract with SONES
- Customer requirements changed, focusing mainly on quality of service (zero water shortage)
- Employees had high expectations
- Work volume increased considerably
- The performance contract became increasingly demanding

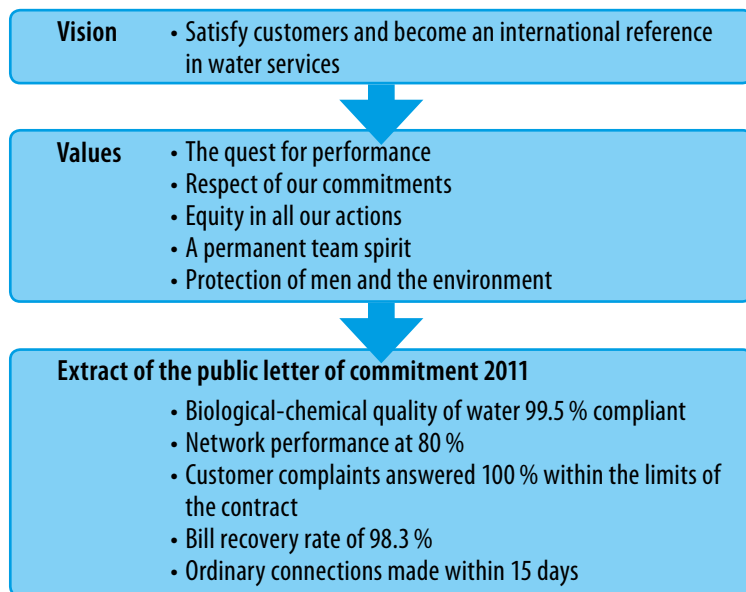
To address these challenges, SDE implemented a project designed to be:

- Motivating for staff
- Generating rapid productivity gains, significant in all areas, particularly in operations and works
- Innovative in terms of listening and meeting the new demands of the consumer
- Enhancing for national expertise (institutional customers and suppliers) and to allow the signing of a contractual amendment.

The setting up and success of this project led SDE to adopt a highly structured quality approach including clear links between the strategic lines of the company and their implementation "by process" and business function.

In this respect, the annual "Public letter of engagement", issued by the CEO at the beginning of the year, has an essential role: it sets the key objectives and policies of the company and is used as a basis for defining the specific objectives and tasks for each organizational unit.

SDE's vision and values are summarized in **Figure 4**, along with an extract of the public letter of commitment for 2011 :



**Figure 4** – SDE's vision and values

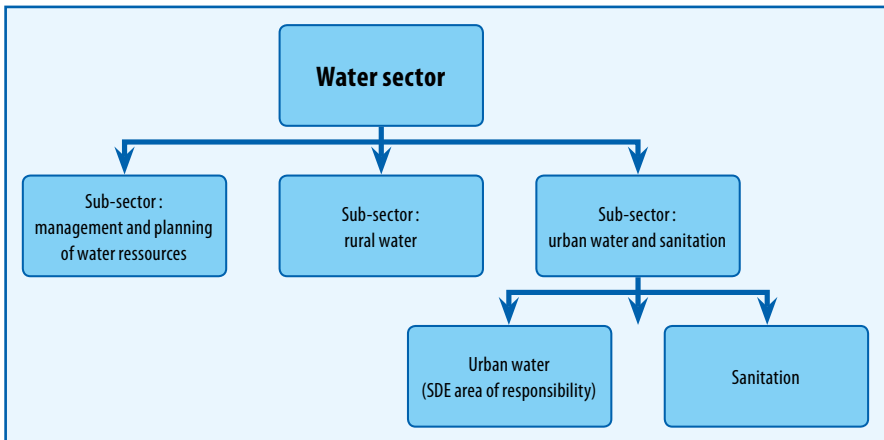
The main objectives for 2011 were defined in four areas of which customer satisfaction had top priority. These were :

- Customer satisfaction
- Health and safety of colleagues as well as their professional development
- Protection of the environment
- Optimization of processes

## 10.4 Analysis of the value chain

### 10.4.1 Industry value chain

In Senegal, the water industry is structured around three functional areas of responsibility or sub- sectors represented by **Figure 5** below:

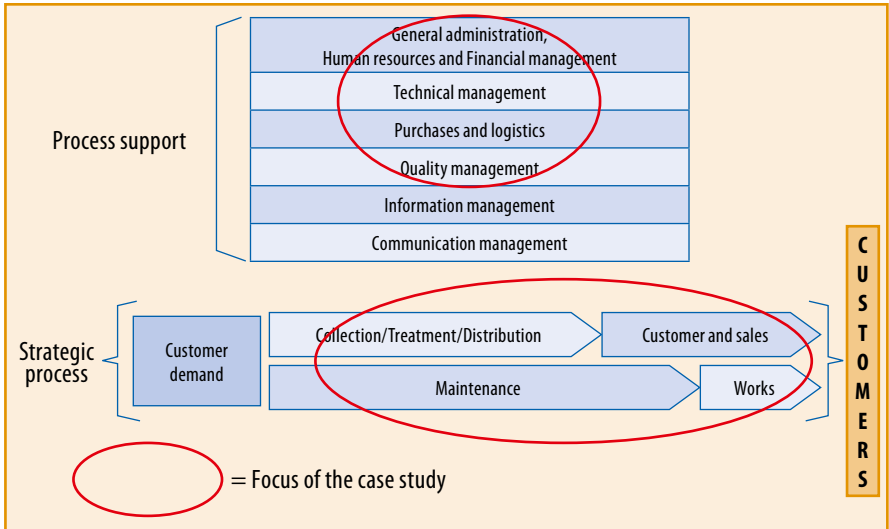


**Figure 5** – Senegal’s water industry structure

Operating in the urban water sector, SDE is responsible for the technical and financial management of state owned assets in this sector. SDE and ONAS have the monopoly of the Senegalese urban water market, and so far they remain the only companies specialized in water supply and sanitation.

### 10.4.2 Company value chain

With respect to the collection, treatment and distribution of water, SDE has a structured management. Just like any business, its value chain consists of main functions (refer to as “strategic process”) and support functions (“process support”) as represented in **Figure 6** :



**Figure 6** – SDE's company value chain

### 10.4.3 Key value drivers

SDE's key value drivers concern the improvement of Senegal's urban water sector, and are directly linked to binding elements in the performance contract with SONES.

The list of value drivers and associated operational indicators are given in **Table 1**.

Value drivers	Operational indicators
Quality and quantity of water	<ul style="list-style-type: none"> <li>• Respect of the production plan : 100 %</li> <li>• Rate of bacteriological and physico-chemical compliance &gt; 98.7 %</li> <li>• Rate of pressure below 1 bar (every 4 months)</li> </ul>
Maintenance – electromechanical and network	<ul style="list-style-type: none"> <li>• Response time for return to service (dosage pumps, chlorine meters and rain water management) : 100 %</li> <li>• Rate of availability of an emergency generator on critical sites : 100 %</li> <li>• Rate of work requests classified C1 (direct impact on service continuity or staff safety) completed within time limits : 100 %</li> <li>• Rate of leakage isolated and repaired within time limits : 100 %</li> <li>• Hydraulic efficiency of the network : 80,5 %</li> </ul>
Efficient billing, recovery and customer relations management	<ul style="list-style-type: none"> <li>• Rate of increase in sales <math>\geq</math> 1.7 %</li> <li>• Rate of estimated billing <math>\leq</math> 1.5 %</li> <li>• Rate of recovery : 98.3 %</li> <li>• Rate of cancellation <math>\leq</math> 1.5 %</li> <li>• Customer satisfaction <math>\geq</math> 85 %</li> </ul>
Performance of engineering projects (re : the network's expansion)	<ul style="list-style-type: none"> <li>• Rate of achievement of connections within time limits</li> <li>• Rate of road repairs within 15 days for Dakar and 30 days for the region</li> <li>• Turnover of engineering works</li> </ul>

**Table 1 – List of value drivers and associated operational indicators**

It should be emphasized that customer satisfaction is a key factor for the renewal of SDE's contract with the State and that, in 2010, the customer satisfaction survey gave a result of 86 %, above SDE's stated objectives.

## 10.5 Scope of assessment of the pilot project

The scope has been limited to those functions where the use of standards is particularly visible, and to those activities more closely related to the company's value drivers.

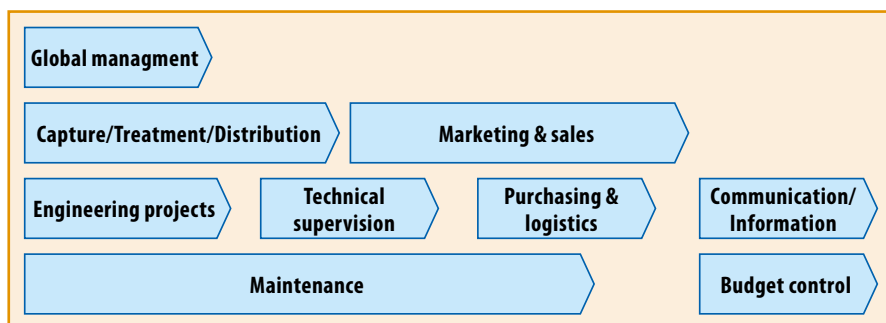


Figure 7 – Scope of assessment of the pilot project

## 10.6 Standards used in the company value chain

Functions	Standards used	Comments or definitions
General administration	ISO 9001 ISO 14001 OHSAS 18001	ISO 9001 is the most relevant
Purchasing & logistics	ISO 9001 ISO 14001 OHSAS 18001	No specific product or testing standards are used for checking products
Production	Afnor XP T 90-401 Afnor NFT 90-414 Afnor XP T 90-416 ISO 9001 ISO 14001 OHSAS 18001 WHO standards : Quality of drinking water	Note : <ul style="list-style-type: none"> <li>• AFNOR XP T 90-401 : Testing water – Enumeration of micro-organisms revivable at 37 degrees celsius – Pour-plate technique</li> <li>• AFNOR NFT T 90-414 : Water quality – Detection and enumeration of Escherichia coli and coliform bacteria – Part 1 : membrane filtration method</li> <li>• AFNOR XP T 90-416 : Testing water – Detection and enumeration of enterococci – General method by membrane filtration</li> <li>• WHO standards in the form of Directives related to water quality are used for water treatment and disinfection</li> </ul>

<b>Technical supervision (Research &amp; development)</b>	ISO 9001 ISO 14001 OHSAS 18001 Fascicule 71	Fascicule 71 is a technical regulation of the French governmental Ministry of Ecology, Sustainable development and Energy giving the general technical conditions for the supply and installation of aqueducts and water distribution applicable to civil engineering works
<b>Maintenance</b>	ISO 9001 ISO 14001 OHSAS 18001 NF C 15-100 NF X10-601 NEMA standards	Note : <ul style="list-style-type: none"> <li>• Some NEMA standards (National Electrical Manufacturers Association of the USA) are used (more detailed information not available)</li> <li>• AFNOR NF C 15-100, Low-voltage electrical installations</li> <li>• AFNOR NF X10-601, Centrifugal, mixed flow and axial pumps – Code for acceptance tests – Class C</li> </ul>
<b>Engineering</b>	ISO 9001 ISO 14001 OHSAS 18001 Fascicule 71	Fascicule 71 is a technical regulation of the French governmental Ministry of Ecology, Sustainable development and Energy giving the general technical conditions for the supply and installation of aqueducts and water distribution applicable to civil engineering works
<b>Customer service Marketing &amp; sales</b>	ISO 9001 ISO 14001	Customer services and sales do not use any specific standard
<b>Quality management</b>	ISO 9001 ISO 14001 OHSAS 18001 NS 05-061 : water discharges NS 05-062 : air pollution	Note : NS stands for “ Norme Senegalaise “ <ul style="list-style-type: none"> <li>• NS 05-061, Management of water discharges (this standard is an adjunct to the Environmental Code of Senegal)</li> <li>• NS 05-062, Air pollution. Discharge standards</li> </ul>

**Table 2** – Standards used in the company value chain

## 10.7 Selection of operational indicators to measure the impact of standards

Functions	Related activities	Value drivers	Standards used	Operational indicators	Definitions of indicators
General administration	Global management, global accounting and finance		ISO 9001 ISO 14001 OHSAS 18001	Tax administration	Respect of payment dates for monthly tax installments at a rate of 100 %
	Human resources	Control of costs related to staff		Control of number of staff	Reduced staff costs
Production	Capture-discharge-distribution	Quality of production processes	AFNOR XP T 90-401 AFNOR NFT 90-414 AFNOR XP T 90-416	Respect of yield rate and production plan	Failure to meet the yield rate leads to penalties such as those specified in the contract binding SDE and SONES
	Treatment and disinfection	Quality of processes and treatment of products	ISO 9001 ISO 14001 OHSAS 18001 WHO standards: quality of drinking water	Bacteriological and physico-chemical compliance	Failure to comply leads to penalties
	Maintenance	Compliance with maintenance schedules, curative and preventive alike	ISO 9001 ISO 14001 OHSAS 18001 NF 15-100 Electromechanical NEMA standards NF X 10-601 on pumps	Response time and equipment availability (in working order)	The control and reduction of response time is key to compliance with the company's production plan
Sub-maintenance (centralized function)					



Functions	Related activities	Value drivers	Standards used	Operational indicators	Definitions of indicators
Marketing & sales	Billing		ISO 9001	Sales	Increase in sales
	Recovery		ISO 14001 OHSAS 18001	Meeting the defined recovery rate	Meeting or exceeding the recovery rate allows the company to increase its turnover and financial performance
	Listening to customers			Claims processed on time	Efficient management of customer complaints reinforces the quality policy
Engineering	New works and renewal works		ISO 9001 ISO 14001 OHSAS 18001 Fascicule 71	Connections completed on time	Execution of on-time connections helps increase sales and contributes to customer satisfaction
Technical supervision	<ul style="list-style-type: none"> <li>• Studies</li> <li>• Surveillance</li> <li>• Internal monitoring</li> </ul>		ISO 9001 ISO 14001 OHSAS 18001 Fascicule 71	Savings on energy costs	Energy costs are most significant

**Table 3** – Operational indicators to measure the impact of standards

## 10.8 Calculation of the economic benefits of standards

### 10.8.1 Economic benefits quantified during the assessment

Business functions (BF)	Operational indicators	Financial impact (XOF)	Comments
Purchasing and logistics	<b>Staff control</b>		By using ISO 9001, managerial staff has been reduced by 19 %, and work volume has increased. This reduction is explained by a better control of processes. The result could be better if the company had higher performing data management software in place. Spreading this reduction over a five year period gives a yearly average (19%/5) of 3.8 %. Therefore the impact of the use of standards can be calculated as follows : XOF 1 477 636 336 × 21 % × 3.8 % = XOF 11 791 538
	Management expenses	1 477 636 336	
	% of staff costs	21 %	
	Effects of the use of standards (19 % reduction in staff over 5 years)	3.8 %	
	<b>Total impact for this BF</b>	<b>11 791 538</b>	
General administration	<b>Staff control</b>		Through the consistent implementation of ISO 9001, this function has been able to improve productivity – leading to an approximate 10 % reduction in staff in 2010. Because staff costs represent 70 % of the function's expenditure, the impact of the use of standards can be calculated as follows : XOF 945 419 532 × 70 % × 10 % = XOF 66 179 367
	Accounting and finance expenses	945 419 532	
	% of staff costs	70 %	
	Effects of the use of standards (10 % reduction in staff)	10 %	
	<b>Total impact for this BF</b>	<b>66 179 367</b>	
Customer and sales	<b>Policy to reduce paper consumption</b>		Application of ISO 14001 has enabled paper consumption to be reduced by 8 %. This reduction is mainly due to a policy of two-sided printing. Spreading this reduction over a six year period (2005 to 2011) gives annual average savings of 1.33 %. Therefore the impact of the use of standards can be calculated as : XOF 37 820 516 347 × 9 % × 1.33 % = XOF 45 271 158
	Management expenses	37 820 516 347	
	Share in paper supplies	9 %	
	Reduction in paper consumption in respect of the environment by applying ISO 14001.	1.33 %	
	<b>Impact 1 (of 3)</b>	<b>45 271 158</b>	

Business functions (BF)	Operational indicators	Financial impact (XOF)	Comments
Customer and sales	<b>Increase in sales</b>		An increase in sales of 4.8 % has been achieved in 2010 over 2009. Part of it (about 3.5 %) is due to a rise in the number of customers (increased demand). The other share (1.3 %) is due to increased consumption. The use of standards (primarily ISO 9001) has significantly contributed to this performance by : <ul style="list-style-type: none"> <li>Ensuring permanent water quality through the modernization of tools for technical surveillance, and customer relations management using ESRI (a mapping software integrating the call centre and cockpit) and the planning of interventions</li> <li>100 % commitment to the plan for monitoring water quality</li> </ul> The impact of standards can therefore be estimated as follows : XOF 73 100 000 000 × 1.3 % = XOF 950 300 000
	m3 turnover in sales	73 100 000 000	
	Increase in sales	4.8 %	
	% attributable to standards	1.3 %	
	<b>Impact 2 (of 3)</b>	<b>950 300 000</b>	
	<b>Improved recovery rate</b>		A monitoring process for billing (setting up of two remote meters resulting in more accurate billing) enabled the recovery of over 200 000 m <sup>3</sup> at end 2010. The impact resulting from the application of this process is thus estimated at : XOF 73 100 000 000 × 0.17 % = XOF 124 270 000
	Total sales	73 100 000 000	
	Increase in sales owing to the number of m <sup>3</sup> recovered	0.17 %	
	<b>Impact 3 (of 3)</b>	<b>124 270 000</b>	
	<b>Total impact for this BF</b>	<b>1 119 841 158</b>	
Technical supervision	<b>Control of energy consumption</b>		Better control of planning and operations and in particular a stricter control of kWh/m <sup>3</sup> – actions undertaken since 2007 in the framework of the quality management implementation (including the set-up of an energy savings committee in charge of reviewing the use of energy) have led to 1.54 % savings in energy costs. The resulting impact in 2010 is estimated as follows : XOF 13 100 000 000 × 1.54 % = XOF 201 740 000
	Annual electricity costs	13 100 000 000	
	Savings in energy achieved through the application of a management system	1.54 %	
	<b>Total impact for this BF</b>	<b>201 740 000</b>	

**Table 4** – Economic benefits quantified through the assessment

The **Table 5** recapitulates the impacts expressed per department and finally the total impact as a percentage of total sales revenues :

Functions	Financial impact of standards
Purchasing and logistics	11 791 538
General administration	66 179 367
Customer and sales	1 119 841 158
Technical supervision	201 740 000
<b>Total contribution to the company EBIT (in XOF)</b>	<b>1 399 552 063</b>
<b>Total contribution to the company EBIT (in EUR)</b> (There is a fixed exchange rate with the Euro : 1.000 XOF equal 1,53 EUR)	<b>2 133 600</b>
<b>Contribution to EBIT as percentage of total sales</b>	<b>1.91 %</b>

**Table 5** – Impacts expressed per department and total impact as a percentage of total sales revenues

### 10.8.2 Another advantage of standards : Improved control of the network

In addition to the impacts mentioned above, a significant improvement in performance has been achieved through the actions below :

- The cutting off of water supply when populations move (this has solved the problem of significant leakages in flooded areas)
- Reconfiguration of the Afia area of the network
- 85 pipe and pipeline leakages repaired in time, saving 260m<sup>3</sup>/h water loss

These actions led to an increase in network performance of 5.15 % between 2000 and 2010, a yearly average of 0.51 %. The current performance (between 79% and 80% in the past few years) is not yet at the 85 % level required by the contract with SONAS. However, it should be noted that 85 % is a very ambitious target (even for industrialized countries).

While the actions mentioned in relation to improved control of the network have been undertaken and monitored in the framework of SDE's quality management system (and the latter has clearly contributed to achieving these results by supporting a continual improvement philosophy), it has not been possible to estimate the relative contribution of the use of standards in this area as compared to other factors.

## 10.9 Qualitative and semi-quantitative considerations

### 10.9.1 Summary by business function

The rigorous implementation of ISO 9001 and other management system standards has contributed to improving the monitoring and control of all the SDE departments analyzed throughout the study.

A summary of the most important qualitative benefits indicated by each business function is given below :

#### **General administration**

- A steady stabilization over time of costs related to maintenance, caretaking, auditor fees and telephone
- Efficient monitoring of operational costs (electricity, diesel and staff) responsible for 60 % of expenditure, according to a policy of improved productivity and more efficient management of electricity

#### **Purchasing and logistics**

Improvement in the supply of SDE's vehicle fleet through :

- Improved product conformity due to collaboration with suppliers having integrated their management systems
- Shorter delays in reaching contractual agreements because products are based on clearer specifications

- More accurate forecasts due to the controlled consumption of spare parts and products

### **Production**

Improvements in activities related to water capture, discharge and distribution, such as :

- Staff performance in the measurement and analysis of results
- Implementation of a corrective action system as well as more efficient monitoring of the execution of action plans
- Better control of production through the use of scoreboards and management by objectives

Improvements in activities related to water treatment :

- More efficient organization
- Greater reliability of the results of water testing and analysis
- Faster response of staff in addressing water quality problems

### **Technical supervision**

Improvements in activities related to studies, surveillance and internal monitoring :

- Better management of staff resources
- Better administrative management
- Easier exploitation of notice of tenders since the adoption of a quality management system by SONES
- Better management of energy resources

### **Marketing and sales**

- Improved planning and deployment of staff
- Better organization, increasing SDE's capacity to meet demands without extra staff
- More efficient communication system
- Significant improvement in the response time for replacing meters

- Continual progress in customer satisfaction – the total number of customers satisfied with tap water delivered by SDE grew from 45 % in 2005 to 86 % in 2010

### **Engineering**

- Improved monitoring of supply planning
- Improved conformity of engineering works by following specifications and keeping data files on supplies received and on nonconformities
- Setting up of a system allowing the assessment of engineering works immediately after completion
- Better administrative and technical organization through the development of procedures

### **Maintenance**

- Setting up of a critical analysis system for certain practices
- Establishment of a more transparent organization with a more balanced distribution of workload
- Greater visibility of staff activities resulting in increased productivity

Between 2004 and 2010, SDE made significant efforts to ensure the smooth operation of all its facilities. Positive results were confirmed by a maintenance audit conducted in 2010, showing a 95 % rate of availability of equipment.

### **10.9.2 Specific considerations about work accidents**

A safety, quality and environmental initiative enabled SDE to achieve improvements in the rate of accidents. The record covered 14 years (1997 to 2010) and, despite an atypical peak in 2000 (31 accidents) and 2001 (29 accidents), the number of accidents has steadily declined.

Year	Accidents	Lost workdays	Frequency rate	How serious
1997	24	510	8.8	0.2
2010	9	160	3.76	0.07

**Table 6 – Number of accidents**

This situation shows the positive impact of SDE's commitment to OHSAS 18001 and certification against this standard.

### **Evolution of productivity**

The quality management system has also enabled SDE to analyze and monitor key productivity rates. As can be seen from **Table 7**, productivity has steadily increased.

	2006	2007	2008	2009	2010	Improvement 2006/2010
Turnover/agent (M XOF/agent)	41.18	47.75	49.69	52.38	69.26	<b>68.19 %</b>
Number of subscribers/agent	372.6	404.7	425.6	446.2	456.5	<b>22.51 %</b>
M <sup>3</sup> sold/agent (Km <sup>3</sup> /agent)	90.6	96.03	97.1	98.43	100.9	<b>11.36 %</b>

**Table 7 – Productivity 2006-2010**

## **10.10 Evaluation of results**

The application of the methodology for assessing the economic benefits of standards for SDE has revealed a contribution to the company EBIT of XOF **1 399 552 063** (about USD 2 700 000) corresponding to 1.91 % of the company's total annual turnover in 2010.

This result was influenced by the following factors:

- The information from persons interviewed was mainly qualitative and therefore difficult, and sometimes impossible, to quantify
- The difficulty of determining precisely which part of a given impact was attributable to the use of standards



- The adoption of a prudent approach based on always assuming the lower value of a given range (for example, in the case of the accounting and financial management business function, costs attributed to staff were estimated between 70 % and 80 %, in which case the 70 % figure was used)

This indicates that, while already significant, the impact of standards for SDE is most probably underestimated. Information gathered through the interviews has also indicated that there is still potential for further process and performance improvements.

Some examples are given below :

- Corrective actions can be taken to increase the network yield, especially in flooded areas where the main connections are not systematically cut off when populations move, thus causing significant and continual leakage. This can make it impossible to access the areas to read meters or locate leakages
- The rate of recovery can be further increased by educating populations about certain detrimental practices such as, among others, damaging the network to bring water to cattle
- A new payment system, such as by Internet or mobile phone, would help to further increase customer satisfaction

It should be emphasized that, for SDE, the benefits of using standards have primarily been derived from a coherent and comprehensive application of the ISO 9001 and ISO 14001 philosophy. This has resulted in well-structured processes, in the use of indicators to monitor efficiency and effectiveness, and in the ability to undertake corrective or improvement actions – all of which have contributed to performance improvement.

## 10.11 Conclusions

The study has demonstrated that the use of standards contributes to the creation of value for SDE, with an estimated contribution to the company EBIT of XOF 1 399 552 063 (about USD 2 700 000) corresponding to nearly 2% of the company's total annual turnover.

Use of standards is sometimes perceived as costly and therefore an obstacle to economic development. However, this assessment demonstrates that compliance with, and effective use of, standards is often accompanied by an improvement in productivity, a better customer satisfaction policy and enhanced economic performance.

This study has shown the positive impact of standardization for SDE. It provides a concrete example that can help to better inform Senegalese businesses of the advantages offered by standardization and, hopefully, to promote a proactive attitude towards standards.

While the result of applying the ISO methodology to a private company like SDE is convincing, it should be taken into account that SDE operates in an industry where competition is non-existent and, from a purchasing perspective, where customers do not have much choice. It would be interesting to carry out other studies of private companies operating in a "normal" competitive environment.

Finally, the adaptation and application of the assessment methodology to the public sector (non-profit enterprise) remains a necessity for developing countries like Senegal.