Visual Management as a Mechanism for Control and Reduction of Hidden Costs in the Economic Enterprise: A Case Study of Sonelgaz Company - Souk Ahras

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Abstract :

This study aims to analyze the crucial role of visual management as an innovative administrative mechanism for detecting and verifying hidden, unclear, and unjustified costs that do not appear tangibly in the accounting system and records at Sonelgaz. To achieve this objective, a descriptive approach was adopted to examine the theoretical aspects of the topic, and a case study was conducted on the Electricity and Gas Distribution Directorate – Souk Ahras Unit.

The study concluded that the application of visual management tools achieves a quantitative transformation of hidden costs into tangible financial gains in Sonelgaz, as it contributes to reducing unplanned maintenance costs by being a means of predicting breakdowns before they occur, reducing energy loss by organizing the interventions of technical teams, and also reducing the costs of inefficiency of company employees.

Keywords: Visual management, Hidden costs, Financial gains, Sonelgaz.

JEL classification codes: M10; M42; L25; L94.

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Introduction:

In the framework of modern industrial competitiveness, cost reduction and operational efficiency have emerged as critical components that guarantee the survival and prosperity of organizations, which have doubled their efforts to accomplish this goal. As a result, a financial resource shortfall in budgetary systems has been discovered. This situation has prompted managers and experts to look for new approaches to uncover the resource-draining covert procedures that vanish into the realm of unseen operations rather than being readily visible in documents and financial statements.

From this perspective, hidden costs have surfaced that indicate a structural weakness in the management system itself rather than just being incidental charges. According to current economic research, this kind of expense could account for 15% to 30% of the value of operational processes. Traditional accounting systems are unable to identify these costs because they infiltrate through lost revenue from anticipated sales, energy used in ineffective operations, and wasted time and duplicated effort brought on by the lack of unified standards. As a result, they are "internal taxes" placed on business performance by organizational disorder rather than secondary costs.

This strategic viewpoint reveals Visual Management as a radical management philosophy in addition to a conventional organizational instrument.

Problem Statement: In light of the foregoing, the primary issue that can be raised is as follows:

In what ways does visual management help Sonelgaz Company manage and cut hidden costs?

Sub-questions: The following sub-questions are included in this problem:

- What kind and extent of hidden costs are present in Sonelgaz Company's operational procedures?
- What visual management techniques and technologies are available at Sonelgaz Company?
- Does the adoption of visual management components contribute to controlling and transforming hidden costs into financial gains for Sonelgaz Company?

Hypotheses: The following could be used as a primary hypothesis for this study:

By transforming implicit information into visible indications, visual management helps Sonelgaz Company achieve efficient control and reduce hidden costs.

From this hypothesis, a set of sub-hypotheses can be formulated as follows:

- The hidden costs of Sonelgaz's operational processes are concentrated in three main areas: downtime of equipment, generation and transmission stations, energy waste in distribution networks and administrative work repeated due to poor information flow between departments;
- A three-level visual management approach can be utilized in Sonelgaz, including: centralized visual control panels, local visual signals at operating sites and flowcharts specifically developed for maintenance and emergency operations**;**
- At Sonelgaz, the use of visual management results in a quantifiable conversion of hidden costs into observable financial gains, particularly through preventative and proactive actions.

Study methodology: Sonelgaz (Electricity and Gas Distribution Directorate, Souk Ahras) will be the subject of a case study as well as a collection of books, articles, and research papers that describe the study (visual management, hidden costs).

I. The concept of visual management:

Visual management is defined in contemporary literature as a management system that aims to make essential organizational information immediately visible and comprehensible to all employees, supporting coordination and effective decision-making (Liff & Posey, 2004, pp. 11-12).

1. The importance of visual management:

1.1 The importance of visual management in improving organizational understanding: Visual management is an essential tool for improving common understanding within an organization, as it enables workers to quickly and clearly perceive the organizational situation and operational performance, which reduces misunderstanding and enhances internal coordination (Liff & Posey, 2004, pp. 18-20).

1.2 The importance of visual management in supporting administrative control: Visual management contributes to strengthening administrative control by enabling management to monitor performance continuously and without complexity, through visual indicators that show deviations as soon as they occur(Anthony & Govindarajan, 2007, pp. 45-46).

1.3 The importance of visual management in improving internal communication: Visual management reduces reliance on complex text reports, and improves the quality of internal communication by transforming

information into unified, easy-to-understand visual messages(Daft, 2016, p. 294).

1.4 The importance of visual management in enhancing transparency and accountability: Visual management works to raise the level of transparency within the organization, which enhances individual and group accountability, and reduces ambiguity in roles and responsibilities (Schein, 2010, pp. 67-70).

1.5 The importance of visual management in supporting continuous improvement: Visual management is a pivotal element in the philosophy of continuous improvement, as it contributes to quickly detecting problems and motivating workers to participate in solving them (Imai, 2012, p. 89).

2. Pillars of visual management:

2.1 Transparency: Visual management is based on the principle of transparency, where information related to performance and processes is readily available and clear to all employees without exception. This facilitates communication, decision-making, and promotes self-management. Through transparent processes, trust is built among stakeholders, and the desired value is achieved (Brady, 2014, p. 21).

2.2 Simplicity: Visual management systems aim to simplify communication and make it more engaging. Achieving simplicity and appeal in sensory communication and task design is essential for a comfortable work environment, relying on simplifying complex information and transforming it into easily understandable symbols and signs in a short time(Tezel, 2016, p. 769).

2.3 Real-Time Information: Visual management requires real-time information display, enabling rapid intervention in the event of any deviations. Visual indicators that display the operational status of a process, especially in the event of an unplanned occurrence, can reduce response time by seconds or minutes, ultimately improving process uptime and increasing productivity. Visual cues can also be used to expedite repairs, commissioning, and adjustments, thereby minimizing unplanned downtime (Ortiz & Park, 2011, p. 4).

2.4 Participation: Visual management depends on the participation of all organizational levels in understanding and analyzing indicators, and not limiting it to senior management only(Mintzberg, 2011, pp. 98-101).

2.5 Continuity: Visual management is not a temporary activity, but an ongoing system that requires constant updating of indicators and standards(Neely, Adams, & Kennerley, 2002, p. 268).

II. The concept of hidden costs:

The concept of hidden costs is linked to the socio-economic approach to management, which believes that economic performance is affected by organizational and behavioral factors that are not visible in the accounting system(Cappelletti, Savall, & Zardet, 2024, pp. 29-30).

Hidden costs are defined as costs that do not appear in traditional accounting records, but which directly affect an organization's economic performance, such as lost time, errors, poor quality, and decreased productivity(Savall & Zardet, Mastering Hidden Costs and Socio-Economic Performance, 2008, pp. 15-16).

1. The importance of discovering hidden costs in an organization:

Discovering hidden costs in an organization has several advantages, which can be summarized in the following points:

1.1 The importance of hidden costs in explaining an organization's real performance: Hidden costs are a crucial element in explaining the gap between apparent accounting performance and real economic performance, as an organization may show accounting profits despite incurring actual economic losses(Savall & Zardet, 2015, p. 391).

1.2 The importance of hidden costs in rationalizing overall costs: Studies indicate that hidden costs may represent a large percentage of an organization's total costs, which makes controlling them an essential input to reducing costs without compromising quality or investment(Blocher, Stout, Juras, & Cokins, 2015, pp. 48-49).

1.3 The importance of hidden costs in improving productivity: Hidden costs often result from poor utilization of human and material resources, and therefore reducing them directly leads to raising the level of productivity and operational efficiency (Sink & Tuttle, 1989, p. 73).

1.4 The importance of hidden costs in supporting the continuity of the institution: Accumulated hidden costs lead to the erosion of profitability in the long term, which threatens the continuity of the institution even if risk indicators do not appear in the short-term financial statements(Savall & Zardet, 2008, pp. 28-29).

1.5 The importance of hidden costs in enhancing competitiveness: Controlling hidden costs allows an organization to offer products and services at

competitive prices while maintaining a profit margin, which enhances its competitive position in the market(Mahloul & Douadi, 2021, p. 334).

1.6 The importance of hidden costs in improving the quality of administrative decisions: Ignoring hidden costs leads to administrative decisions based on incomplete information, while analyzing them allows for more realistic and accurate decisions to be made(Kaplan & Cooper, 1997, pp. 84-88).

2. Types of hidden costs within the organization:

Hidden costs are classified into several main types, including(Blocher, Stout, Juras, & Cokins, 2015, pp. 52-56):

- Costs of wasted time;
- Costs of errors and rework;
- Costs of poor quality;
- Costs of poor coordination;
- Costs of low motivation.

III. The practical part: Utilizing visual management to cut down on hidden costs at Sonelgaz-Souk Ahras

Prior to discussing Sonelgaz's visual management tools, the information sys tem and associated cost system must be examined

1. Sonelgaz Company's hidden costs include:

The factors of hidden costs at Sonelgaz Company are related to the following:

1.1 Lack of production:

- Power outages, which are associated with the following: duration (length of outage), damage (severity of damage to the network), repair maintenance; partial renovation or replacement of equipment.
- Complaints and their repercussions (compensation, legal fees, preparing a risk provision).

1.2 Inefficient management:

- Material and human resources are available without increasing the sales base (customers) (idleness);
- Payment evasion, electricity theft, and litigation costs;
- Failure to process files swiftly and meets needs in accordance with requests.

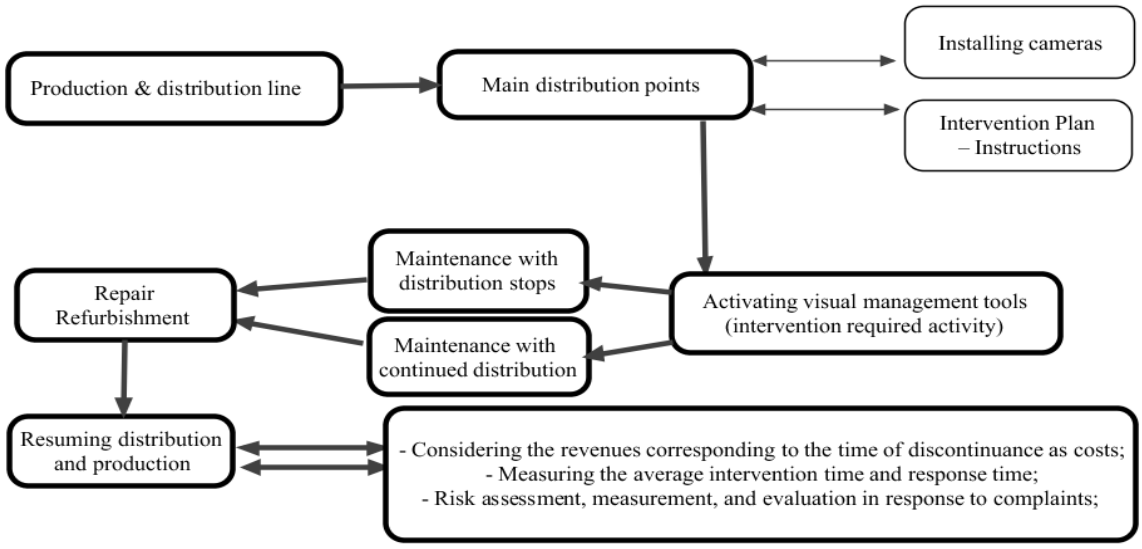
The following items may have hidden costs as a result of the above:

- Increased salaries (excessive workforce);
- Overtime (slow and delayed interventions, as well as their inefficiency);

- Additional consumption (extra use of resources) (idleness, Non quality costs).

The diagram that follows the operational flowchart of Sonelgaz Company, which includes the technical procedures involved in the production and distribution of gas and electricity, is depicted in the following diagram:

Figure N°.1: Diagram illustrating how to find and cut hidden costs using visual management tools



Source: Prepared by researchers based on company documents

This figure illustrates the distribution of gas and electricity as well as the continuous monitoring that goes along with it. It makes use of a balanced scorecard, visual management tools like thermal cameras, and approved procedures and intervention techniques.

2. An examination of the effects of Sonelgaz's use of visual management tools and how they relate to hidden costs:

The following table and figure, which are based on the company's documented data, highlight key performance indicators for assessing the business, such as turnover, risk provision sand outcomes over a three-year period that are connected to the institution's performance and costs:

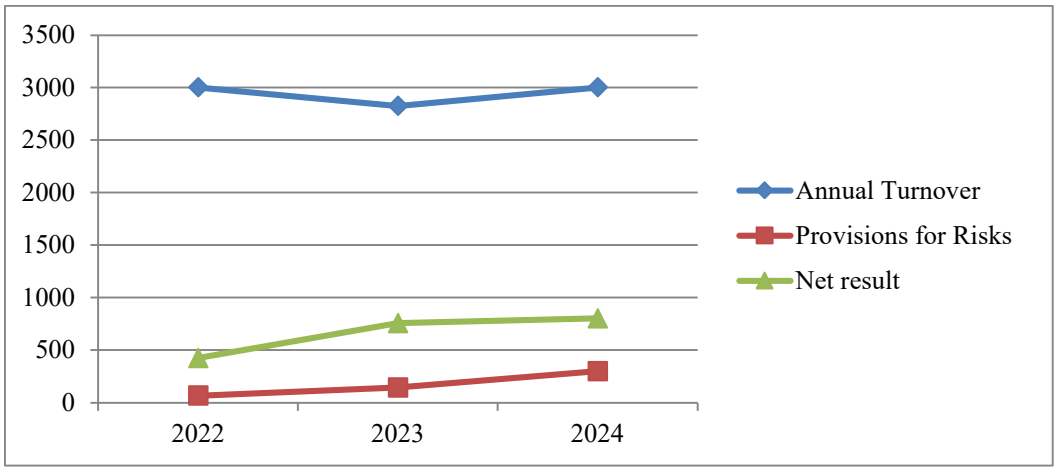
Table N°.1: Some elements of the income statement for Sonelgaz

Note: Unit of measurement for amounts (10^6) DA

Year	Annual Turnover	Provisions for Risks	Net result
2024	3084.00	300	803.27
2023	2826.10	145.6	758.118
2022	3003.83	67.3	425.10

Source: Prepared by researchers based on company documents

Figure N°.2: Evolution of turnover, provisions for bad debts, and net income for Sonelgaz



Source: Prepared by researchers based on company documents

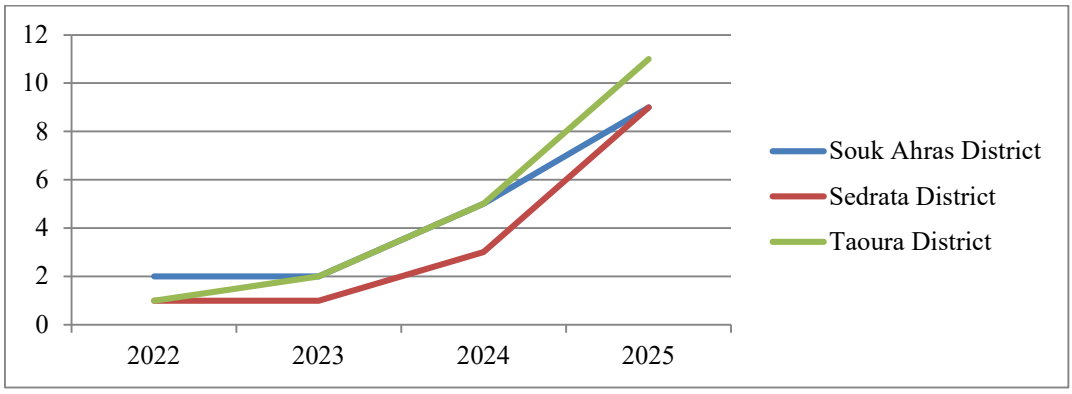
The organization's reliance on critical inputs and advanced visual management technology to monitor distribution lines and key areas of interest is evident in the table and figure below, which shows the number of thermal cameras deployed and planned over the past four years:

Table N°.2: Souk Ahras province's municipal-level distribution of thermal power plants and thermal power stations

D / Y	Souk Ahras District	Sedrata District	Taoura District	total	Number of planned cameras	Coverage percentage %
2022	2	1	1	4	75	5.33
2023	2	1	2	5	75	6.66
2024	5	3	5	13	75	17.33
2025	9	9	11	29	75	38.66

Source: Prepared by researchers based on company documents

Figure N°.3: Shows the distribution of thermal cameras across the districts of Souk Ahras province



Source: Prepared by researchers based on company documents

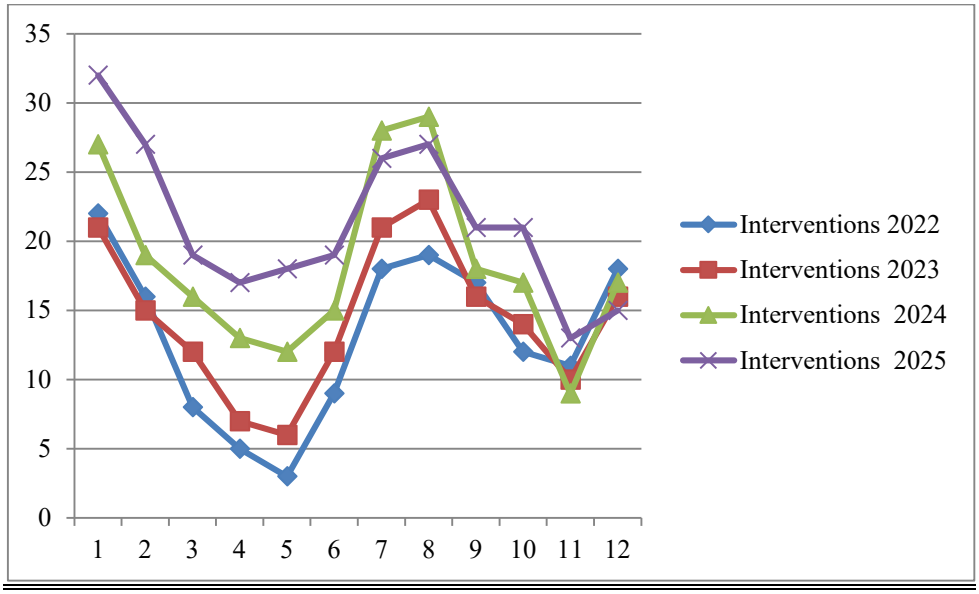
The table and figure below show the number of monthly interventions at the level of sections where thermal cameras were installed, which varied according to the different seasons, showing a constant increase during the winter and summer seasons and stabilizing during the spring and autumn seasons.

Table Nº.3: Shows the number of interventions at the level of thermal cameras and automatic circuit breakers

month	1	2	3	4	5	6	7	8	9	10	11	12
Interventions2022	22	16	8	5	3	9	18	19	17	12	11	18
Interventions2023	21	15	12	7	6	12	21	23	16	14	10	16
Interventions2024	27	19	16	13	12	15	28	29	18	17	9	17
Interventions2025	32	27	19	17	18	19	26	27	21	21	13	15

Source: Prepared by researchers based on company documents

Figure Nº.4: Shows the number of interventions at the level of thermal cameras and automatic circuit breakers



Source: Prepared by researchers based on company documents

The distribution of technical teams' interventions throughout the course of the year is depicted in the table, with a peak during the summer and winter, when both heating and cooling demand consistently rise. In addition to situations that call for work and intervention, such routine maintenance and peak-season preparations, interventions can also take place in the spring and fall.

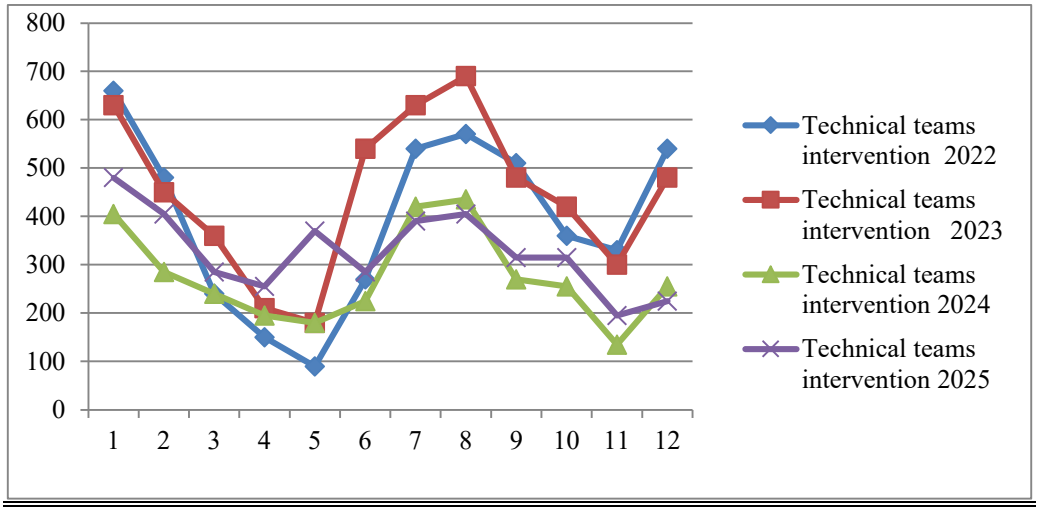
The following table and figure illustrate the time that technical teams typically take to handle intervention requests:

Table Nº.4: Average intervention time of technical teams in minutes

M / Y	1	2	3	4	5	6	7	8	9	10	11	12
2022	660	480	240	150	90	270	540	570	510	360	330	540
2023	630	450	360	210	180	540	630	690	480	420	300	480
2024	405	285	240	195	180	225	420	435	270	255	135	255
2025	480	405	285	255	370	285	390	405	315	315	195	225
note: Average time per intervention: 30 minutes (during 2022-2023) / and 15 minutes afterwards												

Source: Prepared by researchers based on company documents

Figure Nº.5: A breakdown of the average intervention time for technical teams, in minutes



Source: Prepared by researchers based on company documents

The table indicates a relationship between the number of interventions and the time it takes technical teams to intervene; nonetheless, it is noteworthy that the time required for each intervention (intervention season in minutes) decreased and improved by 50% in 2025–2024 compared to 2023–2022. This is a result of the technical teams' dependence on visual management tools, like automatic circuit breakers and thermal cameras, as an intervention signal which alerts teams before accidents, interruptions, and damage occur, allowing for perfectly timed preventive intervention. In addition, the quality of the technical teams' work during interventions has improved. This is due to the efforts of team leaders to train their teams on the scientific division of labor and on controlling the timing of

interventions for each stage, striving to adhere to and achieve this under the pressure of monitoring and evaluation processes.

3. Main Causes of Recording Hidden Costs:

3.1 Activities Leading to Increased Consumption:

Any consumption of an organization's resources represents a cost. The distinction between normal costs, necessary for carrying out operations, and abnormal costs is based on a fundamental analytical question: Is it possible to perform the same activity, under normal operating conditions, with a lower level of resource consumption than is currently recorded?

Accordingly, any increase in consumption leads to an increase in costs. When this increase is economically justified, it remains visible and trackable within the accounting information system. However, when it is difficult to justify or explain, its causes are considered hidden, generating hidden costs. The main sources of these costs include, but are not limited to, the following:

- Excessive time required to complete operations under normal operating conditions;
- Poor quality of task execution despite the availability of standard equipment and adherence to usual completion times;
- Failure to properly complete and test maintenance work before network reconnection, leading to frequent malfunctions, longer service interruptions, and higher costs;
- Delayed response times and inaccurate allocation of intervention efforts;
- Suspension of sales during maintenance and repair work, resulting in the loss of actual and ongoing sales opportunities that cannot be compensated for by increased production or retroactively adjusting sales schedules, unlike other goods;
- The inherently high-risk nature of the company's operations, where any error or negligence generates additional costs, including compensation, legal disputes, or the replacement of damaged facilities.

3.2 Activities Leading to Increased Human Activity:

Human activity plays a central role in the operations managed and coordinated by Sonelgaz, given the high technical, professional, and academic qualifications of its staff. The nature of the company's work necessitates a team-based system and a shift system, ensuring the continuous presence of technicians and specialists during official working hours and on-call periods.

The scope of intervention by these teams generally corresponds to the geographical coverage of the distribution network within the province. Therefore, effective intervention planning is crucial to avoid overstaffing compared to actual and scheduled tasks. For example, when intervening in a particular municipality, technical teams must be prepared for all possible scenarios through accurate fault diagnosis and detailed operational planning, rather than resorting to frequent relocations and multiple interventions. Such shortcomings lead to prolonged service interruptions, lost sales opportunities, and increased customer complaints, all of which contribute to the accumulation of hidden costs.

3.3 Additional Wages:

In general, the activities of Sonelgaz's employees and technicians do not contribute significantly to total payroll, as wages are primarily linked to the jobs they hold. However, inefficiency costs arise when employees receive fixed wages while recording unproductive hours during their time at work.

From an accounting perspective, this unproductive time can be identified and disclosed within traditional accounting systems, as it represents hidden costs in the form of overtime pay paid for less than the corresponding level of actual output. To mitigate these costs, Sonelgaz managers can adopt modern planning and control methods, such as Gantt charts and the Program Evaluation and Review Methodology (PERT), particularly in planning complex processes. These tools help identify the most probable, normal, and pessimistic completion times, thereby reducing wasted work time and improving operational efficiency.

3.4 Non-Productive Working Time:

The quality of Sonelgaz's operations is closely linked to its ability to minimize sales losses during service interruptions. Therefore, downtime, whether related to technical teams or production and distribution shutdowns, is the company's worst-case operational scenario and is unacceptable from a management perspective.

This has led to a strategic reliance on technologies aimed at eliminating downtime, particularly visual management tools. These tools enable Sonelgaz to continuously monitor its distribution network, with particular attention to high-load and densely populated areas. The goal is to avoid periods where the company is unable to sell its services, as these losses are irrecoverable and represent genuine missed sales opportunities. Furthermore, downtime can be attributed to intervention activities by

technical teams, as any delay in response or network restart is considered lost time. Every minute of delay results in significant financial losses that directly impact sales volume and operating results, while also increasing the likelihood of higher risk provisions due to customer complaints and equipment damage.

3.5 Overtime Working Hours:

With reference to additional wages, overtime working hours represent time spent beyond normal working hours, which cannot be accurately determined or predicted prior to completing the initial inspection and diagnosis of each technical failure by intervention teams. The estimation of required time becomes possible only after the preliminary diagnosis, which allows decision-makers to assess whether the expected intervention time falls within a normal, standard, or pessimistic scenario. Such scenarios usually arise due to the complexity of the task, the lack of necessary equipment or spare parts, or the need for regional-level technical support.

In addition to maintenance duration, the nature of the intervention determines whether production and distribution activities must be suspended, which consequently leads to a halt in sales, or whether operational and time-related conditions require continuous work to restore distribution points under all circumstances. These situations are often driven by customer complaints or by pressure exerted by central management and local administrative authorities, particularly during critical periods.

3.6 Lack of Expansion in Sales and Distribution Activities:

Sonelgaz operates in a growing sector closely linked to urban and rural development. Consequently, the company must continuously invest and expand its network to meet customer demand and support network expansion projects, inevitably creating new sales opportunities by increasing both production capacity and distribution capabilities.

This underscores the importance of the administrative function, particularly in processing customer connection requests and the company's response to these requests, which is often measured by average response time. This also depends on the ability of technical teams to keep pace with connection operations. In this regard, Sonelgaz frequently relies on specialized subcontractors to carry out specific work on its behalf, based on defined contracts and well-defined work plans that specify each contractor's

geographical scope and the timeframes to be adhered to according to scheduled programs.

3.7 Risks:

Risk is a critical element in Sonelgaz's operations due to the inherently hazardous nature of the services it provides, the high cost and sensitivity of the equipment used, and the need for highly qualified technical personnel. Furthermore, the company's activities are closely linked to its customers, who have the right to file complaints and seek compensation through official channels.

Accordingly, management prioritizes risk prevention, particularly concerning critical assets such as transformers and spare parts, through ongoing employee training in industrial safety and the provision of appropriate protective equipment. Particular attention is also given to minimizing incidents that could affect customers, especially during peak energy consumption periods.

From an accounting perspective, inadequate risk management can lead to higher compensation and legal costs, resulting in increased risk provisions. This directly impacts financial results and contributes to the accumulation of hidden costs.

4. Secondary Causes of Hidden Costs:

4.1 Weak Internal Communication:

Before the application of visual management tools, internal communication within the institution showed noticeable weaknesses. Most information related to faults came indirectly through customer complaints or public reports submitted via available contact numbers. These reports were later verified and forwarded to management or the on-call technical team for intervention.

This traditional communication chain often caused delays and reflected a lack of structured internal coordination. After the adoption of visual management, the process became more proactive rather than reactive. Technical teams started relying on real-time visual indicators, such as temperature variations at specific points, which signal abnormal situations even before an actual failure occurs. As a result, intervention time decreased by nearly 50% compared to the previous period. This shift highlights how improving information flow inside the organization can significantly reduce hidden time losses.

4.2 Delayed Fault Detection:

Faults are part of the daily operational reality at Sonelgaz due to the nature of electricity and gas distribution, the complexity of networks, and frequent human activity in urban environments. These conditions naturally increase the probability of interruptions and equipment stress.

However, delays in detecting the early signs of faults have often been observed. Many of these issues are linked to human-related factors such as unplanned network transfers, overloading, misuse, or the use of materials that are not fully adapted to operating conditions. When such situations are not identified early, they lead to equipment failures and additional indirect costs. Visual management contributes to reducing these delays by making abnormal situations visible and measurable, thus allowing earlier technical decisions.

4.3 Decrease in Operational Efficiency:

Operational efficiency at Sonelgaz did not fully meet planned targets during the studied period. Although the initial objective was to deploy 75 thermal cameras, only 29 units were installed, representing 38% coverage. This limited deployment explains why overall efficiency improvements remained below expectations.

Nevertheless, the installed units produced clear positive effects. Intervention times were shortened, technical teams responded faster, and several preventive actions were recorded, avoiding both equipment damage and service interruptions. These results show that while global efficiency indicators remained below the plan, local performance improved significantly at the equipped sites. Therefore, the issue appears to be related more to the scale of implementation than to the effectiveness of the tool itself.

4.4 Increased Occupational Safety Risks:

Field operations inherently involve safety risks. For this reason, team leaders must continuously ensure that workers are trained in task execution methods, equipment checks, and the proper use of personal protective equipment. Training relies on manuals, visual boards, Kanban systems, and scheduled learning sessions.

Performance in this area is often assessed through indicators such as the number of work accidents, the value of damaged equipment, and financial provisions allocated for risks. However, it is important to note that not all provisions correspond to actual losses. In practice, better team organization and timely interventions tend to reduce both accidents and

material damage. Visual management supports this by clarifying tasks, limiting confusion, and helping teams act in a more controlled manner.

5. Results:

The main findings of this analytical study on the impact of using visual management tools in Sonelgaz Company in Souk Ahras Province and its relationship to hidden costs can be summarized as follows:

- Hidden costs appear on both the commercial and industrial sides of the company's activity.
- The impact of visual management becomes stronger when it is connected to dashboards and the information system, especially when alerts generate mandatory automated responses.
- Although the total number of interventions did not change significantly, the nature of interventions evolved. About 75% of the interventions carried out after installing thermal cameras were preventive and did not result in damage.
- Technical interventions also became 60% more controlled. In addition, wasted time related to searching for fault locations or waiting for customer information was reduced by nearly half.
- Visual management at Sonelgaz contributed to reducing the time lost during intervention by technical teams by a considerable percentage of nearly 50%. Therefore, the time taken to intervene excludes searching and relying on communications from customers and external observations, and reduced the maintenance time itself.
- Sonelgaz's reliance on visual management reduces unproductive time, which it used to incur as costs, since the company and all its interests continued to operate while its source of income (distribution and sale of electricity and gas) was stopped during outages. Visual management limits and reduces this time through early detection of points that will cause problems and then the automatic dispatch of teams to them before the outage occurs.
- Visual management can monitor and compare the extent to which administrative staff respond to network supply requests, their response rate, and how high, low, and in what manner it is;
- Visual management also supports administrative monitoring, allowing comparisons between response times and service requests. Overall, it is estimated to influence between 50% and 60% of hidden costs, a result that depends on the balance between industrial and commercial activities and on human resource qualifications. Its role also extends to awareness

campaigns aimed at both customers and employees, especially during peak demand periods.

- Visual management takes various forms in the company through customer awareness campaigns and explanatory and guidance announcements for employees, especially during peak times, for example by urging rational consumption to preserve resources, reducing interventions and directing them in a way that is based on real, realistic data that takes into account the ways and mechanisms of employees to deal with them during those times.

IV. Conclusion:

This research sought to deconstruct the dialectical relationship between visual management and hidden costs in the Sonelgaz company, moving beyond a superficial approach to a deep structural analysis. It clarifies that visual management is one of the newly developed technical means for controlling costs in general and hidden costs in particular. It shows that hidden costs are concentrated in Sonelgaz's operational processes in three main areas: the downtime of equipment and generation and transmission stations, as well as the weak intervention of technical teams to repair these faults, energy waste in distribution networks, and the repetition of administrative tasks due to the weak flow of information between departments. Thus, the study answered the first sub-question. On the other hand, it was revealed that Sonelgaz can benefit from visual management in more precise ways if it is linked to the dashboard and its information system, and if responses to its alerts are linked to a binding automated system. This answers the second sub-question. Based on the above results of the study, it can be said that the application of visual management achieves a quantitative transformation of hidden costs into tangible financial gains in Sonelgaz, especially through precautionary and predictive measures. Here the study excels at addressing the main question.

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