

VIABILIDAD FINANCIERA DE LA IMPLEMENTACIÓN DE SST EN LA ESTACIÓN DE SERVICIO LOS ÁLAMOS

FINANCIAL FEASIBILITY OF SST IMPLEMENTATION AT LOS ÁLAMOS SERVICE STATION

Fabian Aguirre¹

Independent researcher

aguirreluna.fabian@hotmail.com

<https://orcid.org/0000-0001-8768-4780>

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RESUMEN

La evaluación financiera ha desempeñado un papel crucial en la gestión empresarial, proporcionando herramientas para analizar la viabilidad y rentabilidad de diversos proyectos. En el sector de estaciones de servicio, la implementación de sistemas de seguridad y salud en el trabajo (SST) es fundamental debido a la naturaleza riesgosa de sus operaciones. El problema de investigación nace debido a que la estación de servicio "Los Álamos" enfrenta dificultades para justificar financieramente la inversión en la Gestión Técnica de SST, lo que genera incertidumbre en la toma de decisiones y desafía su capacidad de cumplir con las normativas y garantizar un entorno laboral seguro. El objetivo de este estudio es evaluar detalladamente el impacto financiero de la implementación de la Gestión Técnica de SST en la estación de servicio "Los Álamos". En la metodología, se utilizó un enfoque cuantitativo, con análisis vertical y horizontal de los datos financieros recopilados a través de encuestas y revisión documental. Se analizaron los costos iniciales y los beneficios económicos de la implementación de medidas de seguridad. Los resultados, lograron evidenciar la identificación y cuantificación de los costos de implementación de diversas medidas de seguridad en los puestos de trabajo, destacando la necesidad de crear un entorno laboral más seguro. Las proyecciones financieras muestran que, si bien la inversión inicial es considerable, la implementación de la Gestión Técnica de SST es viable y sostenible a largo plazo. En conclusión, la inversión en Gestión Técnica de SST, a pesar de los costos iniciales, es financieramente viable y se justifica por la reducción de accidentes, ausentismo y sanciones, así como por el fortalecimiento de la posición competitiva de la empresa.

Palabras clave

Implementación, seguridad, salud laboral, finanzas, análisis

ABSTRACT

Financial evaluation has played a crucial role in business management, providing tools to analyze the feasibility and profitability of various projects. In the service station sector, the implementation of occupational safety and health (OSH) systems is fundamental due to the risky nature of its operations. The research problem arises because the service station "Los Alamos" faces difficulties in financially justifying the

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investment in OSH Technical Management, which generates uncertainty in decision making and challenges its ability to comply with regulations and ensure a safe working environment. The objective of this study is to evaluate in detail the financial impact of implementing OSH Technical Management at the "Los Alamos" service station. In the methodology, a quantitative approach was used, with vertical and horizontal analysis of financial data collected through surveys and documentary review. The initial costs and economic benefits of implementing safety measures were analyzed. The results showed the identification and quantification of the costs of implementing various safety measures in the workplace, highlighting the need to create a safer work environment. The financial projections show that, although the initial investment is considerable, the implementation of OSH Technical Management is viable and sustainable in the long term. In conclusion, the investment in OSH Technical Management, despite the initial costs, is financially viable and justified by the reduction of accidents, absenteeism and penalties, as well as by the strengthening of the company's competitive position.

Keywords

Implementation, safety, occupational health, finance, analysis

INTRODUCTION

Financial evaluation has played a fundamental and crucial role in the field of business management throughout history, providing organizations with a set of essential tools to carry out a thorough and meticulous analysis of the viability, stability, and profitability of the various projects they decide to undertake. In its initial stages, this concept was limited to relatively simple calculations that focused on profits and losses. However, over time, it has undergone a notable evolution that has expanded its horizons and applications in the business context; therefore, currently, much more complex and sophisticated techniques have been incorporated that allow companies to make more informed, strategic, and well-founded decisions in the management of their resources, as well as in long-term planning (1).

Particularly in sectors considered high-risk, such as fuel service stations, financial evaluation expands considerably to include not only the analysis of immediate profitability, but also the implementation of systems that ensure occupational safety and health (OSH). This need becomes especially critical in a context where companies handle highly flammable products, which requires meticulous and rigorous management to prevent accidents and minimize the economic losses that may arise from non-compliance with established regulations (2).

From a macroeconomic perspective, numerous governments and international institutions have promoted the creation of policies that oblige companies to establish robust technical management systems in OSH, which not only seek to ensure compliance with the legal regulations in force in each region, but also have the purpose of optimizing the use of available resources, covering both financial capital and human talent.

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In the Latin American context, a notable increase in investment destined for these systems has been observed, especially in industries that present high occupational risks, which highlights the importance of implementing stricter and more effective safety protocols (3).

However, despite the growing pressure to adhere to these regulations, many companies, such as the "Los Álamos" service station located in Ecuador, face serious difficulties when trying to evaluate the financial impact of their investments in OSH.

The lack of solid and systematic financial control has complicated the justification of the profitability and viability of such investments, generating uncertainty in decision-making and challenging the ability of organizations to comply with regulations and ensure a safe working environment (5).

Furthermore, in the research conducted by (4) on the financial diagnosis of the implementation of the OSH Management System in the PRISPMA company, the importance of companies carrying out this process to comply with the national regulations related to this aspect is exposed, for which companies must have a budget; therefore, it is essential that the development of the SG-SST is supervised monthly and the impact is evaluated.

This evaluation is of the utmost importance not only to guarantee compliance with safety regulations, but it is also vital to ensure that the investment in OSH is financially sustainable in the long term. In this way, it will contribute to the sustainability and productivity of the service station, while offering a model that can be replicated in other companies in the sector that are seeking to implement efficient and effective management in terms of occupational safety and health.

This approach will not only benefit the organization in question, but can also serve as a valuable reference for other entities that face similar challenges in OSH management, thus promoting a culture of safety, responsibility, and efficiency in the sector.

For the following research, two types of methods were used, which are mentioned below:

Vertical analysis method

According to (6), it is mentioned that the method is used to analyze financial statements, with a single determined date and two applicable techniques, which are:

Integral probabilities: denominates the part that an individual item represents within a determined group of the financial statements.

Simple justification: compare the figures of more than one financial statement; in other words, the mathematical ratio obtained between the figures of more than one group of financial statements of a specific company.

This technique used in accounting and finance to evaluate the structure and composition of the financial statements allows the comparison of the relative importance of each item in relation to the common total; unfortunately, small details that limit the method must be taken into account, such as the inability of the

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percentages to reflect the real size of the items, the relative values may be affected by inflation, and that the financial data must be precise and current to be useful.

Horizontal analysis method

It compares homogeneous financial data in two or more consecutive periods, thus determining increases and decreases in the variations of the accounts from one period to another (7); the degree of importance that the method assigns to the report of changes and activities is considered of great breadth, clearly showing whether the results will be positive or negative (8).

Two types of techniques are applied to use the horizontal method:

Variations in increases and decreases: through the calculation of increases and decreases, the monetary concepts of the financial statements are expressed in the stability of one period compared to others.

Trends of increases and decreases: the calculation of financial rises and falls in percentages is stimulated, of each quotation in the stability of a financial statement, thus giving the advantage of determining the relevance in the variations of the figures of the financial statements (9).

Therefore, the present study has as its primary objective to evaluate in detail the financial impact that the implementation of OSH Technical Management entails in the "Los Álamos" service station. To achieve this objective, a thorough and meticulous analysis of the initial costs associated with the adoption of safety measures will be carried out, as well as of the economic benefits that arise from the reduction of occupational accidents and absenteeism. In addition, a financial model will be developed that will allow comparing the economic projections both with and without the investment in OSH, thus facilitating the determination of its effect on the overall profitability of the company.

MATERIALS AND METHODS

Research method:

In the present study, a quantitative approach has been chosen, characterized by the systematic collection and rigorous analysis of financial data from the "Los Álamos" service station. This approach allows not only the obtaining of precise and objective numerical data, but also provides a solid basis for carrying out an exhaustive evaluation of the financial viability of occupational safety and health (OSH) measures. Through the implementation of well-structured and rigorous analytical methods, the aim is to obtain conclusions that are both robust and well-founded, thus contributing to a deeper understanding of the economic impact of the interventions adopted.

Data collection

It was carried out through a systematic and structured approach, ensuring that relevant and precise data were obtained for the analysis. First, a survey form was designed that was distributed among the administrative and operational personnel of

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the "Los Álamos" service station. This form included specific questions about the costs associated with the implementation of occupational safety and health (OSH) measures, as well as about the frequency of occupational accidents and absenteeism levels.

In addition to the surveys, an exhaustive examination of existing financial documentation was carried out, which comprised cost reports, accident records, and historical absenteeism data. Access to these records was obtained through the human resources and finance department of the station, thus ensuring that the information used was both current and relevant. The combination of surveys and document analysis allowed a triangulation of data, which strengthens the validity and reliability of the results obtained.

Study selection

It was a methodical process that was carried out in several stages. First, inclusion and exclusion criteria were established to determine which studies would be considered for the analysis. The inclusion criteria were:

- a) Studies that addressed the implementation of OSH measures in service stations or similar contexts.
- b) Research published in the last five years, thus ensuring that the information was relevant and current.
- c) Documentation that included data on costs and benefits associated with the implementation of OSH.

On the other hand, exclusion criteria were established that comprised:

- d) Studies that did not provide specific data on the relationship between investments in OSH and their financial impacts.
- e) Research that was not peer-reviewed or that lacked methodological rigor.
- f) Literature that did not focus on the service station sector or that did not present data applicable to this context.

Once the criteria were defined, a search was carried out in academic databases such as SCOPUS, LATINDEX, and Google Scholar. Keywords such as "occupational safety and health", "cost-benefit analysis in OSH", and "financial impact of OSH in service stations" were used. After the initial search, the abstracts of the studies were reviewed to determine their relevance, and those that met the established criteria were selected.

Data analysis:

For the analysis of the collected data, the vertical and horizontal analysis methods were applied, where the horizontal method allowed comparing homogeneous financial data at different times, while the vertical analysis allows evaluating the composition and structure of the financial statements. The use of these analytical approaches allows effective alignment with the research objectives.

RESULTS

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The results obtained affirm the need to identify and evaluate the costs of implementing safety and protection measures in different work positions within a fuel service station, analyzing three types of positions: the administrator, the fuel dispenser, and the tanker truck driver. In this way, various risk conditions or situations are observed, such as criminal threats for the administrator, the lack of adequate conditions for night work and the handling of risks associated with heights or slippery surfaces for fuel dispensers, and exposure to flammable substances, traffic accidents, leaks, as well as spills for the tanker truck driver.

Due to this, specific measures are proposed, such as the implementation of panic buttons, rest shelters, and provision of personal protective equipment (PPE), highlighting the need to create a safer work environment (10). In addition, the table incorporates the costs associated with each of these measures, allowing those responsible to evaluate their financial viability.

The reason for this development arises from the need to mitigate risks in the work environment and comply with safety regulations, guaranteeing the protection of both workers and the company's assets, while optimizing the resources available for these improvements.

Table 1: Implementation costs

N°	Work position	Condition	Measure	Cost
1	Administrator	Criminal threat	Request police protection	No cost
			Implement a panic button in the administration office	\$450
		Workers do not have a workstation to spend the night (low temperatures)	Implement a shelter so that workers can spend the night during night work	\$100
			Provision of thermal work clothing that is also antistatic and fireproof	\$600
2	Fuel dispenser	Lack of harness use, tanker surface with fuel residues, slippery surface	Provision of a harness and lifeline for work at height	\$120
			Training on work at height and PPE use	\$150
			Supervision during the fuel unloading process	\$30
3		Exposure to vapors produced by gasoline and diesel in unloading processes	Provision of respirator with filters for fuel unloading	\$110

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			Direct supervision of PPE use	\$48
		Exposure to contact with diesel and gasoline. Dermal route of entry into the body	Provision of nitrile gloves for dispensing and unloading of fuels	\$25
		Musculoskeletal pain	Implementation of a shelter for rest periods	Value already considered
			Provision of ergonomic safety shoes	\$150
		Night work	Implement a shelter for night work	Value already considered
		Responsibility for receiving cash sales money	Training on citizen security	No cost
			Provision of panic buttons at dispensing islands	Value already considered
4		Verbal and physical aggression	Training on customer service and handling difficult situations	\$180
		Possible sources of fire at dispensing islands	Elaboration, implementation and training of a safe work procedure for unloading and dispensing fuels	\$350
			Supervision during the work shift	\$80
5	Tanker truck driver	Lack of information on existing risk types	Implementation of warning, obligation and prohibition signage	\$100
		Work at height (over 1.80 meters)	Implementation of a safe work procedure for fuel unloading	Value already considered
			Provision of harness and lifeline for work at height	Value already considered
		Projection of solids or	Provision of safety glasses	\$10

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		liquids		
		Handling of chemicals	Provision of nitrile gloves	Value already considered
		Monthly inspections / transport of chemical products	Monthly inspections / Training on work procedure	\$60 / Value already considered

Table 1 presents detailed information on the types of mitigation measures and the costs associated with their implementation in the positions of administrator, fuel dispenser, and tanker truck driver. The types of measures address risks of a criminal nature, extreme weather, ergonomic, by-products with design and operation restrictions. The administrator presents a criminal risk where the installation of a panic button in the office at a cost of \$450 was proposed, aided by police protection at no extra cost. That directed at the dispenser highlighted exposure to dangerous conditions, the lack of thermal protection at night, and the high incidence of fuel vapors (11).

The fuel dispenser is especially exposed to dangerous conditions of lack of thermal protection at night and coming into contact with hydrocarbon vapors, which requires the implementation of shelters, provision of thermal clothing, gloves, and respirators, and training in PPE. According to Table 1, the clothing and equipment represent the highest costs. Work garments cost \$600 and the safe procedure costs \$350.

Regarding the tanker truck driver, the risks involve work at height and the handling of dangerous chemicals. It consists of securing with a harness, safety glasses, and gloves, work supervision, and training in safe procedures. It is vital for the safety of the worker in the unloading and transport of fuels, due to the protection it provides in case of falls and splashes.



Figure 1: Projections of losses and gains per year with investment

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Figure 2: Projections of losses and gains per year without investment

In Figures 1 and 2, variations to be considered in the interpretation of the horizontal analysis are shown in both items. In the box labeled "Without investment," an important growth is observed starting from the year 2021, followed by financial stability in the following years. In the box "With investment," growth is experienced until 2021, but then there is a significant drop in the years 2022 and 2023, with a slight recovery in 2024.

In the interpretation through vertical analysis, the item "Without investment" exposes progressive growth, through the demonstration of a constant and sustained increase with respect to the base year (2018); on the contrary, the item "With investment" presents an increase until 2021; from 2022, the values fall and in 2024 they are barely 63.31% of the 2018 value (12).

DISCUSSION

The meticulous and detailed analysis of the results obtained through the application of the horizontal and vertical analysis methods in the financial evaluation of the implementation of Technical Management of Occupational Safety and Health (TM-OSH) at the "Los Álamos" service station reveals a highly suggestive, significant, and revealing trend in relation to the projected costs and gains for the period from 2018 to 2024.

In the scenario where the investment in TM-OSH is not considered, the company manages to maintain greater short-term profitability, thus avoiding incurring the additional expenses related to the implementation of preventive measures. This result was widely foreseeable, since operating costs are not increased, which allows the financial equilibrium of the organization to be preserved efficiently and effectively (13), (14). However, this situation turns out to be highly detrimental and damaging for the service station in legal terms, since the absence of adequate technical management of OSH implies flagrant and serious non-compliance with national regulations, particularly the Labor Code (15).

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Consequently, the company could face severe sanctions and even legal claims derived from possible accidents or occupational diseases, which would not only seriously affect its corporate image and reputation, but could also generate substantial losses due to the abrupt and devastating interruption of its productive activities.

When contrasting these findings with the results of previous studies, such as those conducted by (16), (17), it is possible to confirm in a forceful and conclusive manner that the integral and holistic well-being of collaborators at the physical, psychological, and social levels is fundamental and primordial for their optimal work performance, since occupational health is established as a crucial, determining, and decisive requirement for productivity, sustainable socioeconomic development, and the competitiveness of the environment in which the company operates.

Furthermore, considering that the commercialization of fuels involves their transport and distribution, including filling through dispensers, the health and safety of service station workers becomes a constant, priority, and unavoidable concern in management processes.

Therefore, in the projections of losses or benefits, the investment in TM-OSH must be considered in an unavoidable and strategic manner, since indicators such as the absenteeism rate can negatively, significantly, and detrimentally affect productivity and generate considerable losses for the organization (19).

Similarly, in relation to the research by (20), in the results of the present study, it has been possible to verify that the investment in TM-OSH, particularly the initial investment, has a highly significant, determining, and decisive influence on the company's gains.

Although the initial costs are considerable, this financial strategy turns out to be viable, sustainable, and profitable in the long term, since the gains remain at positive levels, demonstrating its profitability and sustainability over time, and it is fully and forcefully justified in the continuity of its implementation, as it not only contributes to the safety and integral well-being of all personnel, but also considerably reduces the risks of accidents and occupational diseases, the absenteeism derived from these, and the potential expenses for indemnities (21).

Likewise, in the long term, it minimizes the operating losses derived from occupational incidents and significantly and substantially improves the reputation and positioning of the company in the market, which contributes substantially to increasing its productivity, competitiveness, and long-term sustainability. These factors, in addition, protect the organization from economic sanctions for non-compliance with current legal regulations (22), (23), (24).

Finally, in comparison with the previous cases and the research work of (25), it is concluded that, although the gains without investment may appear higher at first glance, there is a high risk and danger that the company may face future economic sanctions and even that workers may file complaints against it for the precarious and deficient working conditions.

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CONCLUSIONS

The thorough analysis of the results obtained in the financial evaluation of the implementation of Technical Management of Occupational Safety and Health (TM-OSH) at the "Los Álamos" service station reveals that, although the initial investment in these safety measures entails considerable costs, this strategy stands as a financially viable and sustainable option in the long term.

The projections of losses and gains demonstrate that, despite the slight temporary decrease in benefits during the first years of implementation, the company manages to maintain a positive and encouraging financial outlook, which fully justifies the continuity and persistence in the adoption of this initiative.

When contrasting the scenarios with and without the investment in TM-OSH, it is evidenced that, although the alternative of not implementing these safety measures presents higher gains in the short term, this approach entails a high risk of regulatory non-compliance and exposure to potential economic sanctions, as well as the possibility of facing labor claims from workers. These negative consequences could generate considerable operating losses and, even more serious, seriously affect the reputation and competitive positioning of the company in the market, seriously compromising its long-term sustainability.

The investment in TM-OSH not only contributes to guaranteeing the integral well-being and occupational health of collaborators, but also translates into a significant reduction in the rates of absenteeism and occupational accident rates. These factors, in turn, positively and favorably impact the productivity and competitiveness of the service station in the long term, strengthening its position in the market and consolidating its sustainability as an organization.

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