

"DESIGN OF AN EVOLVING SYSTEM FOR THE IMPLEMENTATION OF A SECURITY AND SAFETY MANAGEMENT SYSTEM IN MALAGASY COMPANIES"

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ABSTRACT

We are now seeing that companies are beginning to take into account the safety and security impact on the social climate and on the performance of the organization. Thus, their policies focus on improving the profitability of investments by preventing occupational risks. The management of these two areas requires the implementation of an effective management system. The challenge is not only to secure the staff at work but also the activity of the company in general, while avoiding additional costs. The question is: How to implement systems for managing safety and security efficiently?

Aware of safety issues and security, companies are committed to a set of rules and standards governing these areas. Yet managing multiple systems in parallel is often cumbersome and difficult for businesses. To remedy this problem, this research aims to model an approach that integrates safety and security into a single management system. Indeed, the standards and rules governing the two areas present several similarities, grouping them into an integrated security-safety management system, while considering their specificities turns out to be more practical and effective for companies.

Keywords: *Management - System - Device - Safety - Security*

INTRODUCTION

Companies create wealth and evolve in a dynamic social and environmental environment, they are therefore exposed to several dangers and risks, both internal and external to the company. Thus, they have obligations not only to offer safe working environments to their employees, but also to secure their activity in general. This situation pushes them to engage in a standardization process in terms of security and safety. Standardization would be a concrete commitment in vogue and common to companies by which they take into consideration the security of men, machines but also products to ensure the continuity of activities. The main thing is to know how to prevent risks in order to avoid additional costs in the restoration of damage.

Safety is the absence of danger, i.e. a situation in which someone or something is not exposed to critical events or risks (failure, accident, deterioration, physical aggression, theft, etc.). Safety is the state in which the risk of physical or material damage is limited to an acceptable level.

In the field of work, safety concerns accidents at work and occupational diseases. Closely linked to occupational health, occupational safety is a multidisciplinary approach that aims to eliminate or reduce the risk of accidents that may occur during the exercise of a professional activity.

The main objectives are to reduce the frequency and severity of work-related accidents, to increase reactivity in emergency situations, to improve the quality of life at work for personnel, to integrate safety at work into the overall management of the company, to gain external recognition, to raise awareness, to train and to support personnel.

Safety is the state of someone or something that is safe, has nothing to fear, i.e. taking precautions. An acceleration and a better taking into account of the management of safety is to be noted these last years in the companies. This system allows them to reduce all intentional risks - malicious acts, terrorism and negligence. They protect their employees and their assets and ensure the continuity of their activities.

All organizations are facing increasing threats: data hacking, intrusions, fraud, armed attacks, hostage taking, etc. In order to manage security, and to counter the increased risk of malicious acts, organizations must protect themselves. This translates into the need for a clear and practical management system that identifies the roles and responsibilities of each person, including the manager, and the deployment of well-defined procedures.

Management, generally confused with the management of an organization or a company, is characterized by the implementation of a well-defined approach according to the activity and the objective of the company. Integrated management has become a key success factor for companies, not only because it is a strategic axis at the organizational level, but also because it is a way for companies to obtain a competitive advantage, because the emergence of this type of approach is not essentially due to the awareness of organizations, but rather to the will of stakeholders. In order to meet their requirements, the integrated management system is useful to develop responsible actions that are increasingly oriented towards standardization.

Safety and security are terms that are often confused, their differences are mainly noted in their characterization in companies. The notion of safety is rather for the activities while security concerns the machines and the personnel. However, their common ground lies in their management systems which are mainly focused on preventive actions. Thus, managing them through a single integrated safety and security management system is more practical and efficient. This vision requires companies to have a great capacity of adaptation and especially an effective managerial approach.

These situations lead us to model an evolving system of implementation of a Management System in the fields of security and safety at the level of companies.

The major stake of the implementation of this management system is not only to secure the personnel at work but also the activity of the company in general, while avoiding additional costs in order to guarantee the global performance of the company.

The problem that arises is therefore to know: How to implement efficient safety and security management systems?

The steps of the model design follow the method MEVA¹. The integrated safety and security management model is first designed from the requirements of the relevant standards, avoiding redundancy, and conducting a general policy for the prevention and control of risks. This model will then be tested in companies where the management of these two areas is necessary, taking as a hypothesis the improvement of the management of safety and security by the implementation of this integrated management system.

The experimentation will be done on a sample of fourteen companies working in the field of hydrocarbon transport in Madagascar. The choice of this sector of activity is dictated by a certain number of criteria favorable to the research. Indeed, this sector is marked by high exposure to occupational risks and accidents, and the companies working in this sector are subject to quality and standards constraints RSE².

The verification of the hypothesis will be done by analyzing the results of an opinion survey conducted among the employees of these companies concerning the effectiveness of the experimental system. The evaluation of the evolutionary system of implementation of the management systems relates to the steps of implementation of the system: Launching, planning, management of the resources, implementation and control and follow-up.

An experimentation by a scientific method which consists in using statistical calculations: the correlation method to confirm the validity of the hypothesis and to obtain quantitative data allowing to refine it. The qualitative data obtained by experimentation will be analyzed by a software recognized by its effectiveness which is the "Sphinx" in order to validate the hypothesis. Indeed, the Sphinx software allows the design of a questionnaire, the capture and analysis of the responses and the exploration of the recorded data. The software integrates more advanced multidimensional analysis techniques (factorial analysis, typology, etc.) and can analyze any file containing numbers and/or text, regardless of its origin. Also, the software allows to process open-ended questions, non-directive interviews or any other text regardless of its origin.

¹ Modélisation- Expérimentation- Validation- Application

² Responsabilité sociale de l'entreprise

CONCEPTUAL BASE OF THE STUDY

To face the increased risks of malicious acts, organizations must have an effective strategy. This translates into the need for a clear and known organization, allowing the identification of the roles and responsibilities of each person, including the manager, and the deployment of well-defined procedures.

The management system is an approach that brings together the provisions relating not only to the actions to be taken in the face of risks and opportunities, but also to the determination of legal requirements, and above all to the setting of objectives and planning of actions to achieve them. This approach mobilizes, in a permanent way, all the members of the company in order to manage and improve the effectiveness of its operation in front of the evolution of its environment. Total efficiency is part of a continuous improvement approach, which is a concept inspired by the wheel of DEMING³.

During the planning process, and particularly in setting objectives, the standard requires consideration of the overall issues and expectations of its workers and other stakeholders, and identifies the "risks and opportunities" that may arise from hazards, risks, and legal and other requirements. This approach allows the policy and objectives to be more closely aligned with the company's overall strategy.

Resource management concerns the evaluation and allocation of the resources necessary for the operation of the management system.

The implementation must consider the operational control and the preparation and response to emergency situations. The company must establish processes to manage the changes that affect its operations, such as working conditions, changes in knowledge about hazards and risks.

For monitoring and follow-up, the organization must determine what needs to be monitored and measured, including the effectiveness and efficiency of operational and other prevention measures. And finally, for continuous improvement of the company's overall performance, it must formalize corrective actions to reduce the gaps between set and achieved objectives.

Safety has become an essential axis for organizations in terms of image but also in economic and regulatory terms. It is in their interest to play the game at the risk of being sanctioned and of tarnishing their image and no longer being profitable.

Safety has economic stakes because work accidents represent a cost for organizations. In addition to the direct costs of caring for the victim, there are indirect costs such as material costs (repair of damaged equipment), salary costs due to lost time and replacement of personnel, production losses, delivery delays, and lost orders.

Many accidents are caused by human errors, which are generally the result of a lack of information about the risks. Knowing a risk allows to acquire adequate reactions in order to avoid it. This is why many organizations integrate safety management into their policies.

Each company organizes its security according to its field of activity, its operational geographical perimeter and also its internal culture. However, beyond simple questions of organization or organization chart, it is the way in which the security function is exercised within a company that will guarantee its ability to face various threats and to deal with crisis situations. This responsibility proposes to describe the process that led to the implementation of a management system, from its conception to its operation.

The safety management system ensures that the safety resources put in place are appropriate to the level of risk of the company. The safety director of a company, together with its service provider, is responsible for defining the safety policy, which will be implemented within the system and applied to all its sites. The system thus represents a safety reference system, classified by risk.

The standards concerned

The management system for safety and security is generally based on ISO standards. The ISO (International Organization for Standardization) standards are international reference documents that allow to know if an organization respects a set of processes. They are reference documents on which an organization relies to set up its processes.

³ La roue de DEMING se décompose en quatre phases :

- Plan : Préparer, planifier. Cela correspond à la stratégie.
- Do : Développer, réaliser, mettre en œuvre. Cela correspond à l'exécution des tâches.
- Check : Contrôler. Cela correspond à la vérification.
- Act : Agir, ajuster. C'est que l'on met en place une action pour ajuster.

The ISO 45001 standard is a set of international standards relating to occupational health and safety management systems. It was developed by a committee of experts specializing in the fields of occupational health and safety, and follows the same structure as other management system standards such as ISO 14001 and ISO 9001. It also takes into account previous international standards developed in this field such as OHSAS 18001, the ILO-OSH guidelines of the International Labour Organization, various national standards and international labour standards and OIT conventions. This makes it one of the most valuable health and safety management systems to date. Achieving ISO 45001 certification demonstrates that the company operates a best practice occupational health and safety management system, reducing the likelihood of accidents and violations of legislation, as well as improving the overall performance of the organization.

ISO 28000 prescribes the requirements for a safety management system, including aspects critical to supply chain safety assurance. Security management is linked to many other aspects of business management. The objective of the standard is to provide a framework of best practices for reducing human and freight risks in the supply chain. It addresses security issues at all levels of the supply chain, particularly in the logistics area, to respond to risks and threats such as terrorism, fraud and piracy. Security management is linked to many other aspects of business management. With ISO 28000, organizations can determine if appropriate security measures are in place and protect their properties from various threats.

The requirements of the safety and security standards create similarities in the management system for both areas. Both systems begin with management commitment, followed by the drafting of a prevention policy based on document management and training. The verification of the activities undertaken allows for corrective actions to be taken to cover the gaps between the objectives and the actions taken. Finally, a management review allows for the readjustment of the planning to improve the performance of the management system.

Design of the safety and security management system (SMSeSu)

The safety management system (SMSe) aims to reduce the frequency and severity of work-related accidents, to increase responsiveness to emergency situations, to improve the quality of life at work for employees, and to integrate safety at work into the company's overall management.

The safety management system (SMSu) allows to reduce all the intentional risks and malicious or terrorist acts targeting the company's activity.

The Security and Safety Management System offers a dual legal and operational competence that responds particularly to the specific challenges of management working in the global management of risks, the protection of people, property and tangible and intangible assets.

The formalized SMSeSu mapping has as input data the risks of professional accidents and malicious acts. The management process is managed by the SMSeSu by the management. The operational process consists of implementing the prevention of occupational hazards and malicious acts. The support processes consist of managing personnel in the workplace and managing Safety and Security in the infrastructures and facilities. And finally, we have as output the prevention and protection of personnel and stakeholders from occupational accidents and malicious acts

The system begins with the commitment of the management, then the development of plans and the evaluation of the necessary resources. Once these prerequisites are established, actions are implemented according to processes and procedures to manage the activities.

There is no required form for the implementation of prevention actions. It can be a commitment to training and information for employees, the development of new work instructions or even the modernization of work equipment or premises.

Staff training must be a real training policy based on forward-looking skills management in order to be relevant and effective. To establish this training policy, it is necessary to identify training needs, analyze the results of the risk assessment resulting from the single document for the evaluation of professional risks, but also the results of the annual evaluation interviews, and the needs related to new projects. These training courses can be used by organizations that can use the skills acquired by their staff to increase their performance.

The document system is also a prevention tool. It is at the service of the organization's performance, and it allows information to be structured. It must be based on the organization's usual operations. It describes the organization in the form of processes, each process corresponding to an activity of the company. The documentation system must also be based on practical documents that are quick and easy to read for users. However, the documents must be permanently updated in order not to create any gaps.

Risk assessment consists of identifying and classifying the risks that personnel may encounter in the course of their work. This assessment aims to implement preventive actions as close as possible to reality. The single document for the evaluation of professional risks is a prerequisite for the implementation of a safety and security policy at work. The single document makes it possible to identify, evaluate and classify the risks at work in a work unit, and it

makes it possible to propose an action plan to reduce these risks. It is a means of prevention because it tries to identify the possible risks that can occur in certain work units.

Finally, the audit is a management tool to ensure the functioning of the system but also its effectiveness. Its objective is to assess the results that we want to obtain, what we have really done and what we need to do. It is an essential tool for identifying the corrective actions to be implemented and the possible improvements. Its objective is to drive the organization towards progress.

In summary, the integrated safety and security management system is designed according to a managerial approach including

- The launch phase, which concerns the development of the various plans and actions to be undertaken
- The management of resources for the estimation and allocation of the necessary resources
- Implementation, which consists of the actual setting up of the planned actions
- The control and follow-up of the actions carried out and the planning of corrective actions.

The evaluation of the effectiveness of the system will be based on the opinions of the employees of the companies that have experienced the system. First, the effectiveness of the SMSeSu will be evaluated by its practicality. Secondly, the evaluation of the level of improvement in the areas of safety and security will allow us to estimate the effectiveness of the system.

RESULTS

Analyse de la praticité du dispositif

In any project, effectiveness is not only limited to the expected results, but also and above all to the practicality of the system. The following results refer to the employees' opinions on the practicality of the managerial approaches designed to implement a management system SeSu.

In concrete terms, the practicality of a system must respond both to the fact that the steps of its implementation are complete and well understood but also judged easy by the users or employees on the one hand, but on the other hand, that this practice meets the initial expectations of companies so that the change does not generate a certain resistance that could be detrimental to the duration of its implementation in the organization. The results of our study establish the uniformity of opinions⁴ collected from company employees, which generally indicate agreement with the practicality of the system.

Table 1: Mean scores of employee opinions on device practicality items

evaluation items for the practicality of the device	Mean	Ecart type
In your opinion, are the steps of the device complete?	3,26	,789
Do you think the steps are understood?	3,30	,802
In your opinion, are the steps easy to implement?	3,28	,820
Do you think the scheme meets the initial expectations of the companies?	3,30	,808
In your opinion, does the system not generate resistance to change?	3,35	,774
In your opinion, does the system allow the SMH3SQE to be implemented in record time?	3,29	,779

Source: Author, 2020

The five items used to assess the contributions that the system could make include enriching maturity through feedback, achieving objectives, improving personal development and, above all, contributing to the company's certification in the areas and profitability of the system.

⁴ Les écarts types sont tous plus petits

It is clear from the averages and standard deviations that the opinions are uniform⁵, of the respondents presented in the table below that employees more than agree on the capitalization of the values that the system can bring, as the average scores exceed the scale of 3 that marks the overall agreement of the interviewees.

Table 2: Average scores of evaluation items for the device's contributions

Items for evaluating the contributions of the system	Mean	Ecart type
In your opinion, has the feedback during the implementation enriched the maturity of the company?	3,28	,797
In your opinion, does the system allow the company to reach its objectives?	3,29	,773
In your opinion, does the system improve the personal development of employees?	3,33	,764
According to you, the system allows the company to be certified to reinforce its H3SQE commitment?	3,32	,741
According to you, the system is profitable for the company?	2,86	,567

Source: Author, 2020

Evaluation of the improvements made by the SMSu

It should be remembered that before the experiment, these companies already had management systems that managed safety and security separately. The new system is supposed to bring improvements in both areas. The following results explain the changes observed in the management of safety and security during the experimentation.

Improved security management

Frequently, accidents are caused by human and material errors that are generally the result of a lack of prevention. Knowing a risk allows to acquire adequate reactions in order to avoid it.

That is why many companies implement a system of protection and securing of machines in the safety management. In addition, training can be used by companies to use and master the skills acquired by their personnel in order to reduce risks. In view of the results of the table below, which summarizes the opinions, fairly consistent, the observation of improvement in the standards required in safety management is real after the implementation of the system.

Table 3: Average score for items assessing the impact of the system on safety management

Impact assessment items	Mean	Ecart type
In your opinion, has the accident prevention system been improved since the application of the new system?	3,30	,770
In your opinion, has the reliability of the protections used been improved since the application of the new system?	3,28	,809
In your opinion, has the system for securing machines been improved since the application of the new system?	3,27	,819
In your opinion, has the safety training system been improved since the application of the new system?	3,29	,798

Source: Author, 2020

⁵ Les écarts types sont inférieurs aux moyennes

Improvement of safety management

On the one hand, the prevention of criminal attacks has not been successful, but on the other hand, the security training system has not been able to provide a conclusive state of affairs. Nevertheless, the barrier and insurance systems, according to the opinions of the respondents, have improved after the implementation of the system

Table 4: Average scores for items measuring the impact of the system on safety

Items to measure the impact of security management	Mean	Ecart type
In your opinion, has the prevention of criminal attacks been improved since the implementation of the new system?	2,83	,586
In your opinion, has the security barrier system been improved since the implementation of the new system?	3,38	,719
In your opinion, has the security assurance system been improved since the implementation of the new system?	3,27	,775
In your opinion, has the security training system been improved since the implementation of the new system?	2,95	,483

Source: Author, 2020

EFFECT OF THE IMPLEMENTATION OF SMSESU ON THE IMPROVEMENT OF SECURITY AND SAFETY MANAGEMENT AT THE ENTERPRISE LEVEL

A management system for safety and security at work (SMSeSu) is a management system that combines people and equipment to improve a company's performance in terms of safety and security at work.

It is a tool that allows for better control of the company's organization and continuous progress by integrating safety and security into all functions.

The adoption of such a system is the expression of a global and managerial approach to the prevention of occupational risks. It is a voluntary approach that aims not only to anticipate changes but also to increase the company's reactivity and performance in risk prevention and, above all, to limit dysfunctions.

We can deduce from the values of the coefficient of determination R^2 of 0.889 and 0.842, associated respectively with the regression models of the states of improvement of the management of safety and the management of security through the 4 phases of implementation of the device to the significance of these two models if we refer to the values of the significant p-values lower than 0.05.

Table 5: Summary of safety management and security management improvement status models at the end of the four implementation phases

Model	R	R-two	R-two adjusted	Standard error of the estimate	Edit statistics				
					Variation of R-two	Variation of F	ddl1	ddl2	Sig. Variation of F
Safety management	,943	,889	,886	,22315	,889	388,477	4	195	,000
Safety management	,846	,716	,710	,23334	,716	123,067	4	195	,000

Predictors 1 and 2: (Constant), control_monitoring_1, resource management, implementation, launch score

Source: Author, 2020

The results of the F-test on the ANOVA of the relevance of the two models confirm the predictive effects of the 4 phases on the improvement states of safety management and security management.

Tableau 1: ANOVA des modèles des états d'amélioration du management de la sécurité et du management de la sûreté à l'issu des 4 phases d'implantation du dispositif

Model	Sum of squares	ddl	Medium square	F	Sig.
1 Regression	77,375	4	19,344	388,477	,000
Residuals	9,710	195	,050		
Total	87,085	199			

Model	Sum of squares	ddl	Medium square	F	Sig.
2 Regression	26,803	4	6,701	123,067	,000
Residuals	10,617	195	,054		
Total	37,420	199			

a. Dependent variable: improvement of safety management

b. Predictors: (Constant), control_monitoring_1, resource management, implementation, launch score

Source: Author, 2020

However, the analysis of the partial contribution of each of the phases of implementation of the system through the tables of values of coefficients of explanatory variables of the states of improvement of the management of safety and security in this case the launch, the management of resources, the implementation and control and monitoring according to the standards imposed show:

- On the one hand, on the states of improvement of safety management, according to the value of the p-value of 0.133 associated with the implementation higher than 0.05 that this phase of implementation of the device has no conclusive contributions.

Table 7: Coefficients of the model of safety management improvement states by the 4 phases of the system

	Non-standardized coefficients		Standardized coefficients	t	Sig.
	B	Standard deviation	Bêta		
1 (Constant)	-,596	,151		-3,942	,000
score_launch_1	,590	,154	,374	3,822	,000
Resource management	,097	,090	,088	1,074	,284
implementation	-,166	,110	-,130	-1,508	,133
control_monitoring_1	,708	,155	,617	4,570	,000

a. Dependent variable: improvement of safety management

Source: Author, 2020

- On the other hand, the same table of coefficients of the states of improvement of safety management by the 4 phases of the device allows us to see this time that the launch of the device does not have a significant effect on the states of improvement of safety management since the value of the associated p-value of 0.148 is higher than 0.05.

Table 8: Coefficients of the model of safety management improvement states by the 4 phases of the scheme.

Modèle	Non-standardized coefficients		Standardized coefficients	t	Sig.
	B	Standard deviation	Bêta		
1 (Constant)	,724	,158		4,581	,000
Launch score	,234	,161	,227	1,451	,148
Resource management	-,367	,094	-,510	-3,897	,000
Implementation	,315	,115	,377	2,739	,007
Monitoring	,548	,162	,729	3,382	,001

Source: Author, 2020

The validation of our hypothesis stems from the significance of the explanatory model of the effectiveness of the joint management of safety and security by the respective states of improvement of the management of safety and security by the 4 phases of implementation of the device.

Indeed, the p-values associated respectively with the F-test and the ANOVA of global validation of the model are both equal to 0.000 less than 0.05 and the p-value of 0.00 of the table below relating to the coefficient of determination R^2 equal to 0.770 ensures the global validation of this hypothesis.

Tableau 2: Récapitulatif du modèle de régression de l'efficacité du management de la sécurité et de la sûreté par les états d'amélioration du management de la sécurité et du management de la sûreté

Model	R	R-two	R-two adjusted	Standard error of the estimate	Edit statistics				
					Variation of R-two	Variation of F	ddl1	ddl2	Sig. Variation of F
1	,686 ^a	,470	,465	,415	,470	85,598	2	193	,000

a. Predictors : (Constant), safety management improvement, safety management improvement

Source: Author, 2020

The table of coefficients of the model of the effectiveness of the joint management of safety and security through the states of improvement of the management of each of them shows the very significant partial contribution (associated p-values both equal to 0.000 smaller than 0.01) of these two states of improvement of management. This confirms our hypothesis.

Tableau 10: Coefficients du modèle de régression de l'efficacité du management de la sécurité et de la sûreté par les états d'amélioration du management de la sécurité et du management de la sûreté

Modèle		Non-standardized coefficients		Standardized coefficients	t	Sig.
		B	Standard deviation	Bêta		
1	(Constante)	,776	,214		3,622	,000
	amélioration du management sécurité	,331	,070	,389	4,739	,000
	amélioration du management sûreté	,439	,106	,339	4,129	,000

a. Dependent variable: 151 How effective do you think the safety and security management system is?

Source: Author, 2020

CONCLUSION

Over the last century, management systems have moved from a control-centered approach to a global and preventive approach. After the development, there is a necessary need for reconciliation, standardization and consistency. The reference systems have developed, according to the fields and activities of the companies. It is in this option that this research proposes a system of management of the security and the safety. Indeed, in order to prevent professional risks and to reduce to a minimum the incidents which can hinder their activities, the companies are forced to set up management systems managing security and safety. However, similarities have been observed in the management approaches of these two areas. The system tested in this research integrates the two domains in a single SMSesSu management system. This integrated management system is the logical extension of the safety and security standards. The implementation of this management system requires a complete approach to be respected successively, namely: the launch, the management of resources, the implementation, the control and follow-up. The repercussions of this system on the management of the domains are judged positive according to the analyses of the results of survey made with the companies in which the device is tested. This effectiveness is justified not only by the practicality of the system but also by the improvements that it has brought to the management of security and safety of companies.

Contrary to crisis management, whose objective is to manage the immediate consequences of the incident, the SMSesSu analyzes in depth and on the long term the consequences and the causes of the dysfunctions to better correct them. Thus, this system is designed to be part of a continuous improvement process.

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ANNEXES

Annexe 1

Trends in Respondents' Responses to the Launch Device

VARIABLE	ITEMS	Mean	Ecart type
Lancement du dispositif	Are staff invited to participate in device planning?	1,71	,780
	Is the meeting room set aside for all staff?	1,72	,829
	Is an attendance sheet available for each meeting?	2,10	,527
	Are minutes kept for each meeting?	2,45	,671
	Has a call for expressions of interest been made for committee members?	1,71	,762
	Is a profile required for the coordinator position?	3,31	,739
	Is the H3SQE policy written by the coordinator?	3,29	,753
	Is the H3SQE objective proposed by the coordinator?	2,84	,583
	Is the organizational chart developed by the coordinator?	3,27	,819
	Are the terms of reference set by the coordinator?	3,37	,697
	Is the information management system developed by the coordinator?	3,26	,834
	Is the H3SQE hazard list developed by the coordinator?	3,32	,754
	Are the risk assessment methods developed by the coordinator?	3,23	,876
	Are the prevention plans developed by the coordinator?	3,32	,754
	Is the calculation of the effectiveness and efficiency of the plan developed by the coordinator?	2,51	,665
	Is the selection of the coordinator approved by the committee?	3,26	,822
	Is the H3SQE policy approved by the committee?	3,34	,733
	Is the H3SQE objective approved by the committee?	3,33	,789
	Is the H3SQE organizational chart approved by the committee?	3,33	,758
	Are the terms of reference approved by the committee?	3,30	,777
	Is the information management system approved by the committee?	3,36	,750
	Is the H3SQE hazard list approved by the committee?	3,28	,820
	Are prevention plans approved by the committee?	3,31	,766
	Are the risk assessment methods approved by the committee?	3,28	,778
	Is the calculation of the plan's effectiveness and efficiency rate approved by the committee?	2,88	,572
	Are the committee members validated by management?	3,71	,727
	Is the selection of the coordinator validated by management?	3,28	,809
	Is the H3SQE policy validated by management?	3,35	,735
	Is the H3SQE objective validated by management?	3,80	,636
	Is the H3SQE organization chart validated by management?	3,28	,809
	Are the responsibilities validated by management?	2,86	,562
	Is the information management system validated by management?	3,23	,847

Is the H3SQE hazard list validated by management?	3,27	,792
Are the risk assessment methods validated by management?	3,31	,746
Are the prevention plans validated by the management?	3,32	,781
Is the calculation of the plan's effectiveness and efficiency rate validated by management?	3,68	,795
Are the committee members introduced to the staff?	3,30	,749
Is the coordinator introduced to the staff?	3,69	,780
Is the H3SQE policy presented to staff?	2,93	1,042
Is the H3SQE objective presented and understood by staff?	3,25	,831
Is the H3SQE organizational chart presented to staff?	3,29	,804
Are the terms of reference read and approved by staff?	2,89	,608
Is the information management system presented and applied by staff?	2,92	,547
Is the H3SQE hazard list presented and understood by staff?	3,69	,773
Are risk assessment methods presented and understood by staff?	2,86	1,061
Are the prevention plans presented and understood by the personnel?	3,30	,794
Is the calculation of the effectiveness rate of the plan presented and understood by the personnel?	2,94	,541

Source: Author, 2020

Annexe 2

Overall trends in the views of employees in the study sample on resource management in the scheme

Study items for resource management	Mean	Ecart type
Is the competency profile and staff training plan developed by the coordinator?	2,99	1,025
Is the budget developed by the coordinator?	2,12	,560
Is the infrastructure and equipment determined by the coordinator?	2,87	1,083
Are the processes, procedures, work instructions, records and awareness developed by the coordinator?	3,30	,783
Is the information system determined by the coordinator?	2,93	,584
Are the competency profile and training plan for staff approved by the committee?	3,35	,700
Is the budget approved by the committee?	3,34	,704
Is the infrastructure and equipment approved by the committee?	3,27	,825
Are the processes, procedures, work instructions, records and awareness approved by the committee?	3,22	,896
Is the information system approved by the committee?	3,33	,783
Are the staff competency profile and training plan validated by management?	3,28	,802
Is the budget validated by management?	3,69	,829
Is the infrastructure and equipment validated by management?	3,25	,813
Are processes, procedures, work instructions, records and awareness validated by management?	3,73	,756
Is the information system validated by management?	3,31	,784
Are the competency profile and training plan presented and understood by staff?	2,10	1,025
Is the budget presented and understood by the staff?	2,52	1,421
Is the infrastructure and equipment presented and understood by the staff?	2,93	1,020
Are the processes, procedures, work instructions, records and awareness presented and understood by staff?	3,29	,811
Is the information system presented and understood by staff?	2,89	1,048

Source : Auteur, 2020

Annexe 3**Descriptive statistics of employees' views on the implementation of the scheme**

ITEMS	Mean	Ecart type	Analyse N
Is the monitoring plan developed by the coordinator?	3,35	,727	400
Has the coordinator prepared a report on the actions carried out?	3,27	,836	400
Is the results dashboard developed by the coordinator?	3,30	,775	400
Is the compilation of contingency plans developed by the coordinator?	3,34	,733	400
Is the monitoring plan approved by the committee?	3,32	,768	400
Is the summary of completed actions approved by the committee?	3,33	,743	400
Are the results presented to the committee?	3,32	,761	400
Are contingency plans approved by the committee?	3,04	,550	400
Is the monitoring plan validated by management?	3,34	,765	400
Is the review of completed actions validated by management?	3,26	,846	400
Are the results reported to management?	3,67	,857	400
Are emergency response plans validated by management?	3,34	,753	400
Is the monitoring plan presented and understood by the staff?	3,16	,610	400
Is the results of the actions taken presented and understood by the staff?	3,02	,665	400
Are staff informed of the results?	3,25	,830	400
Are emergency response plans presented and understood by staff?	3,52	,782	400

Source: Author, 2020

Annexe 4**Statistics on the evaluation of the monitoring and control system**

Items	Mean	Ecart type	Items	Mean	Ecart type
Is the internal audit program developed by the coordinator?	3,30	,819	Is the external audit program validated by management?	3,31	,823
Is the external audit program developed by the coordinator?	3,30	,794	Is the compilation of control device rules validated by management?	3,67	,804
Is the compilation of control device rules developed by the coordinator?	3,29	,766	Is the system for encouraging staff to report anomalies or opportunities for improvement validated by management?	3,29	,818
Is the system for encouraging staff to report discrepancies or the opportunity for improvement developed by the coordinator?	2,91	,578	Are corrective action lists validated by management?	3,28	,784
Is the compilation of corrective action lists developed by the coordinator?	3,26	,822	Is the evaluation of corrective actions validated by management?	3,24	,820
Is the evaluation of corrective actions developed by the coordinator?	3,33	,770	Is the corrective maintenance plan for risk control validated by management?	3,35	,727
Is the corrective maintenance plan for risk control developed by the coordinator?	3,31	,773	Is the internal audit program presented and understood by staff?	2,54	,672
Is the internal audit program approved by the committee?	3,31	,765	Is the external audit program presented and understood by the staff?	2,45	,678
Is the external audit program approved by the committee?	3,31	,753	Is the compilation of control rules for control devices presented and understood by staff?	3,32	,767

Is the compilation of control device rules approved by the committee?	3,27	,825	Is the system for encouraging staff to report discrepancies or opportunities for improvement presented and understood by staff?	3,24	,816
Is the system for encouraging staff to report discrepancies or opportunities for improvement approved by the committee?	3,33	,729	Are corrective action lists presented and understood by staff?	3,29	,785
Are corrective action lists approved by the committee?	3,31	,773	Is the evaluation of corrective actions presented and understood by personnel?	2,96	1,014
Is the evaluation of corrective actions approved by the committee?	3,34	,725	Is the corrective maintenance plan for risk control presented and understood by staff?	3,26	,858
Is the risk control corrective maintenance plan approved by the committee?	3,31	,738	Is the external audit program validated by the management?	3,31	,823
Is the internal audit program validated by management?	3,35	,741	Is the compilation of control device rules validated by management?	3,67	,804

Source: Author, 2020

