	ECOPETROL RISK MANAGEMENT GUIDE		
	OBJECTIVE INTERNAL VERIFICATION INTERNAL CONTROL ASSURANCE CORPORATE MANAGEMENT		
	VEI-G-010	Prepared 31/03/2017	Version 1

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MAGDALENA R. DE USCATEGUI
Traductora e Interprete Oficial
Resolución No. 0593

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1. OBJECTIVE

Define the general aspects of managing all risks at Ecopetrol S.A. to ensure adequate management of the risks that may result in deviation from the fulfillment of objectives, and produce reliable information for decision-making in the wide range of the company's business activities, decisions or operations.

2. GLOSSARY

Treatment Actions: Planned, temporary and only activity designed and executed to eliminate or reduce risk causes or alleviate impacts from their eventual materialization.

Risk appetite: This is the amount of risk that Ecopetrol S.A. is willing to assume in the search to maximize value for its shareholders and stakeholders.

BWise: Governance, Risk and Compliance (GRC) information solution implemented to ensure the sustainability of the company's internal control, the risk management and controls of the organization, and to support the full cycle of internal audit, aligned with international standards.

Cause: Failure, weakness, condition, restriction or certain or potential circumstances that may give rise to the event, and may increase exposure to the risk or its consequences.

COBIT: Control objectives for Information Technology governance. Best practice for information technology's internal control.

Control: Activity established to mitigate, reduce or eliminate the impact of risks and enhance the achievement of objectives. It must be specific, frequent, measurable and verifiable.

Consequence: Direct and indirect effects on resources and objectives in the event of risk materialization or occurrence.

COSO: Abbreviated name of the Committee that sponsors corporate governance and business management practices in the United States. "Committee of Sponsoring Organizations of the Treadway Commission", which is a private sector initiative comprising professional associations interested on Risk Management and corporate control.


It provides an internationally accepted framework of good internal control practices, providing frameworks and guidelines on risk management, internal control and fraud deterrence.

ERM: Enterprise Risk Management. It is a framework for Business Risk Management.

Event: Incident or occurrence, whether internal or external, affecting the company, process, project or activity, which occurs in a particular place and time, suddenly or accidentally.

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Incident: Unplanned, undesired event or chain of events, all of them foreseeable, that gave rise to (accident) or that, under slightly different circumstances, could have caused (near-miss): injury, illness or death to people, damage to property, the environment, the Company's image and/or customer satisfaction. It occurs when several control failures coincide in time and place.

Impact: The magnitude of the consequences of a risk.

Mitigating factors: Group of activities, barriers, control activities and other existing or evident conditions or mechanisms able to mitigate the probability that the risk will materialize or to reduce its impact if it does.

NTC GP 1000: Technical Quality Standard of Public Management.

NTC ISO 9001: Quality Management Systems

NTC ISO 14001: Environmental Management System Evaluation

NTC OSHAS 18001: Occupational Health and Safety Management Systems.

NTC ISO/IEC 27001: Information Security Management System.

NTC ISO 28000: Supply Chain Security Management Systems.

OSHA 1910.119: Process Safety Management of Highly Hazardous Chemicals.

Objective: Declaration on expected actions. It is a purpose, a challenge to be achieved in a certain time. It must be specific, measurable, achievable and realistic.

Process: Group of mutually related activities using inputs to achieve an intended result (product or service).

Probability: It is the qualitative or quantitative estimate of an event occurrence, determined either objectively or subjectively, and described using general or mathematical terms.


Risk: Any event of uncertain occurrence that, if materialized, generates an impact, positive or negative, in the achievement or fulfillment of the objectives at any level of the Company. It can be measured in terms of probability of occurrence or by the impact of its consequences.

Materialized risk: A risk event that occurred and had an impact on any of the organization's objectives or resources.

Internal Control System: It is the set of policies, principles, regulations, procedures, verification and evaluation mechanisms established by the board of directors or equivalent body, senior management and other employees of an organization to provide a reasonable degree of security regarding the achievement of objectives.

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SOX: Abbreviation for the Sarbanes Oxley Act, which sets out the requirements for reporting and internal control of financial information for companies listed on the United States stock market.

Risk tolerance: It is the level of variation related to the achievement of a specific objective.

3. DEVELOPMENT

3.1. REGULATORY REFERENCES

This document is framed within the following internal regulations in force:

- Ecopetrol Good Governance Code
- Ecopetrol Comprehensive Policy
- Summary of Good Practices for Process Comprehensive Management and Control

3.2. SCOPE

This guide regulates Ecopetrol's risk management, which is thoroughly described in section 3.2 hereunder. The particular details for management of the declared company risks are specified in the documents that govern the processes responsible for them.

3.3 DEFINITION OF RISK

For Ecopetrol, risk is any event of uncertain occurrence that, if materialized, will cause an impact, positive or negative, in the achievement or fulfillment of the objectives at any level of the Company, and can be measured in terms of impact of the consequences and the probability of their occurrence.

All risks are defined by the event, its causes and consequences on the objectives or resources of the company's operation.

3.4. RISK MANAGEMENT PILLARS


3.4.a. Risk Management Culture at Ecopetrol S.A.

Ecopetrol S.A. promotes a series of beliefs, values and desired behaviors of its collaborators on risk management matters, seeking to strengthen the awareness and commitment of employees in proper risk management in the course of their day to day activities.

The risk management culture underlines the need to reinvent ourselves to make sure that the company adapts to its needs and circumstances, ensuring the expected outcome, protecting life and the environment. This culture is framed within the agreements of Ecopetrol S.A.'s culture, through the following actions:

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- *We are honest, creative and collaborative:* We act responsibly and striving for the continuous improvement of the risk management in which we are immersed through cooperation and contributing our experience and creativity for the benefit of the company.
- *We are passionate for Excellence and committed to Life:* We secure the expected results of risk management by making efficient use of resources, being self-critical, disciplined, and making decisions promptly, ensuring sustainability and value creation.

The above, managed through the Leadership value chain, through which leaders must explore the knowledge of their team members, creating an environment of trust through communication and transforming their potential for the benefit of risk management.

3.4.b. Organizational structure of risk management at Ecopetrol S.A.

Ecopetrol manages its risks from a strategic, tactical and operational perspective. In other words, all accountable parties in the organization must have risk management methods to be applied in their appropriate level of responsibility.

Ecopetrol's organizational structure clearly states the roles, authorities and responsibilities to manage risk and its communication; similarly, it is based on the culture of prevention, which is an inherent value of the organizational risk management at all levels.

Prevention is based on making all organization members understand the relevance for the success of Ecopetrol that everyone is capable of detecting opportunities and threats in business so as to take the pertinent control measures.

3.4.c. Regulations and Risk Management Tools

The general action framework for Risk Management in Ecopetrol is established by the Comprehensive Policy of Ecopetrol S.A. and the Summary of Good Practices for Process Comprehensive Management and Control.

Ecopetrol S.A. has defined the regulations and management tools required for the implementation of the risk management cycle, for each of the types of risks identified.


This Guide, together with the various current and related documents, provide the guidelines for execution of the Risk Management Cycle.

3.5. SINGLE RISK MANAGEMENT CYCLE

For all types of risks, Ecopetrol S.A. has implemented a staged single Risk Management Cycle: planning, identifying, evaluating, treating and monitoring risks, as well as a cross-cutting stage of communication, so that possible deviations from the set objectives can be properly managed.

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In this cycle, there is an interaction among the three pillars of risk management, in a systematic, dynamic manner that involves all levels of the organization: the culture, the organizational structure, the regulations and the management tools.



Figure 1 Single cycle of risk management of Ecopetrol S.A.

3.5. a. STAGES OF THE RISK MANAGEMENT CYCLE

3.5. a.1. Planning Stage

Planning allows defining the scope and objectives of the application of the risk management cycle. It must include the definition of the resources, time, guidelines, processes and tools required to develop the next stages of the cycle, in accordance with the Company's declaration of Risk appetite as stated in the Good Governance Manual of Ecopetrol.


3.5. a.2. Identification Stage

It allows to determine in a systematic and structured manner the risks that may positively or negatively affect the fulfillment of the objectives, whether caused by internal factors (infrastructure, personnel, processes and technology) or external factors (economic, business, natural environment factors, political, social and technological) of the organization.

3.5.a.3. Evaluation Stage

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Risks must be prioritized to ensure that available resources are used to treat the most critical ones, by estimating the frequency of occurrence (probability) and impacts, both positive and negative. This estimation can be done qualitatively, semi-quantitatively, or quantitatively.

3.5.a.4. Treatment Stage

At this stage, the possible treatment options are selected, from which the risk management plan is defined and executed.

The appropriate treatment option must be chosen for each of the causes associated with the risk:


- **Avoid:** It consists in not incurring or suspending performance of activities or decisions that could potentially lead to the materialization of the identified risk. A risk is avoided because it has a high probability of occurrence and its impact could translate into serious consequences for the organization. Therefore, the decision is made of not carrying out the activity or replacing it for one that is less risky.
- **Mitigate:** It consists in developing activities whose purpose is to reduce the frequency or severity of losses.
- **Accept:** It means assuming the consequences implied in the materialization of the risk.
- **Transfer:** Transfer the risk, totally or partially, to a third party. The transfer of risks can be done through insurance policies, contractual clauses or guarantees, through which the company's exposure to losses that could derive from the materialization of a risk is avoided.
- **Exploit:** it consists in developing activities that enable taking advantage of situations that lead to exceeding the targets set for the objectives.

Treatment options should reduce the basic causes that may generate risks, address the consequences that would arise if the risk materialized or the probability of their occurrence, all by optimizing and effectively allocating the organization's resources.

3.5.a.5. Monitoring Stage

The objective of the stage is to verify the operation of the Risk Management Cycle and the quality of its performance over time, by monitoring risks and treatment options.

The information generated at this stage enables the identification of alerts leading to timely decision-making on Risk Management. Even though mitigation measures are established as soon as the risks are identified, at the monitoring stage, it is determined whether these mitigation measures have been sufficient to avoid the risk materialization.

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Monitoring can be carried out in two ways: through ongoing activities or by means of separate evaluations, which ensure the continuous application of risk management at all levels and across the Organization.

3.5. a.6. Communication Stage

This stage must be defined during planning and implemented throughout the identification, evaluation, treatment and monitoring stages. Communication enables the socialization of the results and the adequate flow of information (internal and external sources) and dialogue among the interested parties or stakeholders. It is defined as an interactive process for exchanging information and opinions at all levels of the organization seeking to identify, assess and respond to risks.

3.6. ROLES AND RESPONSIBILITIES

Ecopetrol S.A. defines the general roles and responsibilities for the operation of the risk management cycles in each of its application areas.


Similarly, all employees are responsible for managing risks derived from the strategy, processes, programs and projects for which they are responsible or in which they participate, through the implementation of the Risk Management Cycle.

Likewise, they must participate in the implementation of the cycle, establishing preventive measures and reporting new risks, incidents or materialized risks, using the means available in the Company for such purpose.

Corporate Compliance Vice Presidency: Reports to the pertinent areas issues that may impact the objectives and resources of the organization based on the supervision, monitoring and evaluation of risk management, as well as the sufficiency in the identification of risks, risk alerts, mitigation implementation, risk assessment, and progress in the application of risk management in the company.

Corporate Management of Internal Control Assurance: It issues guidelines for the implementation of Ecopetrol S.A. Risk Management and verifies the existence and operation of risk management minimum requirements, offering recommendations to strengthen its management and monitoring.

Risk monitoring areas: These areas are responsible for developing the methodology for the application of the risk management cycle and the assurance of its operation in the company in accordance with the types of risks identified in above numeral 3. 7.

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3.7. RISK CLASSIFICATION

The risks identified in the company can be classified according to a) regulatory references, standards and good practices¹, b) scope of application.

3.7.a. Classification of risks according to regulations, standards and good practices:

Regulation	Type of Risk	Risk monitoring area
NTCISO 14000:2004	Environmental Risks	Vice Presidency for Sustainable and Environmental Development
NTC OHSAS 18001:2007	Safety and Occupational Health Risks	Vice Presidency for Sustainable and Environmental Development
NTCISO/IEC 27001: 2006	Information Security Risks	Procurement and Services Vice Presidency
NTC SO 28000: 2008	Supply Chain Security Risks	Vice Presidency for Sustainable and Environmental Development
OSHA 1910.119	Process Safety Risks	Vice Presidency for Sustainable and Environmental Development
COBIT 4.1	Information Technology Risks	Procurement and Services Vice Presidency
SOX law	Risks (mistakes) in Financial Reports	Compliance Vice Presidency
Anti-Corruption, Fraud, Money Laundering and Terrorist Financing Laws	Compliance Risks: Corruption, fraud and money laundering and terrorist financing	Compliance Vice Presidency
Law 1581 of 2012 and its regulatory decrees	Security risks of information and personal data	Procurement and Services Vice Presidency
Basic Financial or Basic External Circular 100 of 1995 of the Financial Superintendency	Credit, market and liquidity risk	Vice President of Strategy and Finance


Table 1. Classification of risks according to regulations, standards and best practices.

There are risks that are managed through the execution of specific company processes not included in the previous list; for example, insurable risks, risks that cause business discontinuity, risks that

¹ The list of regulations or standards is issued to exemplify possible references that can be used as good practices, without necessarily implying that these must be adopted as mandatory. The formal adoption of a standard or regulation will be performed in accordance with the established Summary of Good Practices for the Management and Integral Control of Processes or to the law in force in the country where the company operates.

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generate a crisis scenario, etc. The management of these types of risks is the responsibility of the owners of the associated processes who must ensure the application of the risk management cycle.


Taking into account that Ecopetrol has different types of objectives depending on the setting to comply with the company's operation and strategy, different risk management applications are developed as shown below.

3.7.b. Risk classification according to scope:

Scope	Type of Risk	Regulatory Reference	Responsible area Risk monitoring
Strategic	Business risks	COSO - ERM / SO 31000	Compliance Vice Presidency
Processes	Process risks	COSO	Compliance Vice Presidency
Programs and Projects	Risks in programs and projects	PMBOK	Vice President of Engineering and Projects
Business cases, mergers and acquisitions	Risks in business cases, mergers and acquisitions	COSO - ERM / SO 31000	Vice President of Strategy and Finance, Vice President of Exploration
Contracting	Contract management risks	ISO 31000	Procurement and Services Vice Presidency
Activities	Operational risks	NTC OHSAS 18001:2007	Vice Presidency for Sustainable and Environmental Development

Table 2 Risk classification according to scope of application.

The scope of risk management application in the company is shown below, differentiating those who focus on cause management to reduce the possibility of risks materialization (preventive risk management) from those focused on management of consequences to reduce impacts (corrective risk management).

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TYPES OF RISKS

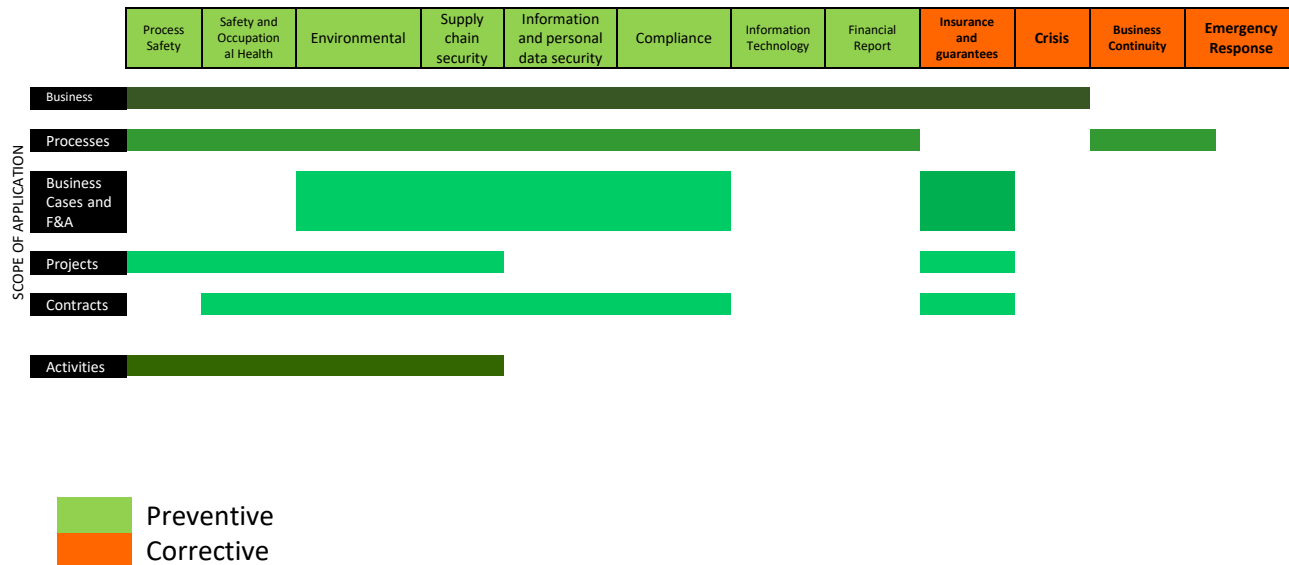


Figure 2. Scope of application of Risk Management in Ecopetrol S.A.

3.8. RISK MANAGEMENT APPLICATIONS


Risk management can be applied at different levels of the organization (Strategic, Tactical or operational), and will depend on the decision planned or being analyzed. Therefore, it will be important to identify the risk management that must be implemented to adequately support the decision. Therefore, the company has defined different procedures and instructions to manage risk in each application.

Likewise, in the decision-making process it is important to integrate risk management to ensure that all risks have been considered and evaluated in an impartial, transparent way, taking into account extreme situations and enabling a broader, more comprehensive perspective to take a decision.

The administration and the person accountable for the decision-making process assume the responsibility of designing and managing with the various business units, both strategic and operational, the appropriate implementation of the guidelines defined for the company's risk management, which will support decision making. The Management of Internal Control Assurance at ECOPETROL S.A. will make sure that the documented guidelines for decision-making comply with that set out in this Guide.

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The scope and instructive that must be followed for such analysis are listed below.

Scope	Regulatory
Strategic	Procedure for applying the Risk Management Cycle in business risks.
Processes	Internal Control System Manual
Business Cases and F&A	Instructive for the application of the Risk Management cycle in cases of Business, Mergers and Acquisitions
Projects	Risk Management Documentation in the project management process.
Contracts	Ecopetrol Contracting Manual
Activities	Analysis of the risks works performed by Ecopetrol SA

LIST OF VERSIONS

Previous Document			
Version	Date (dd/mm/yyyy)	Previous Code Document and Title	Changes
New Document			
Version	Date	Changes	
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