

RISK MANAGEMENT FOR A TYPICAL PETROLEUM, OIL AND GAS COMPANY IN SOUTH AFRICA

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Abstract

Risk management is becoming an important management discipline for most organisations including petroleum, oil and gas companies. However, before risks can actually be managed, it is imperative to ensure that a risk management framework is embedded. This research aims to research the general approach to a risk management process for a typical petroleum, oil and gas company operating in the South African industry and to determine the primary risk types for such a company. The result of this research could serve as an awareness instrument for petroleum, oil and gas industries to support and establish an effective risk management process, while striving to achieve industry and economic objectives. Furthermore, to serve as a working platform for those companies that is still in early stages of developing a practical risk management solution.

Keywords: Risk identification, Risk evaluation, Risk control, Risk financing, Risk appetite, Risk monitoring

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Introduction

The petroleum, oil and gas industry forms a vital and large part of any country's economy. It provides important support to transport, manufacturing and energy sectors and is a huge supplier of employment. As such, risk exposures to this industry culminate in a risk exposure for the country as a whole. Risks arising from this industry are a real threat to the industry and the country and require the close attention of government and executive management. "The resulting loss of income following an event could pose a greater threat than the actual physical damage" (Hamman 2008:6).

Risk management is applicable to all organisations, although the management approaches might differ. In the wake of recent risk management and corporate governance developments in terms of regulation, many organisations have by now implemented, to some degree, a risk management process. In some companies, these initiatives may only extend to safety and health or financial reporting, while others followed a more holistic approach and covered the total spectrum of a risk management process.

Employees of petroleum, oil and gas companies are widely exposed to dangerous activities. As such,

most of these companies are in an advanced stage in managing risks in terms of safety, health and environmental factors. However, to be able to effectively protect the organisation against various risk exposures and threats, it is imperative to understand the total risk exposure and to have a proactive management approach to prevent or minimise the potential effects should these risk events occur. It is, therefore, critical to optimise the benefits that an enterprise-wide risk management approach offers to an organisation.

As enterprise risk management are being pursued by many industries and organisations, it is imperative to do this by means of a structured approach to ensure that the best risk management practices are implemented according to the needs of the organisation.

Petroleum, oil and gas companies face similar challenges to establish a sound risk management approach. As such, this research aims to elaborate on an approach to risk management that could be used as a platform to develop a suitable risk management process for all companies operating in the petroleum, oil and gas industry. This will be achieved by a literature research on a risk management process and typical risks, followed by an analysis of information collated from a leading company in the South African

industry. Information was gathered by means of a questionnaire and interviews with employees of the company. The current status of various risk management methodologies and typical risks faced by the company was determined in order to serve as a platform and guideline for the development of a typical risk management process.

This research covers the following key issues in order to provide clarity on a typical risk management process:

- Components of a typical risk management process and definitions of various risk types which a company operating in the petroleum, oil and gas industry could face.
- Empirical research to identify the status of a typical company within the industry regarding the understanding and application of components of a risk management process as well as to prioritise the primary risk types such a company should be managing.
- Concluding remarks and recommendations on risk management.

Background

Traditionally risk management mostly focused on safety, health and environmental issues relating to people. The modern approach is much broader as companies begin to focus on potential losses and negative influences on business. According to Bardy et al (2008:238), there have been many high profile accidents which have resulted in few, or zero, fatalities and injuries, but huge cost to business. Companies have suffered significant financial losses and entire countries have seen major disruption from single incidents involving relatively small direct asset losses and sometimes no fatalities. For example, the release of dioxin at Seveso, Italy, in July 1976, resulted in no direct fatalities; however, this incident required the evacuation and decontamination of a wide area north of Milan. Although no fatalities suffered, it resulted in the contamination of about ten square miles of land and vegetation and more than 600 people had to be evacuated and about 2000 people had to be treated for dioxin poisoning.

In Australia during 1998 the Esso Longford liquefied petroleum gas processing plant experienced a massive explosion, killing two workers and injuring eight. Although the fatalities and injuries were relatively small, gas supplies to the State of Victoria were severely affected for several months after the incident. Most of the state's gas supply was cut for almost two weeks with serious disruption for a further two months and a total estimated cost to the industry of \$1.3 billion.

A further example is the Exxon Valdez oil spill on 24 March 1989 which resulted in no fatalities, but

in addition to the direct financial losses to Exxon, fines of around \$150 million dollars were imposed along with \$900 million civil settlements. In addition, the oil spill also had an effect on the environment which are difficult to put into \$-value terms.

Although the benefits of safety, health and environmental risks are well-documented and understood by most players in the petroleum, oil and gas companies, the abovementioned types of incidents caused a more focused and wider approach to risk incidents as one incident could have a ripple effect on various factors such as safety and compliance with legislation, people, finance and, ultimately, the continuation of the company as a going concern. As such, risk management should be extended to assess the risk exposures as well as the financial consequences of risk incidents. To emphasise this statement, Bardy et al (2008:239) state that in today's competitive business environment, key drivers are: improved financial performance; maximised up-time; reduced insurance costs; and reduced risk of interruption to business resulting from risk incidents.

In this regard, typical questions to be answered during a risk management process could be:

- Should an incident occur, what will it cost?
- What is the maximum loss which can be suffered as a result of the incident?
- How can the likelihood of an incident resulting in a loss be minimised?
- What are the financial risk exposures?
- How can a cost-benefit analysis of the operational risks be performed?

These questions form an integral part of proactive risk management and emphasises the importance of embedding an enterprise risk management framework and process. Stevens (2008) states that health and safety professionals need to embrace enterprise risk management to ensure that their input is valued by: using the 'correct' language; is risk-based; business focused; commercially relevant; and integrated with organisational policies and systems.

Enterprise risk management (ERM) includes risks that can influence the enterprise as a whole and could include financial risks, legal risks, operational risks etc. Patrick (2008:30) defines ERM as an activity that creates a risk-based approach to managing an organisation's operations, strategy and controls. An important fact, though, is that each and every risk must be managed in its own right. This concept is also referred to as managing risks in silos. As a result of the specialised nature of risk types, such as credit, market and operational risks, it forces a separate management approach for each of them. The concept of "enterprise-wide" lies with the potential influence of the risk exposure to the organisation. A specific risk type could have an

enterprise-wide influence and as such it is important to manage this risk on an enterprise-wide basis instead of a narrow risk or specific business approach.

It is similarly important for petroleum, oil and gas companies to follow a similar approach to manage their risks on an enterprise-wide basis. However, it is imperative to develop such a framework in a structured manner. A phased approach could be followed when developing a risk management framework, which could include the following steps:

- Develop a risk management process.
- Use the process to identify and evaluate the primary risk types and exposures.
- Develop and implement risk control measures.
- Financing of the risk controls, ensuring that the cost of risks does not exceed the benefits.
- Continuous monitoring of controls and changing circumstances which could result in additional risk exposures that should be managed.

It is, however, crucial to determine, up front, exactly what the organisation wants to achieve with

developing and implementing a risk management framework. Should it be just for the sake of having a risk management process, the total initiative would be nullified. The banking sector, for example, refers to the “use test” where it must be proved that the risk management processes and methodologies actually works and assists the organisation to manage its risks up to a point where the benefits of this process and system actually exceed the costs. This in mind, a starting point for any organisation to develop and establish a risk management framework is with a risk management process.

Risk Management Process

The absence of a clearly defined and embedded risk management process has led to many organisations suffering huge losses. The primary reason for this statement is that a risk management process can ensure a proactive approach in identifying risk exposures and implementing preventative controls.

A typical risk management process consists of five components, namely: risk identification, risk evaluation, risk control, risk financing and risk monitoring. This is illustrated by figure 1.

Figure 1. Risk management process



Source: Adapted from Young (2006:33)

Risk identification: This step is regarded as the first step of the risk management process and consists of determining the risk exposures facing the organisation as a whole as well as for individual business processes. According to the Basel Committee on Banking Supervision (2003:8), risk identification is paramount for the subsequent development of a viable risk monitoring and control system. It also refers to the need for an organisation to define and understand the nature of the risk that it faces. However, according to Chapman (2008:109),

before the activity of risk identification is activated it is important to analyse the business. The purpose is to gain an understanding of the following:

- The background of the business. For example, in this instance the general business would be related to petroleum, oil and gas products.
- The specific business activity, for example the specific product which could be petrochemicals, oil or gas etc.

The abovementioned information will provide the platform for an analysis of the business processes which can be used to determine the primary activities and the inherent risk exposures. There are various methods available to determine the inherent risks, such as:

- Questionnaires – using structured questionnaires to gather relevant information on risk exposures.
- Workshops – inviting key staff to a workshop to “brainstorm” business processes in order to determine the risk exposures.
- Surveys – evaluating surveys completed by knowledgeable people to collate information on risk exposures.
- Peer reviews – to gain the opinion of peers regarding specific risk-related issues which could be used during a risk identification process.
- Interviews – acquiring information from specialists by means of interviews regarding specific risk exposures.

After collating the necessary information on the risk exposures, the next step is to determine a suitable risk management tool to finalise the risk identification process. Examples of these tools are:

- Risk and control self-assessments, which aim to assess an organisation’s risk exposures and activities against existing control measures to determine the residual risk (net risk after taking control measures into account) that should be managed.
- Loss data (incident reporting) aims to identify the risks based on historical data of losses incurred due to a risk event. This data is used to identify control measures in order to prevent similar loss events affecting the organisation.
- Key risk indicators (KRI’s) are risks that have been identified and constantly being monitored against benchmarks in order to proactively prevent a risk becoming a major problem to the business. These indicators will alert the organisation to changes that may be indicative of risk concerns.
- Process analysis consists of analysing the key business processes to identify the risks which must be managed in order to ensure that the processes are effective.
- Scenarios aim to construct events which could negatively influence the business. These scenarios are then subject to a risk analysis to identify the possible risks which must be proactively managed.

- Risk modeling makes use of stochastic models which focus on an estimation of the risk of specific processes, using, for example, loss data to determine loss distributions that could assist in identifying expected and unexpected losses.

Risk evaluation: This activity is closely linked to the risk identification component and entails the assessment and measurement of the identified risk exposures. Measurement is the quantification of the risk to determine the types and extent of risk and risk assessments aim to determine the potential frequency and severity of the exposures that have been identified. According to the Committee of Sponsoring Organizations (COSO) (2004:47), in assessing risk, management considers the impact of expected and unexpected potential events. Many events are routine and recurring and they are already addressed in management budgets and programmes. Others are unexpected and may have a significant potential impact on the business and the organisation as a whole. As such, management has the obligation to assess the risk of all potential identified events that are likely to have a significant impact on the organisation. There are a number of methods which could be used to assist in the assessment of risks after the risk identification process, such as:

- Actual loss data which aims to provide information on actual risk events which occurred. The benefit of this information is that a value and/or volume can be determined in order to quantify the actual risk. According to COSO (2004:49), quantitative techniques are dependent on the quality of the supporting data and assumptions and are most relevant for exposures that have a known history and frequency of variability and allow reliable forecasting. Benchmarking, for example, is a useful assessment technique which focuses on specific events and compares results using common metrics to identify control measures or improvements. Some companies use benchmarking to assess the impact and likelihood of potential events across an industry.
- Rating scales form an important part of a risk assessment process, especially when the likelihood and impact of potential risks must be determined (assessed). A risk assessment process captures participants’ views on the potential likelihood and impact of future events, using either descriptive or numerical rating scales (see tables 1 and 2).

Table 1. Scale to determine impact of events

| Scale | Impact |
|--------|--|
| High | Financial impact on the organisation is likely to exceed a threshold value or have a significant impact on the organisation's viability or strategic objectives. |
| Medium | Financial impact on the organisation is likely to be between two threshold values or have a moderate impact on the organisation's viability or strategic objectives. |
| Low | Financial impact on the organisation is likely to be between two threshold values or have a minimal impact on the organisation's viability or strategic objectives. |

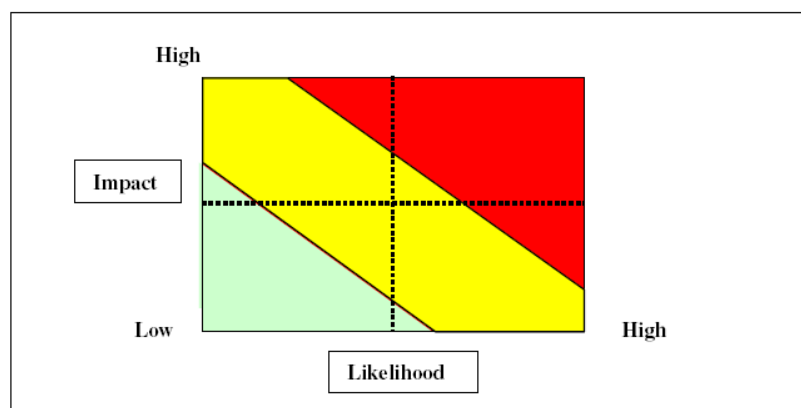
Source: Young (2006:62)

Table 2. Scale to determine the likelihood of events

| Assessment | Description | Indicators |
|------------|---|---|
| High | Probable. Likely to occur in a one-year period or more than 50% chance of occurrence. | Potential of it occurring several times within the next 10 years or has occurred within the past two years (Typical occurrences are due to external influences). |
| Medium | Possible. Likely to occur in a 10-year period or less than 50% chance of occurrence but greater than 2%. | May occur more than once within the next 10 years (These occurrences are typical to external influences, but mostly to occurrences internal in the organisation). |
| Low | Remote. Not likely to occur in a 10-year period or less than 2% chance of occurrence. | Has not occurred in this country; would be surprising if it occurred. |

Source: Young (2006:63)

- The abovementioned rating scales are only an example and each organisation should determine its own scales according to what best suits the assessment and the expected result.
- Risk register contains an output of the assessment proceeding process which should include a full description of the risks and the risk categories. Each risk should be assigned to a risk owner and risk manager. It could also include background information on the impact of the risk on the business.
 - Risk mapping involves a probability/impact diagram which can be used to plot the expected loss frequency against expected impact for each identified risk (Alexander 2003:133). An example of a risk map is illustrated in figure 2.

Figure 2. Illustration of diagram for risk mapping

Source: Adapted from Young (2006:76)

Risk control: Risk control concerns the application of mitigating techniques to prevent or reduce the probability of loss and it aims to eliminate or minimise the potential effect of the identified risk exposures. Important risk controls can be categorised as follows:

- Policies and procedures. Frost et al (2001:67) state that the point of establishing a policy is to ensure a consistent approach to risk management with regard to employees' behaviour, and to ensure that all risks across an organisation are identified. Effective risk management policies and procedures will orchestrate the risk management process for the organisation and, importantly, identify the roles and responsibilities of various role players involved in the risk management process.
- Internal controls. Internal controls should be determined to ensure the implementation of the policies and procedures. Internal control measures are also required to effectively mitigate the identified risks.
- Roles and responsibilities. The new era of risk management requires the specific appointment of risk managers and risk owners. The risk owner is also the business manager and overall responsible for the effective management of the risks facing the business. The risk manager is there to assist the risk owner with specialist advice during the risk management process. Both these role-players play an important role to ensure an effective risk management process.
- Risk reporting. Risk reporting is probably one of the most important aspects of risk management. Risk reports originate from an effective risk management process and ensure that the correct information is

collated and distributed to the decision-makers in a timely manner. An effective risk report will ensure timely decisions to mitigate risks. As such, it is imperative that accurate data is included in risk reports.

Risk financing: This component of the risk management process entails the financial provision for losses that may occur. It therefore, selects the most efficient method of providing (financially) for the elimination or consequences of risks. Thus, risk financing refers to the provision of sufficient funds to manage the risk and to absorb losses as they occur. Funding can be accomplished by, for example, a variety of internal and external financial resources including insurance and risk-based pricing. It is, however, critical that the cost of risk management does not exceed the benefits of the risk management system.

A further important part of the risk financing component of the risk management process is to establish a realistic risk appetite. Risk appetite is defined as the amount of risk to which the organisation is prepared to be exposed to. Risk financing will ensure that the risk appetite of the organisation is realistic in terms of the budget, cost of risk controls, insurance and possible capital allocation.

Risk monitoring: Risk monitoring is a continuous management component of a risk management process which aims to ensure the effectiveness of the risk management system and techniques which the organisation is using. Therefore, risk monitoring can be regarded as the operational process whereby the organisation can ensure that it operates within its defined risk policies and procedures and that the risk management activities are effective. Examples of typical components which could be used for risk monitoring are the following:

- Key Risk Indicators.
- Incident management.
- Internal audit reports.
- Risk reports.

Primary risk types

The primary risk types for a company operating in the petroleum, oil and gas industry was identified as the following:

- Operational risk – which is defined as the risk of losses due to inadequate or failed internal processes, systems and people and external events (Basel 2003:2).
- Credit risk – the risk that a counterparty to a financial transaction may fail to perform according to the terms and conditions of the contract at a given time (Young 2000:3).
- Market risk – the risk of a decrease in the value of a financial portfolio as a result of adverse movement in market variables such as prices, currency exchange rates and interest rates (Young 2000:3).
- Business risk – the risk that threatens the organisation's survival or its ability to sustain a profitable business activity and the creation of shareholder value due to poor strategic planning and/or external influences incorrectly anticipated by management.
- Legal risk – the risk arising from violations of or non-conformance with laws, rules, regulations, prescribed policies or ethical standards. The risk also arises when laws or rules governing certain products or activities of an organisation's customers may be unclear or untested. Non-compliance exposes the organisation to fines, financial penalties, payment of damages, and the voiding of contracts (Young 2000:4).
- Country risk – risks arising from business ventures with or investments in foreign countries due to, for example, local government policies, political situations, corporate governance and economic climates.

- Environmental risk – the risk of loss of existing customers from the deficiencies in environmental performance, increased operating costs arising from compliance with government legislation or fines imposed by empowered environmental institutions (Chapman: 2008:307)
- Safety/health risk – the risk exposure to employees and the community which can negatively influence their health and safety and/or the implications of not complying with health and safety regulations.
- Financial risk – relates to threats to solvency, profitability and liquidity and may arise from market price movements (Cleary & Malleret 2006:84).

Given the abovementioned literature review, the study was exploratory in nature, attempting to determine a basis to establish the status of risk management of a typical petroleum, oil and gas company in South Africa.

RESEARCH METHODOLOGY

Due to the fact that the identified company opted to remain anonymous, the company's identity will not be revealed, however, the company is one of the major role players in the South African petroleum, oil and gas industry.

The population selected for the research consisted of randomly selected employees at all levels throughout the company. A structured questionnaire was decided on to gather data for the research due to the wide geographical area of the company. In order to ascertain the current approach and status of the risk management process for the company as well as the primary risks facing the company a closed-structured questionnaire was developed. The questionnaire was developed from the literature study and with the assistance of senior employees of the company. As such, specific questions were formulated relating to the literature study on a risk management process and definitions of various risks facing the industry. (See table 3).

Table 3. Risk management questions

| # | Component of risk management | Questions |
|---|------------------------------|--|
| 1 | General (Yes/No answers) | 1. Do you have a formal strategic business plan which could be used as a platform for risk assessments? 2. Are you familiar with the risk management process of the company? 3. Do you have a formal risk management process established to support the business objectives? |
| 2 | Risk identification (Scale) | 4. What methods do you use to identify risk exposures? 5. What tools do you use to identify risks? |
| 3 | Risk evaluation (Scale) | 6. How do you measure/assess risks after identifying the risk |

| | | |
|---|---------------------------------|---|
| | | exposures? |
| 4 | Risk control (Scale) | 7. What risk control measures are in place? |
| 5 | Risk financing (Yes/No answers) | 8. Do you have a realistic risk appetite for the company? 9. Do you have sufficient insurance for identified risks? 10. Do you budget for the cost of controls? |
| 6 | Risk monitoring (Scale) | 11. How do you monitor risks? |
| 7 | Primary risk types | 12. Identify and prioritise the primary risks for the company |

Apart from the yes/no questions, the questions were coupled to the following rating scale in order to assist in analysing the response:

- 1 = Not at all
- 2 = Being developed
- 3 = To a degree
- 4 = To a large degree
- 5 = To a full degree
- ? = Unfamiliar concept

Research results

Eighty questionnaires were randomly distributed throughout the company. Thirty-six completed questionnaires were returned on the due date representing 45% of the population.

The response to the questions was analysed in terms of the arithmetic mean in percentages per rating, including the yes/no questions. The analysis of the questionnaire provided the following information:

General information

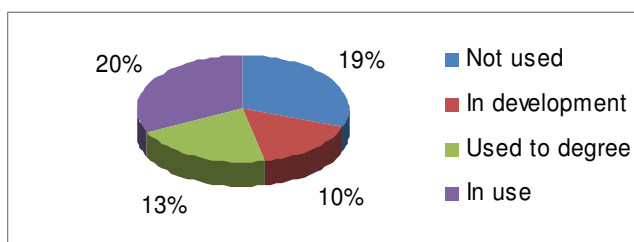
- 50% of the respondents indicated that their business unit have a formal strategic business plan which could be used as a platform for risk assessments, although 25% were unfamiliar with the concept.
- 69% stated that they are familiar with the risk management process of the company.
- 50% indicated that they do have a formal established risk management process to support business objectives.

Risk identification

Methods to identify risk exposures (See figure 3)

On average 27% of the respondents is unfamiliar with the concept.

Figure 3. Risk identification methods

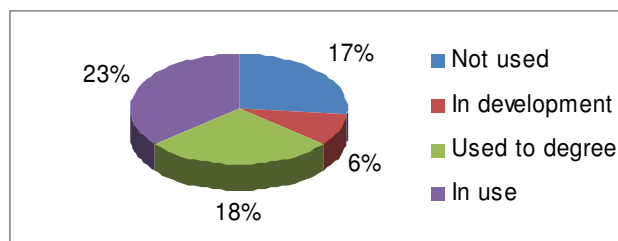


According to the respondents, the methods mostly used to identify risk exposures are peer reviews (13%) and workshops (20%). The methods least used are questionnaires and surveys (19%), while questionnaires are being developed as a method for identifying risk exposures (10%).

Tools to identify risks (See figure 4)

On average 25% of the respondents is unfamiliar with the concept.

Figure 4. Tools to identify risks

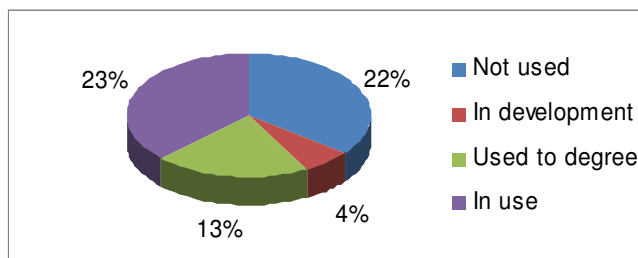


Respondents indicated that risk and control self-assessments (23%) and process analysis (18%) are the most used tools. Scenarios and modeling (17%) are not used, while key risk indicators (6%) are being developed.

Risk evaluation methods (See figure 5)

On average 38% of the respondents is unfamiliar with the concept.

Figure 5. Risk evaluation methods

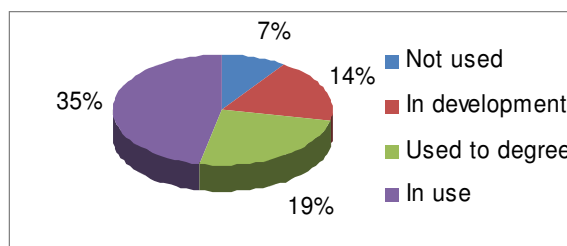


The respondents indicated that the loss data (23%) and the risk register (13%) are the most used methods during the risk evaluation process, while risk mapping (4%) is being developed and rating scales (22%) are not used.

Risk Control (See figure 6)

On average 24% of the respondents is unfamiliar with the concept.

Figure 6. Risk controls



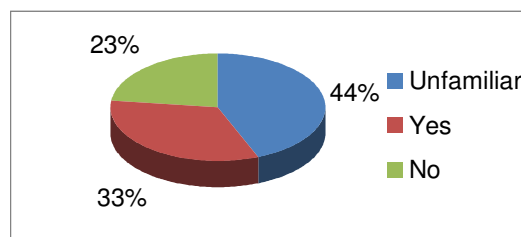
The risk controls mostly used are internal controls (35%) and policies and procedures (19%). The application of dedicated risk officers and risk reporting (21%) are either not used or in a development phase.

Risk Financing

Realistic risk appetite (See figure 7)

44% of the respondents were unfamiliar with the concept of risk appetite. 33% indicated that the company has a realistic risk appetite while 23% indicated otherwise.

Figure 7. Risk appetite

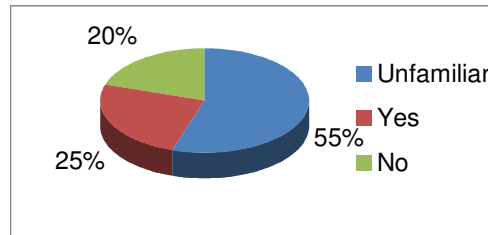


Insurance (See figure 8)

55% of the respondents indicated that they were unfamiliar with the state of insurance as part of the risk financing component. 25% indicated that the

company has insurance for identified risks. 20% indicated that there is no insurance for the identified risks.

Figure 8. Insurance

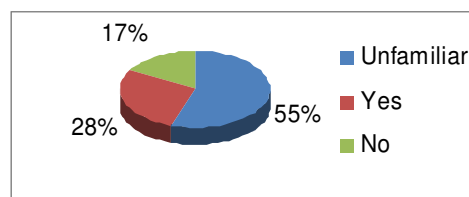


Budget for Cost of Risks (See figure 9)

55% of the respondents indicated that they were unfamiliar with the budget relating to the cost of

risks. 28% indicated that the budget includes the cost of risks and 17% indicated the contrary.

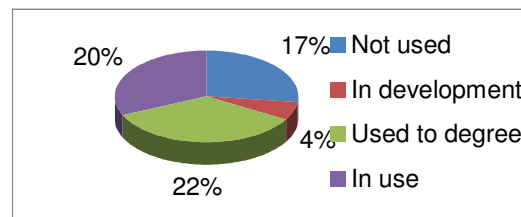
Figure 9. Budget for cost of risks



Risk Monitoring (See Figure 10)

On average 36% of the respondents is unfamiliar with the concept.

Figure 10. Risk monitoring methods

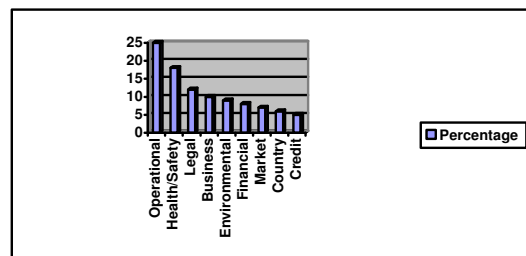


The respondents indicated that audit reports (22%) and monthly risk reports (20%) are the most used risk monitoring methods. The method not used is key risk indicators (17%), while incident management (4%) is being developed.

Primary risks

According to the respondents and based on the given definitions of risk types in the literature study, the following primary risk types were identified and categorised in order of the highest to the lowest priority (See Figure 11):

Figure 11. Primary risk types



Operational risk was identified as the highest priority due to the following factors:

1. Staff turnover
2. System Failures
3. Operating accidents
4. Power outages
5. Fraudulent incidents (Financial losses)

Health and safety risks were categorised as the second highest priority mainly due to the physical nature of the operations. Legal risk was third due to strict regulations imposed by government. Credit risk was rated the risk with the lowest priority at the time of the survey.

Concluding remarks

According to the response, an average of 38% of the respondents was unfamiliar with the various concepts of risk management. As such, it can be concluded that there is a need for risk management training for the company and for the industry as a whole. On the other hand it seems that most of the components of a risk management process are either being used or in a phase of development in order to address the company's needs to implement an effective risk management process.

Risk identification and risk evaluation are two important components of a risk management process. According to the response, the most important methods, namely risk and control self-assessments and incident management are being used respectively. However, it seems that the use of dedicated risk officers for business units is still lacking which requires attention as it forms an important part of ensuring an effective risk management process.

Risk financing, as a component of a risk management process, seems to be an unfamiliar concept to most respondents, which could be addressed by a training programme.

Although the research only involved one company and, therefore cannot be used as a precise reflection of the overall status of risk management for all the companies in the petroleum, oil and gas industry in South Africa, it could serve as a guideline and benchmark for companies operating in this environment. It, furthermore, serves as an indicator that training in risk management is much needed at all management and operating levels. This would ensure that all employees are knowledgeable regarding their role and responsibilities to ensure an

effective and successful risk management process for the company.

References

1. Alexander, C. 2003. Operational Risk: Regulation, Analysis and Management. FT Prentice Hall, Pearson Education Limited. London.
2. Bardy, M. Cavanagh, N. & Liveira, LF. 2008. Managing Business Risks from Major Chemical Process Accidents. 8th ASSE-MEC Conference Proceedings. 16 – 20 February 2008 – Kingdom of Bahrain.
3. Basel Committee on Banking Supervision. 2003. Sound Practices for the Management and Supervision of Operational Risk. Bank for International Settlements Basel.
4. Chapman, RJ. 2008. Simple tools and techniques for enterprise risk management. Reprinted September 2008. John Wiley & Sons Ltd. West Sussex, England.
5. Cleary, S. and Malleret, T. 2006. Resilience to Risk – Business success in turbulent times. Human & Rousseau division of NB Publishers (Pty) Ltd. Cape Town.
6. Committee of Sponsoring Organizations (COSO) of the Treadway Commission. (2004). Enterprise Risk Management – Integrated Framework. Jersey City: Committee of Sponsoring Organizations of the Treadway Commission. Jersey.
7. Frost, C, Allen, D, Porter, J, and Bloodworth, P. 2001. Operational risk and resilience: understanding and minimizing operational risk to secure shareholder value. PricewaterhouseCoopers. Butterworth-Heinemann, Oxford.
8. Hamman, R. 2008. A New Wave of Risks, Enterprise Risk Financial Services Solutions and Risk Strategies for Top Management. Volume 2 no 4 May 2008. Institute of Risk Management South Africa.
9. Patrick, B. 2008. Enterprise risk management and the role of technology: the answer to and cause of all our business problems. Managing Business Risk: A practical guide to protecting your business. Consultant editor: J. Reuvid. 5th edition Ernst & Young Kogan Page & Contributors, London.
10. Stevens, J. 2008. Health & Safety Risk Management. Managing Business Risk: A practical guide to protecting your business. Consultant editor: J. Reuvid. 5th edition Ernst & Young Kogan Page & Contributors, London.
11. Young, J. 2006. Operational Risk Management: The practical application of a qualitative approach. Van Schaiks, Pretoria.