Mount Kenya University

DEPARTMENT OF BUSINESS AND SOCIAL STUDIES

COURSE CODE: BBM 224

COURSE TITLE: PRINCIPLES OF RISK MANAGEMENT AND INSURANCE

Instructional Material for BBM- distance learning

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COURSE OUTLINE

BBM 224: PRINCIPLES OF RISK MANAGEMENT AND INSURANCE

Pre-requisites: BBM 112, 212 and 223

Purpose: To introduce students to the concepts of risk management and insurance key elements in business

Course Objectives: By the end of the course, students should be able to:-
- Define general risks
- Identify enterprise risks
- Analyze risks
- Describe risk management techniques
- Effectively mitigate and manage business risks

Course Content:
- Introduction to risks- definition of risk and risk management; objectives of risk management; The risk management statement and philosophy (risk policy); the risk management department; risk management process; concept of moral hazard and adverse selection
- Risk identification- techniques of risk identification; physical inspection; checklist method; flow charts and organizational chart; HAZOP; other methods
- Risk management methods
- Risk management through Insurance- requisites for insurance; principles of insurance; practices of insurance

Teaching / Learning Methodologies: Lectures and tutorials; group discussion; demonstration; Individual assignment; Case studies

Instructional Materials and Equipment: Projector; test books; design catalogues; computer laboratory; design software; simulators

Recommended Text Books:
- Williams, C. A. et al (2001) Risk Management and Insurance, Boston; McGraw Hill
- George, E. R. (2005) Principles of Risk Management and Insurance, New Delhi; Pearson Educational Inc

Text Books for further Reading:
- Vaughan (2001) Essentials of Risk management and insurance, New York; John Wiley and Sons Ltd

Other support materials: Various applicable manuals and journals; variety of electronic information resources as prescribed by the lecturer

TOPIC ONE: INTRODUCTION TO RISK MANAGEMENT

Learning Objectives

After studying this topic, you should be able to:

- Explain the meaning of risk

- Explain different types of risks

- Identify the major pure risks that are associated with financial insecurity

- Explain methods of handling risk

- Explain why risk management is important to an organization

- Describe an organization's risk management philosophy and policy

1.1 Definition of Risk

Risk is a concept that denotes a potential negative impact to some characteristic of value that may arise from a future event, or we can say that "Risks are events or conditions that may occur, and whose occurrence, if it does take place, has a harmful or negative effect". In everyday usage, risk is often used synonymously with the probability of a known loss. Risk is described both qualitatively and quantitatively. In some texts risk is described as a situation which would lead to negative consequences.

Qualitatively, risk is proportional to both the expected losses which may be caused by an event and to the probability of this event occurring.

Quantitatively, risk is often mapped to the probability of some event which is seen as undesirable. Usually, the probability of that event and some assessment of its expected harm must be combined into a believable scenario (an outcome), which combines the set of risk, regret and reward probabilities into an expected value for that outcome.

Risk, in insurance terms, is the possibility of a loss or other adverse event that has the potential to interfere with an organization's ability to fulfill its goals, and for which an insurance claim may be submitted.

Risk management ensures that an organization identifies and understands the risks to which it is exposed. Risk management also guarantees that the organization creates and implements an effective plan to prevent losses or reduce the impact of losses.

A risk management plan includes strategies and techniques for recognizing and confronting these threats. Good risk management does not have to be expensive or time consuming; it may be as uncomplicated as answering these three questions:

i) What can go wrong?

ii) What will we do, to prevent harm from occurring or our response to the harm or loss if it does occur?

iii) If something happens, how will we pay for it?

1.2 Uncertainty versus Risks

Uncertainty is the lack of complete knowledge about an event/ outcome. It implies there exist more than one possibility and the "true" outcome/state/result/value is not known. Uncertainty is measured by a set of probabilities assigned to a set of possibilities. Example: "There is a 65% chance this market will double in five years"

Risk is a state of uncertainty where some of the possibilities involve a loss, catastrophe, or other undesirable outcome.

Risk is measured by a set of possibilities each with quantified probabilities and quantified losses. Example: "There is a 30% chance the proposed oil well will be dry with a loss of ksh.100 million in exploratory drilling costs".

These terms are used in such a way that one may have uncertainty *without* risk but not risk without uncertainty. We can be uncertain about the winner of a contest, but unless we have some personal stake in it, we have no risk. If we bet money on the outcome of the contest, then we have a risk. In both cases there is more than one outcome. The measure of uncertainty refers only to the probabilities assigned to outcomes, while the measure of risk requires both probabilities for outcomes and losses quantified for outcomes.

1.3 Basic Categories of Risk

The most important categories of risk are:

a) Pure and speculative risk

b) Fundamental and particular risk

c) Enterprise risk

1.3.1 Pure and speculative risk

Pure risk is defined as a situation in which there are only the possibilities of loss or no loss. The only possible outcomes are adverse (loss) and neutral (no loss)

Types of pure risk

i) *Personal risks:* - risks that directly affect an individual. Examples include; risk of premature death, risk of insufficient income during retirement, risk of poor health/sickness, risk of unemployment etc.

ii) *Property risks:* - risk of property damage or lost due to various causes such fire, theft etc. *Direct losses* can result from the physical damage, destruction or theft of property. *Indirect or consequential losses* could also result from the occurrence of a physical damage or theft such as loss of profits from a damaged factory.

iii) *Liability risks:* - under certain instances one may be held personally responsible if they do something that result in bodily injury or property damage to someone else. Examples include: negligent operation of vehicles, defective products, professional misconduct etc

Speculative risk is a situation in which there is either profit or loss. For example an investment in shares may either result in profits if the price of the share increases or in a loss if the price falls. Other examples of speculative risks include gambling, oil exploration, going into business for oneself etc

1.3.2 Fundamental and particular risk

A fundamental risk is a risk that affects the entire economy or large number of persons or groups within the economy. Examples include rapid inflation, war, and natural disaster such as floods, earthquakes, and more recently terrorist attacks.

A particular risk is a risk that affects only individuals and not the entire community examples include car thefts, fires that destroy a business premise without significantly affecting others etc

1.3.3 Enterprise risk Enterprise risk is a relatively new term that encompasses all major risks faced by a business such risks include; speculative risk, pure risk, strategic risk, operational risk and financial risk among other risks. Most risk in enterprise can be grouped into three general categories ie financial risks, operational risks and strategic risks. Enterprise risks may be broadly categorized into the following:

a) *Financial Risks*

This risk concerns the continuous financial position of an enterprise. Any kind of predisposition to activities that could result to possible loss of funds by the business is a financial risk. Financial risks may include credit risks, liquidity risks, interest rate risks, foreign exchange risks and investments portfolio risks. Financial risk results in a business not meeting its financial obligations as and when they fall due for payment.

b) *Operational Risks*

These risks concern the enterprises internal day-to day operations. An operational risk is, therefore, a function of internal controls, information systems, employee integrity and operating process. Examples of operational risks include:

i) *Transaction risk*

This is a risk that arises on a daily basis in the business as transactions are processed. This risk is particularly high for enterprises that handle a high volume of small transactions daily. Common operational risks in the management of an enterprise include:

- Inconsistencies between the inventory management system data and the accounting system data.
- Inconsistent implementation of programs and strategies in the organization.
- Poor record keeping that results in loss of finances.

ii) Fraud Risk: Also referred to as integrity risk. Fraud risk is the risk of loss of earnings or capital as a result of intentional deception by an employee or client. The most common type of fraud in an enterprise is the direct theft of

c) *Strategic Risks*

Strategic risk include internal risks like those from adverse business decisions or improper implementation of those decisions, poor leadership, or ineffective governance and oversight, as well as external risks, such as changes in the business or competitive environment. These include:

i) Governance risk: One of the most understated and underestimated risks within any organization are the risk associated with inadequate governance or a poor governance structure. Direction and accountability come from the board of directors, who increasingly include representatives of various stakeholders in the business (investors, customers, institutional partners, etc). To protect against the risks associated with poor governance structure, businesses should ensure that their boards comprise the right mix of individuals who collectively represent the technical and personal skills and backgrounds needed by the institution.

ii) Reputation Risk: This refers to the risk to earnings or capital arising from negative public opinion, which may affect an enterprise's ability to sell products and services or its access to capital or cash funds. Reputations are much easier to lose than to rebuild, and should be valued as an intangible asset for any organization. Most successful enterprises cultivate their reputations carefully with specific audiences, such as with customers (their market), their funders and investors (sources of capital), and regulators or officials.

iii) External business environment risk: This refers to the inherent risks of the business' activity and the external business environment. To minimize business risk, the enterprise must react to changes in the external business environment to take advantage of opportunities, to respond to competition,

iv)   Regulatory and legal compliance risks: Compliance risk arises out of violations of or non-conformance with laws, rules, and regulations, prescribed practices, or ethical standards, which vary from country to country. The costs of non-conformance to norms, rules, regulations or laws range from fines and lawsuits to the voiding of contracts, loss of reputation or business opportunities, or shut-down by the regulatory authorities.

1.4 Risk and Insurance

Insurance is a risk-reducing investment in which the buyer pays a small fixed amount to be protected from a potential large loss. On the other hand gambling is a risk-increasing investment, wherein money on hand is risked for a possible large return, but with the possibility of losing it all. Purchasing a lottery ticket is a very risky investment with a high chance of no return and a small chance of a very high return. In contrast, putting money in a bank at a defined rate of interest is a risk-averse action that gives a guaranteed return of a small gain and precludes other investments with possibly higher gain.

1.5 Peril and Hazard

Peril is defined as a cause of loss. If a house burns in a fire the peril or cause of loss is fire. Other common perils to property damage are fire, lightning, wind, theft, etc

A hazard is a condition that creates or increases the chance of loss examples include physical (e.g. slippery road defective door lock) and legal hazard (e.g. adverse court ruling, adverse regulatory action by state).

1.6 Moral Hazard and Adverse Selection

Moral hazard is the prospect that a party insulated from risk may behave differently from the way it would behave if it were fully exposed to the risk. Moral hazard arises because an individual or institution does not bear the full consequences of its actions, and therefore has a tendency to act less carefully than it otherwise would, leaving another party to bear some responsibility for the consequences of those actions. For example, an individual with insurance against automobile theft may be less vigilant about locking his car, because the negative consequences of automobile theft are (partially) borne by the insurance company.

Moral hazard is related to asymmetric information. Asymmetric information is a situation in which one party in a transaction has more information than another. The party that is insulated from risk generally has more information about its actions and intentions than the party paying for the negative consequences of the risk. More broadly, moral hazard occurs when the party with more information about its actions or intentions has a tendency or incentive to behave inappropriately from the perspective of the party with less information.

In insurance markets, moral hazard occurs when the behavior of the insured party changes in a way that raises costs for the insurer, since the insured party no longer bears the full costs of that behavior.

There are two types of behavioral change. The first type is the risky behavior itself, resulting in what is called *ex ante moral hazard*. In this case, insured parties behave in a more risky manner, resulting in more negative consequences that the insurer must pay for. For example, after purchasing automobile insurance, some may tend to be less careful about locking the automobile or choose to drive at high speed, thereby increasing the risk of theft or an accident for the insurer. After purchasing fire insurance, the insured

may tend to be less careful about preventing fires (say, by smoking in bed or neglecting to replace the batteries in fire alarms).

A second type of behavior that may change is the reaction to the negative consequences of risk, once they have occurred and once insurance is provided to cover their costs. This may be called *ex post moral hazard*. In this case, insured parties do not behave in a more risky manner that results in more negative consequences, but they do ask an insurer to pay for more of the negative consequences from risk as insurance coverage increases. For example, without medical insurance, some may forgo medical treatment due to its costs and simply deal with substandard health. But after medical insurance becomes available, some may ask an insurance provider to pay for the cost of medical treatment that would not have occurred otherwise.

Financial bail-outs of lending institutions by governments, central banks or other institutions can encourage risky lending in the future, if those that take the risks come to believe that they will not have to carry the full burden of losses. A moral hazard arises if lending institutions believe that they can make risky loans that will pay handsomely if the investment turns out well but they will not have to fully pay for losses if the investment turns out badly. Taxpayers, depositors, and other creditors have often had to shoulder at least part of the burden of risky financial decisions made by lending institutions.

Some believe that mortgage standards became lax because of a moral hazard-in which each link in the mortgage chain collected profits while believing it was passing on risk-and that this substantially contributed to the 2007-2008 subprime mortgage financial crisis. Brokers, who were not lending their own money, pushed risk onto the lenders. Lenders, who sold mortgages soon after underwriting them, pushed risk onto investors. Investment banks bought mortgages and chopped up mortgage-backed securities into slices, some riskier than others. Investors bought securities and hedged against the risk of default and prepayment, pushing those risks further along. There are four different types of hazards;

i)   *A physical hazard* consists of physical properties that increase the chances of loss from various perils such occupying a building under construction, smoking in a petrol station etc.

ii)   *Moral hazard* refers to increase in probability of loss those results from evil tendency of insured persons. It's the *dishonesty tendency* on part of the insured to defraud the insurance company.

iii) *Morale Hazard* results from careless attitude on the part of the insured person towards occurrence of a loss. The purchase of an insurance policy may create morale because of the realization that the insurance company will bear the loss.

iv)   *Legal Hazard* arises out of violations of or non-conformance with laws, rules, and regulations, prescribed practices, or ethical standards, which vary from country to country. The costs of non-conformance to norms, rules, regulations or laws range from fines and lawsuits to the voiding of contracts, loss of reputation or business opportunities, or shut-down by the regulatory authorities.

Adverse selection, *anti-selection*, or *negative selection* is a term used in economics, insurance, statistics, and risk management. It refers to a market process in which "bad" results occur due to information asymmetries between buyers and sellers, where the "bad" products or customers are more likely to be selected.

The term adverse selection was originally used in insurance. It describes a situation where, as a result of private information, the insured are more likely to suffer a loss than the uninsured. Insurance is not as profitable when buyers have better information about their risk than sellers. Premiums set according to average risk will not be sufficient to cover claims because buyers will be selected for higher risk (buyers carrying less risk are less likely to purchase insurance).

In the usual case, a key condition for there to be adverse selection is an asymmetry of information. People buying insurance know whether they have a given characteristic or not, for instance if they are smokers or not, whereas the insurance company does not. If

the insurance company knew who smokes and who does not, it could set rates differently for each group and there would be no adverse selection.

In the early days of life insurance, adverse selection forced many life insurance companies out of business until the life insurance actuaries learned to compensate for adverse selection and underwriting procedures were improved to minimize adverse selection.

The risk of adverse selection generally arises when one does business with people of whom he/she have no knowledge. Adverse selection is a problem is where asymmetric information between the seller and the buyer; in particular, a trade will often produce an asymmetric premium for buyer or seller, if one trader has better/more complete information (e.g., about what other traders are doing, the complete trading book for a stock, etc.) than the average. When a buyer has better information than does the seller (or conversely), a trade may occur at a lower (higher) strike price than otherwise. Ideally, trade prices should be set in an environment in which all the traders have complete knowledge of ambient market conditions (or at least, equal knowledge thereof).

When there is adverse selection, people who know there is an above-average probability of a certain favorable price move-more than the average investor of the group - will trade, whereas those who know there is a below-average probability of a favorable price move may decide it is too expensive to be worth trading, and hold off trading. In this way, the 'better informed' investors will obtain a trading advantage (i.e., a trading premium) over the others.

One common source of adverse selection in the stock market is insider trading, in which an insider (such as a corporation's officers or directors) or a related party trades based on material non-public information obtained during the performance of the insider's duties at the corporation. Many jurisdictions attempt to address this problem by making the practice illegal and imposing longer jail terms and heavy fines.

1.7 Risk Management

Risk management involves identifying, analyzing, and taking steps to reduce or eliminate the exposures to loss faced by an organization or individual. The practice of risk management utilizes many tools and techniques, including *avoiding, assuming, reducing, transferring or insurance*, to manage a wide variety of risks. Every business encounters risks, some of which are predictable and could be controlled by management, and others which are unpredictable and uncontrollable.

The term risk management is a relatively recent (within the last 20 years) evolution of the term "insurance management." The concept of risk management encompasses a much broader scope of activities and responsibilities than does insurance management. Risk management is now a widely accepted description of a discipline within most large organizations. Basic risks such as fire, floods, employee injuries, and automobile accidents, as well as more sophisticated exposures such as product liability, environmental impairment/degradation, and employment practices, are in the province of the risk management department in a typical corporation.

Although risk management has usually pertained to property and casualty exposures to loss, it has recently been expanded to include financial risk management, such as interest rates, foreign exchange rates, and derivatives, as well as the unique threats to businesses engaged in e-commerce. With the increasing role of risk management, some large companies have begun implementing large-scale, organization-wide programs known as *enterprise risk management*.

In enterprise risk management, a risk is defined as a possible event or circumstance that can have negative influences on the organization. Its impact can be on its very existence, the resources (human and capital), the products and services, or the customers of the enterprise, as well as external impacts on society, markets, or the environment. In a financial institution, enterprise risk management is normally thought of as the combination of credit risk, interest rate risk or asset liability management, market risk, and operational risk.

1.7.1 Risk Management Philosophy

This is a broad and clear statement on where the company stands on risk management issues. For instance "It is the philosophy of this company to take all reasonable steps in the management of risk, to ensure that the company is not financially or operationally disrupted". The risk manager needs to ensure that the company is pro-active in the management of risk. To meet this needs a risk management statement important in the following ways:

a) Ensuring that the company is pro-active in its risk management functions and not just managing crises if and when they arise.

b) Ensuring long term objectives are thought out.

c) This focuses attention on the work of the risk management department, and its relationship to other sections.

d) Setting a benchmark for measuring the effectiveness of the risk manager and risk management department.

e) Communicating clearly the philosophy of the company concerning risk management.

1.7.2 Risk Management Policy

Organizational policies are a set of rules that govern various day to day operations. Risk management policy decomposes or breaks down the organization's risk management philosophy into *clear* and *precise* action plans/ rules that must be undertaken in order to adequately tackle the various risks an organization is exposed to.

"In implementing this general philosophy, (as above) it is the policy of the company to":

a) Identify those activities which have or may give rise to loss producing events.

b) Measure the impact of potential loss producing events on the company and its subsidiaries.

c) Take reasonable physical or financial steps to avoid or reduce the impact of potential losses.

d) Purchase insurance for those risks which cannot be avoided, always retaining risk where this is economically attractive.

The policy also includes:

a) The lines of authority - who reports to whom. For example, it might say that all new acquisitions of capital equipment are to be reported to the risk manager by the divisional managers;

b) Areas of risk management which are outside the risk management department, e.g. pure financial losses;

c) A statement emphasizing the approval and full support of the Board of Directors.

The directors have a duty toward the company and its shareholders to exercise skill and care in managing and safeguarding its assets and operations. They are trustees of the company's assets. There is a growing awareness of these duties and responsibilities, and the fact that they can be held accountable for a breach of these. In addition, there are statutory requirements concerning occupational health and safety, involving the possibility of criminal prosecution if the directors are negligent.

1.8 The Risk Management Department

1.8.1 Functions of the Risk Manager

a) To identify and quantify the organization's exposures to accidental loss.

b) To adopt proper financial protection measures through risk transfer (to outside parties), risk avoidance, and risk retention programs.

c) To develop and update a complete system for recording, monitoring, and communicating the organization's risk management program components and costs.

d) To design master insurance programs and self-insurance programs including the preparation of underwriting specifications.

e) Securing and maintaining adequate insurance coverage cost effectively.

f) To determine the most cost-effective way to construct, refurbish, or improve the loss protection system of any facility.

g) To develop and implement loss prevention/loss retention programs.

h) To actively participate on all contract negotiations involving insurance, indemnity, or other pure risks assumptions or provisions prior to execution of the contracts.

i) To create and publish guidelines on the handling of all property and liability claims involving the organization.

j) To comply with local insurance laws

k) To select and manage insurance brokerage representatives, insurance carriers and other necessary risk management service providers.

l) To establish risk management policies and procedures.

The Risk Manager is more than just a: safety officer; or insurance buyer. However, the risk manager cannot be *solely/ individually* responsible for managing the risks of the business. In the more successful risk management programs, this is a collective responsibility, with the Risk Manager;

a) Operating closely with other sectional heads;

b) Discussing problem areas; and

c) Improving safety measures.

The risk management department needs to be managed in the same way as any other. There are questions of staffing, collecting and filing statistics and other information, and budgeting for expenses. The functions of the risk management department are:

a) Identification

b) Analysis

c) Control; (terminate, treat, tolerate, transfer).

d) Record Keeping

e) Managing Insurance Portfolios

Identification

There are different methods and techniques can be employed in risk identification. These methods and techniques will be discussed later in the course. The risk management department is involved in working out combinations of these methods and techniques, and inventing others suitable for use in their particular company environment and culture. The risk manager needs to understand the firm and it does, and to consult with as many stakeholders as possible who can provide insights on issues relating to risk. The manager should clearly understand both the internal and external environment of the organization. This includes managers involved in but not limited to:

a) Health and safety programs in the work place

b) Crisis management

c) Internal audits

d) Financial management

e) Corporate security and executive protection

f) Motor fleet maintenance

g) Product quality control

Analysis

Analysis involves the assessment of

a) The likelihood of a loss - the frequency with which it occurs;

b) The possible and probable consequences - the severity or magnitude of the loss.

Risk Control

The department has the responsibility of keeping up-to-date information on all the operations within the company, and of ensuring that the risk control measures which have been decided upon are implemented. There are two quite distinct tasks involved here.

a) Be aware, or make itself aware, of all the new developments in the company.

b) Implement risk control measurers which are most appropriate for the new developments.

Linked to this is the continual need to keep abreast of new developments in the field of risk control. This implies keeping up-to-date on safety technology and physical risk control methods.

Record Keeping

An important feature of any department's work is keeping records. These records have to be accurate and accessible, and they must be held in such a way that they can be updated easily. The risk manager has different types of records and the computer is of great help in storing and retrieving information. The kind of information a risk manager should have on record includes:

a) Loss records; actual losses; near misses; costs of losses; reserves etc.

b) Details of insurance premiums;

c) Payroll figures;

d) Staff numbers;

e) Acquisitions and mergers;

f) All risk identification records;

g) Safety documents

Managing Insurance Portfolios

Insurance is still a major function in most risk management departments and while it is only one aspect of risk control, it does occupy a great deal of the time of the risk manager. Managing the insurance portfolio for a large corporation or company is almost a job in its own right. It involves:

a) assessing the need for covers of different types;

b) selecting insurers and brokers;

c) evaluating premiums;

d) matching and dovetailing of covers;

e) negotiating on price;

f) drafting wordings;

g) dealing with claims;

h) keeping all insurance records

The *primary objective* of an organization-growth, determines its strategies for managing various risks. *Identification* and measurement of risks are relatively straightforward concepts. Volcano eruption may be identified as a potential exposure to loss, for example, but if the exposed facility is in Nairobi the probability of volcano is rare and it will have a low priority as a risk to be managed.

Businesses have several *alternatives for the management of risk*, including avoiding, assuming, reducing, or transferring the risks. Avoiding risks, or loss prevention, involves taking steps to prevent a loss from occurring, via such methods as employee safety training. As another example, a pharmaceutical company may decide not to market a drug because of the potential liability. Assuming risks simply means accepting the possibility that a loss may occur and being prepared to pay the consequences. Reducing risks, or loss reduction, involves taking steps to reduce the probability or the severity of a loss, for example by installing fire sprinklers.

Transferring risk refers to the practice of placing responsibility for a loss on another party via a contract. The most common example of risk transference is insurance, which allows a company to pay a small monthly premium in exchange for protection against automobile accidents, theft or destruction of property, employee disability, or a variety of other risks. Because of its costs, the insurance option is usually chosen when the other options for managing risk do not provide sufficient protection. Awareness of, and familiarity with, various types of insurance policies is a necessary part of the risk management process. A final risk management tool is self-retention of risks-sometimes referred to as "self-insurance." Companies that choose this option set up a special account or fund to be used in the event of a loss.

Any combination of these r*isk management tools* may be applied in the fifth step of the process, implementation. The final step, *monitoring,* involves a regular review of the company's risk management tools to determine if they have obtained the desired result or if they require modification. Some easy risk management tools for small businesses include: maintain a high quality of work; train employees well and maintain equipment properly; install strong locks, smoke detectors, and fire extinguishers; keep the office clean and free of hazards; back up computer data often; and store records securely offsite.

1.9 Review Questions

1. a)**.** Explain the meaning of risk

   b). Define chance of loss

2. a). What is the difference between peril and hazard?

   b). Define physical hazard, moral hazard, morale hazard and legal hazard.

3. a). Explain the difference between pure and speculative risks

   b). How does fundamental risk differ from particular risk?

4. a). Explain the meaning of enterprise risk

   b). What is financial risk?

5. a). What is enterprise risk management?

   b). How does enterprise risk management differ from traditional risk management?

6. List major types of pure risks that are associated with great financial insecurity.

7. Describe the major social and economic burden of risk to the society

8. Explain the difference between a direct loss and an indirect or consequential loss.

9. Briefly explain each of the following methods of handling risk. Give an example of each

   a) Avoidance

   b) Loss control

   c) Retention

   d) Noninsurance transfers

   e) Insurance

1.10 Selected References

George E Rejda *Principles of Risk and Insurance Management*, Pearson Education, 2007

Bernstein, Peter L. *Against the Gods, The Remarkable Story of Risk*. New York: Wiley, 1996

Wiening, Eric A. *Foundations of Risk Management and Insurance,* First Edition, Malvern, PA: American Institute for Chartered Property Causality Underwriters/ Insurance of America 2002

TOPIC TWO: RISK IDENTIFICATION

Learning Objectives

After studying this topic you should be able to:

- Explain the meaning of Risk identification
- Describe the steps in risk in the risk management process
- Explain tools used in risk identification
- Describe the steps in conducting a HAZOP
- Explain a Risk Register

2.1 Definition of Risk Identification

Risk identification is a deliberate and systematic effort to understand and document all the key risks facing the institution. Risk identification starts with understanding the institutional objectives. Objectives spell out reasons for the organization existence. Risks are those things/events/outcomes that will effect the institution form achieving these objectives. The purpose of completing a risk identification exercise is to identify, discuss and document the risks facing the institution. Risks are recorded is known as the "risk register". The risk register serves three main purposes.

a) It is a source of information to report the key risks throughout the institution, as well as to key stakeholders.

b) Management uses the risk register to focus their priorities.

c) To help the auditors to focus their plans on the institution's top risks.

There are many methods of risk identification. However, whatever the method, ensure that it enables a comprehensive identification of risks, as unidentified risks cannot be planned for and treated. When considering approaches to risk identification note the following:

a) Personal experience or lessons from the past

b) Results of audits or physical inspections

c) Records of prior losses, (i.e. claims, financial or property losses, data/record loss, lost time incidents/occupational health and safety reports)

d) Judgment- consensus, speculative/conjecture, intuition

e) Results of benchmarking for perceived performance deficiencies

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f) Gap analysis- distinguishing between existing practice and business plan objectives

It is critical in the identification of risk, that two key elements of actual or potential exposure are identified, namely:

a) The cause of an exposure (i.e. failure of…, lack of..., loss of..., injury to....)

b) The effect of the exposure - the effects may include financial impact, impact on staff, and other stakeholders, impact on reputation and probity, impact on operational management and impact on the delivery of programs

2.2 Techniques and Tools for Risk Identification

1. Physical inspection
2. Checklists
3 Information-gathering techniques

a) Brainstorming
b) Delphi technique
c) Interviewing
d) Strengths, weaknesses, opportunities and threats (SWOT) analysis

4 Hazard and Operability Study
5 Diagramming technique**s**

a) System or process flow charts
b) Influence Diagrams

6 Documentation reviews
7 Combination Approach

2.2.1 Physical Inspection

This involves the physical examination (concerning things that can be experienced through the five senses) to detect risks facing the organization

Forms of inspection

An inspection program should be flexible. There are no hard and fast rules about it. It should be a combination of routine and non-routine inspection and includes:

a) routine inspection of all risks
b) routine inspection of a particular area of risk

c) specific inspections resulting from recommendations, complaints, reports or advice from staff, users, stakeholders and others -This includes investigations and/or inspections recommended by the risk management or health and safety committee inspections as a result of incidents or accidents

How often should inspections be undertaken?

Routine inspections should be carried out on a regular basis. The regularity depends on the nature of the risks and the circumstances affecting it. It could be monthly or quarterly. It should be more regular if circumstances warrant it. For example, if there is a high risk of injury through slips and falls, it is necessary to carry out more regular and diligent inspections to identify the causes of these slips and falls.

All risks should be reported even if you consider the source to be dubious. The risks should be treated seriously and inspected. Only then can you be confident about discounting them as possible risks.

What to inspect

Make a list of all possible areas of risk including physical and non physical risks. There may be records of previous incidents and accidents logged in a database somewhere. Injury and incident reports are also valuable sources of information.

The following example relates to the inspection of physical risks:

1. To identify physical risks, you should obtain plans of the premises
2. Keep the outdoor areas separate from the indoor
3. For a big facility, divide it into distinct and manageable portions
4. Prepare a standard checklist that can be used for the inspection. For example, it cover any or all of the following:

Physical condition of facilities	Lighting
Emergency management procedures	Noise emission
Storage of goods especially dangerous chemicals	Safety devices
Location and adequacy of first aid facilities	Ventilation
Conformity with current standards	Gas and electrical supply

Who should conduct the inspection?

- In large organizations either a risk management and/or health and safety committee
- For small organizations it may be the carried by one person responsible for risk management.
- The committee should coordinate the process
- Inspections should be carried out by those responsible for the management of the different work areas from which the risk emanates.
- The committee is responsible for conducting regular audits to gauge the adequacy of the inspection programs
- In the event of specialist or expert advice is required, the assistance of relevant experts should be sought

How to conduct an inspection

- Procedures should be developed for all the different types of inspections
- These procedures should be made known to all relevant parties
- The inspection team should have properly clarified all procedures and developed a checklist before any inspection begins
- Develop standard reporting documents that correspond with the checklist so that the results of inspections and remedial actions (both immediate and future) to be taken are properly documented
- Documentation is a key issue, as it would assist with any future audit or legal process. The ability to provide documentary evidence is of paramount importance when defending a claim of negligence
- Any dangerous risks should be treated immediately

2.2.2 Checklists

Organizations may develop checklists of risks based on information collected from past activities. The checklist is a quick way to identify risks. A checklist should not be considered as complete and the possibility of other risks should be addressed. Though checklists are largely industry specific, a typical checklist is given below.

A typical risk Identification checklist

A. External risks

Strategic- risks associated with threats to the organization's purpose or agenda.

Public image- risks associated with negative perceptions of the organization

Stakeholder relationships- risks associated with working relationships and trust.

Media- risks associated with relationships with journalists/editors and/or with unbalanced and negative reporting.

Political- risks associated with losing control of a project or losing the confidence of elected members/government.

Commercial- risks associated with costs, competitive edge and sensitive information release.

Staff/employees- risks associated with availability of key staff and risks to staff undertaking engagement.

Technological- risks associated with loss of intellectual property, processes or methods, obsolescence etc

Business- risks associated with accomplishing core organizational objectives.

Legal liability- risks associated with litigation, public liability and professional negligence.

Cultural/heritage- risks associated with loss of indigenous/non-indigenous significant values or places.

Opportunity cost- risks associated with not undertaking engagement.

B. Internal risks

Vision and business strategy- risk associated with organization vision and business strategy not supporting societal focus.

Leadership- risks associated with:

- lack of support in decision-making
- leadership behaviors not reinforcing expectations
- societal concern with the different messages being presented
- poorly planned and executed activities

Organizational culture - risks associated with:

- poor communication across the organization

- resource allocation not supporting the activities

- lack of linkages between the engagement activities and the overall departmental planning cycle

- lack of genuine commitment to the organization

Employee commitment and skills development strategies- risks associated with:

- staff lacking adequate skills to undertake tasks

- staff lacking adequate motivation to undertake tasks

- lack of resources to support and develop necessary skills

Internal communication and engagement strategies- risks associated with:

- incongruence (out of place) in internal communications and engagement strategies, reflected in external approaches

- confusion of direction

- activities that are duplicated

- lack of support for outcomes

Decision-making and resourcing- risks associated with:

- reduced effectiveness

- inability to follow through on recommendations

Technological support- risks associated with:

- time and cost overruns

- technically flawed systems

- rate of obsolescence

Link to government policies and priorities- risks associated with:

- engagement activities not reflecting government policy and priorities

- organizations not meeting the expectations of society as reflected in government policy and priorities

- the impact on the funding strategies of organizations

- the political impact of engagement not being considered

- stakeholder relationships being affected

Stakeholder relationships and cross-government partnerships- risks associated with:

- engagement initiatives developed at local level not being supported at head office level

- engagement initiatives developed at head office level not being supported at local level

- community groups trading-off one part of government against another

2.2.3 Information-Gathering Techniques

Several methods of information gathering can be used in risk identification. These may include the list below.

a) *Brainstorming*

Probably the most frequently used risk identification technique. The goal is to compile a comprehensive list of risks that can be addressed later in the risk analysis processes.

How Brainstorming Works?

A meeting is organized with a multidisciplinary set of experts. Under the leadership of a facilitator, these people generate ideas about enterprise risks. The brainstorming meeting proceeds without interruption, without expressing judgment or criticism of others' ideas and without regard to individuals' status in the organization. Sources of risk are identified in broad scope and posted for all to examine during the meeting. Risks are then categorized by type of risk and their definitions are sharpened. Brainstorming can be more effective if participants prepare in advance, the facilitator develops some risks in advance, and the meeting is structured by business segment and risk category

b) *The Delphi technique*

The Delphi technique is a method by which a consensus of experts can be reached on a subject such as project risk. Project risk experts are identified but participate anonymously. The Delphi technique helps reduce bias and minimizes the influence of any one person on the outcome.

How the Delphi Technique Works?

A facilitator uses a questionnaire to solicit ideas about the important project risks. The responses are submitted and put into risk categories by the facilitator. These risks are then circulated to the experts for further comment. Consensus on the main project risks may be reached after a few rounds of this process.

c) Interviewing

Risks can be identified by interviews with experienced project managers or with experts in the field. The appropriate individuals are selected and briefed on the project. The interviewees identify risks on the project based on their experience, the project information, and any other sources that they find useful.

d) Strengths, weaknesses, opportunities and threats (SWOT) analysis

Ensures examination of the organization from each of the SWOT perspectives to increase the breadth of the risks considered

2.2.4 Hazard and Operability (HAZOP) Study

General Description

A HAZOP study identifies hazards and operability problems. The concept involves investigating how the plant might deviate from the design intent. If, in the process of identifying problems during a HAZOP study, a solution becomes apparent, it is recorded as part of the HAZOP result; however, care must be taken to avoid trying to find solutions which are not so apparent, because the prime objective for the HAZOP is problem identification. HAZOP is based on the principle that several experts with different backgrounds can interact and identify more problems when working together than when working separately and combining their results.

The process is systematic and it is helpful to define the terms that are used:

a) *Study Nodes* - The locations or specific points (on piping and Instrumentation drawings and procedures) at which the process parameters are investigated for deviations.

b) *Intention* - The intention defines how the plant is expected to operate in the absence of deviations at the study nodes. This can take a number of forms and can either be descriptive or diagrammatic; e.g., flowsheets, line diagrams.

c) *Deviations* - These are departures from the intention which are discovered by systematically applying the guide words (e.g., "more pressure").

d) *Causes* - These are the reasons why deviations might occur. Once a deviation has been shown to have a credible cause, it can be treated as a meaningful deviation.

e) *Consequences* - These are the results of the deviations (e.g., release of toxic materials). Trivial consequences, relative to the study objective, are dropped.

f) *Guide Words* - These are simple words which are used to qualify or quantify the intention in order to guide and stimulate the brainstorming process and so discover deviations. Parameters include temperatures, reaction rates, composition, or pressure etc

Examples of HAZOP Guide Words and Meanings

Guide Words	Meaning
No	Negation of the Design Intent
Less	Quantitative Decrease
More	Quantitative Increase
Reverse	Logical Opposite of the Intent
Other Than	Complete Substitution

The Concept

The HAZOP concept is to review the plant in a series of meetings, during which a multidisciplinary team methodically "brainstorms" the plant design, following the structure provided by the guide words and the team leader's experience.

The team focuses on specific points of the design (called "study nodes"), one at a time. At each of these study nodes, deviations in the process parameters are examined using the guide words. The guide words are used to ensure that the design is explored in every conceivable way. Thus the team must identify a fairly large number of deviations, each of which must then be considered so that their potential causes and consequences can be identified.

The best time to conduct a HAZOP is when the design is fairly firm. There is a natural relationship between the HAZOP deviation approach and the usual control system design philosophy of driving deviations to zero; thus it is very effective to examine a plant as soon as the control system redesign is firm.

The success or failure of the HAZOP depends on several factors:

a) The completeness and accuracy of drawings and other data used as a basis for the study
b) The technical skills and insights of the team
c) The ability of the team to use the approach as an aid to their imagination in visualizing deviations, causes, and consequences
d) The ability of the team to concentrate on the more serious hazards which are identified.

Steps in conducting a HAZOP
a) Define the purpose, objectives, and scope of the study
b) Select the team
c) Prepare for the study
d) Carry out the team review
e) Record the results.

It is important to recognize that some of these steps can take place at the same time. For example, the team reviews the design, records the findings, and follows up on the findings continuously. Each step is discussed below as a separate item.

Define the Purpose, Objectives, and Scope of the Study
The purpose, objectives, and scope of the study should be made as explicit as possible. These objectives are normally set by the person responsible for the plant or project, assisted by the HAZOP study leader (perhaps the plant or corporate safety officer). It is important that this interaction take place to provide the proper authority to the study and to ensure that the study is focused. Also, even though the general objective is to identify

hazards and operability problems, the team should focus on the underlying purpose or reason for the study. Examples of reasons for a study might be to:

a) Check the safety of a design
b) Decide whether and where to build
c) Develop a list of questions to ask a supplier
d) Check operating/safety procedures
e) Improve the safety of an existing facility
f) Verify that safety instrumentation is reacting to best parameters.

It is also important to define what specific consequences are to be considered:

a) Employee safety (in plant or neighboring research center)
b) Loss of plant or equipment
c) Loss of production (lose competitive edge in market)
d) Liability
e) Insurability
f) Public safety
g) Environmental impacts.

Select the Team

Ideally, the team consists of five to seven members, although a smaller team could be sufficient for a smaller plant. If the team is too large, the group approach fails. On the other hand, if the group is too small, it may lack the breadth of knowledge needed to assure completeness. The team leader should have experience in leading a HAZOP. The rest of the team should be experts in areas relevant to the plant operation. For example, a team might include:

a) Design engineer
b) Process engineer
c) Operations supervisor
d) Instrument design engineer
e) Chemist
f) Maintenance supervisor
g) Safety engineer (if not HAZOP leader).

The team leader's most important job is to keep the team focused on the key task: to identify problems, not necessarily to solve them.

In addition, the team leader must keep several factors in mind to assure successful meetings:

    a) Do not compete with the members;

    b) Take care to listen to all of the members;

    c) During meetings, do not permit anyone to be put on the defensive;

    d) To keep the energy level high, take breaks as needed.

Prepare for the Study

The amount of preparation depends upon the size and complexity of the plant. The preparative work consists of three stages: obtaining the necessary data; converting the data to a suitable form and planning the study sequence; and arranging the meetings.

    a) *Obtain the necessary data.*

Typically, the data consist of various drawings in the form of line diagrams, flowsheets, plant layouts, isometrics, and fabrication drawings. Additionally, there can be operating instructions, instrument sequence control charts, logic diagrams, and computer programs. Occasionally, there are plant manuals and equipment manufacturers' manuals.

    b) *Convert the data into a suitable form and plan the study sequence.*

The amount of work required in this stage depends on the type of plant. With continuous plants, the preparative work is minimal. The existing, up-to-date flowsheets or pipe and instrument drawings usually contain enough information for the study, and the only preparation necessary is to make sure that enough copies of each drawing are available. Likewise, the sequence for the study is straightforward. The study team starts at the beginning of the process and progressively works downstream, applying the guide words at specific study nodes. These nodes are established by the team leader prior to any meetings.

With batch plants, the preparative work is usually more extensive, primarily because of the more extensive need for manual operations; thus, operation sequences are a larger

part of the HAZOP. This operations information can be obtained from operating instructions, logic diagrams, or instrument sequence diagrams.

c) *Arrange the necessary meetings.*

Once the data have been assembled and the equipment representations made (if necessary), the team leader is in a position to plan meetings. The first requirement is to estimate the team-hours needed for the study. As a general rule, each individual part to be studied, e.g., each main pipeline into a vessel, will take an average of fifteen minutes of team time.

After estimating the team-hours required, the team leader can arrange meetings. Ideally, each session should last no more than three hours (preferably in the morning). With large projects, it has been found that often one team cannot carry out all the studies within the allotted time. It may therefore be necessary to use several teams and team leaders. One of the team leaders should act as a coordinator to allocate sections of the design to different teams and to prepare time schedules for the study as a whole.

Carry out the Team Review

The HAZOP study requires that the plant schematic be divided into study nodes and that the process at these points be addressed with the guide words. As shown in Figure below the method applies all of the guide words in turn and either of two outcomes is recorded: (1) more information is needed, or (2) the deviation with its causes and consequences. If there are obvious remedies, these too are recorded.

HAZOP METHOD FLOW DIAGRAM
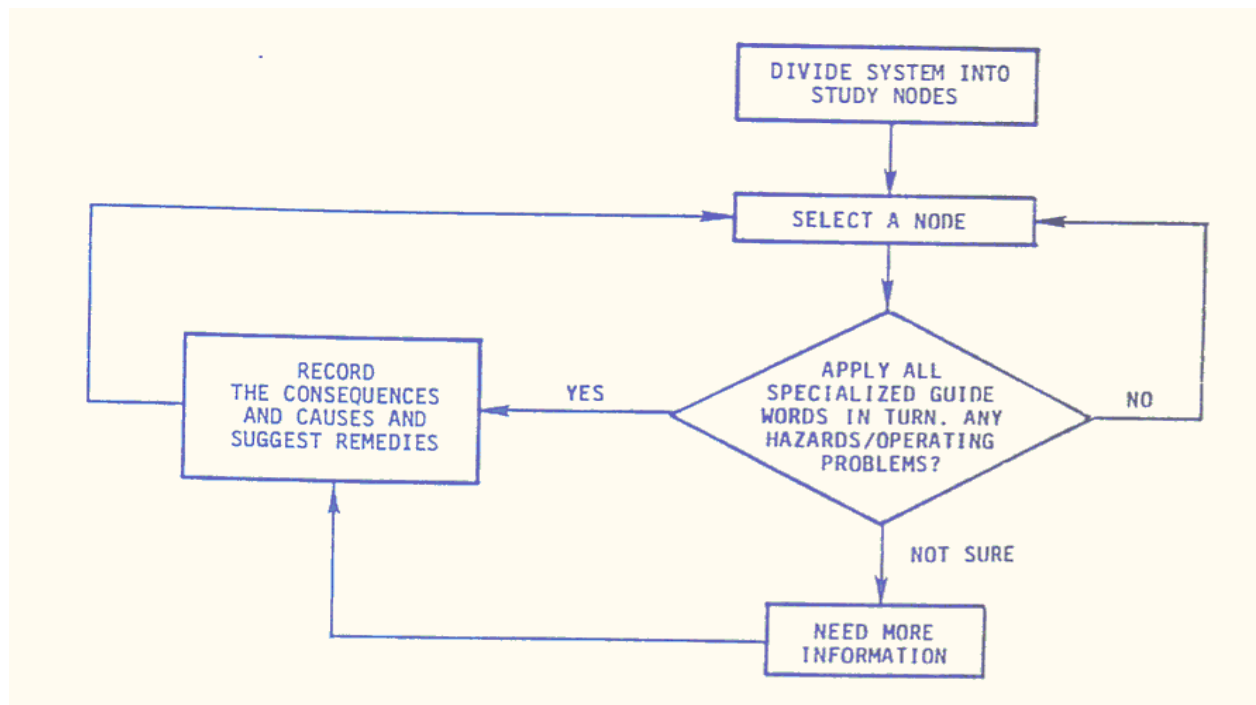
As hazards are detected, the team leader should make sure that everyone understands them. As mentioned earlier, the degree of problem-solving during the examination sessions can vary. There are two extreme positions:

a) A suggested action is found for each hazard as it is detected before looking for the next hazard

b) No search for suggested actions is started until all hazards have been detected.

In practice, there is a compromise. It may not be appropriate or even possible for a team to find a solution during a meeting. On the other hand, if the solution is straightforward, a decision can be made and the design and operating instructions modified immediately. To some extent, the ability to make immediate decisions depends upon the type of plant being studied.

Record the Results

A HAZOP form should be filled out during the meeting. This form is best filled out by an engineer who can be less senior than the team members. This recorder is not necessarily part of the team but, as an engineer, can understand the discussions and record the findings accurately. It has also been found useful to tape-record the sessions and have them transcribed. This saves the only complete record of the discussions and the reasoning behind the recorded findings, and it can be invaluable later in the plant life when the plant is modified, or if an event occurs which is the result of a deviation. Other means of recording can be developed as best suits the organization. Some have found that when insufficient information is available to make a decision, cards are filled out so that the responsible individual is reminded of the action item.

The recording process is an important part of the HAZOP. It is impossible to record manually all that is said, yet it is very important that all ideas are kept. It is very useful to have the team members review the final report and then come together for a report review meeting. The process of reviewing key findings will often fine-tune these findings and uncover others. The success of this process demands a good recording scheme.

2.2.5   Diagramming techniques

Cause-and-effect diagrams: - useful for identifying causes of risks

System or process flowcharts: - show how various elements of a system interrelate and the mechanism of causation

Influence diagrams: - a graphical representation of a problem showing causal influences, time ordering of events and other relationships among variables and outcomes

2.2.6   Documentation Reviews/Document Analysis

Document can aid in the process of risk identification. The assets listing on the balance sheet may alert the risk manger of assets that might otherwise be overlooked. The income /expenses classification in the income statement may likewise indicate areas of operation of which risk manager was unaware.

2.2.7 Combination Approach

This is a preferred approach to risk identification. This is where all the tools listed above are used in risk identification. Each of these tools can provide a part of the puzzle and together can be of considerable assistance to the risk manager.

No individual method or a combination of methods can replace the imagination and diligence of a risk manager in discovering the risks that an organization is exposed. Since many risks appear in many sources, risk managers need wide reaching information systems designed to provide a continuous flow of information about changes in operation, acquisition of new assets, new constructions and changing relationships in and outside the organization.

2.3 Risk Description

Risk may be described in either or a combination of the following:

Labor and equipment productivity	Permits and ordinances
Quality of work	Change in government regulations
Labor, equipment, and material availability	Delayed payment on contract
Safety	Changes in work
Defective material	Financial failure-any party
Contractor competence	Change-order negotiations
Inflation	Indemnification and hold harmless
Actual quantities of work	Contract-delay resolution
Labor dispute	Acts of God
Differing site condition	Third-party delays
Defective design	Defective engineering
Site access/right of way	

2.4 Outputs from Risk Identification

Risk Register

Risk register is a record to document the results of the risk management processes. It contains the following information:

a) List of identified risks with description

b) List of potential responses (added after responses are developed

c) Root causes of risk.

d) Updated risk categories. Process could lead to recognition of a new risk category.

2.5 Review Questions

1. Describe the steps in conducting a HAZOP
2. What is a risk register? Explain three main purposes served by a risk register
3. What factors are considered in selecting a method for risk identification?
4. Explain the following techniques for Risk Identification
    o Physical inspection
    o Checklists
    o Hazard and Operability Study
    o Diagramming techniques
    o Documentation reviews
    o Combination Approach
5. Explain how to conduct an inspection
6. Discuss the various *Information-Gathering Techniques*
7. Define the term risk identification

2.6 Selected References

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TOPIC 3. RISK ANALYSIS/EVALUATION

Learning Objectives

After studying this topic, you should be able to:

- Define risk evaluation/ analysis
- Describe risk maps and use
- Apply probability theory in risk management
- Explain how event tree analysis (ETA) is used in risk evaluation

Once risks have been identified, the risk manager must evaluate them. This involves measuring potential losses and the probability that it is likely to occur. The analysis requires Risk analysis involves the assessment of the likelihood (probability) and impact (severity). There are numerous methods of measuring the likelihood and impact of risks ranging from qualitative to quantitative methods. Among the most common are:

3.1 The Prouty Approach

This straightforward non-mathematical approach identifies four broad categories of loss likelihood

i)   Almost nil - extremely unlikely

ii)   Slight - has not happened, but could happen

iii)   Moderate - happens once in a while

iv)   Definite - happens regularly.

There are also three categories of loss impact:

i)   *Slight* - the organization can readily retain each loss

ii)   *Significant* - the organization cannot retain the whole of the loss, some part must be transferred

iii)   *Severe* - virtually all of the loss must be transferred or the survival of the organization is endangered.

(i), (ii) and (iii) above vary with the size of the organization and its financial resources.

Likelihood/Impact	Slight	Significant	Severe
Almost Nil			
Slight			
Moderate			
Definite			

These broad categories can be readily understood, but the financial significance must be inferred, thus there is need for some kind of mathematical basis.

3.2 Risk Maps

Companies not only generate risk maps to capture impact and likelihood but also to demonstrate how risks look when put together in one place. The value of the map is that it reflects the collective wisdom of the parties involved. Furthermore, risk maps capture considerable risk information in one place that is easily reviewed. A basic risk map captures both impact and likelihood.

High			
	Impact	High Impact Low Likelihood	High Impact High Likelihood
		Low Impact Low Likelihood	Low Impact High Likelihood
Low		*Likelihood of Occurrence*	*High*

When assessing likelihood or probability, the following scales can be used:

a) Low, medium, or high;

b) Improbable, possible, probably, or near certainty; and

c) Slight, not likely, likely, highly likely, expected.

The same is true for assessing impact:

    a) Low, medium, or high impact;

    b) Minor, moderate, critical, or survival; and

    c) Money levels, such as Kshs. 1 million, Kshs. 5 million, etc.

When qualitatively assessing these risks, it is also possible to estimate ranges.

For example, a company might determine that there is a low probability of a customer-related risk having an impact of Kshs.100 million, a moderate probability (or best guess) of a Kshs.50 million impact, and a high probability of a Kshs. 10 million impact.

Risk maps can help an organization determine how to respond to a risk. One weakness in risk maps (and in silo risk management) is that maps do not capture any risk correlations. Ignoring risk correlations can lead to ineffective and inefficient risk management. Risk correlations can be considered for financial risks or non-financial risks. For instance, how some companies manage one foreign currency exposure should be considered with how they manage another foreign currency exposure. Managing these in silos (without an enterprise-wide approach) can be inefficient because dollar exposures to not only the yen or euro ignore that the yen and euro are also correlated.

Similarly, silo risk management would ignore the fact that the movement of interest rates could influence an organization's pension obligations and debt obligations differently. Also how an organization manages commodity exposure today should be factored in with how it plans to change its long-term strategy to manage that same exposure. As is evident, correlations among risks and an enterprise-wide approach are critical.

3.3. Probability Theory

The probability of an event is measurement of the chance that the event will occur within a given time period. Probability can be expressed as a number that varies between 0 and 1.

    • 0 = the event *cannot* occur

    • 1 = the event is *certain* to occur

Values in between can be expressed as fractions (1/2; 1/100) decimals, (0.5; 0.01) or percentages (50%; 1%). The closer the probability to 1, (or 100%) the more likely the event becomes. There are two possible approaches to determining probability:

- A Priori
- A Posteriori

A Priori

This is based on *facts* which are evident at the *beginning.* There are a known number of outcomes. Each outcome has a probability which is known, or can precisely be calculated.

Example 1

In the toss of a coin, the probability of this landing with the "head" up is ½ because: There are two equally possible outcomes - a head or a tail; *one* of these two represents the event being determined.

Example 2

In the same way, the probability of drawing an ace from a well-shuffled deck of cards is 1/13 because out of 52 cards there are four aces.

A Posteriori

Probabilities are based on past experience. (Posterior = back) This is sometimes known as the statistical probability, because the true probability is estimated from the observed number of exposures and previous occurrences.

Example 1

If a fast-food kiosk had 10,000 identical mandazi stalls throughout the country and 200 were damaged by fire in one year, they might assume that the probability of fire in one of their stands was 200/10 000 or 1/50.

Example 2

In a fleet of 100 similar vehicles, 25 are damaged in accidents. The probability is 1/4.

The Multiplication Rule (First Law of Probability)

The first law of probability states:

   a) The probability that two or more independent exposure units will suffer a loss is equal to the product of the probabilities of loss for each of these units.
   b) More simply, this is called the *Multiplication Rule.*

Suppose that four shipments are made to the same four customers, ABC and D, every month.

From past statistics, the spatial interpretation shows the probability of theft of any one of the four shipments to be 1/4.

In our example, if the probability of each unit being involved is 1/4, then

Two units 1/4 x 1/4 = 1/16

Three units 1/4 x 1/4 x 1/4 = 1/64

Four units 1/4 x 1/4 x 1/4 x 1/4 = 1/256

On this basis, it may be possible to negotiate a reasonable rate of premium,

Formula

Shortening Probability to 'P' and calling the units A, B, C and D, this could be written as:

P (A and B) = P (A) x P (B)

P (A, B and C) = P (A) x P (B) x P(C), and so on.

Application

Now consider two buildings, A and B. A is a woodworking shop, with a probability of fire of 0.05. B is a metal workshop, where the probability is 0.02. The buildings are so close together that if one catches fire, there is an 85% chance (.85) that the other will burn as well.

$$P (A) = 0.05$$
$$P (B) = 0.02$$
$$P (A/B) \text{ or } (B/A) = 0.85$$
$$P (A \text{ } and \text{ } B) = P (A) \times P (B/A)$$
$$= (0.05) (0.85)$$
$$= 0.0425 \text{ or about } 1/24$$

Notice that this is the probability if building A starts the fire and spreads it to building B - probability (A and B). There is a lesser probability that B is first to catch fire (B and A)

$$P \text{ (B and A)} = P \text{ (B)} \times P \text{ (A/B)}$$
$$= (0.02) (0.85)$$
$$= 0.017 \text{ or nearly } 1/60.$$

Additions Rule

In the above examples, there are *two* probabilities - the event will, or will *not* occur. Because the scenario represents certainty, the sum or total of *all* the alternatives must equal one.

- If the probability of a car accident is 1/4, the probability of *no* accident is 3/4.
- If the probability of a building having a fire is 0.05, the probability of it not having one is
  0.95.

Probability Trees

We can use this fact in drawing up a probability tree, which is a useful way of illustrating how events combine.

Example 1

At a particular site, the likelihood of a theft occurring is 0.2.
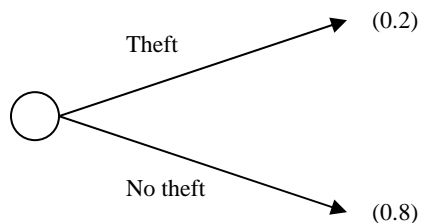
The respective probabilities are shown at the tips of the branches.

Example 2

Now we might think about the *kind* of theft. It might involve:

- Fixtures and fittings 0.3 probability
- Stock 0.5 probability
- Plant 0.2 probability

Notice again, that these add up to 1, being the total of all the probabilities.

Example 3

We said that the *overall* likelihood of a theft was 0.02; we can now split this figure as to fixtures, stock or plant.

Theft (0.2)

Fixtures (0.1)   (0.2)(0.3) = 0.06

Stock (0. 5)   (0.2)(0.5) = 0.10

Plant (0.2)   (0.2)(0.2) = 0.04

No theft (0.8)   (0.8)
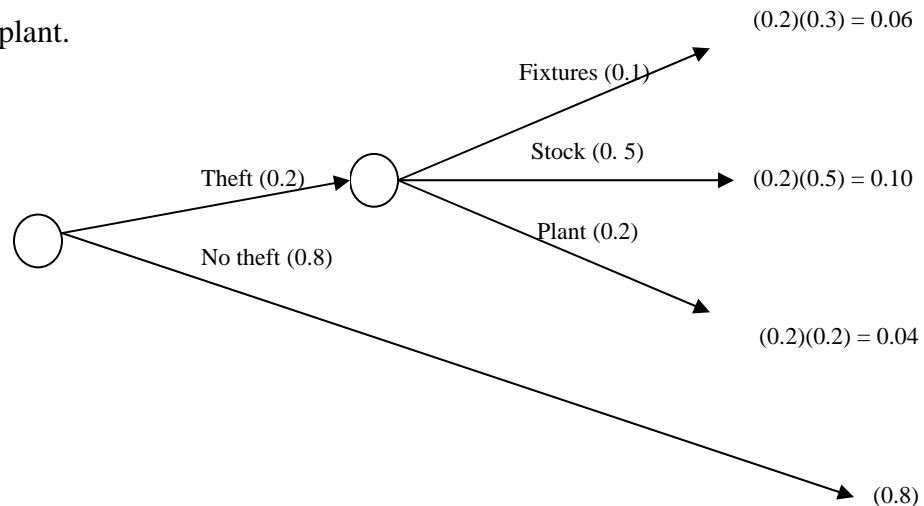
In each case - fixtures, stock, plant, the loss might be large, or small.

The Law of Large Numbers

The larger the number of similar exposure units, the more accurately you can predict the probability that a particular unit will suffer loss. If the fast-food kiosk had only 100 stands instead of 10,000, and 2 sustained loss, the calculated probability would be the same, 1/50. However, there would be less confidence in how close this would come to the real probability of loss. The proportion of stalls that suffer loss could fluctuate widely from year to year. Probability can be interpreted as the proportion of times a specified event will *almost certainly* occur out of a *large number* of trials.

Probability Distributions

(a) The Binomial distribution

The binomial distribution describes the possible number of times that a particular event will occur in a sequence of observations. The event is coded binary, it may or may not occur. The binomial distribution is used when a researcher is interested in the occurrence of an event, not in its magnitude (i.e. likelihood not impact) For instance, in a clinical trial of a pharmaceutical drug, a patient may survive or die; in a production floor of a manufacturing organization, an accident may or may not occur. Other situations in which binomial distributions arise are quality control, insurance problems, medical research and public opinion surveys.

The binomial distribution is specified by the number of observations, *n*, and the probability of occurrence, which is denoted by *p*.

$$P(x) = \frac{n!}{x!(n-x)!} p^x (1-p)^{n-x}$$

The mean of a binomial distribution is given by *np* and the standard deviation is given by $\sqrt{np(1-p)}$

Example: Assume that goods of a certain firm faces the possibility loss of items through theft while on transit, and the probability of loss of a single item is 0.4, when a group of 4 items are considered the possible number of losses are 0, 1, 2, 3 or 4 and their probabilities can calculated as;

$$\text{Probability of 0 losses} = \frac{4!}{0!(4-0)!} 0.4^0 \times 0.6^{4-0}$$

$$= \frac{24}{1 \times 24} \times 1 \times 0.1296 = 0.1296$$

$$\text{Probability of 3 losses} = \frac{4!}{3!(4-3)!} 0.4^3 \times 0.6^{4-3}$$

$$= \frac{24}{6 \times 1} \times 0.064 \times 0.6 = 0.1536$$

Note: that the probability of 0, 1, 2, 3 or 4 losses sum up to 1

(b) The Poisson distribution

The Poisson distribution is an appropriate when the sample size is very large and the probability of success is very small. Examples of such data are mortality of infants in a city; the number of misprints in a book, the number of accidents in a production line etc The Poisson distribution is a mathematical rule that assigns probabilities to the number occurrences. The probability density function of a Poisson variable is given by:

$$P(x) = e^{-\mu} \frac{\mu^x}{x!}$$

Where; μ = mean given as *np*

e = the base of natural logarithms (approximately 2.718)

Application of Poisson distribution:

If out 100,000 items shipped by firm only 120 were damaged in transit. What is the probability of having 0, 1, 2, 4 etc damaged items in a sample of 1000, items? Obviously if the binomial distribution was used the calculations would be mind-boggling involving the expression:

$$p(x) = \frac{1000!}{x!(1000!-x)!} 0.0012^0 \times 0.9988^{1,000-x}$$

However with Poisson distribution these probabilities can be easily calculated as follows:

$$P(x) = e^{-\mu} \frac{\mu^x}{x!} \ ,$$

$$\mu = np$$

$$n = 1000$$

$$p = 120/100,000 = 0.0012$$

$$\mu = 1000 \times 0.0012 = 1.2$$

$$P(0) = 2.718^{-1.2} \frac{1.2^0}{0!}$$

$$= 0.3012 \times 1 = 0.3012$$

$$P(2) = 0.3012\frac{1.2^2}{2!} = 0.2169$$

$$P(4) = 0.3012\frac{1.2^4}{4!} = 0.0260$$

And so on.

Note: that the probability of 0, 1, 2, 3 ……or 1000 damages sum up to 1 however as x increases the probability diminishes drastically. For instance the cumulative probability of up to 5 damages is 0.9984, thus the total probability of 6 damages to 1000 damages is 1- 0.9984 = 0.0016

(c) The Normal distribution

The normal distribution has two parameters, the mean *mu* (μ) and the standard deviation *sigma* (δ). Once the parameters are known, the distribution is completely specified. A good guess or estimate for *mu* is the mean of the observed values. An estimate for sigma is the standard deviation.

The normal curve can be fitted into a standard normal curve in which all the integration for area under the curve has been done. This way the probabilities can be easily computed. The standard normal variate Z is given by the expression:

$$Z = (\frac{x - \mu}{\sigma})$$

Example 1: In tossing a coin 1000 times, the mean *np* is $1000 \times 0.5 = 500$ heads and the standard deviation $\sqrt{np(1-p)}$ is $\sqrt{1000 \times 0.5 \times 0.5} = 15.18$

The probability of obtaining less than 470 heads is

$$Z = (\frac{x - \mu}{\sigma})$$

$$= (\frac{470 - 500}{15.18}) = -1.9$$

P (X < 470) = P (Z < -1.9) = 0.0287

Example 1: The monthly demand for a product is approximately normally distributed with a mean of 10,000 units and a standard deviation of 2000 units. What is the probability of a monthly demand being less than 6000 units?

$$= (\frac{6,000 - 10,000}{2,000}) = -2$$

$$= P(X < 6,000) = P(Z < -2) = 0.0228$$

This figure can be obtained from the normal distribution tables

3.3.1 Practical Application of Probability Theory

The distribution of fire damage to the warehouse belonging to X Company is shown below

Amount in Ksh	Probability
0	0.6
30,000	0.2
50,000	0.1
80,000	0.08
100,000	0.01
150,000	0.01

It is the policy of the company to insure fire risks if premiums charged do not exceed 10% of the expected loss, otherwise the risks are retained.

   i)   As the risk manger, advise the company on the course of action with regard to the fire risk if cost for fire insurance is Ksh 5,000

   ii)   What is the probability of losses exceeding Ksh 80, 000?

Answer

i)

Amount in Ksh (x)	Probability(p)	(p)(x)
0	0.6	0
30,000	0.2	6,000

50,000	0.1	5,000
80,000	0.08	6,400
100,000	0.01	1,000
150,000	0.01	1,500
Expected loss $\Sigma(p)(x)=$		19,900

10% of 19,900 = 1,990

Since the cost of insurance premiums is Ksh 5, 000 it exceeds the expected loss

The firm would therefore be advised to retain the risks

ii) The probability of loss exceeding Ksh 80,000 is the probability of a Ksh 100,000 loss or the probability of Ksh 150,000 loss $((0.01 + 0.01) = 0.02)$

3.4 Event Tree Analysis (ETA)

ETA is based on a binary logic in which an event either has or has not happened or a component has or has not failed. It is valuable in analyzing the consequences arising from a failure or undesired event. An event tree begins wit an initiating event such as a component failure, increase in temperature/pressure or a release of a hazardous substance. The consequences of the event are followed through a series of possible paths. Each path is assigned a probability of occurrence and the probability of various outcomes can be calculated.

Illustration: The likelihood and consequences of fire in a sprinkler installed plant may be analyzed using ETA as follows

Initiating event	Fire spreads quickly	Sprinkler fails to work	People cannot escape	Resultant event	Scenario
			P = 0.5 Yes	Multiple Fatalities	1
		P = 0.3 Yes			
	P = 0.1 Yes		No P = 0.5	Loss/ Damage	2
Fire Starts		No P = 0.7		Fire Controlled	3
Frequency = 1Year	No P = 0.9			Fire Contained	4

ETA is a useful tool for major accident hazard assessment. In major accidents ETA is used for the evaluation of possible consequences following a release of toxic/flammable vapors cloud from a process and to analyze the impact on plant, personnel, general public and the environment.

3.5 Gain/Loss Curves

Every item written into a firm's profit and loss account and its balance sheet is a stochastic variable with a probability distribution derived from probability distributions for each factor of production. Using this approach we are able to derive a probability distribution for any measure used in valuing companies and in evaluating strategic investment decisions. Indeed, using this evaluation approach it is possible to calculate expected gain, loss and their probability.

Illustration: As a simple illustration assume that that the risk management department of company X has generated the following probabilities for annual loss as a result of post harvest deterioration risk.

Annual loss amount (in Millions of Ksh)	0.3	0.48	0.68	1.13	1.15	1.50	1.98	2.73	4.28
Probability that loss will not exceed amount shown	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1

Plotting the above data produces the Gain/loss curve shown below

An Illustration of Gain/Loss Probability Curve for Company X
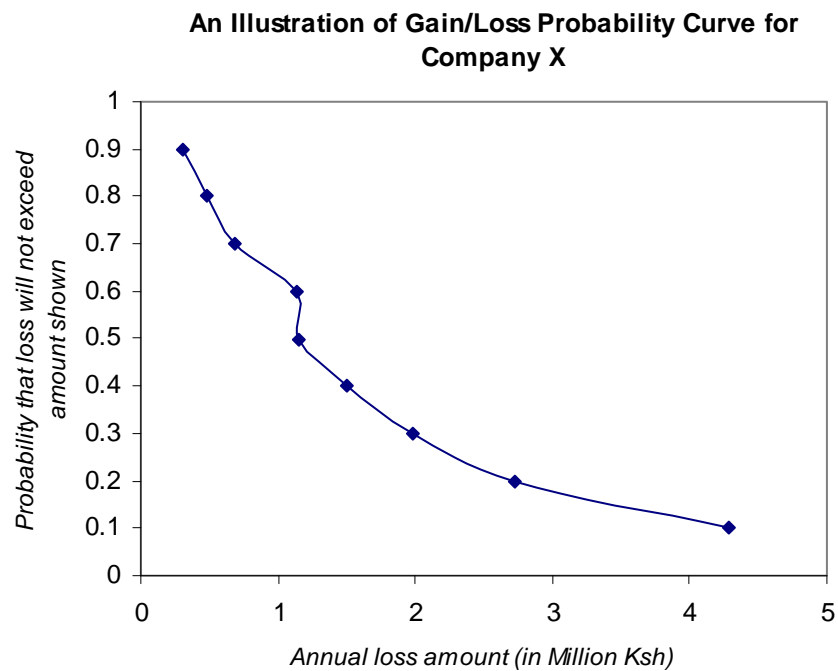
Gain/loss curves are useful tools because they help an organization see how a risk can influence its financial statements and result in a gain or a loss. They also reveal the distribution of potential gains and losses. Gain/loss curves do not show correlations between risks, however, and they do not show all the risks in one place.

The curve shows how much money the company loses or gains from post harvest deterioration risk. The horizontal axis represents dollars, and the vertical axis represents probability. The curve shows that the organization loses $1.15 million dollars on average

(at 50% probability in this illustration) as a result of this risk. Moving along the probability scale shows that, 90% of the time, this organization loses $300,000 because of this risk. The organization believes it loses $4.28 million about 10% of the time.

The shape of the probability curve provides concise information concerning risk. The lower the risk the steeper the probability curve, whereas the flatter the curve the higher the risk is evident. Knowing how big of an impact a risk causes over a distribution of probabilities provides management with the information necessary to decide how much money to spend managing the risk. Gain/loss curves can also reveal that some risks occasionally generate gains instead of losses. Developing gain/loss curves require substantial data collection, and a company has to balance the data collection efforts with the benefits obtained.

3.6 Tornado Charts

Similar to gain/loss curves, tornado charts attempt to capture how much of an impact a risk has on a particular parameter such as revenue, net income, or earnings per share.

Illustration: A firm is considering investing in a fish processing plant which costs Ksh 6,000,000 that is expected to generate constant net incremental cash flows of Ksh 3,000,000 for the next four years. If the cost of capital is 10% and 0.05% of the project cost constitute capitalized transport cost for the project plant, construct a tornado chart depicting the effect of (a) +/- 1% in interest rates (b) +/-10% in Plant cost and (c) +/-10% in transport cost on the net present value (NPV).

Since the cash flow is constant it is an annuity thus the PV can be obtained using the present value interest factor at annuity (PVIFA).

$$PVIFA = \left[\frac{1 - \frac{1}{(1+r)^n}}{r} \right]$$

(a)   @ 10% NPV= $3,000,000 \times 3.169865446 - 6,000,000 = 3,509,596$

       @11 % NPV= $3,000,000 \times 3.10244569 - 6,000,000 = 3,307,337$

@ 9% NPV= $3,000,000 \times 3.239719877 - 6,000,000 = 3,719,160$

(b)   @-10% Plant cost = $3,000,000 \times 3.169865446 - 5,403,000 = 4,106,596$

         @+10% Plant cost = $3,000,000 \times 3.169865446 - 6,597,000 = 2,912,596$

(c)   @-10% Transport cost = $3,000,000 \times 3.169865446 - 5,997,000 = 3,512,596$

         @+10% Transport cost = $3,000,000 \times 3.169865446 - 6,003,000 = 3,506,596$

With the ranges calculated, the tornado chart can be constructed around the projected NPV as shown below
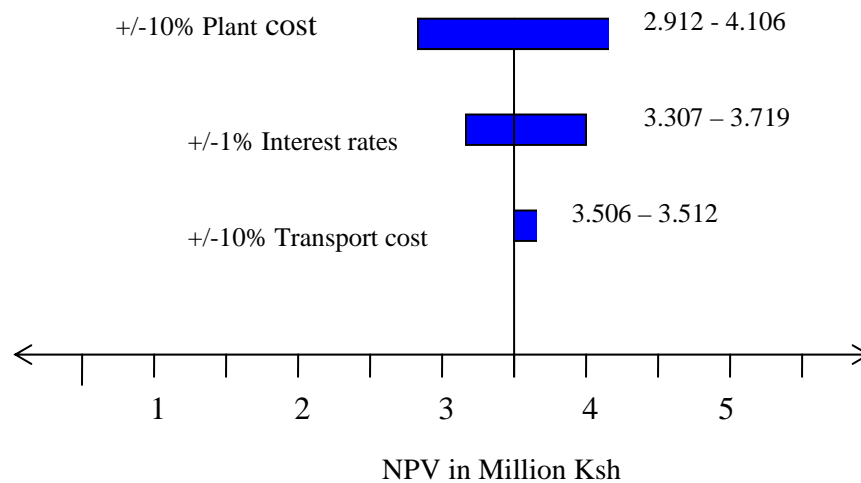
Tornado charts do not show correlations or distributions, but they are valuable because executives can see, in one place, the biggest risks in terms of a single performance parameter.

3.7 Risk Corrected / Adjusted Revenues

Risk-adjusted (or risk-corrected) revenues allow management to see how revenues could look if risks were managed better. Risk-corrected revenues are smoother and more controllable. Risk-corrected revenues also produce a tighter distribution of earnings. A tighter distribution of earnings could potentially lead to improved performance of its stock price. While stakeholders (e.g., investors) appreciate growth in earnings, they also

appreciate some level of stability and predictability and are often willing to pay a premium for these attributes.

3. 8 Earnings at Risk

Earnings at risk are determined by examining how earnings vary around expected earnings. In this approach, variables are examined to see how they influence earnings, such as determining the influence that a one-point movement in interest rates would have on earnings. Similarly, expected or budgeted cash flows can be determined and then tested for sensitivity to certain risks. Some companies trace the earnings-at risk to individual risk sources. Knowing the actual root cause or source of the risk helps to manage it more efficiently. Companies can also trace the earnings-at-risk to business units to help gauge the hedge effectiveness of each business unit. Knowing which business units have the greatest risk is valuable information. With this knowledge, a company could compare a business unit's earnings level to the earnings-at-risk. Those units that generate low earnings and high levels of risk may not be desirable business units. Having earnings-at-risk in the aggregate allows an organization to see which months have the greatest risk. Also, distributions can be created that estimate the probability of meeting earnings targets

3.9 Revision Questions

1. Explain how event tree analysis (ETA) is used in risk evaluation
2. What are risk maps
3. Explain three categories of loss impact
4. Explain the three laws of probability
5. Differentiate between the following dependent and independent events
6. Consider two vehicles, A and B. A is a petrol transport tanker, with a probability of fire of 0.05. B is a diesel transport tanker, where the probability is 0.02. The vehicles are always transporting fuel together that if one catches fire; there is an 85% chance (.85) that the other will burn as well. Determine the probability if A starts the fire and spreads it to B - probability (A and B).

7. Assume that goods of a certain firm faces the possibility loss of items through theft while on transit, and the probability of loss of a single item is 0.4, when a group of 5 items are considered the possible number of losses are 0, 1, 2 , 3 ,4 or 5 .determine the probability of 2 , 3 ,4 or 5 losses

8. If out 10000 bolts produced by a machine 12 are damaged. What is the probability of having 0, 1, 2, 4 bolts damaged in a sample of 100 bolts?

9. Of 500 employees of a firm 280 have a life insurance policy ,400 have a medical insurance cover and 200 participate in both programmes

   a) What is the probability that a randomly selected employee will be a participant in atleast one of the two programmes?

   b) Determine the probability that an employee will be a participant in the life insurance plan given that he has a medical insurance coverage

10. The mean and standard deviation of the wages of 60000 workers engaged in a factory are ksh 1200 and ksh 400 respectively assuming the distribution to be normal;

    Required: Determine the following;

    i)   The percentage of workers getting wages above ksh 16,000

    ii)   Number of workers getting wages between 600 and 900

    iii) Number of workers getting wages between 1100 and 1500

3.10 Selected References

George E Rejda *Principles of Risk and Insurance Management*, Pearson Education, 2007

Bernstein, Peter L. *Against the Gods, the Remarkable Story of Risk*. New York: Wiley, 1996

Wiening, Eric A. *Foundations of Risk Management and Insurance,* First Edition, Malvern, PA: American Institute for Chartered Property Causality Underwriters/ Insurance of America 2002

TOPIC FOUR: RISK MANAGEMENT METHODS

Learning Objectives

After studying this topic, you should be able to:

- Explain major methods of handling risks

- Explain the meaning of catastrophe planning

- Describe risk funding methods

- Explain non insurance transfers

4.1 Meaning of Risk Management

This is a process that identifies loss exposures faced by an organization and selects the most appropriate techniques for treating such exposures. Because the term "risk" is ambiguous and has different meanings, many risk managers use the term "loss exposure" to identify potential losses. A *loss exposure* is any situation or circumstance in which a loss is possible, regardless of whether a loss occurs. Examples of loss exposure include manufacturing plants that may be damaged in an earthquake or flood, defective products that may result in lawsuits against the company, theft of company's property because of inadequate security. In the past, risk managers generally considered only pure loss exposure faced by the firm. However, newer forms of risk management are emerging that consider both pure and speculative loss exposures faced by the firm.

4.1.1 Objectives of Risk Management

These may be classified into two: pre loss and post loss objectives

Pre loss objectives are:

i) To prepare for potential losses in the most economical way:- This involves analyzing the cost of safety programs , insurance premiums aid and the cost associated with the different techniques for handling losses

ii) To reduce anxiety: - certain loss exposures can cause great worry and fear for the risk manager and key executives for example the threat of a catastrophic law suit from a defective product can cause greater anxiety than loss from a minor fire.

iii) To meet any legal obligations: - government regulations for instance may require that the firm install safety devices to dispose hazardous waste materials properly or label products appropriately. The risk manager must ensure that these legal obligations are met

Post loss objectives are:

i) To ensure survival of the firm: - after the loss occurs the firm should be able to resume at least partial operations within some reasonable time frame.

ii) To continue operating:- for some firms ability to continue operating is of critical importance public utilities such as water companies must continue to provide service. Competitive firms such as banks must also continue operating otherwise their businesses will be lost to competitors.

iii) To ensure stability of earnings: - earnings per share can be maintained if firms continue to operate. The firm may however incur huge expenses to achieve this goal and perfect stability may not be maintained if the firm is not cushioned from the loss

iv) To ensure continued growth of the firm: - this may be achieved through new products and markets development or by acquiring or by merging with other companies. It is therefore imperative to consider the effect of a loss of the firm's ability to grow.

v) To minimize the effect the loss may have on other persons and on society: - a severe loss can adversely affect employees, suppliers, creditors and the community in general. A severe loss that shuts down a plant for an extended period in a small town may cause considerable economic distress in the small town

4.1.2 Steps in the Risk Management Process

There are four steps in the risk management process

     a) Identify loss exposures

     b) Analyze the loss exposures

     c) Select appropriate techniques for treating the loss exposures

     d) Implement and monitor the risk management program

Each of these steps is discussed below

Identifying Loss Exposures

The first step in risk management process is to identify all major and minor loss exposures. This step involves analysis of all potential losses. Important loss exposures relate to the following:

i)   *Property loss exposures*

- Building, plants , other structures
- Furniture, equipment, supplies
- Computers, computer software, and data
- Inventory
- Accounts receivable, valuable papers and records
- Company planes, boats mobile equipment

ii)   *Liability loss exposures*

- Defective products
- Environmental pollution (land, water, air, noise)
- Sexual harassment of employees, discrimination against employees, wrongful termination
- Premises and general liability loss exposures
- Liability arising from company vehicles
- Misuse of the internet and e-mail transmission, transmission of pornographic material
- Directors' and officers' liability losses

iii)   *Business income loss exposures*

- Loss of income from a covered loss
- Continuing expenses after a loss
- Extra expenses
- Contingent business income loss

iv)   *Human resources loss exposures*

- Death or disability of key employees
- Retirement or unemployment
- Job-related injuries or disease experienced by workers

v)   *Crime loss exposures*

- Holdups, robbers, burglaries
- Employee theft and dishonesty
- Fraud and embezzlement
- Internet and computer crime exposures

- Theft of intellectual property

vi)   Employee benefit loss exposures

- Failure to comply with government regulations
- Violation of fiduciary responsibilities
- Group life and health and retirement plan exposures
- Failure to pay promised benefits

vii)   Foreign loss exposures

- Acts of terrorism
- Plants, business property, inventory
- Foreign currency risks
- Kidnapping of key personnel
- Political risks

viii)   Reputation and public image of the company

A risk manager has several sources of information that he/she can use to identify the precedent loss exposures. They include those methods discussed in topic two. Others financial statements, risk analysis questionnaires and historical data.

Analyze the Loss Exposures

The second step in risk management process is to analyze loss exposures. This step involves measuring the frequency and severity of a loss. Frequency refers to probable number that may occur during a given time. Severity refers to the probable size of the loss which may occur. Loss exposures analysis is carried out using risk analysis methods discussed in topic three.

Once the risk manager estimates the frequency and severity of loss for each type of loss exposure, the various loss exposures can be ranked according to their relative importance. For example a loss exposure with the potential of bankruptcy of a firm is much more important than an exposure with a smaller potential.

Select the appropriate Techniques for Treating the Loss Exposures

The third step in the risk management process is to select the most appropriate, or a combination of techniques, for treating the loss exposures. These techniques can be classified broadly as either risk control or risk financing. Risk control refers to techniques

that reduce the frequency and severity of losses. Risk financing refers to techniques that provide for the funding of losses. Many risk managers use a combination of techniques for treating each loss.

4.2 Methods of Handling Risks

The existence of risk causes discontent to individuals and the uncertainty accompanying it causes anxiety and worry. The following are the main five ways of handling risks.

i) *Risk avoidance* Risk is avoided when an individual refuses to accept the risk. This is accomplished by merely not engaging in actions that would give rise to risk. For instance if a firm wants to avoids risks associated with property ownership, it will not purchase but lease it. The avoidance of risk is one way of dealing with risk but it is a negative rather than a positive technique. Risk avoidance if extensively utilized by both individuals and the society will lead to lack of development.

ii) *Risk Retention* When an organization does not take the step of avoiding, reducing or transferring the risk, then the possibility of risk involved will be retained. The act of retention may be voluntary or involuntary. *Voluntary* risk retention is characterized by the recognition that the risk exists and the organization has decided to retain it. *Involuntary* retention occurs when and individual exposed to risk does not recognize it existence until the risk occurs. Risk retention is a legitimate way of dealing with risk and in most cases it's the best method of handling risk. Each organization must decide which risk it should retain, avoid or transfer on the basis its ability to bear the loss. As a general rule risks that should be retained are those that lead to relatively small certain loss.

iii) *Risk Transfer* Risks may be transferred from one firm to another that is more willing and is capable of bearing the risk. Additionally risk may be transferred through insurance contracts. Insurance is a mean of shifting or transferring risk, in consideration of specific payments (premiums). The insurance company undertakes to indemnify the party taking insurance up to a certain limit for a specified loss that might occur.

iv)   *Risk Sharing* The distribution of risk is accomplished in many ways in the society. One way through which risk is shared is through co-operatives. These organizations funds are pooled together each bearing only a portion of risk that the enterprise will fail. Insurance is another device designed to deal with risk through sharing.

v)   *Risk/Loss Reduction* This is achieved through risk control (risk prevention) or the law of large numbers. Risk control is achieved through safety and loss prevention programs e.g. medical cover, fire sprinklers, guards, burglary alarms are measures of dealing with risk by reducing its impact. Through the law of large numbers of exposure units, a reasonable estimate of the cost of losses can be made. On the basis of these estimates it is possible for an organization such as an insurance company to assume responsibility of loss of each exposure unit.

4.3 Risk Control and Risk Financing

Risk control includes techniques, tools, strategies and processes that seek to avoid, prevent, reduce or otherwise control the frequency and/ or magnitude of loss and other undesirable effects of risks. Risk control also includes methods that seek to improve understanding or awareness within an organization of activities affecting exposure to risk.

Risk control has a strong relationship to risk financing because the control of risks can have a significant effect on the frequency and severity of losses that must be financed.
The positive effects of risk control on an organization's risk financing usually occur irrespective of the particular risk financing methods used: if losses do not occur, loss financing is not needed. Therefore any efforts to control a risk will usually have a positive effect on the cost of financing.

4.4 Contingency or Catastrophe Planning

This is an integrated approach to loss reduction. It is an organization wide effort to identify possible crisis or catastrophes and develop plans for responding to such events. Catastrophe planning usually involves a fairly lengthy process of research and evaluation that ultimately yields a contingency plan for possible use in the event of catastrophe.

A catastrophe plan involves the following activities:

- Backup, off-site storage computerized records.
- Updating fire suppressant system.
- Training employees on emergency safety procedures
- Disaster training/ planning with government agencies such as the fire department.
- Creation of an emergency response team or committee e.t.c.

Catastrophe plans are much less likely to succeed if imposed on an organization that has no existing risk management culture in place at the time of a disaster. Duplication offers a special case of loss reduction. Backing up of computers files and storing the files off-site is a good example of duplication while storing of critical spare parts fall under the concept of duplication too.

Separation is the other case of loss reduction. This technique isolates loss exposures from each other instead of leaving them vulnerable to a single event e.g. a rule that requires employees in a supermarket to move cash accumulations over stated amount from cash registers to a secure location such as bank vault. The logic behind separation is to reduce the likelihood that a single event could affect all organization's exposure to loss Separation does not necessarily reduce the chance of loss to a single exposure unit, but it tends to reduce the chance of a catastrophic loss.

4.5 Information Management

To realize maximum benefits from a loss control program. The program objectives and benefits should be communicated to stakeholders such as employees insurers, regulators among others.

Lack of information can cause stakeholders to become uncertain about the nature of the organizations actions with respect to matters affecting their interests. Communication also increases awareness of the loss causing process, this allows better forecasts of the consequences. One possibility for enhancing awareness is a reporting method and system of rewards for employees who make suggestions leading to safer practices.

4.6 Role of Government in Risk Management

Governmental agencies are involved in loss control because;

(a) Public interest often demands loss control and quick response to emergencies.

(b) Governmental entities can provide certain services such as those of fire department more efficiently and economically than can scattered firms.

(c) The government agencies exercise this responsibility through education, statuses and codes regulating building construction, working conditions, safety equipment and clothing, sewage disposal facilities and operation of motor vehicles

(d) The government ensures risk control through inspections designed to enforce the status and codes, police fire departments, rehabilitation programs, assembly and dissemination of data released to loss prevention etc.

4.7 Funding Arrangements

Funding arrangements for retention of risk range from not making any provisions out of profits to sophisticated techniques such as captive insurance. These are discussed below

(i) *No Advance Funding*

Many decisions to retain property and liability losses do not involve any formal advance funding. The organization simply bears the losses when they occur. However, if losses fluctuate widely year to year the organization may experience distress when large losses occur. Major losses are rarely financed through borrowing partly because creditors consider retention of such losses to be financial mismanagement.

(ii) Earmarked liability Account

This account is created to absorb fluctuation in uncovered losses. Each year a provision for loss is added to this account with profit or other financial gain being reduced by this amount. When an uninsured loss occurs it is then deducted from this account rather than from profits thereby smoothing the effects of uninsured loses.

(iii) Earmarked Asset Accounts

Organization may hold cash or investments which can be easily turned into cash for the purpose of paying uninsured losses. This approach could be used when uninsured loss could possibly exceed cash available for emergencies.

iv) Captive Insurers

A captive insurer is an insurer that is owned by the insured. The parent organization establishes a captive insurance subsidiary that writes insurance against the parents insured risks. The captive insurers may write insurance for other parties not affiliated with the parent. Since the captive insurers are part of the same organization with the parent transfer of risk would not appear to be motive. The reasons for firms forming captive are;

i)   Lack of specialized firm which can offer the kind of insurance required.

ii)   When there are no statistics about chance of loss so that accurate premiums can be calculated.

iii)   When the chance of loss is so rare that the parent company does not require re-insurance.

4.8 Non insurance Transfers

Risk financing transfers in contrast to risk control transfers provide external funds that will pay for the losses should an adversity strike. Non insurance transfers differ from insurance in that the transferees are not legally insurers.

(i) Instruments of trade credit

Drafts: **-** are used in international trade. The seller draws up a draft and ships it to the customer's bank along with the shipping documents. The customer either pays or acknowledges debt prior to being gives the shipping documents. The customer's bank then forwards the payment or the acknowledgement in the form of a trade acceptance.

Bank acceptance: **-** If there is uncertainty about a customers ability to pay the seller may ask the customer's bank for a guaranty of payment in the form of a bank acceptance.

Letter of Credit: **-** When an even stronger guaranty of payments is required the seller may ask the customer to arrange a letter of credit with an established in a bank in the seller's country. The letter of credit signifies the customer credit worthiness and should the customer default the bank will pay for the goods.

Stand by Letter of Credit: Serves the same purpose as letter of credit but in domestic transactions and may apply to a category of transactions.

In theory, a letter of credit would satisfy financial security requirements for self insurance. However the holder of a letter of credit faces default risk, hence the letter of

credit should be confirmed by a bank in the letter of credit or a very reputable bank outside the customer's country.

(ii) Other Non-Insurance Transfers

Many of such transfers occur as a result of provisions in contracts dealing primarily with other matters but in some cases the transfers occur through contracts specifically designed to shift financial responsibility.

The transfers differ as to the extent of responsibility at one extreme the transferor shifts only the financial responsibility for negligent act of the transferee (vicarious liability) and at the other end is to be identified for losses covered under the contract no matter who caused the loss e.g.

a) Lease contract where the landlord transfer responsibility for damage to the rented property

b) A courier service contract obligating the bailee to pay for losses in excess of its statutory or common law liability.

(iii) Hedging

A hedge is employed to offset a risk associated with holding an asset or arising from a transaction hedging contracts such as options, forwards and futures, swaps have been employed to offset such risks as price fluctuation of assets e.g. oil, currencies, interests rates etc. A hedge could also employ assets whose rations are negatively correlated e.g. a holder of stock in a corporation with oil reserves might hedge the stock to invest in an electrical utility that uses oil to produce electricity efficient diversification.

4.9 Agreements and Combination

A pooling agreement may take the form of an agreement to store losses that occur among pool participants e.g. municipalities may agree to share liability exposures arising from fire protection activities through a pooling agreement. A pooling of risk exposures also is called combination which refers to the combining or pooling of loses arising from a large number of exposures. This results in the loss per unit becoming more predictable risk control. The number of units in the pool serves as a proxy for the pools risk bearing capacity which is in the form of financial resources.

4.10 Factors Affecting Choice between Retention and Transfer

   a) *Legal Economic and Public Policy Limitations*

Significant limitations apply to transfer of risk especially non insurance transfers.

   i)   A contract may transfer only part of the risk that the organization though it had shifted to someone else.

   ii)   The language is often so complicated that legal action may be required for the meaning to become apparent.

   iii)   Courts interpret transfer provisions narrowly due to their being that broad shifts of responsibilities are often declared invalid by being out of tune with public policy or being grossly unfair to the transferee.

   iv)   Since contracts vary widely there are few precedents for courts to follow.

   v)   If the transferee is unable to pay the transferor must bear the loss.

   vi)   The transferee who has the major incentive for loss control may lack the expertise or authority for effective control

   b) *Degree of control*

When an organization has little or no control over the outcome, transfer becomes attraction. The larger the degree of control the more attractive retention becomes over transfer. Insurance weakens incentives to prevent or reduce loss because losses are compensated *moral hazard.* As a consequence, the premium for insurance coverage is higher than what it would be if some mechanisms for manifesting the loss prevention incentives were present. The results are increase in the cost of insurance relative to retaining the loss. Retention therefore increases the incentives of the organization to establish the loss-prevention and loss mitigating activities. From a public policy perspective, society benefits when the burden of loss falls on the party best equipped to control the loss producing events.

   c) *Loading Commission, financial services fees and other transactions costs*

Loading fees and transaction costs represent the amount by which the cost of transfer exceeds the expected value of the benefit payments from the transferee. Holding other factors constant higher loading fees increase the attractiveness of retention. Loading commissions are fees charged for providing the insurance service. Fees charged by banks other financial institutions for services such as providing letters of credit or other

financial commitments are other examples. Securities transactions also entail transaction costs, when options are used to hedge risk the transaction cost are incurred in buying and selling securities to maintain the hedge.

   d) *Value of services provided by insurers and other financial institutions*

Loading fees and transaction costs are not necessarily wasted money. In many cases loading fees are compensation for providing services that the transferee would provide itself in the absence of the transfer. A bank may provide valuable advice to a client in arranging a letter of credit and the bank's compensation may come from arranging the required letter of credit. Insurers have the advantage that they can spread overhead costs over many insureds'. They offset to some exert the services would have been provided by the risk manager. These would otherwise spare the risk manager time in selecting the insurer, negotiating terms of the insurance contract and the price to be charged and filling a proof loss with the insurer incase of a loss.

   e) *Opportunity Costs*

Evaluation of insuring a risk versus retention should consider the investment income that should be earned during the time between payment of the insurance premium and the ultimate payment of the claim. Investment income reduces the cost of a given claim. This is often evaluated by comparing the present value of retention costs to the present value of insuring the risk. In the absence of market restrictions or institutional constraints, one would not expect the opportunity set of investments to differ between insurers and organizations that retain risks. Similarly one would expect insurance premiums to reflect anticipated investment income.

   f) *Tax Considerations*

Generally insurance companies tend to receive favorable tax treatment relative to consumers of insurance. Insurance companies are allowed to deduct from current taxable income their provision for future claim payment. A firm paying claims using its own funds in contrast cannot deduct payments from taxable income until economic performance occurs (claim payments). Holding other factors constant the tax-induced effects place insurers at the greatest advantage relative to heavily taxed organizations, but this advantage declines with lowly taxed forms or non taxed firms. When tax related

effects are believed to be important, experts in tax accounting and tax law may be consulted to evaluate appropriate methods for risk financing.

g) *Retention may be the only possible method*

In some case, retention is the only possible, or at least the only feasible tool. The organization cannot prevent the loss, avoidance is impossible or clearly undesirable, and no transfer possibilities (including insurance) exist, consequently the organization has no choice but to retain the risk. A firm with a plant in a river valley or an earthquake prove area may find that no other method handling the flood) earthquake risk if feasible. Abandonment and loss control would be to expensive and no insurance cover available .In other passes, part but not all of the potential can be controlled or financed internally. Sometimes insurance is not available unless the insured agrees to absorb the first part of say Ksh. 5M of any loss. These uninsured losses cannot be completely controlled or transferred elsewhere; the organization will be forced to retain them.

4.11 Commercial Insurance

Insurance is a risk financing transfer under which an insurer agrees to accept financial burdens arising from loss. The insurer agrees as reimburse the insured the loss (as defined, in the insurance contract) in return for premium payments. Insurance as a device of handling risk is covered comprehensively in the next topic.

4.12 Review Questions

1. What are the objectives of Risk Management?
2. Explain the steps in the Risk Management Process
3. Outline the various methods of handling risks
4. What is risk control?
5. What is a catastrophe .what are the activities involved in catastrophe plan
6. Outline the role of government in risk management
7. Outline the factors affecting choice between retention and transfer
8. What is the meaning of risk management?
9. Explain the objectives of risk management both before and after a loss occurs.
10. Distinguish between risk control and risk financing and describe three risk control and three risk financing techs

11. Discuss the considerations that effect choice between retention and transfer

4.13 Selected References

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TOPIC FIVE: RISK MANAGEMENT THROUGH INSURANCE

After studying this topic you should be able to:

- Define the insurance
- Explain characteristics of insurance
- Differentiate between insurable and non-insurable risks
- Describe the distinguishing features of insurance contract

5.1 Definition of insurance

Insurance can be defined from the view point of several disciplines such as law, economics etc. The Commission on Insurance Terminology of the American Risk and Insurance Association defines insurance as the pooling of fortuitous losses by transfer of such risk to insurers, who agree to indemnify insures for such losses to provide other preliminary benefits on their occurrence, or to render services connected with risk.

5.2 Elements of an insurance transaction

Four elements are required for an insurance transaction

    (i)   A contractual agreement

    (ii)   A premium payment

    (iii)   A benefit payment occasioned by circumstances defined in the insurance

           contract

    (iv)   The presence of a pool of resources held by the insurer to reimburse claims

    The pool is able to provide a stronger guaranty as it becomes larger because of pooling of resources. The low of large numbers allows the average loss per insured unit to fall close to the true expected loss.

5.3 Characteristics of Insurance

    i)   Pooling of losses

Pooling is the spreading of losses incurred by the few over the entire group, so that in the process average loss is substituted for actual loss. Pooling or sharing of losses is the heart of insurance. Pooling involves the grouping of a large number of exposure units so that

the law of large numbers can operate to provide a substantially accurate predication of future losses. Pooling ensures that units contribute a small amount as premium. Thus in the event of a loss to unit it can be paid out of the pooled/contributed resources.

Therefore pooling implies

a) The sharing of losses by the entire group

b) Prediction of future losses with accuracy based on the law of large numbers

With regard to the first concept assume that there are 1000 residents in an estate in Mombasa who agree to share the loss of fire to any of the resident's house. Further assume that each of the houses in the estate is valued of Ksh. 1M. With the pooling of losses the expected loss (1,000,000/1000 = 1,000) is replaced with actual loss Ksh. 1,000,000

With respect to the second concept the law of large numbers states that the greater the numbers of exposures the more closely will the actual results approach the probable results that are expected from an infinite number of exposures. For example if you toss a coin in the air, the apriori probability of getting a head is 0.5. If you flip the coin 20 times you may get a head 15 times. Although the observed probability is 0.75 the true probability is still 0.5. If the coin is tossed a million times the actual number of heads would be approximately 500,000. Thus as a number of random losses increases the actual results approach the expected results.

For most insurance lines, the actuary seldom knows the true likelihood and impact. If there are a large number of exposure units, the actual loss experience of the past may be a good approximation of future losses.

 ii)   *Payment of fortuitous losses*

A fortuitous loss is one that is unforeseen and unexpected and occurs as a result of chance In other words the loss is accidental.

 iii)   *Risks Transfer*

Risk transfer means that a pure risk is transferred from the insured to the insurer, who typically is in a stronger financial position to pay for losses than the insured. From the view point of the individual pure risks that are typically transferred include the risk of

premature death, poor health, disability, destruction and theft of property and personal liability law suits.

  iv)   *Indemnification*

Indemnification means that the insured is restored to his/her approximate financial position before the occurrence of the loss. Thus if ones home burns in a fire a home owner's policy will restore him/her to his/her previous position and not more.

v. Requirements of an Insurable Risk

Insurers normally insure only pure risks, but not all pure risks are insurable, certain requirements must be fulfilled before a pure risk can be insured. From the insurers perspective there are six requirements of an insurable risk

    a) *There must be a large number of exposure units*

Ideally the large group of exposure units should be roughly similar but not necessarily identified. The purpose of this requirement is to enable the insurer to predict loss based on the law of large numbers.

    b) *The loss must be accidental and unintentional*

The loss must be fortuitous and outside the insured's control. The reason behind this requirement is that if intentional losses were paid moral hazards would be substantially increased and premiums would rise as a result. This would reduce the number of persons buying insurance leaving an insufficient number of exposure units to predict future losses. Second the loss must be accidental. Because the law of large numbers is based on random occurrence of events, and prediction of future events may be inaccurate if a large number of intentional or non-random events occur.

    c) *The loss must be determined and measurable*

This means that the loss should be defined as to cause, time place and amount. Life insurance in most cases meets this requirement cause and time of death and face amount of policy. Some losses are however difficult to determine the cause and amount. Sickness and disability are highly subjective and the same even can affect two persons quite differently. The basic purpose of these requirements is to enable an insurer to determine if the loss is covered under the policy and how much should be paid.

    d) *The Loss Should not be Catastrophic*

This means that a large proportion of exposure units should not incur loss the same time.

If all or most of the exposure units were to simultaneously suffer losses the pooling techniques would breakdown and become unworkable. Premium must therefore be increased to prohibitive levels and the insurance technique will no longer be a viable. Ideally insures wish to avoid catastrophic losses in reality however this is impossible since catastrophic loses periodically result from floods earth quakes etc. To meet the problem of catastrophic loss the insurer:

- i)   May reinsurance where the insurer is indemnified for catastrophic loss.
- ii)   May avoid the concentration of risk by dispersing their coverage area over a large geographic area.
- iii) Use financial instrument as catastrophe bonds which are now available for dealing with catastrophic losses.

  e) The Chance of Loss Must be Calculable

The insurer must be able to calculate with the average frequency and average severity of future losses with some accuracy. This requirement is necessary so that proper premiums can be charged sufficient to pay all claims expenses and yield a profit to the insurance company during the policy period. Not all loss can be easily calculated, certain losses are difficult to insure because the chance of catastrophic loss is presence e.g. floods, wars etc.

  f) The Premiums must be Economically Feasible

This means that the insurer must be able to pay the premium further for insurance to be attractive the premiums paid must be substantially les than face value or amount of the policy.

Practical Limits to the Requirement of an Insurable Risk

Few if any insurer risk meets all the requirements fully:

- i)   The condition requirement the loss to be accidental and preventable but cost associated with monitoring the insured behavior limits the extent to which insurer can require loss prevention
- ii)   Issue detaching related to behavior of insurer persons particularly if the insured can conceal information related to the likelihood of his behavior.
- iii)   Another issue affecting the insurability of risk is the presence of substitutes for coverage either through government programs

iv)   Common law development through court interpretations of statutes and through resolutions of civil disputes is factor determining whether a given risk is insurable or not.

v)   Most insurers hesitate to pioneer in not successfully tested by other insurers.

In conclusions note that a risk that is generally uninsurable today may be insurable at some future date because of changes in the risk it self or because of improvement in the technical knowledge or o ability of insurer or other more compelling reasons.

5.5 Distinguishing Features of Insurance Contract

The following are the normal requirements of a valid contract;

a) Offer and acceptance

b) Consideration

c) Legal capacity

d) Purpose not contrary to public interest

Apart from the above normal features of any general contract, the following characteristics distinguish insurance contracts from other contracts.

i)   *Personal Contract*

Insurance contract are personal contract .Though subject of a property contract .Through subject of a property contract is an item of property the contract insurer the legal interest of a person or an entity not property itself. If the owner of a property that is insured sells it the new owner is not insured under the contract .This reduces the likelihood of moral hazard that could arise if the identity of the insured were not known by the insurer.

ii)   *Unilateral Contract*

This means that the court will enforce the contract in one direction only .i.e. against one of the parties and in this case, the insurer. Soon after the insurer has received premiums from insured, the insured has fulfilled his part of the agreement i.e. the contract is executed with respect to the insured but still executory with respect to the insurer .

iii)   *Conditional Contract*

The insurer can refuse to perform if the insured does not satisfy certain conditions contained in the contract for example the insurer need the chance of loss pay the claim if

the insured has increased the chance of loss in some manner prohibited under the contract or has failed to submit proof of loss within a specified period.

iv)   Aleatory Contract

Aleatory contract have a chance element and an uneven exchange. Under such contract the performance of at least one of the parties depend on chance and the party promises to do much more than the other party. The uneven exchange is not a few in the contract but a fundamental feature of a contract that in both conditional and aleatory.

v)   Contract of Adhesion

When legal despite arise over the meaning of contract language court usually follow the principal of holding the writer responsibility for working a provision. Under contract of insurance, ambiguous provision are interpreted in favors of insured. This principle is after referred to as an ambiguity rule. If a provision is a standard insurance contract is ambiguous court will interpret the provision in a manner favorable to the policyholder.

The principal is however unlikely to hold if the insured particularly in the drafting of the contract wording the state or other legal authority dictates the working or where brokers or other agencies negotiate on behalf of their customer over the contract wording. The exclusions or qualifications must be conspicuous plain and clear Other distinguishing features of insurance contract are:

> i)   Contract of utmost good faith
> ii)   Valued and indemnity contracts
> iii)   Contracts employing subrogation

These three features will be discussed below under the principles of insurance

5.6 Principles of Insurance

i)   Principle of Indemnity

This principle states that the insurer agrees to pay no more than the actual amount of loss i.e. the insured should not profit from a loss. The principle does not imply that the loss must be paid in full, because of deductibles or other contract provisions, the amount paid could be less than the actual loss. This principle has two fundamental purposes. The first is to prevent the insured from profiting from a loss and the other is to reduce moral

hazard. Life insurance policies are not contracts of indemnity but valued contracts i.e. contracts to pay the face amount upon death of the insured.

In property insurance, the basic method for indemnifying the insured is based on the *actual cash value* of the damaged property at the time of loss. Courts have used three major methods to determine the actual cash value.

a) Replacement cost less depreciation

This rule has traditionally been used to determine the cash value in property insurance. It takes into consideration both inflation and depreciation of property values over time. Depreciation is a deduction for physical wear and tea, r age and economic obsolescence. Replacement cost is the current cost of restoring an item to its previous status and quality. For example assume that a person has insured his car against an accident. A similar car would cost Ksh 1M, but the car is 30% depreciated. The actual cash value under this approach will be;

Replacement cost = 1,000,000

Deprecation = 300,000 (car is 30% depreciated)

Actual cash value = replacement cost - depreciation

= 1,000,000 – 300,000

= 700,000

b) Fair market value

This is the price a willing buyer would pay a willing seller in a free market. Some courts have ruled that fair market value should be used to determine actual cash value of loss. The fair market value may be below the actual cash value based on replacement cost less depreciation due to poor location, deteriorating environment etc. If a loss occurs the fair market value may reflect more accurately the value of loss. For instance if a building's value based on cost is Kshs 10m but the market value is Kshs 5m, the actual cash value based on the fair market value is Kshs 5m and not Kshs10m.

c) Broad evidence rule

This means that the determination of the actual cash value should include all relevant factors. The relevant factors include replacement cost less deprecation, fair market value, expected present value of income from the property, opinions of appraisers and numerous other factors.

Exceptions to the Principle of Indemnity

There are several important exceptions to the principle of indemnity, these include:

   a) *Valued policy*

A policy that pays the face amount of insurance if total loss occurs is referred to as a valued policy such policies are typically used to insure antiques, rare paintings, family heirlooms etc. Due to difficulty in determining the actual cash value of property at the time of loss, the insurer and insured both agreed on the value of the property when the policy is first issued. For example a painting worth Kshs.1m today may be insured for this sum. When it is lost the face value of Kshs. 1m must be paid. As the amount paid may exceed the actual cash value, the principle of indemnity is violated.

   b) *Valued policy laws*

This are laws that exist in some countries that require the payment of the face amount to the insured if a total loss the property occurs due a peril specified in the law. The specified perils vary among the various countries and include fire; lightning etc. For instance if a building is insured for Kshs. 2m it may have a cash value of Kshs. 1.75mbut if a total loss occurs the face amount of Kshs. 2m must be paid.

The original purpose for valued policy laws was to protect the insured against allegations that the property had been over issued by an agent order to receive higher commission. After a total loss the insurer can not offer to pay less than the face amount for which premiums had been paid on grounds that the property had been over insured.

   c) *Replacement cost insurance*

Replacement cost insurance means that there is no deduction for depreciation in determining the amount paid for loss. For example assume that the roof in your house is 7years old and has a useful life of 14years. The roof is damaged by wind storm and the current replacement cost is Kshs. 500, 000. Under the actual cash rule you would receive Kshs. 250, 000 (500,000 – 250,000) But under the replacement cost policy, you would receive the full Ksh500, 000. Replacement cost insurance is based on the recognition that actual cash value can still result in a substantial loss for the insured.

d) Life insurance

A life insurance is not a contract of indemnity but a valued policy that pays a stated sum to the beneficiary upon insured's death. For obvious reasons, the indemnity principle may not apply to life insurance because human life can not be replaced. The need to provide a specific amount of monthly income for the dependants of the insured, life insurance must be purchased before death occurs.

ii) Principle of Utmost Good Faith

It states that a higher degree of honesty is imposed on both parties to an insurance contract than is imposed on parties to other contracts. The principle has its roots in ocean marine insurance where the insurer had to place great faith in the statement made by the applicant for insurance concerning cargo to be shipped because the contract may be formed in a location far from the cargo and ship making inspection difficult. The principle of utmost good faith is supported by three important legal doctrines.

a) Representations

Representations are statements made by the applicant for insurance. Answers to questions such as age, health status etc is called representations. A legal significance of representations is that the insurance contract is voidable at the insurer's option if the representations are:

(i)   Material

(ii)   False and

(iii)   Relied on by the insurer

Material means that if the insurer new the true facts the policy would not have been issued or it would have been issued on different terms. False means that the statement is not true or is misleading reliance means that the insurer relies on the misrepresentation in issuing the policy at a specified premium. For example if a person applies for insurance and states that he/she has not visited the doctor in the past 3 years but had heat surgery 9 months earlier. If the person later dies, the contract would be voidable at the option of the insurer for making a false material statement that was relied upon by the insurer.

An innocent misrepresentation (unintentional) also makes the contract voidable. Further the doctrine of material misrepresentation also applies after the loss has occurred. If the

insured submits a fraudulent proof of loss or misrepresents the value of damaged items, the insurer has the right to void the coverage.

ii) *Concealment*

It is intentional failure of the applicant for insurance to reveal a material fact to the insurer. It is the same thing as non disclosure. The legal effect of a material concealment is the same as misrepresentation – the contract is avoidable at the insurer's option.

To deny a claim based on concealment, a non-marine insurer must prove two things:

a) The concealed fact was known by the insured to be material

b) The insured intended to defraud the insurer.

A marine insurer is not required to prove that the concealment is intentional. The applicant's lack of awareness of materiality of the fact is of no consequence. An applicant should reveal all facts to the property. The insurer can successfully deny claim if they prove that the concealed fact is material.

iii) *Warranty*

This condition that is affirmative before or on policy reception and promissory during the period of the policy. A warranty is a statement that becomes part of the insurance contract and is guaranteed by the maker to be true in all respect. E.g. a firm may warrant that an automatic sprinkler system will be in working order throughout the term of the policy. A clause describing the warranty becomes part of the contract. Based on the common law, in its interest form, a warranty is a harsh legal doctrine that may affect many insured parties. In cases where minor breaches of the warranty affects risk only temporary or insignificantly, courts will interpret the breach liberally.

5.7 An Analysis of Insurance Contracts

Insurance contracts can be divided into the following parts:

c) Declarations

d) Definitions

e) Insuring agreement

f) Exclusions

g) Conditions

h) Miscellaneous provisions

All insurance contracts do not necessarily contain all the six parts but the classifications provide a convenient framework for insurance contracts analysis.

a) *Declarations*

These are statements that provide information about property or activity to be insured. This section (declaration) is usually found on the first page contains information on the identity of the insurer, name of insured, location of property, period of protection, amount of insurance, amount of premium e.t.c. In life insurance declaration page though not often the first page it contains the insured's person name, age, premium amount, issue date and policy number.

b) *Definitions*

Key words or phrases have quotation marks ("….") or are bolded which are then defined. The purpose of various definitions is to define clearly the meaning of key words or phrases so that coverage under the policy can be determined more easily.

c) *Insuring agreements*

The insuring agreement summarizes the major promises of the insurer. There are two basic forms of an insuring agreement in property liability insurance.

      i) Named-perils policy

      ii) All-risks coverage

Under a *named-perils policy*, only those perils specifically named in the policy are covered. Under an *all-risk policy*, all perils are covered except those specifically excluded. All-risk coverage is generally preferable to named-perils coverage, because the protection is broader. If a loss is not excluded it is then covered. Further the burden of proof is placed on the insurer to deny claim. To deny claim the insurer must proof that the loss is excluded. In order to avoid unreasonable expectations the term all risks has been replaced with risk of direct loss to property. However, this is interpreted to mean all losses are covered except those excluded. Life insurance is an example of an all risk policy with a major exclusions being suicide.

d) Exclusions

There are two major types of exclusions

i) Excluded losses

A contract may also exclude certain losses in property insurance for instance, professional liability may be excluded

ii) Excluded property

A contract may exclude or place limitations on the coverage of certain property. In home owners policy for instance, cars may be excluded.

Reasons for exclusions

i) Some perils are considered uninsurable – A given peril may substantially depart from the requirements of an insurable risk discussed previously.

ii) Exclusions are also used because extraordinary hazards are present- a hazard is a condition that increases the chance or severity of loss. As such personal car and a passenger service vehicle (PSV) should not be charged similar premiums.

iii) Exclusions are also necessary because coverage can be better be provided by other contracts. This avoids duplication of coverage and to limit coverage to policy best designed to provide it e.g. a car is excluded from home owner's policy.

iv) Certain property is excluded because of moral hazard or difficulty in determining or measuring the amount of loss. A homeless policy may limit coverage of money to say Ksh. 15,000/= to avoid unlimited coverage which would increase fraudulent claims.

v) Exclusions may also be used because coverage is not needed by the typical insured party. - Most homeowners do not own planes. To cover planes as part of homeowners' policy would be grossly unfair to majority that does not own planes.

e) Conditions

These are provisions in the policy that qualify or place limitations on the insurer's duty to perform insurance contract terms. If these conditions are not met the insurer can refuse to pay the claim. Common policy conditions include notifying the insurer when loss occurs, protecting the property after loss, preparing an inventory of damaged items e.t.c.

f) *Miscellaneous provisions*

These include requirements if loss occurs, subrogation, cancellation e.t.c.

5.8 Endorsement and Riders

The two terms are often used interchangeably and means the same thing. In property and Liability insurance, an endorsement is a written provision that adds to deletes from or modifies the provision in the original contract. In life and health insurance a rider is a provision that amends or changes the original policy. For example a home owners policy exclude coverage for earthquakes, however an earthquake endorsement can be added to cover damage from earthquakes. Similarly a waiver of premium rider can be added to life insurance policy if the insured becomes disabled. An endorsement takes procedure over any conflicting terms of the contract unless it is contrary to the law or regulation.

5.9 Deductibles

A deductible is a provision by which a specified amount is subtracted from total loss payment that otherwise would be payable. A deductible is not used in life insurance because the insured death is always a total loss and a deductible would reduce the face amount. Similarly due to the legal defense, personal liability insurance does not use deductibles.

Purposes of deductible

i)   It eliminates small claim that are expensive to handle and process e.g. an insurer an incur Ksh 500,000 in processing a claim of Kshs. 10,000

ii) Deductible are used to reduce premiums by paid the insured-

Because deductible eliminate small claim, premiums can be substantially reduced. The principles of insuring large losses instead of small losses are called the Large –loss principle. Other factors being constant large deductibles are preferred to small ones.

Deductible in property insurance

The following deductibles are commonly found in properly insurance

     i)   Straight deductible

With a straight deductible the insured must pay a certain number of shilling losses before the insured is required to make a payment. If for example a car is involved in an accident requiring Kshs. 100,000 and the policy has a Kshs. 10,000 deductible, the insured will receive Kshs. 90,000 from the insurer and meets the rest.

     ii)   *Aggregate deductible*

An aggregate deductible means that all losses that occur during a specified time period usually a policy year are accumulated to satisfied the deductible amount, once the deductible is specified the insurer pays losses in excess of the deductible.

For example if a policy has aggregate deductible of Ksh. 10,000 and a loss of Kshs. 5,000 occurs during the policy period, insurer pays nothing. If another loss occurs of Kshs 7,000, during the policy the period the insurer is required to pay Kshs. 2,000 i.e. ((5,000+7,000) - 10,000).

Deductible in health insurance

In health insurance a deductible can be stated in terms of money or time

     i)   *Calendar year deductible*

Usually found in basic medical expense and major insurance contracts. Eligible medical expenses are accumulated during the calendar year and once they exceed the deductible amount the insurer must pay the benefits promised under the contract.

     ii)   *Corridor deductible*

A corridor deductible is one that can be used to integrate a basic medical expense plain with a supplement major medical expense plan. The corridor deductible applies only to eligible medical expense that is not covered by the basic medical expense plain.

E.g. if a person has Kshs. 2m medical expense cover of which Kshs. 1.5m is paid by the basic medical expense plan, and has a Kshs. 30,000 corridor deductible the person must pay Kshs. 30,000 to receive the supplemental Kshs. 500,000 benefit subject to pay limitations.

iii)   Elimination (waiting) period

An elimination waiting period is a stated period of time at the beginning of a loss during which no insurance benefits are paid. This are commonly used in disability –income contracts that have elimination period of 30, 60 or 90 days or even longer.

5.10 Coinsurance

This requires the insured to insurer the property for a stated percentage of its insurable value. If the coinsurance requirement is not met at the time of loss the insured must share in the loss as a coinsurer. A coinsurance formula is used to determine the amount to the paid

$$Amount\ of\ re\operatorname{cov}ery = \frac{Amount\ of\ insurance\ earned}{Amount\ of\ insurance\ required} \times Loss$$

For example if a commercial building has an actual cash value of Kshs. 50m and the owner has insured if for Kshs. 30m and an 80% coinsurance clause is present the required amount of insurance is Kshs. 40m(80% of 50m)Thus if a loss of Kshs.1m occur only Kshs. 0.75m will be paid i.e.

$$Amount\ of\ re\operatorname{cov}ery = \frac{30M}{40M} \times 1M = 0.75M$$

The fundamental purpose of coinsurance is achieve equity in rating because most property insurance losses are partial rather than total losses and if everyone insurers partially the premiums will be higher. The term coinsurance in property insurance is not an agreement to apportion loss between parties to contract but a contractual incentive to carry an amount of coverage close to the value of the property being insured.

In contrast to property insurance a coinsurance clause in health insurance which is technically called *a percentage participation clause* is an agreement to apportion loss. E.g. if a person has a medical expense cover of Kshs 505,000 with a supplement medical policy with a deductible of Kshs 5,000 and an 80-20 coinsurance clause. The insurer pays 80% of medical expense in excess of the deductible or Kshs 400,000 and the insured pays 20% of the bill plus the deductible or Kshs. 105,000.

5.11 Other Insurance Provisions

i) Pro rate Liabilities

If two or more policies insure the same type of insurable interest in the property, each insurance shares the loss based on the proportion. Each insurance bears its proportion of the total amount of insurance in the property.

E.g. if a given property is worth Kshs.100, 000 and is insured by insurer A B & C at Kshs.20,000, Kshs.30,000 and Kshs. 50,000 respectively and a loss of Kshs.10,000 occurs,

A meets $\dfrac{20,000}{100,000} \times 10,000 = 2,000$, B meets $\dfrac{30,000}{100,000} \times 10,000 = 3,000$, and C meets

$\dfrac{50,000}{100,000} \times 10,000 = 5,000$

ii) Contribution by Equal Shares

This is usually found in liability insurance and each insurer pays equal amounts until its policy limits exhausted. In the above example each insurer will share a Kshs. 3333 loss. (Ksh. $10,000 \div 3$).

iii) Primary and Excess Insurance

The primary insurer pays first and the excess insurer pays only after the policy limits under the primary policy are exhausted. e.g. if A owns a car and has a Kshs. 1m policy for liability insurance and B a friend of A has a liability insurance of Kshs. 0.5 m. if B drives A's car and negligently injures C and the Court orders B to pay Kshs 0.75 M since B is the Primary insurance, it pays the first Kshs. 0.5 m and the rest Kshs. 0.25 m is met by A's insurance policy.

5.12 Benefits of Insurance

i) Indemnification of the Insured
Restoring individuals and families to their financial position prior to loss allows them to maintain their financial security, firms also remain in business, employees keep their jobs, customers continue to receive goods and services, and suppliers still receive

ii) *Reduction of uncertainty* Worry and fear before and after loss is reduced.

iii) *Source of investment funds* Premiums paid to insurance firms are invested in productive activities thus driving economic growth

iv) *Interest in loss control* The need for insurance gives insurance industry a direct interest in loss control e.g. highway safety, fire prevention, prevention of theft e.t.c. Society benefits when losses are reduced.

v) *Enhancement of credit* Insurance makes a borrower a better credit risk by generating the borrower's collateral. E.g. insurance of a house may be a condition for issuance of a mortgage.

5.13 Costs of Insurance

i) *Increases cost of doing business or operation expenses* Administration expenses, premium taxes, allowances for contingencies, profit e.t.c.

ii) *Fraudulent claims/ moral hazard* Faked accidents, phony burglaries e.t.c.

iii) *Inflated claims* Attorneys for plaintiff sue for high – liability judgments. Insured inflate damages to property e.t.c.

5.14 Contemporary Issues in Risk Management

1. Piracy in the gulf of Aden

2. Continued difficulty in measuring the "actual value" added by risk management – apart from reduced capital requirements.

3. Increased reliance on rating agencies to rate the quality of risk management efforts. It's not clear whether these rating agencies are equal to the task.

4. New emphasis on the development of "Generally accepted risk principles. Greater closure of risk informal

5.15 Revision Questions

1. Define the term insurance
2. Explain characteristics of insurance
3. Differentiate between insurable and non-insurable risks
4. Describe the distinguishing features of insurance contract
5. What are the elements of an insurance transaction?
6. Outline the characteristics of Insurance
7. Explain the six requirements of an insurable risk
8. Discus the requirement of an Insurable Risk
9. Outline the requirements of a valid contract;
10. Explain the Principles of Insurance
11. Explain the various parts of an insurance contract
12. What are the benefits of Insurance?
13. What are costs of Insurance?

Selected References

George E Rejda *Principles of Risk and Insurance Management*, Pearson Education, 2007

Bernstein, Peter L. *Against the Gods, The Remarkable Story of Risk*. New York: Wiley, 1996

Wiening, Eric A. *Foundations of Risk Management and Insurance,* First Edition, Malvern, PA: American Institute for Chartered Property Causality Underwriters/ Insurance of America 2002

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SCHOOL OF APPLIED SOCIAL SCIENCES

DEPARTMENT OF BUSINESS AND SOCIAL STUDIES

BACHELOR OF BUSINESS MANAGEMENT

UNIT CODE: BBM 224 TITLE: PRINCIPLES OF RISK MANAGEMENT & INSURANCE

TIME 2HRS

Instructions

*Answer Question **ONE** which is **Compulsory** and any other **TWO** questions*

Question One
a) Explain the meaning principles of risk management and insurance (2 marks)

b) Explain the considerations that effect choice between retention and transfer
   (5 marks)

c) Discuss the various methods of handling risks   (15 marks)

d) Outline the characteristics of insurable risk   (5 marks)

e) Explain the meaning of enterprise risk   (3 marks)

   (30 marks)

Question Two
a) What are the objectives of Risk Management?   (10 marks)

b) Explain the steps in the Risk Management Process   (10 marks)

   (20 marks)

Question Three
a) Consider two vehicles, A and B. A is a petrol transport tanker, with a probability of fire of 0.05. B is a diesel transport tanker, where the probability is 0.02. The vehicles are always transporting fuel together that if one catches

fire; there is an 85% chance (.85) that the other will burn as well. Determine the probability if A starts the fire and spreads it to B - probability (A and B).

(10 marks)

b) State and explain **any** five techniques of risk identification   (10 marks)

Question Four

a) Briefly explain the steps in the Risk Management Process   (10 marks)

b) What do you understand by the term captive insurance   (5 marks)

c) Outline the role of government in risk management   (5 marks)

(20 marks)

Question Five

Discuss the principles of insurance   **(20 marks)**

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TIME 2HRS

Instructions

*Answer Question **ONE** which is **Compulsory** and any other **TWO** questions*

Question One
   a) Explain the characteristics of an insurable risk   (10 marks)
   b) Explain the objectives of risk management both before and after a loss occurs

                                                                        (5 marks)

   c) How does fundamental risk differ from particular risk?   (5 marks)
   d) With help of illustrations, explain; physical hazard, moral hazard, morale hazard
      and legal hazard   (10 marks)
                                                                        (30 marks)

Question Two
Briefly explain the following terms as used in insurance
        a) Coinsurance
        b) Deductibles
        c) Endorsement and Riders
        d) Exclusions
        e) Definitions   (Each 4 marks)
                                                                        (20 marks)

Question Three

    a) What are risk maps?   (5 marks)

    b) Explain various information-gathering techniques   (10 marks)

    c)   Explain social and economic burden of risk to the society   (5 marks)

                                          (20 marks)

Question Four

  a) Differentiate between a direct loss and an indirect or consequential loss

                                          (5 marks)

  b)   Of 500 employees of a firm 280 have a life insurance policy ,400 have a medical insurance cover and 200 participate in both programmes

      i.   What is the probability that a randomly selected employee will be a participant in atleast one of the two programmes?   (4 marks)

      ii.   Determine the probability that an employee will be a participant in the life insurance plan given that he/she has a medical insurance coverage

                                          (6marks)

  c)   What factors are considered in selecting a method for risk identification?

                                          (5 marks)

                                        (20 marks)

Question Five

    a) Explain any **Five** functions of a risk manager   (10 marks)

    b) With the help of examples differentiate between pure and speculative risks

                                          (10 marks)

                                        (20 marks)