FN241
Risk Management and Insurance
Risk Management Topics

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Risk Management Topics

- Risk management definition & objectives
- Risk management process – identify, measure, tool, monitor
  - Risk-control techniques
  - Risk-financing techniques
  - Application: Personal risk management
- Advanced topics in risk management

Meaning of Risk Management

- Risk Management is a process that identifies loss exposures faced by an organization and selects the most appropriate techniques for treating such exposures

- A loss exposure is any situation or circumstance in which a loss is possible, regardless of whether a loss occurs
  - E.g., a plant that may be damaged by an earthquake, or an automobile that may be damaged in a collision

Objectives of Risk Management

- Primary objectives for a company
  - **Value maximization** objective – the ultimate goal of a company is to maximize the value of the organization
  - However, Vaughan and Vaughan (2014) propose that the primary of risk management is

    "to guarantee that the organization is not prevented from achieving its other objectives by the losses that might arise out of pure risk"

- Primary objectives in managing personal risks
  - To avoid the deprivation of the individual and those dependent on him/her in the event of a loss that causes the termination of income

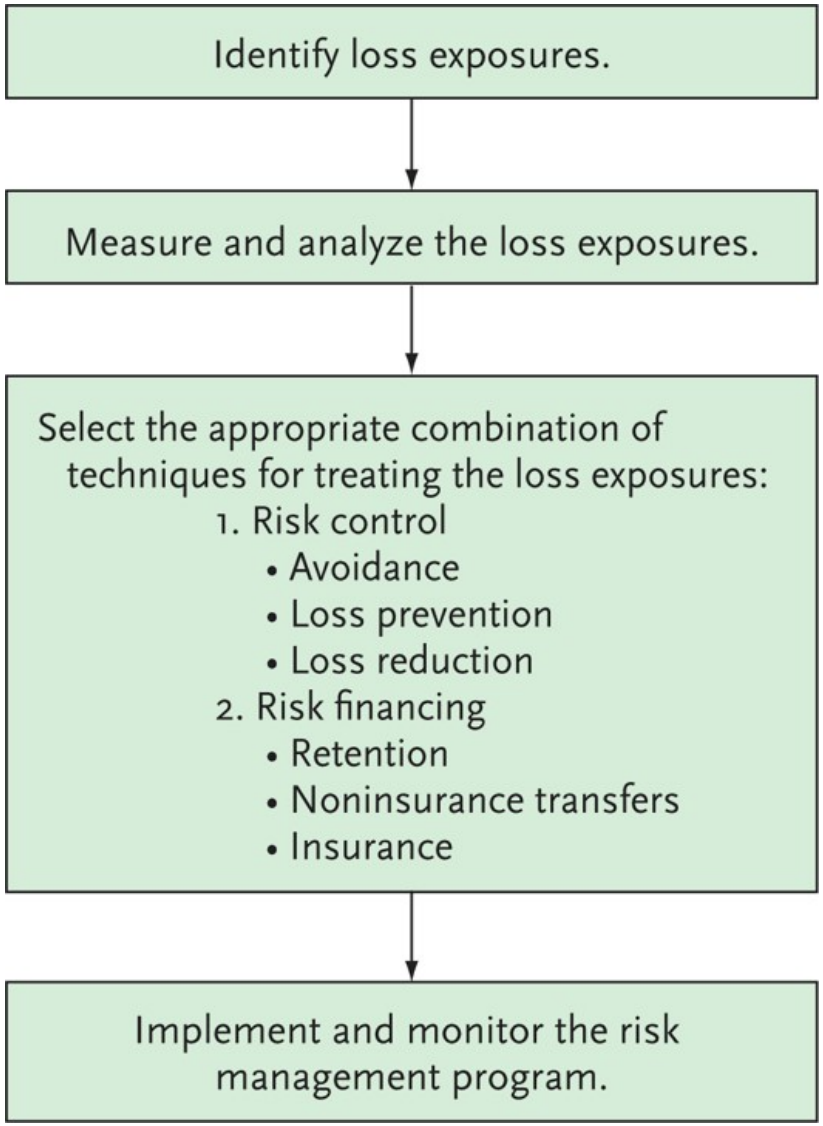
Personal Risk Management

- Personal risk management refers to the identification of pure risks faced by an individual or family, and to the selection of the most appropriate technique for treating such risks

- The same principles applied to corporate risk management apply to personal risk management

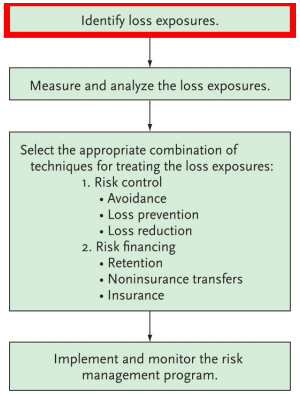
- Focus on ……

Steps in the Risk Management Process



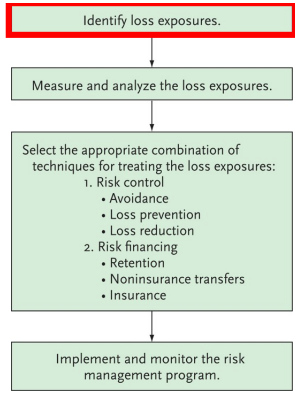
Source: RM Exhibit 3.1

1 Identify Loss Exposures



- Property loss exposures
- Liability loss exposures
- Business income loss exposures
- Human resources loss exposures
- Crime loss exposures
- Employee benefit loss exposures
- Foreign loss exposures
- Intangible property loss exposures
- Failure to comply with government rules and regulations

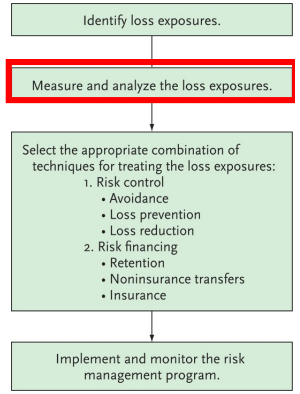
Identify Loss Exposures



- Risk Managers have several sources of information to identify loss exposures:
  - Risk analysis questionnaires and checklists
  - Physical inspection
  - Flowcharts of company operations
  - Financial statements
  - Historical loss data

- Industry trends and market changes can create new loss exposures.
  - e.g., exposure to acts of terrorism

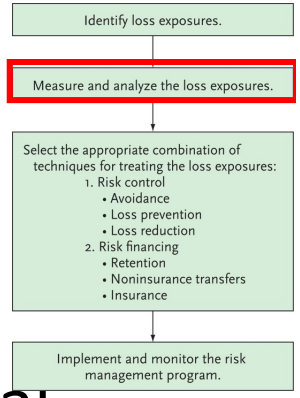
2 Measure and Analyze Loss Exposures



- Estimate for each type of loss exposure:
  - Loss frequency (ความถี่ของความเสียหาย) refers to the probable number of losses that may occur during some time period
  - Loss severity (ความรุนแรงของความเสียหาย) refers to the probable size of the losses that may occur

- Rank exposures by importance

Loss Forecasting

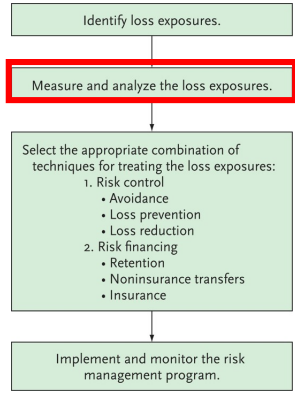


- The risk manager can predict losses using several different techniques:
  - Probability analysis
  - Regression analysis
  - Forecasting based on loss distribution
- Of course, there is no guarantee that losses will follow past loss trends

2.1 Probability analysis: the risk manager can assign probabilities to individual and joint events.

- The probability of an event is equal to the number of events likely to occur (X) divided by the number of exposure units (N)

Loss Forecasting – Probability

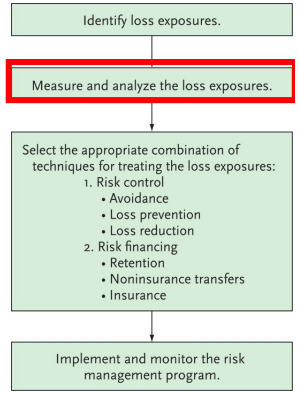


- 2 events are considered <u>independent events</u> if the occurrence of one event does not affect the occurrence of the other event.

- Suppose the probability of a fire at plant A is 4% and the probability of a fire at plant B is 5%. Then,

$$P(fire\ at\ plant\ A) \text{x}\ P(fire\ at\ plant\ B)$$
$$= P(fire\ at\ both\ plants)$$
$$= .04 \text{ x } .05 = \ .002\ or\ .2\%$$

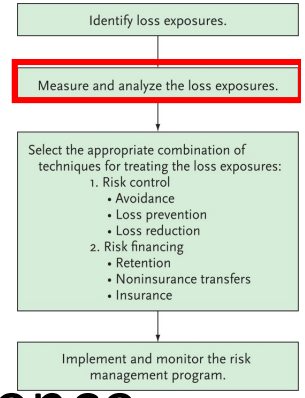
Loss Forecasting – Probability



- 2 events are considered <u>dependent events</u> if the occurrence of one event affects the occurrence of the other.

- Suppose the probability of a fire at the second plant, given that the first plant has a fire, is 40%. Then,

$$P(fire\ at\ one\ plant)$$
$$\text{x}\ P(fire\ at\ second\ plant\ given\ fire\ at\ first\ plant)$$
$$= P(fire\ at\ both\ plants)$$
$$=.03\ \text{x}\ .40 = .012\ or 1.2\%$$



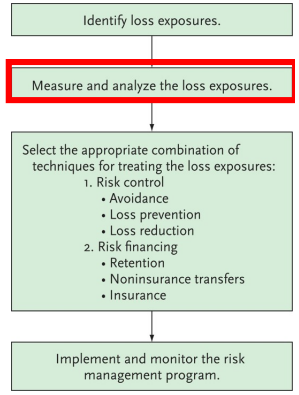
Loss Forecasting - Probability

- Two events are <u>mutually exclusive</u> if the occurrence of one event precludes the occurrence of the second event

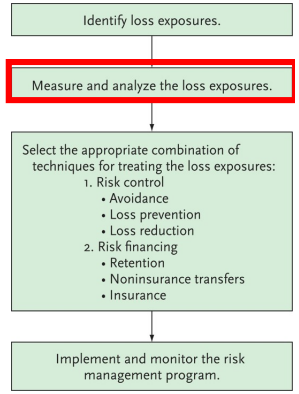
- Suppose the probability a plant is destroyed by a fire is 2% and the probability a plant is destroyed by a flood is 1%. Then,

$$P(fire\ destroys\ plant) + P(flood\ destroys\ plant)$$
$$= P(fire\ or\ flood\ destroys\ plant)$$
$$= .02 + .01 = .03\ or\ 3\%$$

Loss Forecasting – Regression

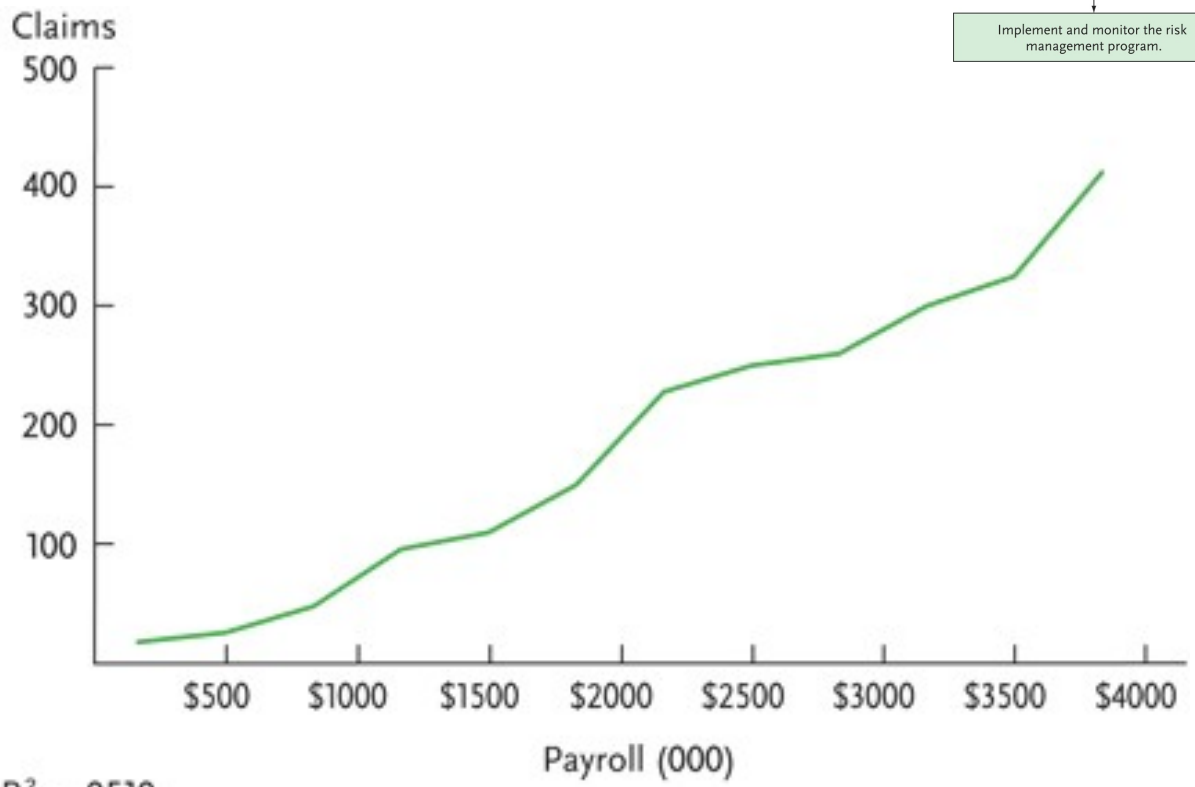


2.2 Regression analysis characterizes the relationship between two or more variables and then uses this characterization to predict values of a variable



Relationship Between Payroll and Number of Workers Compensation Claims

Year	Payroll in thousands	Workers compensation claims
2001	$ 400	18
2002	520	26
2003	710	48
2004	840	96
2005	1200	110
2006	1500	150
2007	1630	228
2008	1980	250
2009	2300	260
2010	2900	300
2011	3400	325
2012	4000	412



Regression results: $Y = -6.1413 + .1074\ X,\ R^2 = .9519$

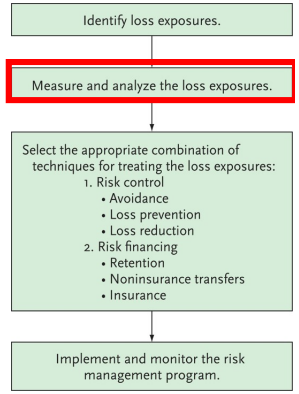
Predicted number of claims next year, if the payroll is $4.8 million:

$Y = -6.1413 + (.1074 * 4800)$

$Y = 509.38$

Source: RM Exhibit 4.4

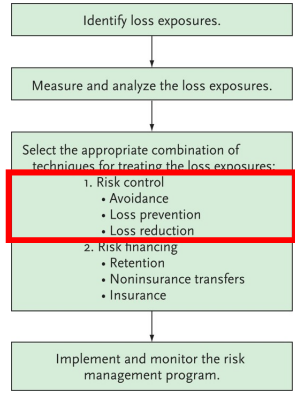
Loss Forecasting – Loss Dist.



2.3 A loss distribution is a probability distribution of losses that could occur

- Useful for forecasting if the history of losses tends to follow a specified distribution, and the sample size is large
- The risk manager needs to know the parameters of the loss distribution, such as the mean and standard deviation
- The normal distribution is widely used for loss forecasting

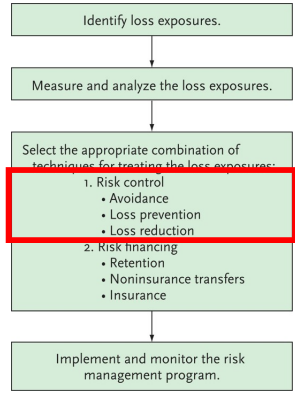
3 Select the Appropriate Combination of Techniques



3.1 Risk control (การควบคุมความเสี่ยง) refers to techniques that reduce the frequency and severity of losses

- Methods of risk control include:
  - Avoidance
  - Loss prevention – deals with frequency
  - Loss reduction – deals with severity
  - Duplication
  - Separation
  - Diversification

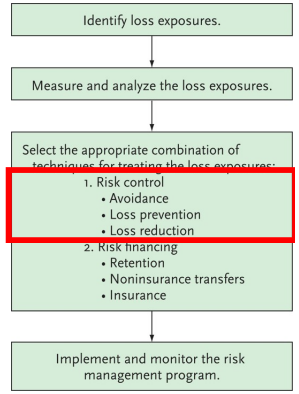
Financial Analysis in Risk Management Decision Making



- The **time value of money** must be considered when decisions involve cash flows over time
  - Considers the interest-earning capacity of money
  - A present value is converted to a future value through compounding
  - A future value is converted to a present value through discounting

* This topic is discussed in FN201 (Business finance) and more advanced finance classes

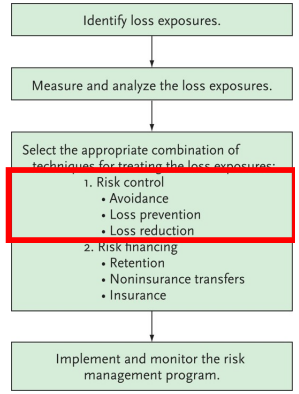
Financial Analysis in Risk Management Decision Making



- Risk managers use the time value of money when analyzing insurance bids or making **risk-control** investment decisions
  - Capital budgeting is a method for determining which capital investment projects a company should undertake.
  - The net present value (NPV) is the sum of the present values of the future cash flows minus the cost of the project
  - The internal rate of return (IRR) on a project is the average annual rate of return provided by investing in the project → **IRR is the interest rate that makes the NPV = 0**

* This topic is discussed in FN201 (Business finance) and more advanced finance classes

Financial Analysis - Example

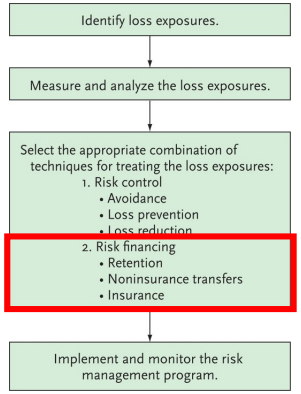


- A sprinkler system for TBS Company's production facility will cost $175,000. The project will provide net after-tax cash flows of $50,000 per year for 5 years.

- Assuming an interest rate of 6%, what is the NPV of this project? What is the project's IRR? Do NPV and IRR indicate that this project is acceptable?

* This topic is discussed in FN201 (Business finance) and more advanced finance classes

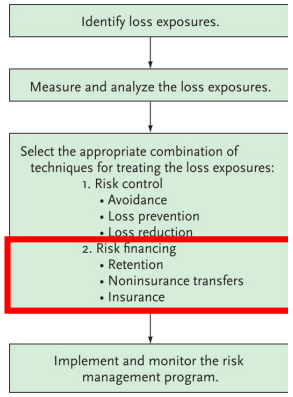
Select the Appropriate Combination of Techniques



3.2 Risk financing (การจัดหาเงินเพื่อจัดการความเสี่ยง) refers to techniques that provide for the payment of losses after they occur

- Methods of risk financing include:
  - Risk Retention (การรับความเสี่ยงไว้เอง)
  - Non-insurance Transfers
  - Commercial Insurance

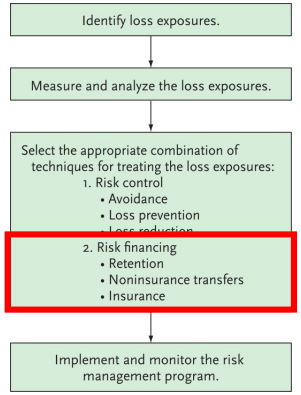
Risk Financing Methods - Retention



- Retention means that the firm retains part or all of the losses that can result from a given loss
  - Retention is effectively used when:

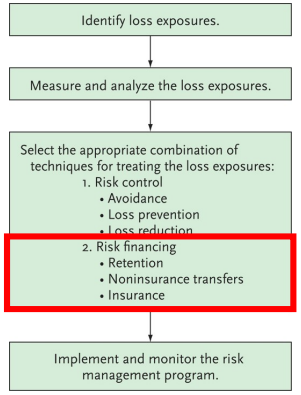
  - The retention level is the dollar amount of losses that the firm will retain

Risk Financing Methods - Retention



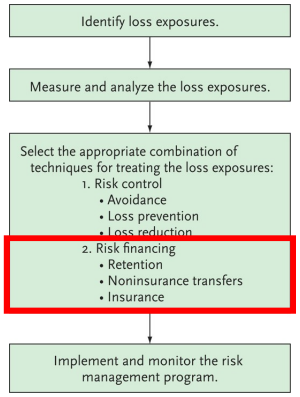
- Self-insurance, or self-funding (การประกันภัยตนเอง) is a special form of planned retention by which part or all of a given loss exposure is retained by the firm
  - Widely used by employers to provide group health, dental, and vision to employees
  - Tailored to fit the needs of the group
  - Lower fixed costs – Most expenses are variable based on the actual claims

Risk Financing Methods - Non-insurance Transfers



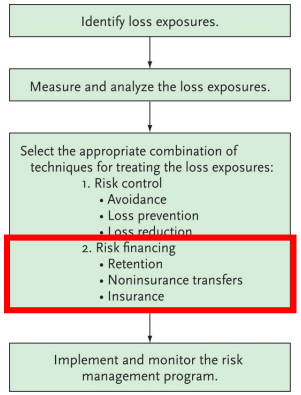
- A non-insurance transfer (การโอนความเสี่ยงที่ไม่ใช่การประกันภัย) is a method other than insurance by which a pure risk and its potential financial consequences are transferred to another party
  - Examples include: contracts, leases, hold-harmless agreements (ข้อตกลงรับชดใช้)
  - A company's contract with a construction firm to build a new plant – the construction firm is responsible for any damage to the plant while it is being built

Risk Financing Methods - Insurance



- Insurance is appropriate for low-probability, high-severity loss exposures: key areas are as follows
  - Selection of insurance coverages and an insurer
  - Negotiation of terms
  - Dissemination of information to relevant workers
  - Periodic review of the insurance program

Risk Financing Methods: Insurance



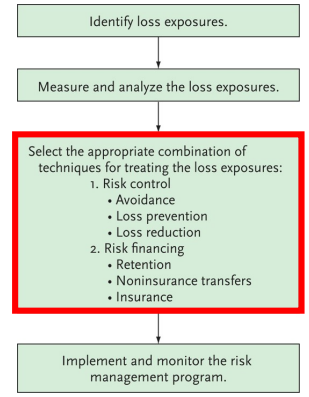
Disadvantages

- Premiums may be costly
- Negotiation of contracts takes time and effort (for corporate)
- The risk manager may become lax in exercising loss control

Advantages

- Firm is indemnified (ได้รับการชดใช้ค่าสินไหมทดแทน) for losses
- Uncertainty is reduced
- Insurers can provide valuable risk management services
- Premiums are income-tax deductible

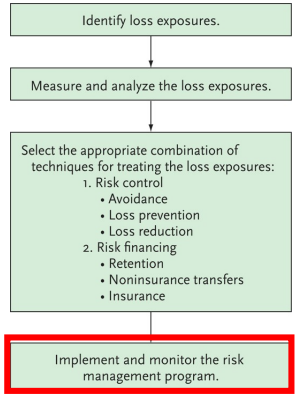
Avoidance Prevention Reduction
Retention Non-insurance Insurance



Type of loss	Loss frequency	Loss severity	Examples	Appropriate risk management techniques
1.	Low	Low		
2.	High	Low		
3.	Low	High		
4.	High	High		

		Loss frequency			
		Almost nil	**Slight**	**Moderate**	**Definite**
Loss severity	**Severe**	Transfer	Reduce/Prevent	Reduce/Prevent	Avoid
	Significant	Retain	Transfer	Reduce/Prevent	Avoid
	Slight	Retain	Transfer	Prevent	Prevent

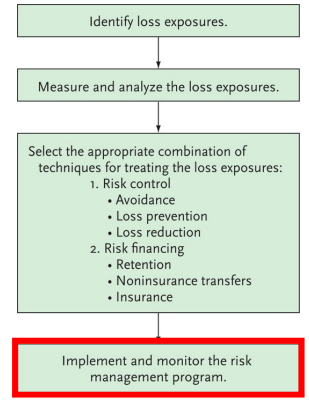
4 Implement and Monitor the Risk Management Program



- Implementation of a risk management program begins with a <u>risk management policy statement</u> that:
  - Outlines the firm's objectives and policies
  - Educates top-level executives
  - Gives the risk manager greater authority
  - Provides standards for judging the risk manager's performance

- A <u>risk management manual</u> may be used to:
  - Describe the risk management program
  - Train new employees

Implement and Monitor the Risk Management Program



- A successful risk management program requires active cooperation from other departments in the firm

- The risk management program should be periodically reviewed and evaluated to determine whether the objectives are being attained
  - The risk manager should compare the costs and benefits of all risk management activities

Benefits of Risk Management

- Enables firm to attain its pre-loss and post-loss objectives more easily
- A risk management program can reduce a firm's cost of risk
- Reduction in pure loss exposures allows a firm to enact an enterprise risk management program to treat both pure and speculative loss exposures
- Society benefits because both direct and indirect losses are reduced

The Changing Scope of Risk Management

- Today, the risk manager:
  - Is involved with more than simply purchasing insurance
  - Considers both pure and speculative financial risks
  - Considers all risks across the organization and the strategic implications of the risks

The Changing Scope of Risk Management

- Financial Risk Management refers to the identification, analysis, and treatment of speculative financial risks:
  - Commodity price risk
  - Interest rate risk
  - Currency exchange rate risk

- Financial risks can be managed with capital market instruments

Enterprise Risk Management

- Enterprise Risk Management (ERM) is a comprehensive risk management program that addresses the organization's pure, speculative, strategic, and operational risks
  - Strategic risk refers to uncertainty regarding an organization's goals and objectives
  - Operational risks develop out of business operations, such as manufacturing
  - As long as risks are not positively correlated, the combination of these risks in a single program reduces overall risk

Other Risk Management Tools

- Value at risk (VAR) analysis involves calculating the worst probable loss likely to occur in a given time period under regular market conditions at some level of confidence
  - The VAR is determined using historical data or running a computer simulation
  - Often applied to a portfolio of assets
  - Can be used to evaluate the solvency of insurers

* This topic is discussed in FN415 (Financial risk analysis)