

Journal of

INDUSTRIAL TECHNOLOGY

Volume 16, Number 4 - August 2000 to October 2000

Integrating Enterprise-Wide Risk Management Concepts into Industrial Technology Curricula

By Dr. Ronald L. Meier

KEYWORD SEARCH

***Curriculum
Legal Issues
Management
Safety***

Reviewed Article

The Official Electronic Publication of the National Association of Industrial Technology • www.nait.org

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Integrating Enterprise-Wide Risk Management Concepts into Industrial Technology Curricula

By Dr. Ronald L. Meier

Dr. Ronald L. Meier is a professor of Industrial Technology at Illinois State University, Normal IL. Ron and his partners with the Market-Driven Quality Group LLC spent the last three years defining the domain of contemporary or emerging enterprise-wide risk management for professional risk managers and senior management. One outcome from this research was the development of a commercial website for risk managers. This same research team received a National Science Foundation grant in 1997 to develop high school, community college, and university curricula to infuse problem solving, team development, and contemporary business concepts into existing technological courses. Ron teaches courses in Foundations of Industrial Technology, Digital Electronics, and Managing Industrial Operations.

Introduction

What is risk? Webster's Dictionary (1990) defines risk as the possibility of loss or injury, a dangerous element or factor, or an exposure to hazard or danger. It is very difficult to assess any business function, process, or activity that cannot benefit from thoroughly assessing the risks that can have a negative impact on an enterprise's competitiveness and profitability.

For the purpose of this article risk is defined as the possibility that something will go wrong to impede the attainment of specific business objectives. Most risks are an outcome, the risk itself is not something that can be directly managed or controlled. However, the root cause or factor that creates the risk is manageable and in many cases controllable. There are alerts, warning signs or indicators that a risk may occur. Effectively managing or controlling the root causes of risk can result in market leadership, robust growth, premium stock prices, and investor confidence.

As defined by the National Association of Industrial Technology, "Industrial Technology is a field of study designed to prepare technical and/or management oriented professionals for employment in

business, industry, education, and government. Industrial Technology is primarily involved with the management, operation, and maintenance of complex technological systems..." (NAIT, 1999)

By expanding on several of the key words within this definition – Industrial Technology also encompasses topics such as marketing, finance, political & legal systems, as well as relationships with employees, competitors, and the supply chain. If this is true then Industrial Technology faculty and students need to understand the connections and linkages among a wide variety of business and management concepts to better prepare themselves to succeed in 21st century. The intent of this paper is to further reinforce the importance of business and management courses as a vital component of any Industrial Technology curriculum. This paper examines key trends in risk management as well as a taxonomy of risks that depicts an enterprise-wide or holistic perspective in dealing with risk.

What is Risk Management?

Risk Management is the practice used to prevent as many losses as possible and arranging methods of payment for the rest. Risk Management is a scientific approach to the problem of dealing with the pure risks faced by individuals and businesses (Lam & Kawamoto, 1997). Managers have full responsibility dealing with all risks facing the organization, including both speculative and pure risks. A risk manager is usually a highly trained individual who makes risk management

their full time job or the responsibilities may be spread out within a risk management department.

Risk Management is not just buying insurance for a company. It also involves dealing with both insurable and uninsurable risks and the choice of the appropriate techniques for dealing with them. The emphasis of risk management is not getting the most insurance for the dollar spent, but to reduce the cost of handling risk by the most appropriate means. Insurance then, happens to be one of the several approaches for minimizing pure risks the firm faces. When the risk manager's role encompasses pure loss prevention they spend their time examining:

- Hazards such as fire, tornado or hurricanes, theft, piracy, vandalism, and crime
- Internal operation exposures caused by safety and security practices, workers' compensation, and employee dishonesty
- Fiduciary uncertainties created by mishandling money or making poor investment decisions for an employee or pension fund, whether through deliberate acts, misrepresentation, or error.

Traditional risk managers do not make decisions on the basis of maximizing shareholder value; most do not even consider their responsibility to investors. Investors do not reward well thought out insurance programs; they reward good risk management.

What is Enterprise Risk Management?

Enterprise risk management is a systematic approach to managing risk. Risk, risk factors, and mitigation programs are considered on a business wide basis, internally and externally. Enterprise risk management assumes that shareholders are indifferent to arbitrary compartmentalization of risk. Enterprise risk management also assumes that risk factors generally have multiple effects and that to have any value, mitigation programs must consider all such effects (Lange, 1998).

The ability to predict - and control - risk in all areas of the company is now an essential component of an effective business strategy. As a result, risk management has become one of the most complex strategic issues businesses face. That's because a well-executed, broad-based risk management program enables companies to achieve their goals - by providing effective processes for addressing the events or actions that can impede their achievement. And, while the Risk Manager or CFO may be responsible for developing this program, the challenge of predicting and controlling risk actually extends throughout the entire organization.

Risk management has traditionally been the bailiwick of insurance companies. But traditionally insurable risks cover only 20% of actual losses (Cooney, 1999; Thornhill, 1999). This leaves a huge gap, one that corporate risk managers are just beginning to address with a new approach called Enterprise Risk Management. Enterprise Risk Management encompasses the entire organization rather than being limited to the narrow field of insurable risks. Three driving forces are responsible for the changes occurring in enterprise-wide risk management. They are 1) global economic interrelationships; 2) recognition by senior management that risk/reward decisions made within an organization are interrelated; and 3) senior management's decisions on how to manage risk do directly affect shareholder value (MDQG LLC, 1999).

The Nonprofessional Risk Manager

Although many of the larger companies have an entire department devoted to risk management, smaller companies are not so lucky. Risk manager is not a position to be taken lightly and demands a lot of precision if loss is to be avoided. Decisions must be made as to what kind of insurance is to be purchased, how much, and from whom. If the insurance coverage is inadequate and a loss occurs, the firm will suffer a financial loss. On the other hand, if the business is overinsured, the loss in wasted premiums is also a concern. Therefore, it is vitally important that the nonprofessional risk manager be familiar with and understands the principles of risk management. It is also important for the nonprofessional risk manager to know where to go to get help and advice that is in the best interest of the company.

Industrial technology professionals are just the people to articulate and integrate effective ERM programs. Industrial technology professionals tend to be process oriented with a thorough background in business functions, processes, and activities. This type of background and orientation is a tremendous asset for implementing effective ERM reporting systems.

Buying Insurance

As stated earlier, buying insurance is just one technique risk managers use to deal with pure risks. In general, when purchasing insurance, there are two mistakes that most people make: buying too little and buying too much. The first, which is potentially more costly, can leave the individual vulnerable to unbearable financial loss. On the other hand, too much insurance, buys protection against losses that could more economically be retained.

With the previous information provided, a plan is needed to obtain maximum benefits from the dollars spent. A priority ranking for insurance expenditures must be put into place. Keep in mind the three classifications of risks, *critical*, *important*, and *unimportant*. There are three types of insurance coverage designed to protect

against these risks (MDQG LLC, 1999):

- *Essential* insurance coverage includes those policies designed to protect against loss exposures that could result in bankruptcy. Insurance coverage required by law is also considered an essential coverage.
- *Important* insurance coverage includes those policies that protect against loss exposures that would force the insured to borrow or resort to credit.
- *Optional* insurance coverage includes those policies that protect against losses that could be met out of existing assets or current income.

Alternatives To Commercial Insurance

In searching for the most appropriate technique for dealing with risk and the growth of risk management, alternatives have been developed. These include:

- **Self-Insurance Programs** – Many firms elect to self-insure certain exposures because they believe it will be cheaper to do so in the long run. Self-insurance is the setting aside of cash to cover any potential losses (Rubin, 2000).
- **Captive Insurance Company** – A company formed to insure the risks of a parent company. This is usually done when business insurance for a certain commercial risk cannot be obtained through traditional markets (Rubin, 2000). Two types of captive organizations are:
 - *Pure Captives*. A pure captive is any company that insures risks of its parent and affiliated companies. Also known as a single parent captive.
 - *Association or Group Captives*. A type of captive insurer owned by members of a sponsoring organization or group, such as a trade association.
- **Risk-Retention Groups** – In addition to Purchasing Groups, risk-retention groups evolved because of the Risk Retention Act of 1986. Any corporation or other

limited liability association whose activities do not include the provision of insurance other than reinsurance with respect to the similar or related liability exposure of any other risk retention group that is engaged in business or activities (Rubin, 2000)

- **Risk-Sharing Pools** – A group of entities may elect to pool their exposures, sharing the losses that occur, without creating a formal corporate insurance structure (Rubin, 2000).

The Risk Management Process

The risk management process consists of six steps which either a professional or non-professional risk manager can map to an organizations business decisions and corporate goals (MDQG LLC, 1999).

The first step in the risk management process is the *determination of the objectives* of the risk management program, deciding precisely what it is that the organization expects its risk management program to do. One primary objective of the risk management effort is to preserve the operating effectiveness of the organization. A second objective is the humanitarian goal of protecting employees from accidents that might result in death or serious injury.

Step two – the *Identification of the risks* involves someone being aware of the risks. The following tools or techniques provide awareness:

- Risk Analysis Questionnaires
- Exposure Checklists
- Insurance Policy Checklists
- Flowcharts
- Analysis of Financial Statements
- Other Internal Records
- Inspections
- Interviews

Once the risks are identified, the risk manager must *evaluate the risks*. Evaluation means measuring the potential size of the loss and the probability that it is likely to occur. The evaluation requires ranking of priorities as critical risks, important risks, or unimportant risks.

The fourth step, *consideration of alternatives and selection of the risk treatment device*, examines various approaches used to deal with risks and the selection of the technique that should be used for each one. Alternatives for managing or controlling risks include avoidance and reduction. Risk financing mechanisms include risk retention and risk transfer or risk shifting. Risk treatment devices are used in deciding which technique to use to deal with a given risk; the risk manager considers the size of the potential loss, its probability, and the resources that would be available to meet the loss if it should occur.

Simply stated, the *implementation of the decision* is the decision to retain a risk. When an organization decides to retain a risk they establish policies and procedures to reduce or eliminate the probability/frequency of occurrence and the severity of the impact.

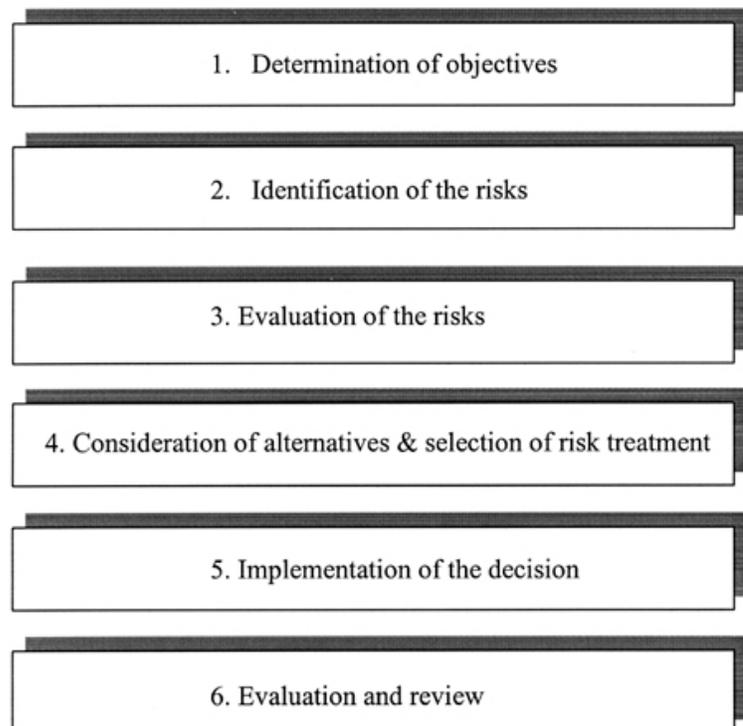
The final step, *evaluation and review* are essential to the program for two reasons. Within the risk management process the business environment changes; new risks arise and old ones disappear. Techniques appropriate last year may not be this year and so

constant attention to risk is required. Mistakes sometimes occur. Hopefully, through evaluation and review, the manager is able to review decisions and discover mistakes before they become too costly.

Addressing the Root Causes of Risk

The goal of Enterprise Risk Management (ERM) is to identify and address all potential risks and their root causes. A good ERM program allows companies to avoid risks by identifying the business functions, processes, and activities that created them and then developing and implementing strategies to minimize the potential exposure. ERM also enables companies to monitor external factors or internal processes that can't be changed, and develop strategies to *reduce risks* that can't be avoided. Identifying all potential risks your organization faces is the first step in the development of an effective Enterprise Risk Management program. Once potential risks are identified, you can assess your organization's vulnerability and develop processes for controlling significant risks. But this is an extremely time-consuming and

Figure 1. The six-step risk management process.



onerous task. And with limited staff, time and resources, many companies never develop an effective ERM program. Industrial technology professionals with their systems and process orientation are just the people to help identify where problems or risks originate within the organization. When examining internal operational risks such as: inventory shrinkage, mechanical breakdowns, inadequate quality control, resource dependencies, business interruptions, business systems incompatibility, etc., industrial technology professionals are well qualified to assess and determine the root cause of these problems as well as how they impact the organizations financial and operational functions and activities.

A Risk Taxonomy

The Market-Driven Quality Group LLC, a Normal, IL company, has spent three years developing and refining a taxonomy of risk. Figure 2 depicts the cross-functional and cross-disciplinary nature of enterprise risk management. Risks were described according to their specific characteristics and source of origin. This taxonomy contains four categories, sixteen subcategories, and 180 individual risks. The following text describes each of the categories and identifies each subcategory (Williams, Meier, Humphreys; 1998).

Definitions of Risk Categories

External Factors: The business problems and exposures in this category are the result of phenomena that lie outside the immediate realm of the company's *direct* influence or control. These external factors have been classified within three subcategories: 1) Political, Legal, & Regulatory; 2) Human Perils; and 3) Natural. Although the analysis and management of these problems is the responsibility of the company, by definition they originate from sources that are removed from the specific activities and operations of the company. Nevertheless, exposure to these external factors effects how management makes decisions regarding internal operations. Additionally, the subcategories may

establish constraints within which the company must operate.

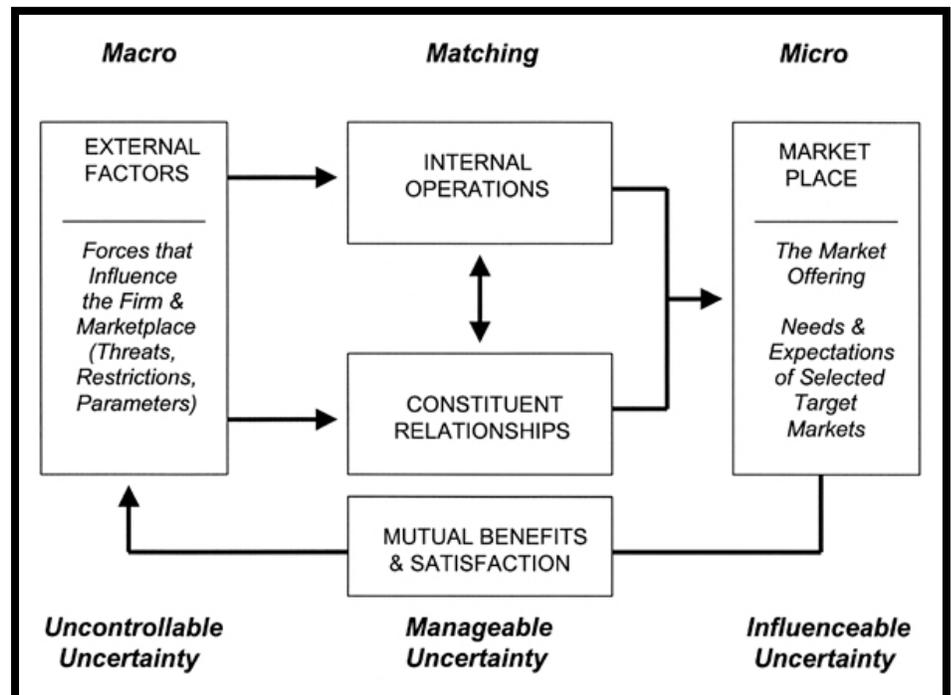
Internal Operations: This category encompasses the uncertainties associated with a company's functional business processes and systems. It manifests the risks and exposures related to the various functional activities comprising the business's operations. These functional risks and uncertainties have been classified into five subcategories; 1) Technology, 2) Operations, 3) Finance, 4) General, and 5) Strategic. These uncertainties reflect today's intensely competitive market that expects innovative products, exceptional quality, and short cycle-times at the same time that it demands low costs. The functional business processes and systems are the vehicles through which the organization collects and uses information, conceptualizes customer needs and expectations, and generates relevant value added solutions that it offers in the marketplace.

Relationships: Relationship risks pertain to the various stakeholders that organizations serve and/or maintain relationships with in the course of conducting business. Four subcategories of relationships with the inherent

risks have been identified; 1) Investors, 2) Channel Members, 3) Employees, 4) Customers. While including the more traditional risks inherent in dealing with second and third parties, this category also embodies the uncertainties associated with the expanded business paradigms of supply chain management and strategic partnering. This extended perspective of organizational stakeholders reflects the diverse risks and uncertainties associated with the complex of multiple interrelationships between an enlarged set of network members. These uncertainties must be effectively addressed if the network is to perform and maximize the mutual benefits for all parties.

Marketplace: The Marketplace category comprises the set of potential business problems and exposures related to the firm competing in its chosen market(s). Marketplace risks have been further organized into the following four subcategories; 1) Image/ Reputation, 2) Market Offering, 3) Competition, 4) Market Dynamics. Key issues in this category pertain specifically to the process of managing the market offering(s) of the firm in the market place (including planning and

Figure 2. The enterprise system as it relates to risk management
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positioning), competitive forces and marketplace activities, and the dynamics of continual change in customer expectations. This category of risks carries a high level of importance due to increasingly dynamic trends in markets, evolving business strategies, and intensifying competition. These risks directly affect the firm's competitive position and performance outcomes (e.g., sales, market share, profitability, brand equity, and customer satisfaction).

Infusing Risk Management Into Industrial Technology Curricula

As we prepare industrial technology professionals we must be sure to instill more than just the basics of organizational operations (i.e. technology, operations, finance, and strategy) in our graduates. In the future, industrial technology graduates will need to possess a background and understanding of:

- The external factors that affect an organizations decision-making ability such as political, legal, & regulatory issues; human emotions and tendencies that influence theft and fraud; and environmental and

natural disasters.

- The constituent relationships that must be built with investors, supply chain partners, employees, and customers.
- The marketplace and its affect on organizational image/reputation, market offerings whether products or services, competition, and market dynamics.

The subsequent matrix parallels the NAIT accreditation guidelines and demonstrates how and where the concepts of enterprise-wide risk management can be integrated into an industrial technology curriculum.

NAIT Foundation Requirements

Content Areas

Risk Topics That Can Be Addressed

NAIT Foundation Requirements	Content Areas	Risk Topics That Can Be Addressed
General Education	Economics	Economic Crisis (Recessions, Downturns)
Management	Sociology	Theft, Piracy, Espionage, Terrorism, Hijacking, Drug & Alcohol Abuse
	Quality Control	Inadequate Quality Control, Poor Product Design
	Production Planning	Inventory Obsolescence, Business Interruptions, Short Shelf Life, Product Liability, Product Recalls, Express and Implied Warranties
	Industrial Supervision	Employee Dissatisfaction, Insufficient Staffing, Lack of Experienced Employees, Improper/Wrongful Termination
	Finance & Accounting	Fluctuations in Financial Markets, Credit Downgrades, Insufficient Financial Liquidity, Excessive Risk to Return Ratios, Unrecognized Deferred Tax Liability, Currency Fluctuations, Interest Rate Fluctuations, Structure of Taxing Authority, International Accounting Differences
	Safety Management	Non-compliance with Legal Regulations, Third Party Liabilities, Poor Workplace Safety Practices, Employee Injuries on the Job,
	Facilities Layout	Explosions, Fire, Earthquakes, Flooding, Lightning, Deficient Internal Processes/Controls
	Materials Handling	Inventory Shrinkage, Not Having Access to Accurate Information, Not Properly Using Information, Transportation Problems
	Communications	Unethical Sharing of Information, Unreliable/Inadequate Information Systems,
	Business Law	Legislative Changes in Regulations, Import/Export Regulatory Changes, Regulatory Enforcement Changes, Fair Trade Issues, General Business Liability, Discrimination in Employment Practices, Sexual Harassment, At-Will Employment Liabilities, Contractual Liabilities, Copyright and Patent Violations,
	Marketing	Difficulty in Accessing Markets, Shifts in Market Demands, Excess Industry Dominance, Being Ahead of the Market, Competitor Price Competition, Poor/Eroding Public Image, Decreasing Brand Loyalty, False Advertising
Technical	CAD/CAM Electronics Computer Technology Packaging Manufacturing Processes	Changing Technology Standards, Technology Vandalism, Failure to Keep Pace with Technology, Volatility in Computer Systems and Storage, Business Systems Incompatibility, Mechanical Breakdowns,

Curriculum and course materials need to be developed to include the concepts of enterprise-wide risk management. As educators we need to follow a systematic process for teaching about these risks. The following eight-step process illustrates how the author discusses the risk of Product Liability in a Managing Industrial Operations class. The materials in the text boxes are provided courtesy of XL Insurance, Hamilton, Bermuda.

First, the risk is thoroughly described and defined. It is important for the student to understand the legal interpretations and perspective of the risk.

Product Liability is the liability that results from a product that is defective in design, manufacturing, instructions, or advertising.

- For the seller of the product, this is the traditional product liability
- For the buyer of the product, this can be a workers compensation problem if an employee is injured
- It can also be an environmental problem if the defect leads to a chemical release or spill
- The buyer can also face regulatory risks if the failure of the product to comply with regulations results in a fine

Second, give an example of an actual product liability case.

Example of Ohmeda Fire Sprinklers Product Liability Case

An example that illustrates the business risk is the recall of Ohmeda fire sprinklers. Ohmeda and the Consumer Product Safety Commission agreed to the recall. Under the recall program there will be a \$50 allowance for distributors and installers of these sprinklers to replace them with an improved design. If someone who has these sprinklers installed in their house is injured because of the defect, there will be a potential for a Product Liability lawsuit. If there is damage caused to the home because of negligence while replacing the sprinkler, the contractor's insurance will be called upon to pay for the damages. If the recall instructions are alleged to be the reason for the damage, then Ohmeda will be named as a defendant as well.

The business risk to Ohmeda is the loss of goodwill on the part of its distributors, installers and customers. In this case, Ohmeda risks the loss of business to distributors who may choose to carry the products of other manufactures. Customers who choose these sprinklers for top end homes may decide to purchase from other manufacturers because of the loss of confidence in the design and manufacturing quality of the Ohmeda product.

There is also a regulatory business risk. If Ohmeda failed to comply with any Consumer Product Safety Commission (CPSC) regulation, there are potential penalties for late reporting of the problem that could result in fines and in the extreme criminal exposure.

(Source: Bass, Lewis (1998). *Products Liability: Design and Manufacturing Defects*. New York: Clark, Boardman, Callaghan.)

Third, discuss the issues and effects the risk has on the organization.

Issues & Effects

The potential of Product Liability exists when a product leaves the manufacturer and enters the distribution channel or market. Accordingly, machines that are custom built for manufacturing or testing within the manufacturers own facility are not considered products and are not subject to Product Liability.

The types of products that have the potential of Product Liability are:

- Products used by consumers which are purchased and are intended for personal use, or which are not purchased and may be used by the general public (e.g. shopping carts, playground equipment, etc.)
- Products that are provided to a Beta site to be tested
- Products that are loaned or given away

Another potential for Product Liability exists when people using or people in the vicinity of the product are injured and or property is damaged. Business liability exposures also exist where the product results in business interruption or other consequential damages.

When products under warranty fail and must be repaired or replaced at the manufacturer's expense, this too becomes a business risk since it is considered Product Liability. Other business risks occur where the manufacturer has entered into contractual agreements regarding the reliability or up-time of the product. In these situations, the manufacturer may face economic exposure if the product fails to meet the reliability specifications of the contract.

Product Liability has now been adopted in Europe and Japan. The difference in these parts of the world is that the legal systems are different than in the U.S. where legal fees are based on the amount of a settlement that usually amounts to approximately 33% of the settlement (This is known as a contingency fee arrangement). Other countries do not have contingency fee arrangements and legal fees are preset, or are set at an hourly basis. It is less likely then, that a plaintiff will bring a lawsuit in those countries.

When managers consider the consequences that the enterprise may experience if the risk occurs, they should consider:

Is the risk covered by insurance?

Punitive damages are not covered by insurance in most states. Criminal penalties are personal to the individual. Recall insurance coverage is only now beginning to be a product that the insurance industry is offering.

Does the manufacturer's supplier have sufficient amounts of and the right type of insurance to adequately indemnify or absolve themselves of any potential liability?

An indemnification agreement may not have any value if the person who agrees to indemnify has no or inadequate insurance.

How well prepared is the company to respond to the risk?

If there is the need for a recall, can a recall be decided upon and carried out efficiently with the least impact on goodwill and at the lowest cost? If the product is defective, can the company fix the problem quickly without introducing new problems inadvertently?

Impacts of Product Liability can include cash-based concerns such as expenses and revenues as well as non-cash or indirect concerns such as loss of goodwill and reputation. These impacts can be both short and long-term for the company. Specific impacts of Product Liability are included in the following table along with the nature and duration of these impacts.

Organizational Impact Table: Product Liability

Impacts	Nature of Impact			Duration of Impact	
	Revenues	Expenses	Indirect	Short-term (<1 year)	Long-term (>1 year)
Impact on goodwill	X		X	X	X
Loss of sales	X			X	X
Competition leverages the firm's problems	X		X	X	X
Lowered morale of employees	X	X	X	X	X
Cost to fix the problem		X		X	
Increased insurance costs		X			X
Cost to pay off judgment and defense costs above the risk retention and policy limits		X	X	X	X
Expense to develop/implement quality and safety programs		X		X	

Fourth, the sources (where in the organization the risk originates) and effects (how the risk impacts the organization) are discussed.

A firm may find themselves with a case of Product Liability from numerous causes that may occur either separately or in related groups. The most common and important causes of this problem include:

- Lack of management commitment to product safety
- Failure to create “safe” design
- Inadequate manufacturing quality program
- Improper or inappropriate market presence (incorrect market presence and use – false information or false training of customer)
- Inadequate review/control of sales/marketing representations (e.g., advertising, sales messages)
- Inadequate review/control of warning labels and training materials
- Inadequate review/control of independent contractors (e.g. installation and maintenance)
- Inadequate evaluation and selection of supplier

Risk drivers are variables that influence or determine (a) the probability of a risk occurring and/or (b) the severity of the impact on the organization should the risk occur. The following table identifies the probability or frequency of occurrence and severity for each impact identified above.

Principle Drivers	Will Influence	
	Probability or Frequency of Occurrence	Severity
Dollar amount for quality/safety programs		X
Rate and trend for number of complaints	X	X
Rate and trend for number of mishaps (accidents that don't necessarily lead to harm or lawsuit)	X	X
Rate and trend for product usage inquiries	X	
Life expectancy of safety-critical parts	X	
Number of cases in litigation		X
Dollars spent in litigation		X
Number of accidents in/with certain products or product lines	X	
Number of accidents in certain user groups	X	
Number of accidents in specific usage applications	X	
Dollars spent in claims management		X

Fifth, very basic measurement and assessment tools are derived to assist with evaluating the potential for product liability claims.

Analytics, Diagnostics, & Metrics

Alerts

The following checklist can be used to alert an organization to the potential of a Product Liability claim.

Top of Form

- | | |
|---|--|
| Are accurate high quality hazard data being maintained and monitored (hazards found or corrected prior to ship to market is low)? | <input type="radio"/> YES <input type="radio"/> NO |
| Has a budget been established for either the quality or safety program? | <input type="radio"/> YES <input type="radio"/> NO |
| Are incident data for marketing/distribution as well as customer usage being tracked? | <input type="radio"/> YES <input type="radio"/> NO |
| Is warranty data being analyzed? | <input type="radio"/> YES <input type="radio"/> NO |
| Are warranty data within expected parameters? | <input type="radio"/> YES <input type="radio"/> NO |
| Have adequate provisions been made to defend against litigation? | <input type="radio"/> YES <input type="radio"/> NO |
| Is an overall corporate strategy in place regarding how to effectively manage a product liability portfolio? | <input type="radio"/> YES <input type="radio"/> NO |

Sixth, strategies for reducing downside exposures and enhancing upside potential are discussed.

Downsides

Dealing with Product Liability issues can be very disruptive and costly to an organization. Accordingly, when a Product Liability issue surfaces, the affected organization will want to correct the problem as quickly and smoothly as possible. Ideally, the organization will take steps/actions to prevent issues from occurring in the first place, however, in the event of a Product Liability dispute corrective actions may be necessary. Strategies for dealing with Product Liability issues fall into two major categories, Preventive and corrective.

Preventive

The primary step in prevention is to develop and implement a holistic risk management program such as a “Product Safety and Liability Prevention Program.” A central component of this type of program is defining, in specific terms, what level of exposure to Product Liability is acceptable. The two primary components most comprehensive prevention programs address are Product Design and Human Factors/Ergonomics.

Product Design

Of critical importance is developing designs that are structurally capable of “...withstanding the foreseeable forces under reasonable and realistic accident scenarios.” Formal design reviews with all key stakeholders is normally necessary to ensure design specifications are in place, are reasonable and prudent, and that these design features are possible to produce with existing manufacturing processes.

Human Factors/Ergonomics

Of equal importance to the Product Design are provisions made to ensure end users/consumers use the product as intended – Human Factors/Ergonomics. This normally encompasses detailed instructions written in the language of intended users/consumers, demonstrations if necessary, and guidelines describing the intended operating environment/parameters.

Corrective

Corrective strategies should be based on a pre-designed set of actions or protocols that automatically come into play when a Product Liability issue arises. These corrective strategies may actually utilize the strategies identified above as Preventive, however, several additional factors should be considered as part of a comprehensive corrective strategy. These factors, at a minimum, include:

- Corrective Action Decision Making (CADM)
Defining who is consulted, what decision-making authority these individuals have, how decisions are made, and timing issues prior to a Product Liability issue surfacing are key components of the CADM Process.
- Recall Decision Making (RDM)

Separate from, but related to, CADM is RDM. Once decisions related to correcting a design flaw have been made, decisions related to recalling or not recalling products must also be made. As in the CADM, defining who is consulted, what decision making authority these individuals have, how decisions are made, timing issues, where repairs will be completed, allocating resources needed for product repair, and cost parameters should be identified – optimally, before a potential issue arises.

Upsides

Companies that gain expertise in Product Liability avoidance and control have a valuable commodity to sell to other users. Some industry organizations are involved in activities both to provide better knowledge of liability problems to their member companies and to work towards legislative protections against abuses of the civil liability system. Controlling Product Liability risk can produce the following upsides:

- Decreased costs to certify product to Underwriters Laboratories (UL) or other standards
- Decreased costs to meet international “Conformite Europeanne” (CE) requirements, CE is the European equivalent of the UL
- Decreased risk of criminal penalties
- Decreased risk of punitive damages
- Decreased warranty costs
- Decreased costs of recalls and retrofits
- Decreased costs of design changes
- Decreased costs of insurance
- Decreased number of accidents
- Decreased number of lawsuits
- Decreased time spent supporting litigation (e.g., document preparation, interrogatories, depositions, courtroom activities)
- Increased speed of getting new products to market
- Increased customer satisfaction
- Increased profitability
- Increased peace of mind on the part of company personnel
- Increased customer goodwill
- Increased market share and sales
- Safer products

Seventh, practicing knowledge experts in the field are identified.

Lewis Bass, PE, JD

Principal

Lewis Bass International, Inc.

1101 San Antonio Road, Suite 409

Mountain View, California 94043 USA

Phone: (650) 962-8453

Fax: (650) 962-0296

E-mail: lewbass@gte.net

Web-Site: <http://www.lewisbass.com>

Biography:

Lewis Bass is Principal in the Lewis Bass International, Inc. and, with an emphasis on liability prevention, specializes in the legal aspects of product, environmental, hazardous materials, and facility safety. Mr. Bass is a frequent lecturer, presenting seminars on the *System Safety Approach to Safety and Liability Prevention* and has taught at the University of Wisconsin and the University of Southern California Institute of Safety and Systems Management. He has written numerous articles and books, including *Product Liability: Design and Manufacturing Defects*. Emphasizing product liability prevention for over 20 years, Lewis Bass has affiliated offices in 59 cities around the world with hundreds of personnel including attorneys, certified engineers, hygienists, and ergonomists. Currently, Lewis serves as safety consultant for large and small organizations across the United States and in Europe, Japan and Korea. His clients include many Fortune 500 companies such as Intel, NASA-AMES, Nikon, Sony, Allen Bradley, ITT, and Tektronix.

Mr. Bass holds a BS in Mechanical Engineering, an MS in Industrial and Systems Engineering, and a JD in Law. Mr. Bass is a registered professional safety engineer, member of the editorial board of the *Journal of Products Liability*, and a member of the MEDMARC Insurance Company loss control resource panel. He is task group leader for the robotics and mechanical sections of the revised SEMI S-2 (*Guidelines for Semiconductor Equipment Safety*) and a co-author of SEMI S-8 (*Ergonomic Guidelines for Semiconductor Process Equipment*).

Eighth, case studies are identified and examined that illustrate the consequences for failing to recognize potential risks (lessons learned), as well as exemplary practices (best practices) in which organizations can learn how to reduce potential exposures. Additionally, books, videos, and other educational materials are identified to assist with the long-term educational needs of the students.

Dow-Corning One Step Closer To Resolving Class-Action Product Liability Suit.

More than twenty years ago countless women responded to advertisements similar to a modern version of the following: "...Now become more beautiful and elegant than you ever imagined with fuller, more shapely breasts." Of course the product that was responsible for producing these "...more shapely breasts" were breast implants. What was unforeseen by the appropriate medical regulatory agencies such as the Food and Drug Administration (FDA) and an army of public and private sector research scientists was that the breast implants would eventually fail. The consequences of breast implant failure were and are a host of life-threatening ailments and illnesses for the individuals having had implant surgery. A secondary set of consequences related to the breast implant failures are more than 7,000 product liability cases which have now been combined into a class-action suit against the producer of the product, Dow-Corning.

Even though Dow-Corning had stopped production of breast implants several years ago, they found, and continue to find, themselves in a very difficult position. Customers who had purchased these breast implants as much as 20 years ago were, and are, experiencing implant ruptures, hardening of the implants, chest pain, and "unexplained illnesses" which were eventually linked to the implants. Further, one in four women who had these implants required major surgery to repair damage and/or remove the implants. And since serious medical conditions develop over extended periods of time, it is generally accepted by medical and legal experts, and the FDA, that the extent of damage is not yet fully known.

To correct the situation, the FDA has since enacted very strict guidelines on use of and materials in implants. Further, in order to provide some financial relief for those women who have experienced this product failure, a preliminary settlement against Dow-Corning has been granted in the amount of \$3.2 billion to be paid over the next fifteen years — and it's not over there.

Several victim's advocacy groups and legal representatives of some plaintiffs are calling for Dow Chemical, parent company of Dow-Corning, to be named in the suit as well. In this emerging legal initiative proponents are arguing, "...It's unfair to let one of the world's richest corporations off the hook here for its own negligence and its child's bankruptcy. Dow-Chemical and Dow-Corning are now trying to fashion an indemnification agreement absolving Dow-Chemical of further financial liability, however, since the damage has already occurred any potential indemnification agreement is expected to have limited value.

(Source: "A Final Step Toward Settlement In Dow Corning Case", *Knight-Ridder / Tribune News*, June 28, 1999.)

UK Insurance Brokers Push for Y2K Premium

The computer Year 2000 problem (generally referred to as Y2K) is creating concerns for both producers and users of products and services. One case, involving a subsidiary of Toshiba and a Michigan Grocer, has already been settled. According to the plaintiff's attorney, who specializes in automobile product liability, Y2K is simply a case of applying the "lemon law" to high technology companies.

In the United Kingdom, insurance companies have generally favored blanket exclusion for the Y2K question. According to the technical services manager for the British Insurance and Investment Brokers Association, companies came to a recent meeting intending to exclude this issue altogether from product liability policies as a foreseeable event that should be outside the scope of insurance coverage. However, after discussion with brokers the insurance writers have agreed to cover material damage and business interruption resulting from Y2K problems with the payment of an additional premium. For example, if a food-processing machine fails due to a Y2K problem, the machine will not be considered an insured loss. However if the failure causes damage to the processing plant in which the machine is located, or if there is a loss of business by the processor, insurance coverage will take effect.

This example of negotiation between insurers and companies provides a model of reasonable protection for both the insurer and the insured. It protects the insurance company from directly covering losses that should either be prevented by the affected company or born by the outside supplier of faulty products, but it also protects the insured from unforeseeable or difficult-to-predict events. This example also illustrates the sort of mediated dialogue between insurers and insured that can provide avenues for cooperation on minimizing and controlling risk.

(Source: *Computergram International*. June 23, 1998.)

Best Practice

Title: Legal Shield for Suppliers of Biotechnology Firms

Description: Industry working with regulators can achieve some protection against Product Liability concerns.

A major Product Liability concern for manufacturers is exposure that results when products are used in the manufacture of another product. Components and raw materials, once sold, are largely out of the control of the seller, but Product Liability concerns remain. In most cases, even if the material supplied is of itself not defective or faulty, suppliers may still be held responsible in a Product Liability case. For these suppliers, potential risk exposure can far exceed probable profits.

In recent years some industries with high Product Liability risks have had difficulty in obtaining component parts and raw materials because their suppliers have been worried about product liability risk. There is a ray of legislative hope however. The Biomaterials Access Assurance Act passed by Congress and waiting expected signature by the President would protect raw-materials suppliers from inclusion in product liability claims against producers of faulty medical devices as long as the raw material itself was not faulty. Many in the industry feel that this act is necessary because obtaining raw materials has been so difficult. Walter Cuevas of Medtronic Inc. stated, "We've had to spend millions requalifying some of our products with the Food and Drug Administration because they had new materials from new suppliers." It is expected that this act will also benefit startup firms in the medical industry who have had difficulty in finding suppliers willing to assume the liability risk of unknown manufacturers.

(Source: Penni Crabtree, *Knight-Ridder / Tribune Business*, August 13, 1998.)

Media Library

Books

Bas, Lewis (1998). *Products Liability: Design and Manufacturing Defects*. New York: Clark, Boardman, Callaghn.

Daller, Morton F. (1997). *Product Liability Desk Reference: A Fifty-State Compendium*. Frederick, MD: Aspen Law & Business.

National Academy of Engineering (1994). *Product Liability and Innovation: Managing Risk in an Uncertain Environment*. Washington, DC: National Academy Press.

Ryan, Joseph (1994). *Product Liability Handbook*. New York: Prentice Hall.

Law and Engineering Professional Journals

Journal of Products Liability

Quality Progress <http://qualityprogress.asq.org/>

Tort and Insurance Practice Section (TIPS) Journal

Risk Management <http://www.rims.org/rmmag/>

Industrial Management

Human Factors Society Journal

American Society of Safety Engineers

Laws, Codes and Regulations

Occupational Safety & Health Administration (OSHA). Process safety management regulations

<http://www.osha-slc.gov/SLTC/processsafetymanagement/index.html>

Occupational Safety & Health Administration (OSHA). Lockout Tag-out

<http://www.osha-slc.gov/SLTC/controlhazardousenergy/index.html>

Discussion

Literature on traditional risk management strategies is abundant and can be found in several journals. *Risk Professional* is the official monthly publication of the Global Association of Risk Professionals (GARP). GARP membership and the journal are provided free. Information and member registration forms can be found at (<http://www.garp.com>). *Business Insurance* magazine is a monthly magazine that reports on corporate risk, employee benefit and managed health care news. *Business Insurance* also has a Website with excellent search functions for data archival and retrieval. The Website can be found at <http://www.businessinsurance.com/>. Additionally, many finance journals include topics on risk management.

The concept of enterprise-wide risk management is fairly new. The early corporate proponents and leaders that emerged in the mid-to-late 90's included companies such as Microsoft, Disney, Exxon, Boeing, and Aon. These companies elevated the importance of enterprise-wide risk management to an essential component of the strategic and operational planning process. Literature on this topic is just becoming available. The larger consulting companies (Andersen, Ernst & Young, and KPMG) have catered to the financial services and insurance industry for many years. However, their initiatives related to enterprise-wide risk management are just two to three years old.

Many universities offer Insurance programs through the College of Business. Exemplary programs can be found at the University of Wisconsin-Madison, Temple University, Pennsylvania State University, University of Georgia, and the University of Seattle. These are for the most part – traditional insurance programs. They are just beginning to explore the concepts of enterprise-wide risk management.

Conclusion

It is imperative that Industrial Technology (IT) graduates develop a keen sense of awareness in respect to all issues that an enterprise will face. IT graduates must understand the day-to-day business, finance, and economics issues that drive an enterprises decision-making ability. As IT graduates gain insight into an organizations decision-making processes their value and net worth increase dramatically. IT graduates need that big-picture perspective of how external factors, constituent relationships, and the marketplace all directly relate to the internal operations and day-to-day decisions that govern the organizations operating parameters. As departments seek opportunities to update and refocus course materials and degree programs we can give our students a significant competitive advantage in the job market if we can impart a general understanding of risks and uncertainties they will encounter in their employment endeavors.

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