ERM Framework and Perspective: Workshop E8

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34th ANNUAL GIRO CONVENTION - 2007
Newport, Wales
Enterprise Risk Management Working Party

- Introduction to ERM
- Frameworks overview / ERM literature review
- Common theme of ERM frameworks
- Actuarial opportunity
- Discussion
What is ERM?

- Exchange Rate Management? **NO**
- A fancy management buzzword? **NO**

Enterprise Risk Management is a tool for managers to identify, analyse, mitigate and monitor risks

- Encompass all risks affecting the company
  - internal and external
  - insurable and non-insurable
Why is ERM Important?

- Change in legislation – Corporate Governance
- Change in regulation – ICAS, Solvency II
- Rating Agency – S&P, AM Best, Fitch Ratings
- Create a common risk language
- Focus resources on important issues
Overall ERM Evaluation

(1) S&P, January 2007
Risk Management Lowers Capital Need

- **Canadian Manufacturers Life** raised to AAA from AA+ in Nov ’06
  - A factor was Excellent evaluation on group's ERM
- **Munich Re** raised to AA- from A+ in Dec ’06
  - Strong evaluation on its ERM a driver
- **Zurich Financial Services** raised to AA- from A+ in June ’07
  - A rationale was “positive impetus from enterprise risk management program. ZFS' ERM program has improved to a strong level, providing management with an effective tool to maintain its risks at a level consistent with its risk tolerance.”
- **Japan's Major Banks** upgraded June ’07
  - Upgrades reflect banks' Adequate ERM, stable improvement in asset quality and capitalization backed by strong economy, and the diversification of revenue sources
Key Messages of our Paper

1. There is no complete and widely accepted definition
2. ERM has to incorporate top down and bottom up approach
3. Identify opportunities as well as assessing the downside risks – value creation
4. Important to have management support
5. Expect the unexpected – Black Swan
6. ERM is not only about understanding and modelling risks but also mitigating them
7. Actuaries need to expand our current skills set
What We Produced

- Substantial review of the ERM literature
- An outline ERM framework based on best elements of other frameworks
- Summary of worldwide actuarial education
- A vision to challenge & stimulate thought
  - Case studies to promote thinking
  - Essays relevant to subject
  - Summary & ideas for next steps
  - Appendices with useful information

Will be on the GIRO website – READ IT!!
ERM Frameworks & Perspectives: A Literature Review

1. Review of ERM Top 12 ‘must reads’
2. Review of 60 ERM texts
3. Listing of 60 ERM web sites
4. ERM Frameworks and Perspectives
ERM Top 12 ‘Must Reads’

2. Brehm, Paul et al. (2007). *Enterprise Risk Analysis for Property & Liability Insurance Companies*
7. Crouhy, Michel et al. (2006). *The Essentials of Risk Management*
8. Lam, James (2003). *Enterprise Risk Management - from Incentives to Controls*
9. Sharma, Paul et al. (2002), *Prudential Supervision of Insurance Undertakings*
ERM Impinges on 4 Main Board Functions
- Chapman locates ERM as axiomatic

Accountability
- to the company
- to owners
- to regulators
- to legislators
- to other stakeholders

Policy Formulation
- creating the vision
- creating the mission
- creating values
- developing culture
- monitoring the environment

Supervisory Management
- oversight management
- monitoring budgetary control
- reviewing key business results
- ensuring business capability

Risk and Opportunity Management

Strategic Thinking
- positioning in the changing markets
- setting corporate direction
- reviewing and deciding key resources
- deciding the implementation process

adapted from Garratt 2003, “The Fish Rots from the Head”
Risk Management Processes
Chapman outlines 6-stage incremental & iterative process

1. Corporate Governance
   (Board oversight)

2. Internal Control
   (sound system of internal control)

3. Implementation
   (appointment of external support)

4. Risk Management Processes
   (incremental phases of an iterative process)
   - Analysis
   - Risk Identification
   - Risk Assessment
   - Risk Evaluation
   - Risk Planning
   - Risk Management

5. Sources of Risk
   (internal to a business and emanating from the environment)
   - Internal Processes
   - Business Operating Environment

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Methodology for each process stage and feedback control loops for entire risk management process - Chapman
Micro & Macro Risk - Chapman

Internal Sources of Risk
- Operational Risk
  - Financial Risk
  - Technological Risk

External Sources of Risk
- Economic Risk
  - Social Risk
- Environment Risk
- Market Risk
  - Political Risk
- Legal Risk
3-Dimensional COSO ERM Framework –
Generic Application across sectors & industries
COSO ERM Framework is supported via a Suite of Application Techniques

<table>
<thead>
<tr>
<th>Internal Environment</th>
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<tbody>
<tr>
<td>Risk Management Philosophy - Risk Appetite - Board of Directors - Integrity and Ethical Values - Commitment to Competence - Organisational Structure - Assignment of Authority and Responsibility - Human Resource Standards</td>
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<thead>
<tr>
<th>Objective Setting</th>
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<tr>
<td>Strategic Objectives - Related Objectives - Selected Objectives - Risk Appetite - Risk Tolerances</td>
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<tr>
<th>Event Identification</th>
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<td>Events - Influencing Factors - Event Identification Techniques - Event Interdependencies - Event Categories - Distinguishing Risks and Opportunities</td>
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<tr>
<th>Risk Assessment</th>
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<td>Inherent and Residual Risk - Establishing Likelihood and Impact - Data Sources - Assessment Techniques - Event Relationships</td>
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<th>Risk Response</th>
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<td>Evaluating Possible Responses - Selected Responses - Portfolio View</td>
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<th>Control Activities</th>
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<td>Integration with Risk Response - Type of Control Activities - Policies and Procedures - Controls over Information Systems - Entity Specific</td>
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<th>Information and Communication</th>
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<th>Monitoring</th>
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<tr>
<td>Ongoing Monitoring Activities - Separate Evaluations - Reporting Deficiencies</td>
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Using a Risk Map to Express Risk Appetite – Any Residual Risk in yellow area exceeds firm’s risk appetite - COSO

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Risk Appetite, Return & Capital at Risk
Firm diversifies portfolio to match target profile - COSO
Understanding the relationship between mission, objectives, appetite & tolerance - COSO

**Mission**
To be a leading producer of premium household products in the regions in which we operate

**Strategic Objectives**
- To be in the top quartile of product sales for retailers of our products

**Measures**
- Market Share

**Strategy**
Expand production of our top-five selling retail products to meet increased demand

**Related Objectives:**
- Increase production of Unit X by 15% in the next 12 months
- Hire 180 qualified new staff across all manufacturing divisions
- Maintain product quality at 4.0 sigma
- Maintain 22% staff cost per dollar order

**Measures**
- Units of production
- Number of staff hired
- Product quality by sigma

**Risk Appetite**
- Accept that the company will consume large amounts of capital investing in new assets, people and process
- Accept that competition could increase (e.g. through predatory pricing etc) as we seek to increase market share, thereby reducing profit margins
- We do not accept erosion of product quality

**Risk Tolerances**

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<thead>
<tr>
<th>Measures</th>
<th>Target</th>
<th>Tolerances - Acceptable Range</th>
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<tr>
<td>- Market share</td>
<td>- 25th percentile</td>
<td>- 20% - 30%</td>
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<tr>
<td>- Units of production</td>
<td>- 150,000 units</td>
<td>- 7,500/+ 10,000</td>
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<tr>
<td>- Number of staff hired (net)</td>
<td>- 180 staff</td>
<td>- 15/+ 20</td>
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<tr>
<td>- Product quality index</td>
<td>- 4.0 sigma</td>
<td>- 4.0 - 4.5 sigma</td>
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Information Flows Within Enterprise Risk Management - COSO

- Internal Environment
  - Risk management philosophy
  - Risk appetite

- Objective Setting
  - Objectives
  - Units of measure
  - Inventory of opportunities
  - Risk Tolerances

- Event Identification
  - Inventory of risks

- Risk Assessment
  - Inherent risks assessed
  - Risk responses
  - Residual risks assessed

- Risk Response
  - Risk responses
  - Portfolio view

- Control Activities
  - Outputs
  - Indicators
  - Reports

- Monitoring
Views Insurers as Systems of Risk Dynamics with External & Internal Players - Wang & Faber
Need to Build Integrated Internal Business Processes – Wang & Faber

ERMT for P&C Companies

- Reserving
- Pricing
- Claims
- Underwriting
Case Studies Identify Causal Chains - Sharma

1. Creation of underlying causes or 'preconditions'
2. Incubation period, intermediate causes arise
3. Preconditions and intermediate causes combine in sufficient numbers to reach a critical mass
4. Trigger event
5. Financial loss to the firm
6. Policyholder harm
Using a Risk Map Template to Map the Causal Chain - Sharma

High Level Risk Map

Underlying Causes - Internal (management, governance, ownership)

Underlying or Trigger Causes - External
(wider changes, as well as event or insurance market)

Internal processes, people or systems
(failed, inadequate)

Risk decisions
(inappropriate risk appetite)

Financial Outcomes
(market, reputational, credit)

Policyholder Harm (losses, insolvency)

Incorrect Evaluation of Financial Outcomes

Risk Appetite Decision

feedback control loop
ERM Evaluation Methodology for Insurers – Standard & Poors

- Competitive Position
- Management & Corporate Strategy
- Operating Performance
- Capitalization
- Liquidity
- Investments
- Financial Flexibility
- ERM
Strategic Risk Management Pillars – Standard & Poors

Strategic Risk Management

Risk Control Processes

Extreme Events Management

Risk Control Processes

Risk Management Culture

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Strategic Risk Management Pillars – Standard & Poors

- Risk/reward framework – measures, criteria
- Capital budgeting process
- Risk adjusted performance measures (value added)
- Optimize risk-adjusted returns

Risk Management Culture

Risk Control Processes
- Quality of risk identification and monitoring
- Standards & limits for retained risks and enforcement
- Effectiveness & execution of RM programs

Emerging Risk Management
- Process for anticipating emerging risks
- Process for responding to extreme events
- Company’s learning process

Risk & Economic Capital Models
- Risk metrics
- Adequacy of modeling infrastructure
- Aggregation of risks
- Control of Inputs and Outputs

Risk/reward framework – measures, criteria
Capital budgeting process
Risk adjusted performance measures (value added)
Optimize risk-adjusted returns

Highly qualified RM staff
Clear & widely-known RM policies / procedures / objectives
Regular communication with board on risk positions & programs

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Comprehensive Risk Control Process – Standard & Poors

Risk Control

- Credit Risk
  - Bonds
  - Mortgage Loans
  - Reinsurance Ceded
  - Other Assets

- Market Risk
  - Interest Rate
  - Equity / Derivatives / Hedging
  - FX
  - Property Real Estate

- Insurance Risk
  - Pricing / Underwriting
  - Reserving
  - Catastrophe
  - Mortality / Longevity
  - Policyholder Behaviour
  - New Products

- Operational Risk
  - Distribution
  - Processes and People
  - IT
  - Fraud & Internal Control
  - HR
  - Outsourcing
  - Reputational

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Risk Quantification Process in Context of COSO Framework—Bohn & Kemp

Risk Assessment and Identification → Risk Prioritisation → Quantitative Modelling of Key Risks → Risk Mitigation / Mitigation Assessment → Action / Monitoring

Determine underlying risk process → Build Risk Modules → Identify Inputs / Parameters → Simulate → Overlay Current and Proposed Mitigation → Monitor
Banking Sector & Derivatives Markets Perspectives on Evolution of VaR measurement methodologies – Crouhy

1. Notional Amount
2. Basis-point value (BPV) approach
3. Value-at-risk approach at the transaction level (with volatilities)
4. Value-at-risk approach at the portfolio level (with volatilities and correlations).
ERM Holistic System – Lam

1. Corporate Governance
   Establish top-down risk management

2. Line Management
   Business strategy alignment

3. Portfolio Management
   Think and act like a ‘fund manager’

4. Risk Transfer
   Transfer out concentrated or inefficient risks

5. Risk Analytics
   Develop advanced analytical tools

6. Data and Technology Resources
   Integrate data and system capabilities

7. Stakeholders Management
   Improve risk transparency for stakeholders
ERM Embedded in Strategic Decision-Making – UK Cabinet Office

- Strategic Decisions
- Decisions transferring strategy into action
- Decisions required for implementation

Uncertainties

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People generally severely underestimate the possibility of unexpected events. Non-Australians used to be convinced that all swans were white, an unassailable belief from empirical evidence. The sighting of the first black swan illustrated the fragility of our knowledge. One single observation of a black swan invalidated a general statement derived from millennia of confirmatory sightings of millions of white swans.
Problem of Inductive Knowledge & Revision of Belief - Taleb

![Graph showing utility over days](image_url)

Surprise!
The Problem of Inductive Knowledge
On-Model Risks versus Value of Black Swans - Taleb

4 largest losses incurred fell outside of casino’s sophisticated ERM models:

1. $100m loss when irreplaceable performer in their main show was maimed by a tiger.
2. Disgruntled contractor hurt during construction of the hotel annex to casino; so offended by the settlement offered him that he made an attempt to dynamite the casino.
3. Employee supposed to send IRS gambling wins returns, but hid them in boxes under his desk. As tax violations are crimes, casino faced the near loss of its gambling licence.
4. Kidnap of casino owner’s daughter led him to fund ransom by dipping into casino cash.

Black swans swamped casino ERM model risks by 1,000 to 1

Qualitative & Quantative inputs
External & Internal
Aware ‘Statistics are artefacts’
Consider ‘off-model’risks
Donald Rumsfeld at Ground Zero
Donald Rumsfeld – Unknown Unknowns

Donald Rumsfeld ‘news briefing’ on 12th February 2002:

“Reports that say that something hasn't happened are always interesting to me, because as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns -- the ones we don't know we don't know. And if one looks throughout the history of our country and other free countries, it is the latter category that tend to be the difficult ones.”
Risks of Relying on the Unconditional Benefits of Past Experience - Taleb

Those unbelievers who rely on the unconditional benefits of past experience should consider the following pearls of wisdom that were allegedly voiced by a famous ship’s captain:

“But in all my experience, I have never been involved in any accident ... of any sort worth speaking about. I have seen but one vessel in distress in all my years at sea. I never saw a wreck and never have been wrecked nor was I ever in any predicament that threatened to end in disaster of any sort”.

Source: E.J. Smith, 1907, Captain, RMS Titanic

Footnote: Captain E.J. Smith’s ship sank on 15th April 1912.
Risks of Relying on the Unconditional Benefits of Past Experience – Captain E J Smith
Common Theme of ERM Frameworks

**CHAPMAN**
- Corporate Governance
- Internal Control
- Implementation
- Analysis
- Risk Identification
- Risk Assessment
- Risk Evaluation
- Risk Planning
- Risk Management

**COSO**
- Objective Setting
- Internal Environment
- Event Identification
- Risk Assessment
- Risk Response
- Control Activities
- Information and Communication
- Monitoring
Common Theme of ERM Frameworks

- Risk Assessment and Identification
- Risk Prioritisation
- Risk Quantification
- Risk Mitigation
- Action and Monitoring
Common Theme of ERM Frameworks

LOOKS FAMILIAR?
Common Theme of ERM Frameworks

*Actuarial Control Cycle*

- General Economic and Commercial Environment
- Identifying the Problem
- Specifying the Solution
- Monitoring the Experience
- Professionalism
Parallel Development

- Increasing global development of Actuarial ERM development
  - UK profession keen to rebrand actuaries as risk advisors and managers
    - FIRM development in UK
    - UK exam system from 2009
  - CAS – ERM Liaison forum
  - In USA Separate ERM conferences – since 2004
  - Banking ERM/ORM conferences
Parallel Development

- Actuarial Professions development
  - UK exam system from 2009
  - CAS
    - DFA from 2000 (exam 8), evolved into a section on ERM (exam 6) along with DFA
  - SOA – pioneered inclusion of ERM in syllabus
    - ‘Chartered Enterprise Risk Analyst’ from July 2007
  - Australian
    - 5 day CPD course planned for later this year
  - International Actuarial Association
    - Discussions are being held with the aim of introducing a global actuarial risk management qualification
Parallel Competition

- Other professions
  - GARP - Global Association of Risk Professionals
  - PRIMA – Professional Risk Management International Association
  - IRM – Institute of Risk Management
  - ERMII – ERM International Institute – Universities and professionals
  - CII/ Cass – joint MSc in Insurance & Risk Management
  - CPCU - American Institute for CPCU (Chartered Profession Casualty Underwriter)
  - IAA - Insurance Institute America
  - Risk & Insurance Management Society (RIMS)
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<th>Additional</th>
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<tr>
<td>Quantitative skills</td>
<td>Communication skills</td>
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<tr>
<td>Ethics</td>
<td>Thought leadership</td>
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<tr>
<td>Risk management skills</td>
<td>Decision making</td>
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<td>Empathy</td>
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Few Observations

- Many risk managers have accountancy or compliance background

- However, CRO positions are increasingly taken up by actuaries

- ERM development in GI industry is lagging behind other sectors such as manufacturing, energy
What Does This Mean for Us?

- Actuaries today
- Qualitative?
- Capital Modeller
- THE ERM SPACE
- CRO?
- Quants?

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Proposed Next Steps

- Form GIERM group
- Produce paper for Sessional Meeting
- Develop best practice, Solvency II compliant, Framework
- Participate in FIRM RMSIG and other groups
- More active links to USA, Australia and then India, China and other emerging countries?
- Challenge thinking about what an actuary is?
Discussion

- Do you think there is a need for actuaries to be involved in the ERM process?
- If yes, should the actuaries be a leader or a follower?
- How to implement ERM in practice?
- Difficulties faced by risk managers/actuaries/CRO
- Success stories
- Best practice?
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