THE NATURE AND THEORY OF RISK

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1. Introduction
Understanding Risk is important for everyone. The different audiences are -- people who have to manage and take the big decisions on risk (risk managers), analysts and others whose job is to assess risk (risk assessors), and students of risk who are interested in getting a perspective on how the thinking on risk has evolved over time. The study of risk has its roots in economics and insurance. For centuries, researchers have attempted to grapple with the basic question of what is risk and how to measure risk aversion. This chapter attempts to offer some historical perspective on how our thinking has evolved over the past few centuries, and the psychologists’ thinking on how humans react to risk. Human beings are neither as rational nor as easy to categorise when it comes to behaviour when confronted with risk as traditional economists had assumed them to be. These findings are categorised as behavioural economics or finance, and understanding the findings is the first step to managing risk. No other function of the insurance industry has changed as quickly in recent years as risk management. Insurers have to manage the risks they accept more efficiently in order to generate sustained added value. Insurers and other financial institutions have established the position of a Chief Risk Officer (CRO) to advance the topic. In risk management, the exchange of knowledge and experience among experts is critical for success. Risk can be defined as the combination of the probability of an event and its consequences. In all types of undertaking, there is the potential for events and consequences that constitute opportunities for benefit (upside) or threats to success (downside). Risk Management is increasingly recognized as being concerned with both positive and negative aspects of risk. Therefore risk has to be considered from both perspectives. In the safety field, it is generally recognized that consequences are only negative and therefore the management of safety risk is focused on prevention and mitigation of harm.
2. NATURE AND THEORY OF RISK

- A man walks across the road and faces it. A car could spin out of control and the man could be hit accidentally.
- A young professional sitting in an aeroplane faces it. He could either be late for the crucial meeting scheduled with an important client and lose a big business due to delay in flight, or the flight may crash into the seas, and he may permanently miss every meeting.
- A famous actor, hugely renowned and respected; accepts it when he agrees to do a role in the movies that requires him to play a terrorist. His whole earlier image may not be the same anymore.

It, of course is ‘risk’. Risk is everywhere. We do not need to find risk. It is easy to worry about the air we breathe, the food we eat, the person we marry, the flight we travel in, the stock we buy, the career we choose, the road we cross; and many more. So what do we do? The easy way out is to avoid taking these risks. Most of us however, manage these risks in our own ways. The man crossing the road may choose not to cross the busy roads at all, or he may devise his own intermediate solution by looking both ways and crossing through the zebra lanes. The person taking the flight may check the timings of the flight prior to departure, and avoid the airlines that have a poor on time arrival history as well as higher accident statistics. The famous actor can avoid the role altogether, or he may want to add a different persona to his earlier image and be known as a versatile actor excelling in any type of role.

The world is an unpredictable place. And as long as there is some uncertainty about the future that could result in an adverse outcome for individuals, the world is a place in which risks must be managed. Life is a game of chance. We take our lives into our hands every day, whether we travel the breadth of oceans or never leave our homes. Money in a mattress is no good; bank accounts are not much better. There is no way to conserve against erosion without making choices, and those choices create risk. Buy a house? The house could burn down, or the real estate market could tank. Invest in your company? If the company fails, you lose your employment and your retirement security at the same time. Buy mutual funds? Pray that the empty mantra of long term works for you, and that you do not face a bear market at the age of 65. It has been said that the amount of risk we take in life is in direct proportion to how much we want to achieve. If you want to live boldly, then you must make bold moves. If your goals are meager and few, they can be reached easily and with less risk of failure, but with greater risk of dissatisfaction once you have achieved them. One of the saddest figures is the person who burns with desire to live, but, to avoid risk; chooses to embrace fear and lives a half life instead. This person is worse off than someone who tries and fails or someone who never had any desire in the first place. Mediocrity condemns itself. If you study risk, you find there are two kinds, blind risk and calculated risk. The first, blind risk, is useless and a waste of time. Blind risk is the calling card of laziness, the irrational hope, something for nothing, the cold twist of fate. Blind risk is the pointless gamble, the emotional decision, the sucker play. The man who embraces blind risk demonstrates all the wisdom and intelligence of a drunkard.
stepping into traffic. However, **calculated risk** has built fortunes, nations and empires. Calculated risk and bold vision go hand in hand. To use your mind, to see the possibilities, to work things out logically, and then to move forward in strength and confidence is what places man above the animals. Calculated risk lies at the heart of every great achievement and achiever since the dawn of time. Risk and reward go hand in hand and so does risk and innovation.

Change often creates new risk. The advent of newer modes of transport and travel, medical advancements, innovative financial instruments such as derivatives, have given rise to newer risks involved in adopting the new changes. The interest rates, currency and commodity price risks that derivatives help firms eliminate also pose a greater threat when derivatives are misused or abused. Progress without risk is paradoxical, and futile. It was rightly said by Wildavsky (1988), that “playing it safe, doing nothing, means reducing possible opportunities to benefit from chance taken, and can hurt people”. What if the man afraid of crossing the road and meeting with an accident, always stayed home thereby appearing to reduce his risk, and what if the inventor of the first aeroplane; the Wright brothers never took off with the birdlike machine they had developed and made their first flight in America, that paved the way for the modern commercial airline travel? And how many other innovations would be lost without the mobility that air travel has brought to us? Thus, if we recognize the evolving nature of risks in an increasingly globally connected world, we need to manage the risks in a responsible manner. The solution is a healthy and responsible risk management approach that neither lends itself to overcaution nor to carelessness.

The various categories of risk are listed in the 1st unit of this book. Out of these some risks are insurable and some are not. Pure risks are insurable as the chance of a loss exists, and the chance of a gain does not. Example, if while travelling in a boat, the boat capsizes; the result is a loss. There can be no gain if the boat capsizes. The loss to life and property is certain. Such risks are insurable. However, where the result can be either a loss or a gain, the risks cannot be insured; as is in the case of a bet placed on a team to win a sporting event, or gambling. These are speculative risks and can be avoided.

**Changing nature of Risk:** The nature of risk management and the challenges generated by its theory and practice have been in a state of evolution over the past 10 years. This process of evolution has created a number of difficulties for those involved in the management of risk, who now increasingly find themselves lacking the necessary capabilities to cope with the nature of this change – not least because of the increased volume of information around the various sources of threat and the trans-disciplinary nature of the problems. The dynamic nature of emergent hazards requires new techniques and analytical frameworks for dealing with low probability– high consequence events that are contextualized within a highly connected system. Risks such as the ‘new’ forms of terrorism, pandemic flu and the recent economic collapse (year 2008) within the financial sector, along with the consequential global
economic crisis, serve to illustrate the borderless nature of risk in a renewed, but in several respects, significantly different manner. Moreover, they present several challenges to conventional approaches to risk management: (1) they often lack the \textit{a priori} evidence that would render them predictable to any degree; (2) they are sufficiently large, in terms of the damage that they cause, to trigger further hazards or crises further down the timeline and (3) their origin, evolution and final scale and form are frequently unknown, such that they represent an emerging, ill-understood and ill-defined set of risks that need to be dealt with. As a result, they often require mediation by technical experts in an attempt to provide an evaluation of the likely failure modes and effects. As a consequence, and on the basis of these characteristics alone, many emergent forms of risk often do not yield to conventional forms of risk assessment and management or indeed to conventional policies at an institutional or Governmental level. These new forms of risk also illustrate the interconnected nature of ‘risk’, ‘crisis’ and ‘disaster’ and the manner in which discrete events can serve as triggers for other problems within an all too often nested system. In addition, the mitigation and response to risks in the broadest sense is increasingly a function of interagency and networked forms of management and organization. Risk transcends a number of academic disciplines and also cuts across other boundaries – whether they are socio-technical, geopolitical, organizational, cultural, and physical or health related. In many cases, the borders or boundaries between these issues are permeable and the effects and consequences of particular hazards can migrate across these borders. Risk is, therefore, and perhaps always has been, a \textit{borderless phenomenon} and, yet despite this, there has been insufficient academic attention focused on the issues that surround the management of those risks across the various ‘borders’ that exist. The interplay between disciplinary perspectives on risk can generate new understandings that may have a relevance to various types of hazards along with their prevention and management. The year 2008 provided several examples of the pervasive and trans-boundary nature of risk within modern societies. The failure of the sub-prime market in the United States and its effects on European banks and beyond, provides a stark reminder of the interconnected nature of business and the manner in which failures can cascade through the ‘system’. This particular failure cascade was both swift and, for many organizations, catastrophic. The failure of established and reputed financial institutions and businesses, and the need for others to be rescued by their respective national governments provided a clear indication of the vulnerability of connected organizations to shock events within the globalized business environment. Although financial connectivity and risk is an obvious and highly visible aspect of modern organizational forms, there are also other more physical manifestations of the interconnected mosaic of hazards that bind organizations together. The continued threat of pandemic flu has remained an issue on the policy agenda for many countries. The close proximity of people to livestock in certain parts of the world, the density of population and the ease with which people travel, all combine to create a ‘tightly coupled and interactively complex’ (Perrow, 1984) system in which disease can both mutate and can be transmitted quickly from animals to humans.
3. ORGANIZATIONAL RISK MANAGEMENT & SYSTEMIC RISKS

Risk management is a central part of any organisation’s strategic management. It is the process whereby organisations methodically address the risks attached to their activities with the goal of achieving sustained benefit within each activity and across the portfolio of all activities. The risks facing an organisation and its operations can result from factors both external and internal to the organisation. The diagram (figure 1) summarises examples of key risks in these areas and shows that some specific risks can have both external and internal drivers and therefore overlap the two areas. They can be categorised further into types of risk such as strategic, financial, operational, hazard, etc. Risk management protects and adds value to the organisation and its stakeholders through supporting the organisation’s objectives by:

- providing a framework for an organisation that enables future activity to take place in a consistent and controlled manner
- improving decision making, planning and prioritisation by comprehensive and structured understanding of business activity, volatility and project opportunity/threat
- contributing to more efficient use/allocation of capital and resources within the organisation
- reducing volatility in the non essential areas of the business
- protecting and enhancing assets and company image
- developing and supporting people and the organization’s knowledge base
- optimising operational efficiency

Risk identification sets out to identify an organization’s exposure to uncertainty. This requires an intimate knowledge of the organisation, the market in which it operates, the legal, social, political and cultural environment in which it exists, as well as the development of a sound understanding of its strategic and operational objectives, including factors critical to its success and the threats and opportunities related to the achievement of these objectives. Business activities and decisions can be classified in a range of ways (figure 1) examples of which include:

- **Strategic** - These concern the long-term strategic objectives of the organisation. They can be affected by such areas as capital availability, sovereign and political risks, legal and regulatory changes, reputation and changes in the physical environment.
- **Operational** - These concern the day-to-day issues that the organisation is confronted with as it strives to deliver its strategic objectives.
- **Financial** - These concern the effective management and control of the finances of the organisation and the effects of external factors such as availability of credit, foreign exchange rates, interest rate movement and other market exposures.
- **Knowledge management** - These concern the effective management and control of the knowledge resources, the production, protection and communication thereof. External
factors might include the unauthorised use or abuse of intellectual property, area power failures, and competitive technology. Internal factors might be system malfunction or loss of key staff.

- **Compliance** - These concern such issues as health & safety, environmental, trade descriptions, consumer protection, data protection, employment practices and regulatory issues.

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**Fig 1** showing examples of the drivers of key risks involved in organizations

**Systemic Risk**: The increasing challenge for risk management goes together with the emergence of a new concept, called systemic risk. This term denotes the fact that risk to human health and the environment is embedded in a larger context of social, financial and economic risks and opportunities. Systemic risk combines natural events—partially altered and amplified by human activity, such as the emission of greenhouse gases—economic, social and technological developments with policy-driven actions both at the national and at the international level. This interdisciplinary field requires a new form of risk analysis, which geographically or functionally integrates data from various sources into one analytical approach. Consequently, systemic risk requires a holistic perspective to combine the identification of hazards, risk assessment and risk management. Investigating systemic risks therefore goes beyond the usual analysis of causes and consequences, and focuses instead on the interdependencies and relationships between various risk clusters.
4. GLOBAL RISK MAPPING
The UK is considered a pioneer in integrated risk management. In 2008, the UK published its first “National Risk Register”, incorporating a risk map giving an overview of potential risks and the extent of the losses associated with them. It also presented a detailed list of all the loss events that might be great enough to make government intervention necessary and provided advice for organisations and private individuals on how to prepare themselves for a loss event.

Figure 2 shows the UK National Risk Register depicting likelihood of the various potential risks and the extent of losses associated with them. Source: UK cabinet Office/ Swiss Re report: Country risk management: making societies more resilient

The world economic forum in its ‘global risks report 2009’, has identified the following risks faced globally, in varying degree of severity, and these risks are shown interconnected to each other. The risks listed and interconnected to each other are:

- Asset price collapse
- Bio-diversity
- Extreme weather events
- Heat waves and droughts
- Tropical Hurricane
- Coastal flooding
- Iraq
- Collapse of NPT
- Israel-Palestine
These risks are of varying degrees of severity and the interconnection also varies with some having strong interlinkage. For example, the linkage between tropical hurricane and fall in US$, Afghanistan and Terrorism; and others are strong.

5. RISKS FACING INDIA: THE MACRO VIEW

Within the framework of the above mentioned interconnected global risks tracked by the Global Risk Network are several that map to the areas identified by CII and the Forum which are critical to the future of India (in terms of their likelihood and/or the severity of their impact). Risks to India were identified, assessed and ranked with each of the following risk families: societal, geopolitical, economic and environmental. Beyond those discussed in this report lie other risks facing India that could prove equally challenging. The four areas of focus are:

- Economic Security,
- Energy Security,
- Agriculture and Food Security and
- National Security,

These are not separate, isolated issues on the risk landscape; their drivers, triggers and consequences are highly interconnected. India’s role in the region and in the global economic and political landscape will largely depend on how it manages many of these issues over the
next decade and beyond. We shall analyse the above mentioned four focus areas on parameters of the risks faced, important trends, Impacts and Mitigation.

A) ECONOMIC SECURITY
The questions that need deliberation and action are:

How is the global financial crisis going to affect India?
How can India manage the current financial turmoil?
What are India’s strengths?

RISKS: India has been affected by the global financial crisis of 2008. The deterioration of the global financial environment has affected the national economy and spillover effects on the real economy are still unfolding. India remains vulnerable to the vagaries of the world currency, commodity and financial markets.

IMPORTANT TRENDS:
Economic uncertainty: The global uncertainties affecting the financial markets and concerns about the global economic outlook have increased the chances of global contagion. Sluggish demand coming from developed economies might affect Indian exports in the coming quarters. However, Indian exports for 2007-2008 exceeded US$ 155 billion. Economic growth in the second quarter of 2008 fell by 1.3% to 7.9%, compared with the same period last year. In the long run, all the indicators for the Indian economy point to sustainability of growth rates: the International Monetary Fund (IMF) prospects for GDP growth for 2008 and 2009 are 7.9% and 6.9%, respectively.

Liquidity management: The Reserve Bank of India adopted several measures to alleviate the pressure on domestic markets – e.g. increasing the borrowing limit from foreign branches from 25% to 50% with a ceiling of US$ 10 million; and cutting the cash reserve ratio (CRR) to 6.5%, which represents an injection of 1 trillion rupees into the market. Under the current environment of high uncertainty and volatility in global financial markets, the Reserve Bank’s active liquidity management will cushion the impact of international financial turbulence and existing measures will be reviewed periodically as the current financial situation evolves.

Inflation: The Consumer Price Index (CPI) climbed to 9% in August, reaching its maximum, from 8.3% in July this year. Commodity prices are slowing down and this helps to ease inflation pressures. To curtail inflation, the government has taken several fiscal measures (e.g. curbing import duty on many agricultural products). Monetary measures, such as the reduction in CRR, will also contribute to curbing the present inflation rate.

Currency: The Indian rupee is depreciating and very volatile: as of October 2008, it depreciated by 24% in the last 12 months. Weakening external demand is likely to affect
exports, but the impact might be mitigated by the currency depreciation – exports have grown 35% during the period April-August 2008, compared with the same period last year.

Labour market: Total factor productivity in India has been increasing in the last years, surpassed only by China. India is a labour surplus economy and human resources are an essential component of economic development and competitiveness. 63.3% of the Indian population is between the ages of 15 and 64 and approximately 30% of the population, or 340 million people, is below the age of 15. This segment of the population is expected to decrease by 2015 due to declining fertility rates, reducing child dependency and increasing the percentage of population of working age.

Real estate market: Property markets have been expanding dramatically in the last years, supported by buoyant economic fundamentals. The genuine demand for real estate, supported by a rising middle class, has not been significantly depressed by increasing interest rates so far. A downturn in global economic growth might have an effect on demand, but increasing public infrastructure projects could keep market demand high.

IMPACTS
Global crisis: India’s dependence on capital inflows to finance its current account deficit is a macroeconomic risk and the global crisis could generate a sharp increase in capital outflows and a reduction in the availability of finance. It could also weaken the balance sheet of the financial institutions, cause a further fall in share and asset prices, and challenge the macroeconomic situation due to shrinking global growth.

Reserves: India has accumulated reserves of US$ 295 billion over the last years of economic expansion, providing a cushion to overcome a potentially pessimistic economic outlook. The level of reserves has decreased recently due to imports paid in US dollars, Reserve Bank intervention and equity portfolio adjustments abroad. The recent fall in commodity prices might help decelerate inflation and could thus benefit the imports bill, while also having a positive impact on reserves.

Domestic demand: The middle class in India is growing fast. Personal disposable income has almost doubled since the year 2000 and consumer spending is increasing, propelling a demand-led growth cycle. India’s savings rate is almost 35% of GDP and its investment rate stands at 35.9% of GDP. Increased domestic demand should partially protect the Indian economy from the effects of a global downturn. A tight monetary policy and interest rate increase are likely to weigh heavily on household borrowing and business investment.

Remittances: India has achieved a large sustained level of remittances; almost 50% of total remittances come from the US and Canada, and the total amount represents almost 3% of
India’s GDP. The financial crisis in these countries will affect India’s population through a reduction of remittances.

*Land and infrastructure:* More than 60% of India is rural and half of rural India belongs to the agricultural sector. Infrastructure is the key to further development; without basic transport and communications networks, it is very difficult for small businesses to develop further and/or foster rural business initiatives. Nowadays, land can be acquired by the government if its final usage is an infrastructure project (state competency). Price-setting mechanisms used to value, purchase and redeem land are not transparent enough, and this results in discontent and even unrest among land sellers.

*Fertility:* Rates are dropping, and increased participation of women in the labour markets in urban areas generates economic growth (in rural areas, women have always been part of the labour force) and contributes to fertility rate reduction – 4 births per woman in 1990, compared to 2.5 today. The fact that women are entering the labour market has a significant impact on the real economy, and is contributing to the reduction of income inequality and increasing household incomes.

**MITIGATION**

*Institutional strength and capacity building* enhance capacity to implement appropriate economic polices and structural reforms. Strategic approaches are needed rather than tactical policies; political uncertainty generates slow and inefficient decision-making. Public sector reforms are necessary for the effective implementation of crucial economic policies such as reduction of the fiscal and revenue deficit, expansion of national capital markets and reform of subsidies schemes.

*Increased economic cooperation* between India and the economies of East and South-East Asia through strengthening the Look East Policy; continuation of negotiations for a Free Trade Area (FTA) with the ASEAN economies; and increased trade activities with African countries shifts the dependency of India to developing and underdeveloped countries rather than the traditional developed countries.

*Land and infrastructure:* Infrastructure projects are necessary to improve rural-urban communications and facilitate inter- and intra-state flows of commodities and services. The Union Budget 2008-2009 includes projects to develop rural infrastructure and roads, which would accelerate domestic growth and enhance trade. To ensure that the land transactions required for infrastructure projects are satisfactory to all parties, it is necessary to promote, implement and sustain a transparent price-setting mechanism and regulation. An alternative – introducing leasing contracts for farmers’ land – would also be an improvement on the current opaque transaction system.
**Education**: Literacy rates have improved dramatically, but further reforms are required to leverage India’s demographic dividend. In recent years, there has been a rise in educational institutions at secondary and tertiary levels, and legislation to regulate and ensure high-quality education needs to be put in place. India requires more skilled labour to sustain the development of more value-added manufacturing and services and high growth rates. High-quality education, analytical thinking and a strategic mindset need to be brought into the system.

**Investment climate conditions**: Further schemes are required to provide incentives to the private sector (domestic and international) to invest in long-term projects in India. Developing stable sources of dollar inflows from trade and investment and continuing financial sector reforms towards further financial inclusion are also required.

**Example**: Hariyali Kisan Bazaaris (DCM Shriram Consolidated), a rural business initiative, has introduced a new retail concept: Hariyali campuses include a retail outlet, fuelling station and banking service, and provide training on the best production techniques to farmers. The business model is expanding and is contributing to improving living standards and promoting sustainable growth in rural India.

**B) ENERGY SECURITY**

The questions that need deliberation and action are:

*How can India improve the energy supply network?*

*How can India become a low carbon economy?*

**RISKS:**

- The gap between demand and supply has worsened in the last years. Energy demand increases as the population grows and the country develops; energy supply has increased at a slower pace. Over one-third of the power generated fails to reach consumers.
- Energy subsidy schemes discourage efficient use of energy and diminish the incentives to increase the use of clean energy sources.

**IMPORTANT TRENDS:**

**Energy demand**: Fossil fuel energy sources – oil and gas – constitute 45% of total energy consumption in India. Total energy demand is projected to increase fivefold in the next 25 years, accounting for 12% of world energy demand. To maintain an average growth rate of 8%, an almost tenfold increase in energy capacity is required.
**Energy resources**: India’s endowment of exhaustible and renewable energy resources is relatively good. The energy sector in India has been receiving special attention in the planning process. Indian industries are proactive and supported by the government, and are adopting cost-effective and environmentally friendly energy sources. Under-performance of the energy sector would be an important limitation to India’s growth potential.

**Electricity**: Inexpensive and reliable electricity supply is vital to India’s prosperity. More than 40% of India’s population (over 400 million people), mostly in rural areas, lacks access to electricity. The country has made significant progress towards the augmentation of its power infrastructure; still, the quality of its electricity supply is low and electricity generation is not used at a maximum capacity. Private companies and households use their own electricity generators, which are both expensive and polluting, to cover power shortfalls.

**Nuclear**: New sources of energy will be needed in the medium to long term to cover rising energy demand in India. Nuclear energy will play an important role in India’s energy mix. Nuclear agreements with foreign countries strengthen the geo-strategic position of India in the world. An India-US civil nuclear deal is expected to produce ample energy resources, help India meet its growing energy needs and deepen the strategic partnership between India and other nations.

**Energy and climate change**: India is the fourth largest economy in installed wind energy capacity. Many initiatives supported by the government and private corporations are being implemented to mitigate and adapt to climate change consequences and move towards a carbon-efficient economy. Investment choices that factor in the environmental impact are a first step to move towards a neutral carbon economy.

**IMPACTS:**

**Import dependency**: The production of crude oil has been stagnant and has boosted the dependency on crude oil imports. India imports more than 70% of its oil. The government has initiated several policies to cover the increasing demand and has intensified foreign relations with world energy suppliers in South and Central Asia, Russia and the Middle East. Energy supply is vulnerable to geopolitical tensions with energy suppliers and energy transit countries. Increasing consumption and increases in oil price would add more pressure to the current account deficit.

**Electricity distribution losses**: Corporations and society at large are willing to increase their energy bill to benefit from a reliable energy supply, but generation and distribution infrastructures need to be in place and extraordinary investment is required. According to the World Bank, transmission and distribution losses account for 27% of the generated power and
are the highest in the world. Various government agencies report losses between 30% and 40%. Those losses are associated with technical inefficiencies and mismanagement.

**Energy subsidies prevail:** Liquid petroleum gas (LPG) subsidies in India are widespread; US$ 1.7 billion was spent in the first half of the current financial year on supplying fuel to poorer households. Nearly 40% of the subsidy expenses benefit only 7% of the population. Energy subsidies encourage consumption and waste, which generate harmful effects on the environment and represent an important liability to the government budget.

**Transport sector:** Rapid economic growth, urbanization and rising income levels have increased the use of vehicles. Fossil fuels are likely to be the predominant energy source in the medium term. The automobile industry has improved technology to meet global standards of carbon emissions; additional research is needed to foster fuel efficiency.

**MITIGATION:**

**Energy access and efficiency:** To fulfil the target of providing electric power for the nation by the year 2012, the country's National Electricity Policy is taking appropriate steps to raise the per capita availability of electricity by nearly 50%. Energy efficiency is a key component of the national development strategy. Increasing electricity generation capacities, improving the regulatory environment to enhance the use of power plants, enhancing energy storage, developing infrastructure for energy distribution and increasing intra-state energy trading to cover state shortfalls would improve the current energy intensity levels. Additional measures are required to open up energy markets and encourage private companies to generate electricity and feed it into the grid.

**Energy subsidies:** A revision of energy subsidies is necessary to assure the right population segment is targeted. Subsidies should not undermine the incentives to provide or use a service efficiently and might discourage investment in the energy sector. Market mechanisms that guarantee efficient energy pricing are essential.

**Infrastructure:** Improving the road network, railways and urban planning is vital to increase energy efficiency and ensure energy delivery to society. Public-private partnership models financing major infrastructure projects can provide the appropriate framework and skills set to accelerate the completion of critical infrastructure projects.

**Promoting clean energy technologies:** India has a huge potential for biomass energy, solar energy, nuclear power and wind energy. Innovation and technology are key components to facilitate the achievement of global environmental standards. The government should strengthen the regulatory framework to foster environmental protection and promote the use
of clean energies. The ongoing promotion of renewable energy sources is required to move towards a low carbon economy.

EXAMPLE: The government has set a target for renewable energies to amount to 10% of India’s total energy mix by 2032, and announced incentives to promote and attract foreign investment to this sector. The Ministry of New and Renewable Energy (MNRE) also announced an accelerated programme on energy recovery from urban waste, including bio-gas.

C) Agricultural Development and Food and Water Security
The questions that need deliberation and action are:

How can agricultural productivity be improved?
What can be done to address the problem of malnutrition?
How can India manage its water resources to avoid problems of availability and quality becoming acute?

RISKS:

- Rural populations are highly dependent on agriculture and pressures are increasing to transform agricultural activity into a sustainable economic sector. Almost 65% of India’s population is directly or indirectly dependent on agriculture, although it only accounts for approximately 16% of GDP.
- Despite current self-sufficiency in food production, approximately 25% of India’s population is malnourished and lives below the poverty line. Child malnutrition is responsible not only for 22% of India’s disease burden, but also for 50% of the 2.3 million child deaths in India each year.
- Agricultural output and rural communities face risks of changing weather patterns linked to climate change and threats from water scarcity and quality. Water for agricultural use currently represents 92% of renewable water resources, compared with 3% for industry and 5% for domestic use.

IMPORTANT TRENDS:

Slow progress on productivity: India is second only to the US in the amount of cultivable land within its borders (147 million hectares). However, in comparison with other high-growth economies such as China or Brazil, its yields are lower and agricultural productivity is climbing at a slower pace. Per capita productivity in India only rose by 7% between 1995 and 2004, compared with 25% in China.

Increasing pressures on land: 600 million people are directly or indirectly dependent on agriculture in India. The size of India’s rural population dependent on arable land has increased from just over 400 people per square kilometre of arable land in 1994 to nearly 500 people per square kilometre in 2003. This trend is almost unique among fast-growing economies, most of which are seeing these figures decline.
Climate change: Changing weather patterns linked to climate change are already manifesting themselves. Incidents of flooding and problems of prolonged drought are on the increase. The trend towards warmer weather in some regions means that certain pests and diseases are entering new areas.

Increasing pressures on water: Agriculture usage accounts for 93% of India’s renewable water supply and is depleting water tables. Other elements are increasing the pressure on water supply and quality: poorly managed and wasteful irrigation practices; a shift to more water-intensive crops, such as horticultural produce; industrial and domestic water usage rising from a currently low base (5% and 2%, respectively); and changing weather patterns – rainfall is more erratic as exemplified by recent monsoon seasons.

Malnutrition: Access to food remains a problem for certain segments of the population. India has the highest rate of child malnutrition in the world. Existing initiatives, including meals for young school children and food vouchers for those below the poverty line, have failed to meet targets. Schemes are not reaching children under three, who are most at risk from disease and growth deficiencies related to malnourishment.

Food security: Relatively high self-sufficiency and government subsidies for the poor have sheltered India from the effects of the higher food prices seen over the past 18 months. While international prices for processed wheat increased by as much as 67% in the first half of 2008, Indian wheat prices rose by only 7%.

Changing consumption patterns: Nutritional patterns have changed since the 1960s, with the successive introduction of cereals, dairy and poultry, vegetables and meat. From a nutritional and production standpoint, this diversification is advantageous. However, this represents a shift to more perishable goods and necessitates more sophisticated supply and retail structures to ensure both health and safety for consumers and returns for the producers.

IMPACTS:
Economic disparities: India’s economic growth is not benefiting rural populations as much as those living in urban areas. Rural communities are most disadvantaged when it comes to infrastructure, education, sanitation and healthcare.

Disputes over access to land and land sale agreements: Given their reliance on land, rural communities are reluctant to sell land for infrastructure development or industrial use unless they feel they can share in some of the generated advantages.

Managing crop diversity: The biggest shift in the agricultural sector has been the move to more horticultural products. Rising demand for fruit and vegetables and shorter growing
cycles, which allow several harvests a year, enable farmers to spread their risk over several crops. Horticultural produce is highly perishable and requires better storage, distribution and retail conditions. These crops also place pressure on water resources.

**MITIGATION:**

**Infrastructure:** Power, water and sanitation are key to human and economic development in rural areas. Road links will allow farmers rapid access to markets and agro-industry to scale up its logistics. The government is working to link rural villages to the Golden Quadrilateral infrastructure project (linking Delhi, Kolkata, Chennai and Mumbai). It is estimated that India is adding an average of three kilometres of roads to its network each day.

**Improving food security by enabling a more efficient market system:** The lack of infrastructure for distribution and of an organized retail sector means that access to wider markets is limited. Policies are required to remove barriers between internal markets and thus allow emergence of an efficient market system. Fair price assistance may still be necessary for the 25% of India’s population that fall below the poverty line, but agricultural prices should vary less if a common internal market can be established.

**Rural development and employment:** India’s agriculture sector alone cannot provide sufficient growth to enable its rural population of 600 million to significantly improve their livelihoods. With better infrastructure and investment in education, it will be possible to develop more value-adding aspects of agriculture, from processing to better product grading, logistics and retail. Several states are successfully attracting industry to rural areas, allowing populations to remain in their villages but to move into non-agricultural based employment.

**Increase investment in existing initiatives to prevent malnutrition:** Current initiatives already provide food to children, but many focus more on young school children. It is critical to extend these programmes to those under the age of three, where malnutrition has the greatest negative effects on physical and cognitive development. Initiatives also need to incorporate parental education and guidance on health and nutrition.

**Education and training:** Primary education, improving literacy rates and vocational training are keys to creating an employable rural workforce. Training is also essential for farmers to become skilled in efficiently managing water and using fertilizers, thus enhancing productivity. Government institutions are working with NGOs to run programmes to train farmers in modern agricultural practices, use of technology and business skills. Business skills enable farmers to form cooperatives or small businesses to boost their revenues.
**Technology – a second Green revolution**: India has developed a group of research councils working on agro-technology. They are introducing disease-resistant crops to reduce the need for pesticides, which are expensive and can have harmful effects. To adapt to the effects of climate change, researchers are introducing drought-resistant seed stock, which can protect farmers in more arid areas, but which also reduces pressures on water tables. The councils and institutes also offer training for farmers to help manage inputs such as fertilizers more efficiently. Since 2005, the institutes have entered into agreements with the private sector to scale up developments and share costs.

**Contract and cooperative models**: A number of interesting models are emerging around farmers’ cooperatives and in the area of contracts. These models have proved successful both in creating new markets for farmers and transferring technology and know-how. Farmers are also creating cooperatives that provide better and more sophisticated retail opportunities through cost-sharing for grading, packaging and transport, and better price alignment.

**Insurance**: The introduction of weather-based insurance into several regions is proving a more effective and cost efficient way to manage risk. Faster pay-outs allow farmers to recuperate their losses and reinvest for the next crop.

**EXAMPLES**:
The government has increased spending on agriculture by 10% each year for the past three years and set up programmes such as the National Rural Employment Scheme to boost skills and job creation. Agricultural Technology Management Agencies (ATMAs) are run at district level. These multi-stakeholder agencies are aimed at educating and supporting self-help efforts by farmers, and bring together farmers, NGOs, experts and officials. The ATMA model was launched three years ago and now covers 600 districts.

**Capacity sharing**: In return for a certain amount of production, processing plants have agreed to share excess capacity with other producers as a way to spread costs and improve standards.

**D) NATIONAL SECURITY**
The questions that need deliberation and action are:

*How can India establish itself as a force for stability in the region?*

*How can India manage to contain and address internal sources of instability?*

**RISKS:**

- **External sources of insecurity**: India’s security policies must address potential threats coming from outside its borders. India’s security policies will need to combine economic, diplomatic and military aspects to protect Indian society and also secure energy supply and trade routes.
Internal sources of insecurity: Radical groups organized along ethnic, far left or religious lines are gaining ground, especially in disadvantaged districts. These need to be closely monitored to prevent the spread of unrest in certain regions and deter extremist attacks.

IMPORTANT TRENDS:

Regional sources of instability: Although dialogue with Pakistan is ongoing, the situation in Kashmir and the continued instability in Afghanistan and along its border with Pakistan remain a source of instability in the region.

Increasing exposure of energy supply to geopolitical risks: As a net energy importer, heavily dependent on oil and with demand set to quintuple over the next 25 years, India’s energy security is a vital part of its strategic security. India will need to continue to pursue its foreign policy of maintaining good relations with energy producers in the Middle East, Russia, Central Asia and South-East Asia.

Increased number of terrorist incidents: The past months have seen a number of fatal attacks carried out in several cities including Delhi, Mumbai and Bangalore. Between 2004 and mid-2008, over 4,800 people were killed in terrorist attacks, many of which were not attributed to any single group. When the perpetrators of attacks were identified, most belonged to radical political groups. Religious radicals were the next group of perpetrators.

IMPACTS

Military spending: Indian military spending has been around 3% of GDP for the past several years; however, the last Union Budget increased defence spending by 10%. India’s military expenditure is higher in percentage terms than many other states, including China, although in absolute terms it is less, at about US$ 16 per capita, compared with US$ 19 in Pakistan and US$ 32 in China. Military spending is planned to total US$ 81 billion over the period 2006 to 2020.

Increased concerns about security: Terrorist incidents raise fears about greater insecurity and place pressure on the police and government to prevent such attacks. As in other countries around the world, if left unchecked, the rise of non-state actors within the state poses as great a risk as exogenous threats. The size and diversity of India’s population make this a serious challenge if authorities are to continue to encourage a tolerant and integrated society. However, with each attack, tensions rise and there are greater calls for police and security services to be given greater means to track terrorists.

Potential for greater tension between religious groups: India has known strife between its different religious denominations in the past. As in other countries, concerns are growing
about fundamentalist movements and the potential for increased strife among different religious communities.

**MITIGATION**

**Continue dialogue with Pakistan and international efforts to bring stability to Afghanistan and its border with Pakistan:** The level of uncertainty and instability around Pakistan’s border with Afghanistan must be addressed to prevent further violence and the rise of unrest among sympathizers in other regions.

**Promote open foreign relations and diplomacy:** Although plans to increase military spending can be seen as investment in the long-term strength of India vis-à-vis other countries in the region, relationships built on trust and trade are an equally important investment. India has demonstrated its capacity to engage in dialogue and build links with a number of very different states and groupings over the years – from the US, China and Russia to the EU and ASEAN – and this will remain an important strategy to mitigate geopolitical risks.

**Protect and diversify energy supply:** India needs to protect routes for its energy supply, both overland and by sea, and will have to develop strong agreements and work with other states to do so. As global energy demand increases, so will the competition, which may heighten tension around some of these supply deals. The diversification of its energy supply is also important for India to mitigate risks to supply disruption. Less dependency on imports will prevent competition for energy sources from becoming a point of tension in relations with exporting nations. In addition, diversification reduces exposure to price volatility, especially for oil. Finally, it accelerates the essential shift to greener power and greater energy efficiency with the goal of reducing carbon emissions.

**Address the threat of increased violence and social unrest:** Among the experts interviewed for this report, there appears to be consensus on the link between instability and the lack of human security, from access to education and health to job creation and economic development. Greater progress is needed to reduce disparities, particularly in disadvantaged regions such as Bihar, West Bengal and Andhra Pradesh, which are among some of the states from where radical groups, such as the Naxalite movement, have emerged. Key to this is a focus on making local people partners in progress by engaging them early in discussions around development plans for their region. Particularly for land issues, local people need to be able to share in the upside generated by new projects and not feel that their involvement is only related to the sale of their land.
Application of information technology and intelligence: Of the US$ 81 billion planned for military expenditure to 2020, US$ 8 billion is earmarked for training to optimize technology as an integral part of security strategy. This greater use of technology for surveillance and policing would help India’s security services work more efficiently to counter internal threats and collaborate with other countries on international issues. With India’s private sector strengths in IT, this could also be a growth area for Indian business.

EXAMPLES:
- India’s relationship with ASEAN and agreements on trade help strengthen bonds with ASEAN member states.
- The India-US nuclear deal established India as a trusted party on nuclear issues. Although it is not a signatory of the Non-Proliferation Treaty, it has accepted IAEA conditions for checks. The agreement also opened the door to technology transfer in areas beyond nuclear power generation such as health and materials, which will have important commercial implications for India’s manufacturing sector.
- The recent EU-India summit demonstrated that India has a relationship with the EU beyond economic issues, in areas such as security, resource management and climate change

6. SUMMARY
- Risk can be defined as the combination of the probability of an event and its consequences.
- Risk is everywhere. We do not need to find risk
- There are two kinds, blind risk and calculated risk.
- Blind risk is the pointless gamble, the emotional decision while Calculated risk and bold vision go hand in hand.
- Change often creates new risk. The dynamic nature of emergent hazards requires new techniques and analytical frameworks for dealing with them
- Risk transcends a number of academic disciplines and also cuts across other boundaries – whether they are socio-technical, geopolitical, organizational, cultural, and physical or health related.
- Organizational Risks can be categorised further into types of risk such as strategic, financial, operational, hazard, etc.
- The risks facing an organisation and its operations can result from factors both external and internal to the organisation.
- Systemic Risk denotes the fact that risk to human health and the environment is embedded in a larger context of social, financial and economic risks and opportunities.
- The world economic forum in its 'global risks report 2009′, has identified many risks faced globally, in varying degree of severity, and some of these risks are interconnected to each other, and have strong inter-linkages.
Risks to India are identified, assessed and ranked with each of the following risk families: societal, geopolitical, economic and environmental.

The four areas of focus for India are: Economic Security, Energy Security, Agriculture and Food Security and National Security.

Whatever be the nature of risk, they have to be managed professionally, and that is why risk management as a subject has evolved as an interdisciplinary study among all academic and scientific studies.

7. **KEYWORDS**

- Chief Risk Officer (CRO): New position within some organizations, denoting responsibility for coordinating an enterprise/ organizational risk management strategy
- Calculated risk: risk taking ability based on some logical and rational decision making process. Aimed at reward as a consequence of the risk taken.
- Organizational/ enterprise risk management: approach for managing all forms of risk faced by the firm, regardless of type, another name for integrated risk management.
- Financial risks: Risks involving credit, foreign exchange, commodity trading, and interest rate; may involve chance for gain as well as loss.
- Hazards: conditions that increase the frequency or severity of loss stemming from the existence of a peril
- Liability risks: Loss exposures arising from the actions of businesses and individuals that cause harm to others
- Risk mapping (risk profiling): Method of risk identification and assessment by arranging all risks in a matrix reflecting frequency, severity, and existing insurance coverage