DHĀRANA

Vol. 9, #1
(January-June 2015)
ISSN 0974-0082

INTERNATIONAL JOURNAL OF BUSINESS FROM BHARATIYA VIDYA BHAVAN'S
M. P. BIRLA INSTITUTE OF MANAGEMENT, BENGALURU

International Workshop on Intercultural Aspects of Disaster Management

Natur Technik Kultur Gesellschaft UNIKASSEL VERSITÄT

Bhavan's Priyamvada Birla Institute of Management

Intercultural Aspects of DISASTER MANAGEMENT

M P BIRLA INSTITUTE OF MANAGEMENT, Bengaluru

INTERNATIONAL WORKSHOP SPECIAL ISSUE

DHĀRANA
INTERNATIONAL JOURNAL OF BUSINESS FROM BHARATIYA VIDYA BHAVAN'S
M. P. BIRLA INSTITUTE OF MANAGEMENT, BENGALURU
Vol.9, #1 (2015) pp 05-16 ISSN 0974-0082

Challenges in Disaster Management

N. Ramanuja*

Abstract

According to the International Disaster Database and IMF, disasters have been hitting the world continuously and has increased steadily since 1960 dipping only in the past decade. During the last decade of last millennium, natural disasters have killed about 6.7 million people, accounting for 88 percent of all deaths due to disasters. Nearly two-thirds of the people killed in these disasters hail from developing countries. Millions of people are affected every year and natural disasters are huge economic burdens on developing economics as insured loss is less than economic losses compared to developed countries.

The need of the hour is to chalk out a multi-pronged strategy for total disaster management to reduce the toll of disasters in the country. The best strategy is to be Proactive rather than reactive in tackling natural disasters and in mitigating the disasters in case of natural or man-made disasters.

Key words and Phrases: Disasters, Impact, Earthquake, Cyclone, Floods and Challenges.

In Indian mythology, at the end of a 'Kalpa' which is about 4.32 billion year, there is supposed to be a huge deluge where the entire creation would be submerged in water after which creation would start again. Prior to one such deluge, King Satyavrata or Vaivasvata Manu the king of South India, when he was offering water oblation to God in a river, a tiny fish fell in his folded hands. As the king was about to throw away the fish, the fish pleaded not to be thrown in the water but to protect it. The fish grew larger and outgrew water reservoirs and lakes in the kingdom and finally had to be let in the ocean.

This supernatural fish or Matsya in Sanskrit,was none other than Lord Vishnu, who declared that a great deluge would come seven days from then and engulf the entire creation. He ordered Manu to assemble all kinds of seeds, herbs and various beings to load them on a boat, that would be sent by Vishnu on the fateful day. Vishnu reappeared as a horned fish on the day of the deluge to protect the boat, when torrential rains engulfed the earth. After last wave of the flood ended, the life on the earth began with the species stored in the boat again.

* *Chairman, B. P. Birla Institute of Management, Mysuru and M. P. Birla Institute of Management, Bengaluru.*
This is an abridged article of the Keynote Address.

Matsyavatara

Noah's Ark

A similar story is that of Noah's Ark which is the vessel in the Genesis flood narrative (Genesis chapters 6–9) by which God saves Noah, his family, and a remnant of all the world's animals from the flood.

The story goes on to describe the ark being afloat throughout the flood and subsequent receding of the waters before it came to rest on the Mountains of Ararat.

It is understood that such a story is also in the Holy Quran, where the ark appears as Safina Nuh. The Genesis flood narrative is similar to numerous other flood myths from a variety of cultures. Another earliest known such myth is the Sumerian flood myth found in the Epic of Ziusudra.

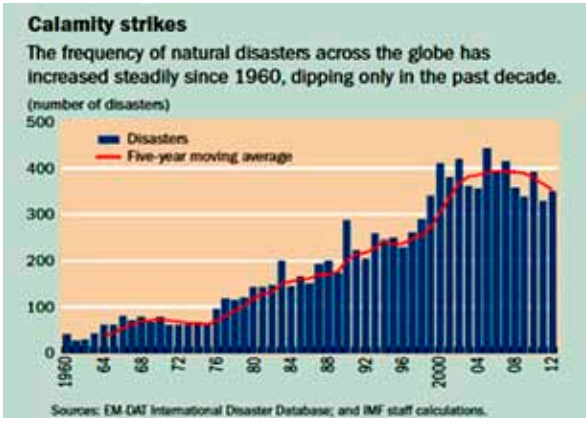
These are the earliest stories of Disaster Management as I can recollect.

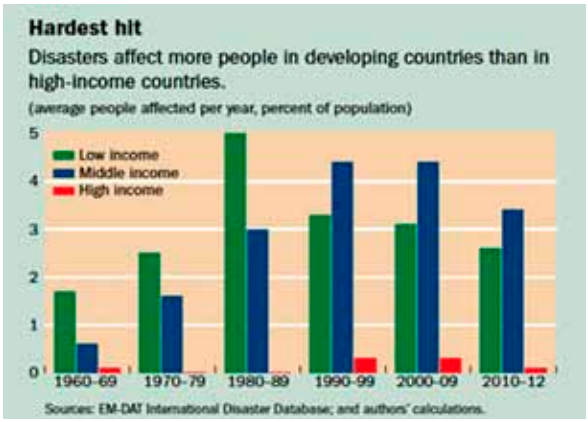
According to the International Disaster Database and IMF, disasters have been hitting the world continuously and has increased steadily since 1960, dipping only in the past decade. The hardest hit are only the developing countries.

The reasons are obvious- lack of knowledge and preparedness and demographical factors.

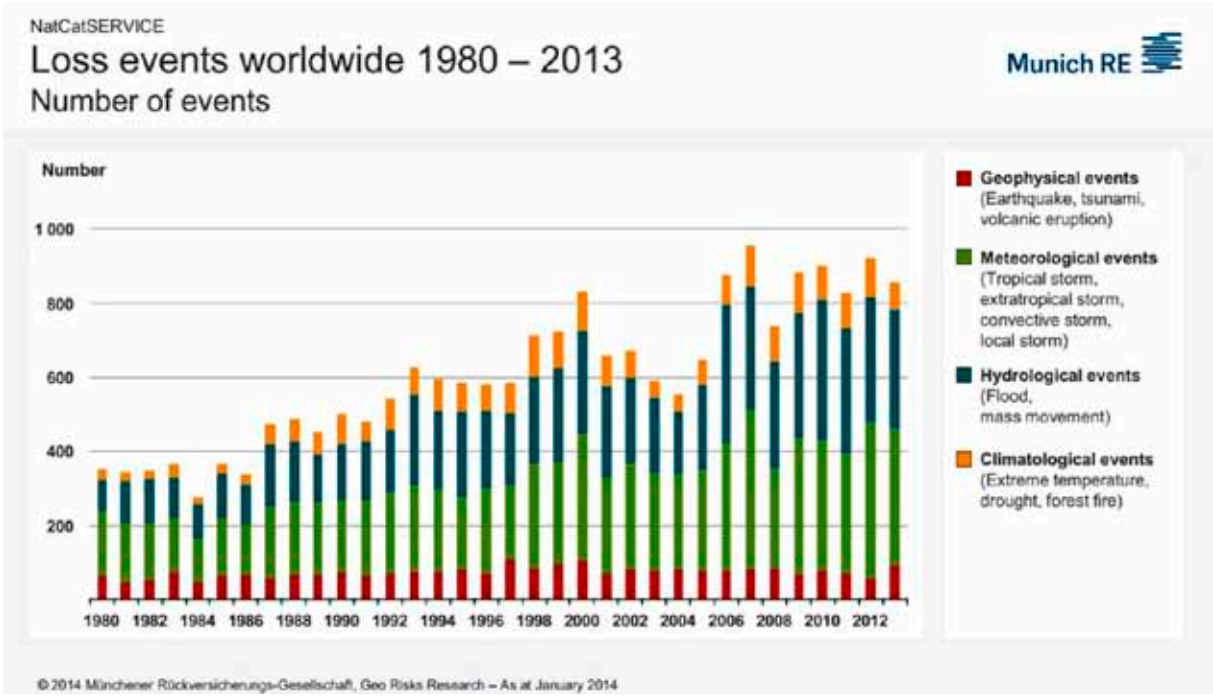
Disaster Management

According to World Development Report (International Federation of Red Cross and Red Crescent (IFRCRC), 2001) natural disasters are categorised as Hydro, Meterological, Geophysical and Climatological events. The manmade or unnatural disasters encompass conflicts, civil strife, riots and industrial disasters.





During the last decade of last millennium, natural disasters have killed about 6.7 million people, accounting for 88 percent of all deaths due to disasters. Similarly, unnatural disasters have killed about 87,000 people. Nearly two-thirds of the people killed in these disasters hail from developing countries like India, with



only four percent of the casualties being reported from highly developed countries (IFRCRC, 2001).

Disaster management is essentially a dynamic process. It comprises of management functions like planning, organizing, staffing, leading and controlling. It also involves many organizations working jointly to prevent, mitigate, prepare for, respond to and recover from the effects of disaster.

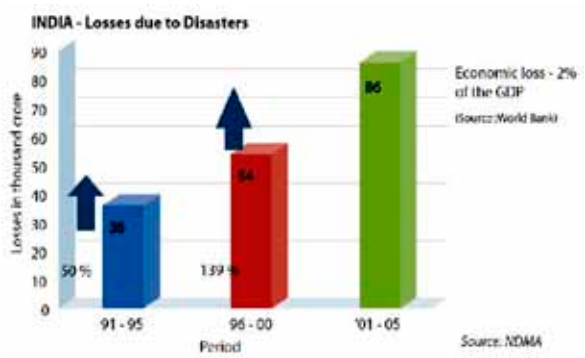
Floods, droughts, cyclones, earthquakes, and landslides have been a recurrent phenomena. About 60% of the landmass is prone to earthquake of various intensities; an area of over 40 million hectares is prone to floods; about 8 % of total area is prone to cyclones and 68% of the area is susceptible to drought. The loss in terms of private, community and public assets due to disasters has been astronomical. Apart from natural disasters, some cities in India are also vulnerable to chemical, industrial and other manmade disasters. Millions of people are affected every year and the economic losses caused by natural disasters amount to a major share of the Gross National Product (GNP). Natural Disasters are huge economic burdens on developing economies such as India.

Impact on Economics

It is seen that the disasters impact the economy of a country substantially. In the short term, economic output shrinks and the fiscal deficit worsens after a disaster. Country's export potential suffers, which leads to larger deficits in trade and services with the rest of the world.

The impact can be alleviated by foreign aid and investment, but after large disasters, the growth and income effects usually persist. A country's growth drops by an average 0.7 percent in the first year after a disaster, with a cumulative output loss after the disaster of about 1.5 percent over and above the immediate direct losses.

Per capita real GDP falls by about 0.6 percent on average and by 1 percent in low-income countries. Droughts have the broadest impact, except in small island states where hurricanes are the most damaging.



One can notice from the above chart that the losses due to disasters account for almost 2% of the GDP. The effect of natural disasters in the Caribbean on growth and debt are sizable. It is observed that, average hurricane reduces a country's output by nearly 1 percent, and a smaller impact from moderate storms by 0.5 percent. Though recovery is there but the negative impact on GDP cannot be ignored. The impact could be similar in case of central America and South America which are more earthquake prone.

Countries with sound financial structure—that is, where more people have bank accounts and more households and businesses have bank loans—suffer less after a disaster. Countries with well-developed financial systems and risk management systems generally run up fiscal deficits but lose less in output.

According to United Nations (UN) global assessment report (GAR) on disaster risk recently states that India loses an estimated Rs.60,915 Cr. annually on account of natural disasters. The figure includes an estimated Rs.46,326 Cr. loss due to floods alone.

During March 2015, the UN member countries met in Sendai, Japan to sign a new Disaster Risk Reduction (DRR) protocol. This protocol will replace the Hyogo Framework of Action (HFA) which came into existence in 2005, after the Indian Ocean tsunami.

Type of Disaster	Estimated Loss (in Cr. INR)
Earthquakes	118
Cyclones	2,771
Storm Surge	4,507
Tsunami	7,192
Flood	46,326
Total	60,915

Source: UN Global Assessment Report, 2015

The DRR protocol will have a 10 year commitment plan period.

The report also states that "an annual global investment of Rs.37,200 Cr. in disaster risk management strategies would generate total benefits in terms of risk reduction of Rs.22,32,000 Cr. This is equal to 20% reduction in annual losses. Around 48 lakh people are affected by disasters annually but if India doesn't invest in DRR then the number would increase to 1.9 crore by the year 2030.

Disasters and Lessons Learnt

Ten major natural disasters in the world in the last 10 years in the order of date of occurence.

1. **The Gujarat Earthquake, India, 26th May 2001** - With 20,000 fatalities, the Bhuj earthquake was a huge disaster.
2. **The Bam Earthquake, Iran, 26th December 2003** - The Bam earthquake was the first of the two "Boxing Day" disasters of the noughties. The earthquake was a direct hit on the ancient city of Bam, the centre of which collapsed almost completely. The death toll was fearsome (26,796 people).
3. **The summer 2003 heatwave in Europe** - The exceptional temperatures recorded in Europe in Summer 2003 is estimated to have killed over 60,000 people– probably for the first time scientists could say with justification that climate change is inducing severe weather events.

4. **The Indian Ocean earthquake and tsunami, 26th December 2004** - The two obvious aspects of this disaster are of course the huge death-toll (165,708 in Indonesia alone, probably 250,000 worldwide, according to the EM-DAT database) across a huge swathe of the coast around the Indian Ocean.
5. **The Simeule / Nias earthquake, Indonesia, 28th March 2005** - With a death toll of 915, this event may seem at first glance to be too small to justify a place in this list. However, this event confirmed the fears of many seismologists that large earthquakes can weaken unfailed sections of adjacent faults, allowing them to rupture in the aftermath of the big event.
6. **The Kashmir earthquake (Pakistan and India), 8th October 2005** - The true toll from the Kashmir earthquake remains unclear – the official total in Pakistan is 73,338, whilst the Red Cross has suggested that a more realistic number may be 100,000.
7. **Hurricane Katrina, USA, 29th August 2005** - The impact of Katrina on New Orleans remains one of the enduring images of the decade. That a major city in a developed country could be so disastrously affected by a hurricane was a shock to many.
8. **The Guinsaugon landslide, Philippines, 17th February 2006** - The tragedy of the Guinsaugon landslide is that the authorities and local people were aware of the threat posed by the slope, and evacuated the town. But, when the heavy rainfall (brought by a typhoon) stopped, the people returned to their homes and schools, only to be buried by the slide.
9. **The Wenchuan Earthquake, China, 12th May 2008** - The impact of the Wenchuan earthquake on the mountains of the Longminshan range was extraordinary. In the aftermath of the earthquake the world watched as the government strove to cope with both the disaster itself and the landslide dams that littered the landscape.
10. **Cyclone Nargis, Burma (Myanmar), 2nd May 2008** - Cyclone Nargis feels like the big event that everyone has forgotten but resulted in death toll of 138,366 people should serve to remind us that Indian Ocean cyclones remain a major threat.

Besides these,three major disasters struck India in 2013 and 2014 one by Phailin Cyclone that hit Odisha coast, cloud-burst in Uttarakhand and floods in Jammu and Kashmir, which wreaked havoc in the country.

Major Disasters in India during recent periods and actions undertaken

1. Cyclone Phailin

Cyclonic Storm Phailinmeaning "sapphire" has been the second-strongest tropical cyclone ever to make landfall in India, behind only the 1999 Odisha cyclone also known as **Cyclone 05B**. This became equivalent to a category 5 hurricane when it approached the Odisha Cost. Even with good preparedness, Odisha's state government estimated that, around 12 million people were affected. The cyclone prompted India's biggest evacuation in 23 years with more than 550,000 people moved up from the coastline in Odisha and Andhra Pradesh to safer places. Most of the evacuated people had been sheltered in 500 specially-built cyclone camps in the two states.

Phailin Hits Odisha

The World Bank praised India's evacuation of nearly 10 lakh people in Odisha and Andhra Pradesh, which ensured minimal loss of human lives.

"Successfully evacuating a million people is not a small task. This cannot be merely achieved by kicking the entire state machinery into top gear for three-four days following a cyclone warning," the World Bank said, days after the cyclone Phailin hit the eastern Indian shore. "This has taken years of planning, construction of disaster risk mitigation infrastructure, setting up of evacuation protocols, identification of potential safe buildings and most importantly, working with communities and local organisations in setting up volunteer teams who all knew exactly what needed to be done".

"The Odisha State Disaster Management Authority (OSDMA) and the Government of Odisha need to be given full credit for their unwavering commitment to disaster preparedness and risk mitigation," the Bank said.

Following the earlier disaster in 1999, Odisha set up the OSDMA, the first state agency focused exclusively on disaster management in India.

Relief Work in Odisha

Hudhud Hits Vishakapatnam

2. Cyclone Hudhud

Caused extensive damage to the city of Visakhapatnam and the neighbouring districts of Vizianagaram and Srikakulam of Andhra Pradesh in October 2014. Damages were estimated to be ₹21,908 crore (US$3.4 billion) by the Andhra state government. At least 124 deaths have been confirmed, a majority of them from Andhra Pradesh and Nepal, with the latter experiencing an avalanche due to the cyclone.

3. Uttarakhand Floods

In June 2013, a multi-day cloudburst centered on the North Indian state of Uttarakhand caused devastating floods and landslides becoming the country's worst natural disaster since the 2004 tsunami. Over 95% of the casualties occurred in Uttarakhand. According to figures provided by the Uttarakhand government, more than 5,700 people were "presumed dead." This total included 934 local residents.

Destruction of bridges and roads left about 100,000 pilgrims and tourists trapped in the valleys leading to

Uttarakhand Hit by Cloudburst

three of the four Hindu Chota Char Dham pilgrimage sites. The Indian Air Force, the Indian Army, and paramilitary troops evacuated more than 110,000 people from the flood ravaged area.

The Army, Air Force, Navy, Indo-Tibetan Border Police (ITBP), Border Security Force, National Disaster Response Force (NDRF), Public Works Department and local administrations worked together for quick rescue operations. Several thousand soldiers were deployed for the rescue missions. Activists of political and social organizations were also involved in the rescue and management of relief centres.

Rescue Work in Uttarakhand

Unlike in case of Phailin which hit Odisha, the unprecedented destruction by the cloud burst witnessed in Uttarakhand state was attributed, by environmentalists, to unscientific developmental activities undertaken in recent decades contributing to high level loss of property and lives. Roads constructed in haphazard style, new resorts and hotels built on fragile river banks and more than 70 hydroelectric projects in the watersheds of the state led to a "disaster waiting to happen" as termed by certain environmentalists.

The environmental experts reported that the tunnels built and blasts undertaken for the 70 hydro electric projects contributed to the ecological imbalance in the state, with flows of riverwater restricted and the streamside development activity contributing to a higher number of landslides and more flooding.

This disaster had left the country pondering over the environment concerns which could lead to disasters in the future.

4. Jammu and Kashmir Floods 2014

According to Government sources, in Jammu and Kashmir floods of September 2014, 300 people died and 25 suffered injuries. Apart from this, damage was caused to 2,61,361 structures, farm sector of 3.27 lakh hectares of agricultural land and 3.96 lakh hectares of horticulture land, 6,910 km of road, 559 bridges, 3,063 PHE schemes, 6,423 irrigation works and schemes, 4,202 sub-stations, 11,671 kms of electric conductors.

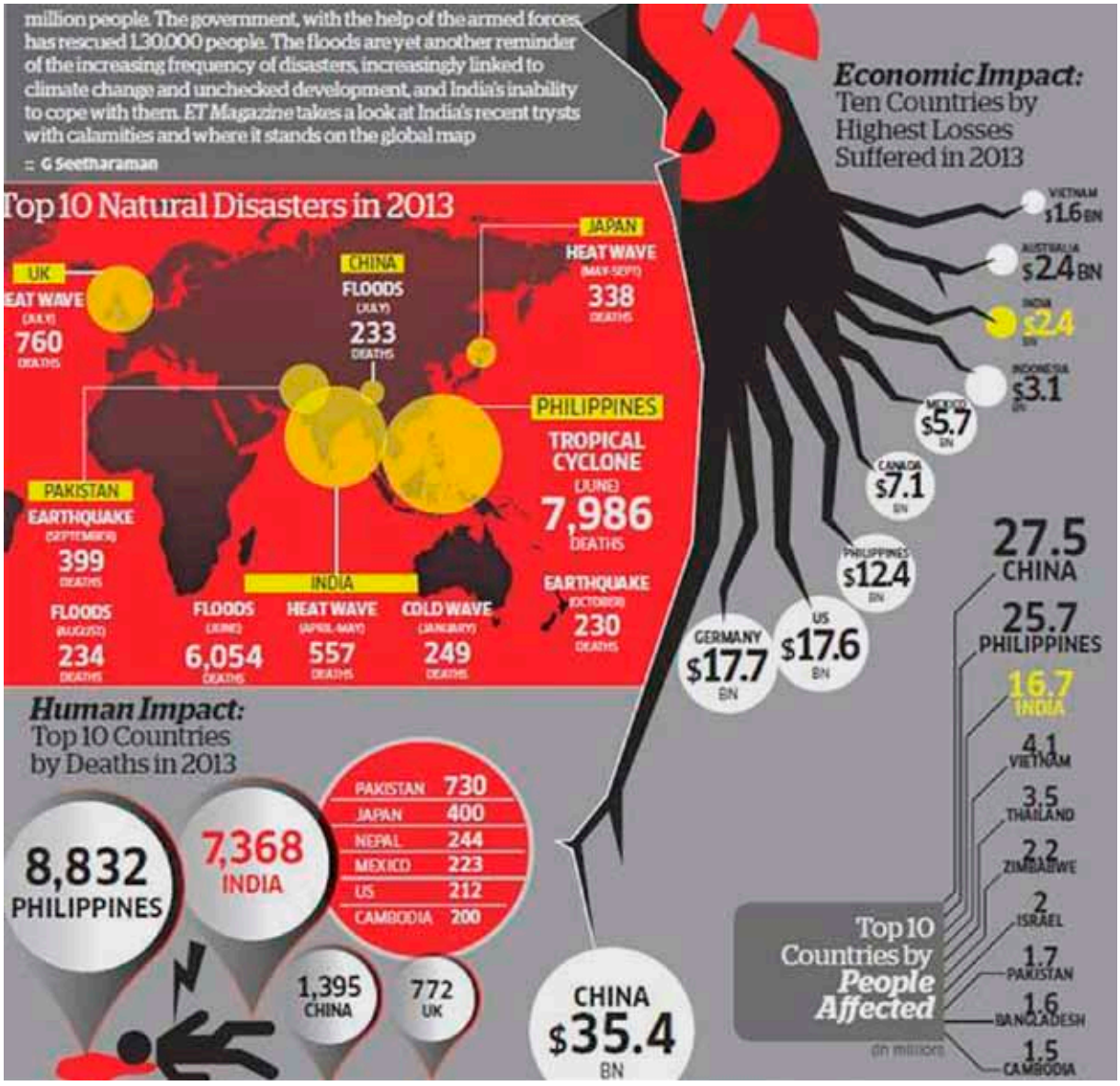
As in the case of Uttarakhand, it is believed that the state ignored warnings from weathermen, which resulted in the disaster.

Some information on the vulnerability of India to disasters is given in the following pictures. (Courtesy: Economic Times Magazine, 14-20th, September).

Increasing Natural Disasters

For Geophysical disasters like volcanoes, earthquakes, rockfalls, landslides, and avalanches, there may be no clear-cut causal relationship between the disaster and the weather. But, for climate-related disasters, one can draw direct causal relations between disasters and the weather. These include hydrological events such as floods, storm surges, and coastal flooding, plus meteorological events like storms, tropical cyclones, heat/cold waves, drought, and wildfires.

Another thing that has risen in the recent years are the financial costs incurred by natural disasters. International organizations such as the Red Cross say that, the world's yearly post-disaster cost is around 65 billion US dollars. Compared that to the four billion spent fifty years ago, adjusted for inflation, and one can realise how expensive preparations have become.



Because of our careless abuse of the environment, the number of natural disasters and the cost of cleaning them up will continue to rise. This should sound caution to us.

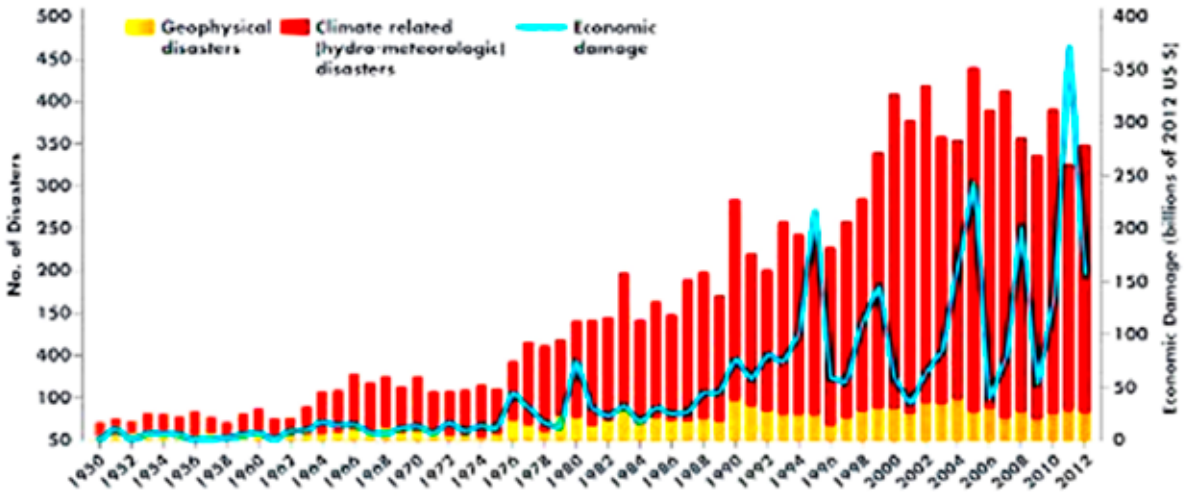
Challenges for the Future

There is a growing need to look at disasters from a development perspective. Disasters can have devastating effect on communities and can significantly set back development efforts to a great extent.

But then, it could also offer an opportunity to invest in development efforts in a post disaster scenario. Disasters are opportunities for communities to reinvent themselves.

One of the glaring lacunae in the process of Disaster Management in India has been the overlooking of unnatural disasters.

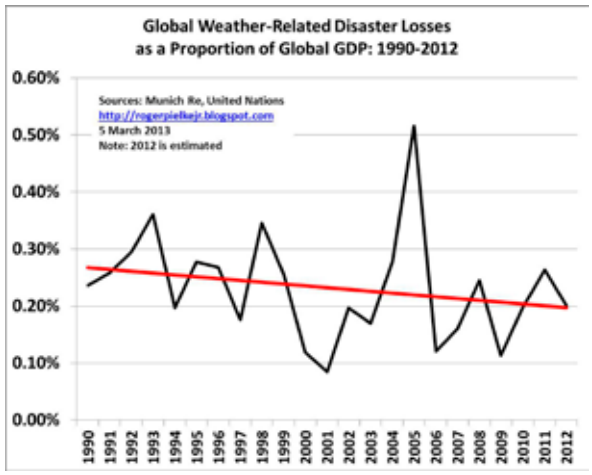
Current global situation also demands initiatives in managing the impact of unnatural disasters. Developments at the international level, particularly culminating on 9/11 have brought the issue of unnatural disasters at the forefront.



The Rising Cost of Global Warming: Increasing Frequency and Cost of Natural Disaster

Nuclear Power Plant Explosion in Chernobyl, Russia

The Exxon Valdez Oil Spill, Alaska, USA



The global community has recognized the serious consequences of Nuclear, Biological and Chemical (NBC) warfare. Hence, unnatural disasters remain a serious challenge for India to address in the near future.

The need of the hour is to chalk out a multi-pronged strategy for total disaster management comprising prevention, preparedness, response and recovery on the one hand and initiate development efforts, on the other.

The countries in the Asia-Pacific region should establish a regional co-ordination mechanism for space-technology based disaster mitigation.

Some of the initiatives in disaster management could be as follows:

- Frame good macroeconomic policies before and after shocks.
- Provision in the budget for emergency spending helps crisis mitigation and resolution, insurance coverage and low public debt bolster government spending flexibility if reconstruction needs arise.
- Public investment in risk reduction.
- Improvement in government policy frameworks to better manage risk and mitigate economic and social costs.
- Estimate the probability of shocks and identify local vulnerabilities and integrate into plans for contingencies, investing in risk reduction, insurance, self-insurance, and disaster response.
- Tax and spending policies need to be flexible, to allow rapid redeployment of spending when needed.
- Coordination with foreign partners before disaster strikes could mobilize external assistance for risk reduction, which is likely to earn a higher return than emergency help after the fact.

A pro-active stance to reduce the toll of disasters in the country requires a more comprehensive approach that comprises both pre-disaster risk reduction and post-disaster recovery. Such an approach should involve the following set of activities:

- Risk analysis to identify the kinds of risks faced by people and development investments as well as their magnitude;
- Prevention and mitigation to address the structural sources of vulnerability;
- Risk transfer to spread financial risks over time and among different actors;
- Emergency preparedness and response to enhance a country's readiness to cope quickly and effectively with an emergency; and
- Post-disaster rehabilitation and reconstruction to support effective recovery and to safeguard against future disasters.

Conclusion

'Should we be talking dollars and cents in the face of human tragedy? The first imperative of public policy should be to save lives, but efforts to reduce economic costs, which carry other human and social costs that can last for generations, are also important. When the economic costs are lessened resources are freed up for disaster preparedness, resilience, and mitigation, which can save lives in the future'say Nicole Laframboise and Sebastian Acevedo.

Sri Suresh Prabhu, Union Minister for Railways once remarked *'Because of the climate change, the intensity and frequency of natural calamities are bound to rise'* This has to be viewed with more concern.

It is learnt that the topic of the workshop on intercultural aspects of disaster management is a topic that is being researched to ensure effectiveness of disaster management and inculcating the cultural awareness and sensitivity which are important factors for the successful planning and implementation of disaster management efforts among multi-cultural expert groups. The workshop is addressing such an important concern.

Disaster management teams composed of experts from different countries have been more and more common in the past and will continue to be so in future. The disaster-management organizations from the affected countries will more frequently seek help from the international community. Hence, it is essential that the cultural aspects are integrated in disaster management work which would ensure an adequate appreciation for the cultural norms and values of the people working in the group to manage the disaster.

The best strategy is to be Proactive rather than reactive in tackling natural disasters and in mitigating the disasters in case of natural or man-made disasters.

References:

1. Disaster Management in India by Vishal Singh in Development Alternatives Newsletter.
2. U N praises India's disaster management system - Times of India 16.10.2014.
3. Cultural Influences on Disaster Management: A Case Study of the Mt. Pinatubo Eruption by C. Dominik Güss,University of North Florida and Oliver I. Pangan, Ateneo de Manila University.
4. Disaster Management In India, Daya Kaul, Md. Ayaz, Lohitkumar S.N., Department of Civil Engineering, IIT Kanpur-208016.
5. Man versus Mother Nature, Finance & Development, March 2014, Vol. 51, No. 1, Nicole Laframboise and Sebastian Acevedo.
6. http://www.skymetweather.com/content/climate-change/natural-disasters-cost-rs-60760-crores-every-year-to-india/ report of March 11th, 2015.
7. 'World Bank praises India's Phailin evacuation efforts'- Report in The Hindu dated October 18, 2013.
8. Economic Times, Magazine 14-20 September 2014.
9. The 5 Most Destructive Natural Disasters of the Past 10 Years-http://bostjanbb.hubpages.com/hub/Worlds-worst-natural-disasters.
10. Future Challenges in Disaster Management-Bihar Institute of Public Administration and Rural Development publication.
11. Publications of Government of India, Odisha, Uttarakhand, Jammu & Kashmir.
12. Various internet resources.

DHĀRANA
INTERNATIONAL JOURNAL OF BUSINESS FROM BHARATIYA VIDYA BHAVAN'S
M. P. BIRLA INSTITUTE OF MANAGEMENT, BENGALURU
Vol.9, #1 (2015) pp 17-21 ISSN 0974-0082

Fire Loads in Heritage Buildings

N. Suresh*

Abstract

The results of a fire load survey carried out on Daria Daulath Bagh and Mahadwara Gopuram Ranganatha Swamy temple at Srirangapatna Taluk, Mandya District, Karnataka (India) are presented. Two heritage buildings with a floor area of 1068.64 m^2 were surveyed. The inventory method was used in the present survey. Analysis has been made to determine the influence of room use and floor level on fire loads. It is found that room use and room floor area are major parameters affecting the fire loads in a room. An attempt is made to calculate the composition of fire load in the buildings surveyed. In these buildings wood contributes to a substantial portion of the total fire load and the immovable contents contributes to about 90% of the total fire loads.

Key Words & Phrases: *Heritage buildings, protection of structures & moveable items / contents*

1.0 Introduction

"Conservation of Cultural Heritage" is a stated goal of the ISO Technical Committee on Fire Safety Engineering. Heritage buildings are exposed to the same fire threats as other buildings. Unlike most other buildings, heritage buildings are of significant architectural and historical importance, and often contain irreplaceable contents. Implementation of the modern prescriptive codes can even have an unfavorable effect on the architectural value of the building. As a consequence, the fire safety engineer needs to use different approaches to guarantee the fire safety level.

The Heritage structures are divided in three categories from the point of view of materials used in their construction viz wood, stone and bricks. Concerning wooden building, the most cause of damage is due to twisting, joints are crushed, and partially rotted these damages may occur in limited area of the structures but the major cause of destruction is due to fire accidents.

The fire protection of heritage buildings is necessary because a large proportion of the buildings are made of wood. They are historic wooden structures that are densely packed and where the threat from fire is high. Some buildings are located in rural areas which correspond to a high risk.

2.0 - Literature Review

2.1 - Case Studies

The Rova d' Antananarivo, Madagascar. This historic hill top complex of nine buildings (Royal palaces, tombs and temples) was built primarily in wood during 17^{th} to 19^{th} centuries. The cultural and religious heart of the country, it had been proposed for inclusion on the world heritage list.

* *Head, Building Fire Research Centre, National Institute of Engineering, Mysuru 570 008.*

The Rova d' Antananarivo, Madagascar. Fanned by high winds, a fire devastated the complex on 6th November 1995. Five of the buildings were razed to the ground ; of the remainder, only basements and perilous masonry elements survived. It was observed that, out of 6175 inventoried objects, 1183 were saved.

Katarina church built between 1656-1695. The architect was Jean de la vallee. The church was damaged and re built again in 1723, but it was not an exact copy of the church. The magnificent tower was new and was finished in 1739. The architect was Goran Adelcrantz The church is on a hill in the south of Stockholm, sodermalm, and you can see it from a long way away. It is a very important part of the Stockholm skyline. The organ façade, which is from 1763, was by Jean Erik Rehn. The altar paice from 1732 and the pulpit from 1753 were by Goran Adelcrantz'son Carl Fredrik Adelcrantz. The altar painting from 1735 was by Lorenz Gottman.

The church was destroyed by the fire in May 1990. This was one of the most notorious fires on the cultural heritage building in Sweden. Only the outer walls made of stone (or bricks) survived. The cause of the fire was most probably an electric fault in the cable of the great hoist chandelier. The church had no smoke detectors. Had there been detectors, the fire would have been discovered at an early stage and probably been put out. The fire brigade was located next door to the church. But when the fire brigade came to the church there was already a big fire and they had no possibility to save the church. The church had an old sprinkler system in the tower but it could not be used because there was not enough water in the Municipal water pipes.

It is important to check old electrical installation regularly and to consider the effect of heating previously not heated spaces. In addition, it is important to have fire detectors in all the spaces, particularly in the attic. Fire brigades should have information concerning the historic buildings in order to act correctly. Remaining structures should be documented as this might have revealed something interesting about the wood joints or other details in the roof constructions. A Fire can be provided a researcher with an opportunity to find some thing that is normally invisible and unobtainable.

2.2 - Objective and Scope of Work

The objective of the present study is

i) Calculation of fire loads of different heritage buildings.

ii) Comparison of fire loads of different heritage buildings.

iii) Recommendation of the suitable solution for protection of the heritage structures against the fire accidents.

2.3 - Scope of The Present Work

Scope of the present work is limited to finding the fire loads in the following buildings.

i) **One heritage building** – Daria Daulath Bagh at Srirangapatna a national protected monument at Srirangapatna Taluk, Mandya district.

ii) **One heritage structure** – Mahadwara gopuram consisting of seven tiers, where wood has been used as reinforcing materials at Ranganatha Swamy temple at Srirangapatna Taluk, Mandya district.

The following are the heritage monuments, which have been considered for the fire load calculation and an brief description of the monuments are given below.

Daria Daulat Bagh (D.D. Bagh)

The D.D. Bagh, "the wealth of the sea" was built in the year 1784 on the bank of the River kaveri and their building served as Tippu sultan's summer palace. The building was built in Indo-Islamic style of Architecture. Rectangular platform with arched entrance. The main structure is a double storey building comprising of wide corridor, several pillars, canopied balconies, an audience hall and private chambers. It is surrounded on all sides by a garden designed in the Islamic char bagh, the water fountains and pathway with Cypresses on either sides were with area on which the garden was divided into four geometric solutions. The structure made by teak wood, bricks and lime mortar was used in the construction. The Northern and southern as well as the inner walls are adored with fine floral patterns and geometric motifs and there are several niches on the outside walls to hold lamps or flower vases. This heritage is an important tourist attraction in Srirangapatna.

Mahadwara Gopuram of Sri Ranganatha Swamy Temple at Srirangapatna Taluk, Mandya District

The Sri Ranganatha Swamy temple is one of the largest in the state and of great importance. An inscription dated 894 AD reveals the Thirumalaiah, the ganga Chieftaien, built the temple of Sriranganatha to commemorate the tradition. There came up a temple dedicated to the god in Sheshashayi form. On the cornices of the plinth on the southern side is an inscription of 1200 AD belonging to the period of Viraballala II, The hoysala king, stating about certain grants made to the priests and temples of the tituva-Ranga-Narayana –Chaturvedi Mangalam. This probably indicates the period of the foundation of the temple and the place as an Agrahara, a centre of traditional learning. Later the vijayanagara Kings, the Mysore wodeyars and Haider Ali enlarged and improved it. The structure is one of the important national protected monuments and the temple is in religious use. Further the significance cause of fire may be due to lighting caused by atmospheric action and by the rituals performed during Vishnu deep utsava The Lofty Mahadwara and imposing the gopura is constructed in vijayanagara period and consist of five tiers (five floors) with total of 131.14 Sqm of wooden floor area and 29470.66 cum of wooden members made of wood.

2.4 - Fire Load

The term fire load is defined as the heat energy that could be released per square meter of a floor area of a compartment of storey by the complete combustion of the contents of the building and any combustible parts of the building itself.

$$q_c = \frac{\sum m_v \times H_v}{A_f}$$

Where,

q_c = Fire load (MJ/m^2)

m_y = Total mass of the combustible material (kg)

H_v = Calorific value of combustible material (MJ/kg)

A_f = Floor are (m^2)

2.5 - Movable Contents

Movable content includes the combustible wooden antique furniture, barricades, Showcases made of ply wood, murals, clothes, and pencil sketches made on paper, Bamboo mats, plastic chairs, and signage's made both of wood and plastics.

2.6 - Immovable Contents

The immovable contents consist of the combustible materials viz wooden members used as supporting frame beams, columns, ceiling , canopied balconies an audience hall.

3.0 Calculations

A sample calculation of [Model Room (1)] shown below.

Model Room - 1

Floor area (A_f) = 27.00 m^2

Weight of immovable combustible material (m_v) = 2499.50 kg

Weight of movable Combustible material (m_v) = 741.00 kg

Total 3240.50 kg

Fire Load $q_c = \frac{\sum m_v \times H_v}{A_f}$ (MJ/m^2)

$= \frac{3240.50 \times 18.60}{27.00}$

$= 2232.34$ MJ/m^2

Calorific value for wooden items (H_v) = **18.60 MJ/kg**

Similar calculations have been adopted for the entire Structures. Tables in the next few pages gives the computation of weights and the corresponding fire load for the entire structures floor wise.

Daria Daulat Bagh at Srirangapatna

Total floor area = 937.50 Sqm

The following materials have been considered as Movable and Immovable contents inside the heritage structure.

Movable Items

Wooden antique furniture, barricades, Showcases made of ply wood, murals, and clothes, pencil sketches made on paper, Bamboo mats, plastic chairs, and signage's made both of wood and plastics.

Immovable Items

The immovable contents consist of the combustible materials viz wooden members used as supporting frame beams, columns, ceiling , canopied balconies an audience hall.

Mahadwara gopuram of Sri Ranganatha Swamy temple at Srirangapatna Taluk, Mandya District

Total floor area = 131.14 Sqm

The following materials have been considered as Immovable contents inside the heritage structure.

Immovable Items

The immovable contents consist of the combustible materials viz wooden members used as supporting frame beams, columns, floors.

Table 1: Fire Load for Daria Daulat Bagh

Sl. No.	Particulars	Floor area	Immovable content			Movable content			Total fire load (MJ/ m2)
			Wt of combustible material, mv (kg)	Calorific value Hv(MJ/ kg)	Fire load qc (MJ/ m2)	Wt of combustible material mv (kg)	Calorific value Hv (MJ/kg)	Fire load qc (MJ/m2)	
1	Front Varandha	115.50	74870.63	18.60	12057.09	109.00	18.60	17.55	12074.64
2	Left Side Varandha	115.50	63733.63	18.60	10263.60	104.00	18.60	16.75	10280.35
3	Rear Side Varandha	115.50	75783.30	18.60	12204.06	128.00	18.60	20.61	12224.68
4	Right Side Varandha	115.50	62275.39	18.60	10028.76	100.00	18.60	16.10	10044.87
5	Models Room-- 1	27.00	2499.50	18.60	1721.88	741.00	18.60	510.47	2232.35
6	Models Room-- 2	24.75	3956.23	18.60	2973.17	397.00	18.60	298.35	3271.52
7	Models Room-- 3	24.75	3956.23	18.60	2973.17	869.00	18.60	653.07	3626.23
8	Models Room-- 4	27.00	2499.50	18.60	1721.88	746.00	18.60	513.91	2235.79
9	Models Room-- 5	60.00	1910.72	18.60	592.32	464.00	18.60	143.84	736.16
10	Models Room-- 6	24.75	3956.232	18.60	2973.17	417.00	18.60	313.38	3286.55
11	Models Room-- 7	24.75	3956.232	18.60	2973.17	397.00	18.60	298.35	3271.52
12	Models Room-- 8	27.00	2499.504	18.60	1721.88	-	-	-	1721.88
13	Models Room-- 9	24.75	3956.232	18.60	2973.17	-	-	-	2973.17
14	Models Room-- 10	24.75	3956.232	18.60	2973.17	-	-	-	2973.17
15	Models Room-- 11	27.00	2499.504	18.60	1721.88	-	-	-	1721.88
16	Models Room-- 12	60.00	1910.72	18.60	592.32	-	-	-	592.32
17	Models Room-- 13	24.75	3956.232	18.60	2973.17	-	-	-	2973.17
18	Models Room-- 14	24.75	3956.23	18.60	2973.17	-	-	-	2973.17
19	Open Space--1	71.50	63567	18.60	16536.31	60767.00	18.60	15807.92	32344.23
20	Open Space--2	71.50	63567	18.60	16536.31	60577.00	18.60	15758.49	32294.80
									143852.45

Table 2: Fire Load for Sri Ranganatha Swamy Temple Main Entrance

GROUND FLOOR									
Sl. No.	FLOORS	Floor area	Immovable content			Movable content			Total fire load (MJ/m2)
			Wt of combustible material, mv (kg)	Calorific value Hv(MJ/kg)	Fire load qc (MJ/m2)	Wt of combustible material mv (kg)	Calorific value Hv(MJ/kg)	Fire load qc (MJ/m2)	
1	First Floor	52.80	6651.79	18.60	2343.24	-	18.60	-	2343.24
2	Second Floor	42.75	5856.45	18.60	2548.07	-	18.60	-	2548.07
3	Third Floor	33.88	5011.08	18.60	2751.07	-	18.60	-	2751.07
4	Fourth Floor	28.05	4392.19	18.60	2912.47	-	18.60	-	2912.47
5	Fifth Floor	17.76	3714.20	18.60	3889.87	-	18.60	-	3889.87
6	Sixth Floor	13.20	2287.43	18.60	3223.20	-	18.60	-	3223.20
7	Seventh Floor	6.60	1928.05	18.60	5433.60	-	18.60	-	5433.60
Total		**195.04**	**29841.19**	**-**	**23101.51**	**-**	**-**	**-**	**23101.51**

4.0 Conclusions

The following conclusions have been drawn based on the limited scope of the project work,

Daria Daulat Bagh

It has been found that the intensity of fire load is maximum in the open space 2 and minimum in the model room 12. In case of accidental fires, precautions have to be taken in open space 2.

Sri Ranganatha Swamy Temple at Srirangapatna

It has been found that the intensity of fire load is maximum in the first tier and minimum in the fourth tier. In case of accidental fires precautions have to be taken in fourth floor.

An efficient fire safety management is essential because these heritage buildings are visited by an average three thousand tourist per day hence the fire alarm, smoke detectors and suitable necessary equipments are to be installed for preventing the major fire disasters.

The most effective method to eliminate the risks of fire is to conduct a fire risk assessment regularly with close monitoring and reviewing; i.e. 'prevention is better than cure'.

Bibliography

1. Herb Stovel, Risk Preparedness: A Management Manual for world cultural Heritage. Chapter 5, pp.44-45.
2. Norwegian links, The Directorate for cultural heritage, The Norwegian fire research laboratory, Article (in Swedish) on fires in old wooden house areas.
3. Regulating Fire Safety in Historic and Cultural Structures; Prof. Vincent M. Brannigan J.D. Dept. of Fire Protection Engineering University of Maryland College Park Md. 20742 USA Firelaw@umd.edu
4. The protection of the architectural heritage against natural disasters proceedings of the European Colloquy on Regulatory Measures concerning the Protection of the architectural Heritage against Natural Disasters in Europe Ravello, Italy, 15-17 November, 1989.
5. V.K. Jain, 'Fire safety in buildings' New Age International Pvt. Ltd., Publishers, New Delhi.
6. 'National Building Code of India', Part IV, Fire and Life Safety.
7. 'A conceptual approach towards a probability based design guide on fire safety', (1983), CIB W14, Fire Safety J., 6, pp.1-59.
8. Andam K.A. (1986), 'Floor live loads for office buildings, 'Build and Envir., 21 (3/40), pp.211-219.
9. James G. Quintiere, (2006), 'Fundamentals of Fire Phenomena', John Wiley & Sons Ltd.

Webliography: www.earth-house.com

DHĀRANA
INTERNATIONAL JOURNAL OF BUSINESS FROM BHARATIYA VIDYA BHAVAN'S
M. P. BIRLA INSTITUTE OF MANAGEMENT, BENGALURU
Vol.9, #1 (2015) pp 50 ISSN 0974-0082

Newsclip

DECCAN HERALD
Excerpts from Deccan Herald Report by Shemin Joy dated 17.04.2015

Govt prepares 'Blue Book' on disaster management

Move is aimed at ensuring zero casualty during crises

The government is looking at ensuring "zero casuality" during natural disasters through proper mitigation measures but has warned states against "artificial suppression" of data on death and destruction.

The suggestion is part of a draft 'Blue Book' to guide relief and rehabilitation efforts before cyclones, learning from the experience of successful management cyclone Hudhud in 2013.

The draft report was sent to states seeking comments by April 30.

Relief Measures

- **Comprehensive state insurance cover to people, homes and cattle**
- **Underground duct for power, communication, gas lines should be planned in all urban bodies**
- **Evacuation routes should be laid or restored before onset of monsoon**
- **Telecommunication systems should be robust and foolproof**
- **Coastal mobile towers need to be built to withstand 250 kmph speed**
- **Alternatives to electricity should be kept ready.**

The proposal for 'Blue Book' came from the Prime Minister's Office (PMO) and the Union Home Ministrey set up an inter-ministerial panel in October last.

Another proposal was the construction of helipads at regular intervals along highways.

With the National Disaster Management already publishing 'Guidelines on Management of Cyclones', the official said the 'Blue Book' does not seek to duplicate the work.

DHĀRANA
INTERNATIONAL JOURNAL OF BUSINESS FROM BHARATIYA VIDYA BHAVAN'S
M. P. BIRLA INSTITUTE OF MANAGEMENT, BENGALURU
Vol.9, #1 (2015) pp 51-55 ISSN 0974-0082

Invited Article

Role of Renewable Energy and Sustainable Technologies in Building an Eco-friendly and Sustainable Anti-poaching Unit in a Forest

Shamsundar Subbarao[1] Dhananjaya K.N.[2]

Natural calamities/Disasters can hit any part of the world and thereby damage the networks of water, energy, food and other amenities as well by and large. Although Disasters/Natural calamities are beyond the control of humans, the impact of the disaster can be localized and minimized by incorporation of Renewable Energy and Sustainable Technologies. The present article illustrates the effectiveness of Renewable Energy and Sustainable Technologies in building a sustainable habitat. The article is based on the case study of an implemented project by NIE-CREST.

NIE-CREST (Centre for Renewable Energy and Sustainable Technologies) is a centre of excellence at the premises of NIE (National Institute of Engineering), Mysuru. The centre is promoting eco-friendly energy systems, Renewable energy and sustainable technologies. The centre itself has successfully implemented numerous projects on eco-friendly and renewable energy systems and sustainable technologies in and around Karnataka.

Major technologies promoted by NIE-CREST include Waste to wealth Systems, Kitchen Waste Biogas Plants, Biodiesel from non edible seeds like Pongamia (Honge), Jatropha, Simarouba, Neem, Mahua (Hippe) and many others, Solar energy technologies - Design & implementation of Solar lighting systems, Parabolic concentrators, Solar cookers and many others, Sustainable building materials like Stabilised Mud Blocks, Alternative building;

Apart from the promotion and implementation of these technologies, the centre is actively involved in Research and Development (R&D) of the eco-friendly technologies. Exhibits of all the technologies promoted are arranged for visitors. The centre is continually involved in conducting Awareness and Training Programmes for all the technologies mentioned above.

Case study of project implemented by NIE-CREST

Aranyaka is an antipoaching unit constructed deep inside the Bandipur forest, Karnataka, India. The project is executed by NIE-CREST. The unit is self sustainable owing to the incorporation of renewable energy and sustainable technologies. The ant poaching unit is rugged, eco friendly and can sustain natural calamities.

1 *Head, NIE-Centre for Renewable Energy and Sustainable Technologies [NIE-CREST], & Associate Professor, Department of Mechanical Engineering, The National Institute of Engineering [NIE], Mysuru-570008.*

2 *Project Assistant, Mysuru District Bio fuel Information and Demonstration Centre NIE-CREST, Mysuru-570008.*

"Aranyaka"

"Aranyaka" An Eco friendly, Sustainable, Renewable Energy based "Anti Poaching Unit"

Source: Authors

"A joint venture of **Wild Life Conservation Trust, Mumbai and Tiger Conservation Foundation, Bandipur,** Designed and Implemented by **NIE-CREST *[NIE-Centre for Renewable Energy and Sustainable Technologies, www.niecrest.in], NIE, Mysore* and Voice for Wildlife Trust – Mysore".**

'Aranyaka'- is a first ever of its kind in Indian Forest Zones. It is built at Avarepura, Moleyur, Bandipur. The uniqueness of the unit lies in the fact that the unit has been planned and designed with emphasis on two major aspects viz. ***Basic amenities and Renewable Energy & sustainable Technologies.***

Basic Amenities: Basic amenities provided in the unit include spacious living room well ventilated with ample natural lighting, a fire place, Kitchen, Beds of Kadapa slab, Good sanitation via toilet and bathroom. These provisions render the unit a pleasant and comfortable place for the forest personnels to stay even for longer periods in the forest region which in turn helps in conservation of forest.

Renewable Energy and sustainable Technologies: Renewable energy and sustainable technologies include the following

Stabilised Mud Blocks: The camp is built with stabilized mud blocks which were prepared at Moleyur RFO Office site using local soil, sand and 9% cement. About 5000 blocks were used for construction. Unlike traditional clay bricks, these blocks do not require fire for burning instead they are cured for 21 days. They look natural and provide thermal comfort inside the unit. In addition to this, the stabilized mud block masonry does not require plastering.

Rain water Harvesting: Considering the deficit of water, rain water harvesting has been implemented to fulfill the water demand for major part of the year, for a roof area of 54m^2 about 40000L of water can be harvested in an year at 93% efficiency. This also contributes towards conservation of water. A total of 9000L storage facility is provided **Thaijar**-A storage tank of capacity 1000L above ground level for storing rainwater, is an other attractive feature of the system

Solar Lighting: Utilisation of solar energy does not essentially fulfill the objective of conservation of energy, if solar energy is utilized with LEDs, the efficiency will be far better. Solar LED (8 Nos.) lights along with a provision for walkie-talkie charger and mobile charger ensures uninterrupted electric power supply and also makes the unit self reliable in terms of energy.

Fuel Efficient Biomass Stoves: The efficiency of conventional cook stoves is less than 10% with release of enormous smoke within the surroundings. These stoves are poor in thermal insulation as lot of heat is wasted in to the surroundings. Fuel efficient Biomass Cook Stove (with a higher efficiency of 45%) and Bath stove have been provided to conserve wood, create a smoke free surroundings.

Sl. No.	Particulars/ Technology	Specifications/ Components of the Systems	Picture
1.	Construction of Building with Stabilized mud block	Construction of building with Stabilized Mud Block Masonry includes Portico, Hall, Kitchen, Toilet and Bath room	

Sl. No.	Particulars/ Technology	Specifications/ Components of the Systems	Picture
2.	Rain Water Harvesting + Thaijar	Includes Trapezoidal channels, PVC Pipes and fixtures, Storage of 9000L (Thaijar of capacity 1000L, Under ground storage tank of capacity 8000L), Settling tank and Sand filter, Simple Hand Pump	
3.	Solar Lighting	Solar LED Lighting includes Solar Photovoltaic Panel of capacity 175W Battery of 12 V rated 100Ah, Wireless set charging point and cell phone charging point and LED Lights (8No.s)	
4.	Fuel Efficient Biomass Cook Stove	2+1 Fuel Efficient Cook Stove including Grate, Door with frame, concrete top plate, ash tray, cooking vessels, heat recovery pan	
5.	Fuel Efficient Biomass Bath Stove	Fuel Efficient Bath Stove including Grate, Door with frame, concrete top plate, ash tray and water heating Vessel	

Source: Authors

Conclusions

Renewable energy and sustainable technologies are effective tools for minimizing the damage which can result from natural calamity, and also help in achieving self reliability in terms of energy, water and hence achieve sustainability.

The implementation of renewable energy and sustainable technologies is likely to reduce the impact of natural calamities like floods, drought to an extent and minimize the after effects of the calamity. With this one can achieve a sustainable habitat.

Biography of **Pooling of Interest Method** in accounting for Amalgamations[1]

J. Shankar*

Abstract

'Pooling of interest method' of accounting for amalgamations is a unique concept among accounting practices. Its uniqueness is in ignoring the historical cost concept, a fundamental concept for recording transactions in accounting. In this practice the evidence of cost provided by the transaction of amalgamation is ignored in accounting for the amalgamation. Defined in Indian Accounting Standard 14 para 10 as "Under pooling of interest method, the assets, liabilities and reserves of the transferrer company are recorded by the transferee company at their existing carrying amounts ….."

This article attempts to find the logic that could have given birth to the 'pooling of interest method' in accounting for Amalgamations. In tracing the logic, the following five steps are taken. To start with, identify the first transaction of business combinations. Second, examine how these early business combinations could have been accounted for. Third, analyze how 'pooling of interest method' accounting for business combinations evolved in United States. Fourth, trace how 'pooling of interest method' of accounting reached India. Finally conclude by the evaluating the reasons for the demise of 'pooling of interest method' in accounting for amalgamations and examine in what form could 'pooling of interest method' survive going forward.

** Consultant Wipro Technologies Ltd., Bangalore*

Introduction

'Accounting is a pragmatic trade'
– J Kitchen

India was ranked the third largest market in the Asia Pacific region, after Japan and Australia for mergers and acquisitions (M&A) in the first half of calendar year 2006[2]. Growth of M&A in the India has been phenomenal. Grant Thornton, investment bankers engaged in M&A tracked 740 deals valued at $26 billion in 2006[3]. This was an increase in value by 44% from $18 billion in 2005. Measured by the number of deals, the growth in 2006 was 58% from 467 deals in 2005.

While mergers and acquisitions activity on the one hand is growing phenomenally, the debate on the effectiveness of merger and acquisition transactions in creating shareholder value on the other hand continues to be hotly contested. Meta research on measuring effectiveness of mergers and acquisitions have not provided conclusive evidence on value creation to the shareholders of acquiring companies[4] *(Illustration 1).*

Proponents of the M&A-value-creation view argue that a rational buyer exploiting stock market irrationality reflected in valuations can create value for shareholders. Some also believe that one need not depend on stock market irrationality as reflected in valuation for M&A transactions to create value. Rational buyer by themselves seeking to build competitive business advantage can create value for shareholders by creating synergy. Synergy is when one business plus one business, totals more than the two businesses individually. Source of synergy is from

[1] Amalgamation is the term used in UK and India for "merger of two or more companies whose shareholders are issued with appropriate number of shares in the new company".
[2] Asia-Pacific M&A Bulletin: Setting the pace for an outstanding year, Mid year 2006 review of Price Waterhouse Coopers.
[3] Reported in Deccan Herald page 15 on December 25, 2006.

Illustration 1

sharing resources and creating economies of scale and economies of scope or complementing each other strengths and negating weaknesses.

The logic of the people who believe that M&A destroys value arises from their view that markets are rational and businesses are valued fairly. They believe that it is the irrational buyer blinded by 'hubris' meaning pride, and belief in their own superior managerial ability to the incumbent management that induce them to buy fairly valued businesses at a premium. The origin for rational market-irrational buyer is in the 'hubris hypothesis of corporate takeover' forwarded by Roll[5]. In this hypothesis, a single decision maker overwhelmed by his self confidence and pride thinks he can do better than the existing management and buys the businesses, contributing to M&A deals.

The second reason for the belief that pursuing M&A strategies destroy value is in the assumption that both the market and the buyer are irrational. Empirical evidence for this is advanced by the waves of mergers and acquisitions that are seen mainly during the bull runs in the stock markets. The popular practice of studying M&A by analyzing merger waves provide some support to this view.

The rational buyer-irrational market view is based on the premise that markets do behave irrationally by undervaluing some businesses and overvaluing some others. This provides opportunity for the overvalued businesses to buy undervalued businesses and create shareholder value.

The rational-buyer-rational-market view is what triggers most of the companies to pursue M&A transactions. The acquirer intends to create competitive advantage by pursuing M&A strategies. Opportunity for creating value arises as flux in socio-political environment like de-regulation, trade liberalization, geo-political changes and demographic changes; economic changes like, dramatic changes in demand and supply situations, changes in capital markets and innovations in technology and financial markets provide an agile management with the opening.

Business rationale apart, accounting and financial reporting methods have also influenced the growth of mergers and acquisitions. Among the exogenous factors influencing mergers, accounting was seen as a prime driver. Accounting and financial reporting methods have been more of an accelerator rather than ignite M&A deals. Pooling of interest method occupies the prime position as an accounting and financial reporting accelerator of M&A deals. "Pooling avoided dilution of earning brought about by the recognition and mandatory amortization of goodwill, when a merger was accounted for as purchase" states the prominent US M&A lawyer Martin Lipton in his Davies Lecture of 2006 in Osgoode Hall Law School, York University.

'Pooling of interest' a term which for the first time was used in the U S Federal Power Commission case in 1943[6] ruled the M&A world till June 2001, when it was finally discarded in US, its birth place. Pooling of interest method of accounting, starting from its birth in United States spread to other parts of the world reasonably quickly. It had a shorter life in most other parts of the world, compared to its birthplace.

A.Tracing origin of business combinations

Tracing the origin of any event historically, is at best a point of view that is highly subjective dependent on the capability of the individual searching, their frame of reference, diligent application, resources available and the extent of work done earlier by others in this area. Given this fact, the first transaction in business combination identified herein needs to be assessed in the context of circumstantial evidence.

Indian Accounting Standard 14 deals with Accounting for Amalgamations. It came into effect from April 1, 1995. In Para 1 the standard states "This statement is directed principally to companies although some of its

[4] Does M&A Pay? A survey of evidence for decision makers, by Robert F Bruner.
[5] Roll.R (1986) 'The hubris hypothesis of Corporate Takeovers" Journal of Business 59; 197-216
[6] Frank R Rayburn and Ollie S Powers, "A history of Pooling of Interest Accounting for business combinations in the United States," Accounting Historians Journal, December 1991, page 155-192

requirements also apply to financial statements of other enterprises." Given this strong link between companies and accounting for amalgamations, the search is for the first combination of two companies.

Adam Smith in his Wealth of Nations first published in 1776 distinguished a joint stock company from private co-partneries, or partnership as we know them now, on three counts[7]. First, in a joint stock company, "no member can demand payment of his share from the company; but each member can without their consent, transfer his share to another person, thereby introducing a new member." Second, "each partner is bound only to the extent of his share" and finally "the trade of a joint stock company is always managed by a court of directors." He further recognizes two forms in which a company can come into existence: by royal charter or by act of parliament.

Satisfying the three conditions of transferability of shares, limited liability of members and separation of management from owners, the first company to exist with these distinctive features is Muscovy Company that was granted its charter in 1555[8]. The famous French historian Fernand Braudel commenting on the first recorded English joint stock company writes "…one could say that Europe had some very early examples of the joint stock company, well before the creation in 1553-5 of the Muscovy Company, the first recorded English joint stock company, though other may have preceded it by a few years[9].

The first merger of two corporate entities that I have been able to identify was in Amsterdam on March 20, 1602, within fifty years of the first company formation. Compagnie van Verre (Company of Distant Lands) merged with Verenigde Oostindische Campaginie (VOC) into a single body. The united company had a Dutch monopoly for all trade with Asia[10]. This merged company remained in existence for 198 years till 1799, when it was dissolved on December 31, with the Dutch government taking over the company[11].

The spread of company as a form of business organization was quite slow in the initial years. Before 1690, there were only some fifteen joint-stock-companies with a total capitalization of £0.9 million in England; by 1695 there were about 140, with a capital of £4.5 million….[12]. It was only in the eighteenth century that companies and stock markets that traded company shares came into their own.

The first acquisition of one corporate entity by another that I have been able to find is on May 23, 1719 in Paris[13]. In August 1717, the French Monarch had approved the statute that formed the Company of the West with the right to all trade between France and its Louisiana colony for twenty five years. This company was given the authority to maintain its own army and navy and to mine and to farm. This company was popularly known as the Mississippi Company.

On May 23, 1719, a Sunday, Mississippi Company acquired the French East India and China Company, to establish an enterprise with global trading rights. The new company was named the Company of the Indies. This acquisition was paid for by issue of 50,000 shares priced at 500 livers each, issued at par.

In U.S., the largest economy for M&A, economists and historians have classified mergers and acquisitions into M&A waves[14]. Four waves are recognized in the 20th century and one wave each in the nineteenth and twentieth century, which is tabulated in *Illustration 2*.

Co-relating the merger waves with stock market booms, a clear pattern emerges *(See Illustration 3)*. Five distinct market peaks are visible in the twentieth century. The peaks were in 1901, 1929, 1966, 1987 and 2000[16]. The period of merger waves also coincides with the periods of stock market booms, giving a reasonable assurance that the first acquisition could have occurred in first stock market boom.

One of the earliest books dealing with stock market booms was published in 1841 written by Charles Mackay, titled "Extraordinary Popular Delusions and the Madness of Crowds". This book deals with two stock market booms, the 'Mississippi madness' of 1719 and 1720 in France and the South Seas bubble of 1720 in England.

The other two prominent books on financial speculations and financial crises are the book written by Edward Chancellor, 'Devil take the hindmost: A history of financial speculation'

[7] Page 940-941, Wealth of Nations, by Adam Smith, published by Bantam Classics, Edition March 2003
[8] Page 26, The Company, A short history of a revolutionary idea, by John Micklethwait and Adrian Wooldridge published by Weidenfeld & Nicolson, 2003
[9] Page 439, The Wheels of Commerce: Civilization & Capitalism, 15th -18th Century Volume 2, by Fernand Braudel, Phonex Press, edition 2002
[10] Page 39, The Corporation that Changed the World
[11] Refer website www.oldest-share.htm referred on December 5, 2006
[12] Page 7,
[13] Page 135, Millionaire, The Philanderer, Gambler, and Duelist who invented modern Finance by Janet Gleeson, Published by Simon & Schuster
[14] Martin Lipton, Merger Waves in the 19th, 20th and 21st Century, in the Davies Lecture, Osgoode Hall Law School, York University, September 14, 2006

Illustration 2

Merger waves of the 19th, 20th and 21st century[15]			
Wave	Period	Driver	Prominent Companies
First	1893 to 1904	Horizontal mergers in basic manufacturing and transportation industries like steel, oil, mining, railroad	US Steel Corporation, Standard Oil & Erie Railroad
Second	1919 to 1929	Vertical integration in industries like automobile, power utilities	General Motors Ford
Third	1955 to 1967-73	Diversification to leverage common management resources	International Telephone and Telegraphs (IT&T)
Fourth	1974-80 to 1989	Hostile takeover and Leveraged Buyouts (LBO)	RJR Nabisco
Fifth	1993 to 2000	Global view of markets and high stock valuation leading to use of stock as acquisition currency	Time Warner & AOL
Sixth	2002 onwards	Emergence of strong national and global companies supported by low rate interest financing	Mittal Steel & Arcelor

Illustration 3

and 'Manias, Panics and Crashes: A history of financial crises' by Charles P. Kindleberger. Both the authors identified Mississippi scheme and South Seas bubble. Charles P Kindleberger points to the peak of these two financial excesses as December 1719 for Mississippi scheme and April 1720 for the South Seas bubble[17].

Considering the above, there is reasonable justification to believe that the first merger could have occurred in and around 1602 and the first acquisition in and around 1719. It is also reasonable to believe that the first merger was of the two Dutch companies. If not the first, then this was among the first few mergers and likewise, the first acquisition if not among the first few acquisition was in France involving the Mississippi Company.

B.Early Accounting methods for business combinations

One can only speculate on how early mergers and acquisitions were accounted for, in my search there was no document available on this issue. Therefore it is logical to work back from where we are today, to as far as we can dig into the yesteryears.

Today, accounting for mergers and acquisitions are mandated by accounting standards. The two dominant schools of accounting today are U S Generally Accepted Accounting Policies (US GAAP) and International Generally Accepted Accounting Policies (IGAAP). The first standard on accounting for business combinations in United States was Accounting Research Bulletin 40 issued in 1950. International Accounting Standards Committee issued its first standard on accounting for business combinations in 1983.

Accounting standards do not emerge in a vacuum. They are a product of experts deliberating on alterative contemporary accounting practices. The trigger for formulating accounting standards in UK and US were divergent practices followed by leading businesses. Both the divergent practices were endorsed by leading audit firms creating confusion among the investors and public.

[15] Tabulated from Martin Lipton's The Davies Lecture, Osgoode Hall Law School
[16] Page 8, Irrational exuberance, by Robert J Shiller, Broadway Books, 2000 edition
[17] Page 224, Manias, Panics, and Crashes: A history of financial crises by Charles P Kindleberger, fourth edition

Accounting standards in US was triggered by the divergence in the accounting treatment followed by joint venture partners General Motors and Standard Oil when they sold their interests in Ethyl Corporation for a profit of $40 million each. General Motors accounted for the proceeds as part of its trading income for the year, while Standard Oil took the surplus directly to the reserves without impacting profit and loss account. These two large industrial organizations were audited by two of the most highly respected international firms of accountants[18].

In UK the trigger for formulating accounting standards was a controversy following the hostile takeover of Associated Electrical Industries (AEI) by General Electric Company (GEC). While resisting the takeover, ten months into the year, incumbent management had forecast a profit of £10 million for AEI for that year. Following the takeover by GEC, financial statements of AEI published under GEC management reported a loss of £4.5 million. The former joint auditors of AEI attributed the difference of £14.5 million to 'matters substantially of fact' £5 million and the balance £9.5 million to 'matters substantially of judgment' arising from variations in accounting policies[19].

Accounting standards are also preceded by eminent experts writing on the subject holding forth their point of view. Given this, writings on accounting practices provide a logical point of search for early accounting of business combinations.

The book 'Methods of Amalgamation' written by A E Cutforth and published in England in 1926 is recognized as one of the earliest writings on this subject[20]. Writing in the preface, the author remarked "no book on the subject of amalgamation appears to have been published in this country, although many amalgamations of industrial and other concerns have taken place within the recent years."

In this book, three methods of amalgamation, as mergers in England were called, are described; Profit pooling schemes, a temporary method and two permanent methods of holding company schemes and direct amalgamation.

1. Profit pooling schemes

The most enduring forms of profit pooling schemes found today are found in Anglo-Dutch firms represented by marquee companies like Royal Dutch/Shell, Unilever and Corus the company currently in news as the target of Tata Steel's acquisition plan.

This structure is best illustrated by Royal Dutch/Shell. 'Royal Dutch/ Shell were a merger of operations only; the group is still 60% owned by Dutch parent, 40% by its distinct British one[21].' Detailing this structure further of Unilever, Datamonitor Plc, describes "Unilever NV and Unilever PLC are the twin parent companies of Unilever group. They have separate legal entities and separate stock exchange listing for their shares, but operate as a single entity; the Unilever group or Unilever. Also Unilever NV, Unilever PLC and their group companies constitute a single reporting entity for presenting consolidated accounts"

2. Holding company schemes

Prevailing practices of accounting for holding company is comprehensively captured in the 1922 lecture given by Gilbert Garnsey to the members of Institute of Chartered Accountants of England and Wales in London. Garnsey a partner in Price Waterhouse & Co. was speaking on "Holding Companies and their published accounts". His lecture was reproduced in The Accountant of January 1923.

In his lecture he describes four methods of accounting for holding company:

1. Reflect investments made in subsidiaries as investment, and account for dividends received in their profit and loss account. In India this method of accounting was practiced prior to the passing of the Companies Act of 1956.
2. Present holding company accounts as in 1 above and in addition present the accounts of the subsidiary companies. This method of accounting was introduced in India with the passing of the Companies Act of 1956.
3. Present holding company accounts as in 1 above and in addition present a statement of the assets and liabilities of all the subsidiary companies taken together. This method of accounting was introduced in India with the passing of the Companies Act 1956.
4. Present holding company accounts as in 1 above and a consolidated balance sheet of the whole undertaking combining the assets and liabilities of all the subsidiaries with those of holding company along with a consolidated profit and

[18] Page 385, an extract from Accounting Standards by John Blake, reproduced in Mergers et al: Issues, implications and case laws in corporate restructuring, by S Ramanujam,
[19] Page 202, Chronology: The Development of Company Financial Reporting in Great Britain 1844-1977 by C W Nobles and R H Parker, in the book, The Evolution of Corporate Financial Reporting by Lee and Parker
[20] Page 100, The Acc
[21] From rivalry to mergers.,' Economist December 2, 2005

loss account combining the profits and losses of all the companies. This method of accounting was introduced in India for companies listed on stock exchanges from April 2001.

In England, one of the earliest companies to publish consolidated accounts was Nobel Industries Limited for the year ended December 1920, in their annual general meeting held in 1922 along with their 1921 accounts[22]. The practice in England was to a large extent influenced by the practice in U S, which was leading the way in presentation of consolidated accounts. United States Steel Corporation which stated business on April 1, 1901 reported from its very first year in 1902 consolidated undivided surplus of the company and its subsidiaries[23].

3. Direct amalgamation

The method of accounting for direct amalgamation or mergers has a more interesting history. Distillers Company Limited, the 27th largest company in UK by turnover for 1972-73 contributed its annual reports from 1881 to 1973 in response to an appeal made by Scottish Committee on Accounting History, a committee of the Institute of Chartered Accountants of Scotland.

In analysis of these reports, it was noticed that in 1908, an existing subsidiary was put into voluntary liquidation and its assets and liabilities were absorbed into the holding company[24]. English Electric Co Ltd also followed an identical method of absorbing subsidiary companies, indicating that liquidating acquired companies to amalgamate them was not a unique event.

English Electric Co Ltd was formed in 1918 to acquire controlling interest in five businesses, The Phoenix Dynamo Manufacturing Co Ltd, Dick, Kerr & Co Ltd, the United Electric Car Co Ltd, the Coventry Ordnance Works and Willans and Robinson. The company announced in its 1924 accounts that it would present consolidated accounts from the year 1925 as 'arrangements having been made to liquidate … (or)… to complete the liquidation of' the companies[25].

Looking at the above practices it is quite possible that early acquisitions could have been accounted for using similar methods of liquidating the acquired companies. For example, the Mississippi Company after acquiring the French East India and China Company could have liquidated the acquired company and absorbed their assets and liabilities.

In the case of the first merger in 1602 involving the Dutch companies, it is probable that the two companies were liquidated and the merged entity was created by the royal charter. Support for this view can be drawn from the writing of Edward Chancellor "In 1602, the united East India Company, the first joint stock company to receive an official government charter, was established with a monopoly over Eastern trade"[26] highlighting the fact that it was the first joint stock company to receive an official Dutch government charter.

C.Evolution of 'pooling of interest method' of accounting for business combinations in United States

Today, two alternative methods of accounting for business combinations are available; the purchase method and the pooling method. The contrast between the two methods is best illustrated by the two acquisitions in the Telecom industry with similar financial profiles that took place within a short span of time, i.e. Northern Telecom (Nortel) acquiring Bay Networks and Lucent acquiring Ascend Communications[27].

Nortel acquired Bay Networks on August 31, 1998. The acquisition was valued at $6.9 billion based on shares of Nortel issued at their prevailing market price. For this consideration, Nortel acquired $1,881 million of tangible assets and took over liabilities of $475 million.

Lucent acquired Ascend Communication on June 25, 1999. This acquisition was valued at $20 billion based on shares of Lucent issued at the prevailing market price. Lucent acquired $2.8 billion of tangible assets and took over liabilities of $0.5 billion.

Nortel as a Canadian company had to account for the acquisition using purchase method and Lucent the US Company used the pooling of interest method of accounting. The salient aspects of accounting in the two transactions are tabulated in *Illustration 4*.

Using the pooling of interest method of accounting gave Lucent an accounting advantage of reporting better performance at two levels. First by not accounting for intangible assets, prospective return on investments were exaggerated, second by not accounting for intangible assets, amortization or impairment of these assets were also

[22] Page 101, The Acc
[23] Page 58,
[24] Page 24, Company Financial Statements by T A Lee, in the book The Evolution of Corporate Financial Reporting by Lee and Parker
[25] Page 101,
[26] Page 9, Devil take the hindmost: A history of financial speculation by Edward Chancellor, published by Penguin Group, June 2000 edition
[27] The End of pooling envy by Claude P Lanfrancon and Darroch A Robertson, in Ivey Business Journal, July/August 2000

Illustration 4

$US billion

Description	Nortel	Lucent
Consideration paid valued at market price of shares	6.90	20.00
Liabilities taken over	0.48	0.50#
Gross consideration paid	7.48	20.50
Tangible assets taken over	1.88	2.80#
Consideration paid for intangibles	5.60	17.70
Intangibles accounted for by acquirer	5.60	0.00
Market value of shares issued & not accounted for	-	17.70

 # as of March 31, 1999 and not the date of acquisition, to that extent not comparable

not charged to the profits thereby inflating the profits reported.

What could have led to the emergence of this method of accounting that moves away from the basic concept of historical cost in recording transactions?

While companies as a form of business organization emerged first in Great Britain, regulating accounting practices for the companies developed earlier in United States. Regulation of accounting practices in Great Britain was through legal decisions in general and for specific industries, through legislative enactments. Among the first few regulations in England was mandating 'Double Account system' of accounting for Railways by the Regulation of Railways Act 1868[28]. It was only in 1942 that Institute of Chartered Accountants of England and Wales issued its first two Recommendations on Accounting Principles. It took another twenty eight years before Accounting Standards Steering Committee was formed in England[29].

1. Fair price for general public

In United States, regulation of accounting practices began by prescribing the accounting methods and practices to regulate fair prices. It started first for interstate transport companies, who were regulated by the Interstate Commerce Commission, established in 1887. The next significant regulation was the enactment of the Securities Exchange Act 1934. A year later, SEC appointed a chief accountant, who initiated the drive to narrow the range of diversity in accounting practices[30].

The birth of 'pooling of interest method' of accounting for acquisitions goes back to 1887. The lineage can be traced to Interstate Commerce Commission and Accounting for Earned Surplus. US Federal Power Commission acted as the midwife delivering this concept[31].

Interstate Commerce Commission (ICC) was set up in 1887 to regulate price by fixing fair rates for interstate transport. ICC was given the power to prescribe the system of accounting that the carriers had to maintain. Not only did they prescribe the system of accounts to be maintained, they prohibited any other system of records to be kept. "The Commission may in its discretion prescribe the forms of all accounts, records, and memoranda to be kept by the common carriers, to which accounts the commission shall have access. And the act makes it unlawful for the carriers to keep any accounts, records, or memoranda other than those prescribed by the commission.[32]"

Fair price was maintained by the commission by fixing fares based on 'rate base' on the principle of 'rate parity'. Rate base was the capital employed in the business and 'rate parity' was achieved by fixing a rate of return on the capital employed by the common carrier.

The principle of maintaining a fair price in United States by capping the return on capital employed was well etched in industries where general public were the consumers.

2.Capital preservation to protect creditors

Limited liability is the feature that distinguished the advent of company as a form of business organization, from the earlier forms of business organizations. For Companies to survive and flourish, it was critical that the interest of creditors be protected. The primary form of protection offered to creditors was capital preservation.

In the Exchange Banking Co. case in 1882, Jessel MR, clearly summed up this principle "The creditor has no debtor but that impalpable thing that

[27] The End of pooling envy by Claude P Lanfrancon and Darroch A Robertson, in Ivey Business Journal, July/August 2000
[28] The origin and emergence of double account system: an example of accounting innovation, by J R Edwards, in Abacus, Volume 21, Number 1, 1985
[29] Page 197, Chronology: The development of Company Financial Reporting in Great Britain 1844-1977, in the book Evolution of Corporate Financial Reporting, by Lee and Parker
[30] Page 209, Chronology: Developments in the Establishment of Accounting Principles in the United States, 1926-1978, in the book Evolution of Corporate Financial Reporting, by Lee and Parker
[31] Inferenc
[32] Extract from the US Supreme Court judgment in Interstate Commerce Commission vs. Goodrich Transit Company, 224 US 194, (1912)

corporation, which has no property except the assets of the business. The creditor, therefore, I may say, gives credit to that capital, gives credit to that company on the faith of the representation that the capital shall be applied only for the purposes of the business and he has therefore a right to say that the corporation shall keep its capital and not return it to the shareholders…[33]"

The need for creditor protection had resulted in classifying the surplus in business into Paid-In surplus, i.e. paid in by the shareholders and Earned-Surplus, a result of the decision to retain profits in the company and not declare it as dividends. In subsequent years, dividend could not be declared out of Paid-In surplus, while Earned-Surplus was available for dividend declaration.

This clarity between Paid-In Surplus and Earned-Surplus began to blur on merger between two existing companies. When two existing companies A and B came together and both had Paid-In Surplus and Earned-Surplus, the question arose on how to consider the two surpluses on merger.

Two schools of thought emerged, as is the case in matters involving judgment, when the same issue is viewed from opposing angles. Those who viewed the merger as only a change in form favored carrying forward earned surplus and wanted to retain the Earned-Surplus after merger. Others viewed the resultant entity as a new company and held that a new company could not start with Earned-Surplus.

Both these views had sound logic and two forms of business combinations began to be recognized; one that resulted in a 'new economic enterprise' and the other that was 'continuation of the old business.'[34] Four criteria were identified to distinguish the two forms:

1. The relative size of the predecessors –if significant, earned surplus of the surviving company should be carried forward
2. The degree of affiliations –if wholly owned subsidiaries were being combined or subsidiary combined with holding company, earned surplus could not exceed the combined earned surpluses
3. The extent to which there was change in ownership
4. The nature and extent of prior business relationships between the two companies

In mergers involving, holding company with their wholly owned subsidiary or merger of two or more wholly owned subsidiaries, earned surpluses were being carried forward on the basis that it was continuation of old business, and the change was in form only and not in substance. This gave rise to the accounting practice of recording the assets and liabilities of the merging company at the cost at which they were being recorded in the company prior to merger. This practice can be seen as the seed that germinated into the 'pooling of interest method' of accounting for amalgamations.

3.The birth of pooling of interest method

In 1935, Federal Power Commission was given powers to "regulate electricity utilities wholesale rates and transactions" by the Federal Power Act, 1935[35]. They followed the method of regulation based on the precedent set by Interstate Commerce Commission of rate parity and rate base.

Holding companies controlled large segments of the utility, railroad, and entertainment business in United States[36]. With introduction of rate regulation, the holding companies saw a way of enhancing their rate base by merging wholly owned subsidiary companies with the holding company or merging two subsidiary companies at values higher than their book values by exchange of shares.

Federal Power Commission saw through design, that resulted in asset write up increasing the capital employed and termed the merger of closely affiliated companies as 'pooling of interest method' and held that valuation on the basis of securities exchanged was improper and no new value should be attached to the assets since no change in substance had occurred[37].

The first accounting standard on business combinations Accounting Research Bulletin 40 issued in 1950 differentiated between two accounting methods and described them as 'pooling of interest' and 'purchase'. The conditions prescribed for a transaction to qualify for pooling method was similar to the conditions prescribed for carrying forward Earned-surplus. It also stated that using pooling method required that the retained earnings of the acquired corporation be carried forward to the acquiring firm.

Thus 'pooling of interest method' of accounting for business combinations was born. While the conditions to be met to qualify for 'pooling of interest

[33] Page 867, Guide to the Companies Act, A Ramaiya fourteenth edition, 1998
[34] Speech of SEC Chief Accountant William W Werntz reported in The history of pooling-of-interests method in the jurisdictions of G4+1 member organizations
[35] Regulation: the fight which saved the nation by Richard Freeman and Marsha Freeman published in American Almanac, February 2001
[36] Page 183, The Great Crash 1929, by John Kenneth Galbraith
[37] Page 22, Accounti

method' varied over the period, the concept in itself flourished for the rest of the century.

D. Tracing how 'pooling of interest method' of accounting for business combination reached India

Indian accounting practices in the last three hundred years and the Indian Company law from birth have shadowed developments in United Kingdom. In fact, early company law in India is legislation for British India[38]. The Indian Statute could be mapped section by section to the British Companies Act. The Companies Act, 1956, was enacted by Independent India, but placed considerable reliance on the UK Act of 1948[39]. Therefore pre-independence history of accounting in Corporate India would be a shadow of the accounting practices in United Kingdom.

Looking at the post independence period, it is only since 1972-73, that mergers and acquisitions concluded during the year have been reported[40]. The year 1972-73 is also seen as a logical point for reporting, as the three key triggers to monitor and regulate business control in the hands of few were activated. The managing agency system was abolished from April 3, 1970[41], the enforcement of Monopolies and Restrictive Trade Practices Act of 1969 from July 1, 1970 and the nationalization of banks in 1969.

In my view prior to this the need for mergers and amalgamations was not felt as managing agency system provided an adequate mechanism for managing multiple companies under common control.

The only exception to the reporting of mergers and acquisitions prior to 1972-73 is of bank mergers under the direction of Reserve Bank of India in 1960's. This initiative saw the number of commercial banks reduced from 566 in 1951, to 292 at the end of 1961, to 100 at the end of 1966 and 85 by the end of 1969. Correspondingly during the same period non-scheduled banks also declined from 474 to 210 to 27 to 14[42].

The first merger and acquisition transaction that I have been able to trace in the post independent India is in the birth of Hindustan Lever Limited. In November 1956, Hindustan Vanaspati Manufacturing Company private Limited, the first subsidiary of Unilever Company set up in 1931, merged with Lever Brother India Limited established in 1933 and United Traders Limited established in 1935 to become the Hindustan Lever Limited[43].

Incidentally, the history of Hindustan Lever is rich in mergers and acquisitions. Starting with its birth in a merger, the company has sought mergers as a way of growth too. In 1993, HLL merged with TOMCO. This was followed by a series of merges within the group companies. In July 1993, Broke Bond India Limited merged with Lipton India Limited to form Broke Bond Lipton India Limited. Three years later on January 1, 1996, Broke Bond Lipton India was merged into HLL. In 1998 Pond's (India) Limited was merged into HLL. In January 2000, HLL acquired 74% stake from Government of India in Modern Foods Limited, a public sector unit.

Earlier Broke Bond India Limited in 1992 had acquired Kothari General Foods and in 1993 acquired Kissan from UB Group and Dollops Ice cream from Cadbury India.

But our interest is in the birth of Hindustan Lever in November 1956 and more specifically in how this merger was accounted for.

In October 1994, the Institute of Chartered Accountants of India announced the Accounting Standard 14: Accounting for Amalgamations, prescribing it as a mandatory standard and stated that the standard should be followed in respect of accounting periods commencing after April 1, 1995[44].

The standard prescribes two methods of accounting for amalgamations, namely the pooling of interest method and the purchase method. The use of pooling of interest method is restricted to amalgamations that meet the five criteria specified in the standard:

i. All assets and liabilities of the transferror company are part of amalgamation

ii. Shareholders holding not less than 90% of the face value of equity shares become equity share holders of the amalgamated company

iii. The consideration of amalgamation is equity shares of the transferee company

iv. The business of the transferrer company is carried on by the transferee company

[38] Para 1 of the Indian Companies Act, 1882,
[39] Page 8, Guide to Companies Act, A Ramaiya, fourteenth edition, 1998
[40] Page 11, An analy
[41] Page 2370, Guide to the companies Act, A Ramaiya, fourteenth edition, 1998
[42] Bank M&A: Stability and Synergy, by A Vasudevan, Business Line November 11, 2004
[43] Website www.hll.com; in the section heritage, subsection milestones
[44] Page 384, Mergers et al: Issues, implications and Case laws in Corporate Restructuring, by S Ramanujam

v. No adjustment is intended to be made to the book value of the assets and liabilities of the transferrer company when they are incorporated in the books of the transferee company

Amalgamation of Tata Oil Mills Company Limited (TOMCO) with Hindustan Lever in 1995 and in the same year amalgamation of Wipro Infotech Limited and Wipro Systems Limited with Wipro Limited are two prominent instances of accounting for amalgamation using 'pooling of interest' method.

Prior to April 1, 1995, accounting for amalgamation was based on the Guidance note on Accounting Treatment of Reserves in Amalgamations issued by the Institute of Chartered Accountants in 1983[45].

It was also in 1983, that International Accounting Standards Committee issued its first accounting standard on business combinations. This standard was a result of the Steering Committee appointed in 1978[46]. This committee prepared a discussion outline, in which they evaluated three potential methods of accounting:

i. The purchase method, in which acquirer recognizes the difference between the cost incurred and the fair value of net assets acquired,

ii. The pooling method, in which the acquirer does not recognize the difference between the cost incurred and the fair value of net assets acquired,

iii. The new entity method, in this method, both the acquirer and the acquired restate their assets and liabilities to fair value on the date of acquisition.

The third identified concept, of new entity method of accounting was discarded as it went against the historical cost convention. Purchase method was recommended in situations where a buyer and seller could be distinguished.

Pooling method was identified for those rare transactions of amalgamations, where a buyer and seller could not be distinguished. The objective of pooling method was described as being to consolidate the pooled companies with minimal changes to their individual financial statements, on the basis that the separate businesses continue as before, though now owned and operated as a single unit.

The second draft issued in 1980, identified three categories; Uniting of interest, Uniting of equal interest and Acquisition. Shares exchanged to combine enterprises of similar market worth were recognized as uniting of interest. Uniting of equal interests was when none of the combining entities individually had controlling interest in the new entity. Acquisition was recognized as a business combination that was not uniting of interest.

In my view this classification seems logical considering the three methods of accounting for acquisition identified. Acquisition would require purchase accounting, uniting of interest would require pooling of interest method and uniting of equal interest would require new-entity method.

However, when the accounting standard IAS 22: Accounting for Business Combination was issued, it had only two methods; purchase and pooling. Pooling method was to be used only in rare circumstances of uniting of interest, in all other cases purchase method was to be accounted. Not defining uniting of interest precisely was the loop hole that gave a lease of life to Pooling. Since uniting of interest was not defined precisely, it permitted amalgamations which were basically acquisitions with purchase consideration in the form of shares to be considered for pooling.

Prior to these discussions and deliberations, what was the thinking on accounting for merger and acquisition? How was the merger of three companies that gave birth to Hindustan Lever Limited accounted for? The options:

1. Did it follow the traditional English practice of liquidating the companies being merged, or

2. Was the new-entity method followed with assets and liabilities accounted for at their fair values, since along with the merger 10% of shares were being offered to the Indian public by Unilever Limited, London, or

3. Was purchase method used, with one company buying out the other two companies by issue of shares or

4. Was pooling of interest method adopted, of accounting for the assets and liabilities of the merging companies at the value at which they were carried in the merging company

From the scrutiny of the Annual report of Hindustan Lever Limited, 1956,

[45] Page 2560, Guide to the Companies Act, A Ramaiya, fourteenth edition 1998
[46] Page 31, The History of the Pooling of interests methods in the Jurisdictions of G4 +1 member organizations

which was titled Report and Accounts, 1956, we can gather the following information from the directors' report:

i. Was converted into a public company on October 27, 1956

ii. Changed its name from Lever Brothers (India) Limited to Hindustan Lever Limited on November 1, 1956

iii. By Bombay High Court order on October 8th, 1956, but with effect from the close of business on December 31, 1955, the three companies were amalgamated under section 391 and 394 of the Companies Act, 1956. The three fully owned subsidiaries of Unilever London, Limited that were merged are:

1) The Hindustan Vanaspati Manufacturing Company Private Limited

2) William Gossage & Sons (India) Limited

3) Joseph Crosfield & Sons (India) Limited

iv. Two wholly owned subsidiaries of Lever Brothers (India) Limited were voluntarily liquidated

1) The North West Soap Company Private Limited

2) The Premier Soap Company of India Private Limited

v. The company took over the soaps and toilet preparation business of its wholly owned subsidiary company United Traders Private Limited and United Traders ceased to carry on any business for the time being.

vi. 2 million equity shares of Rs.10 each was allotted to Unilever in consideration of the vesting of assets of the merged company

vii. 1.57 million Equity shares of Rs.10 each was allotted as bonus shares by capitalizing Rs.15.7 million profits.

viii. Unilever Limited sold by an Offer of Sale to public in India 557,000 shares of Rs.10 each

ix. The figures reported for the previous year in Balance Sheet and Profit and Loss account are of Lever Brothers (India) Limited and are not of the combined merged entity

The following inferences can be drawn based on information listed above and other information available in the Annual reports:

1. The amalgamation under section 391 and 394 of the Companies Act, 1956 resulting from the court order was effective close of business hours, December 31, 1955, a full three months before the Companies Act, 1956 came into force. The Companies Act, 1956, was notified vide Notification No.SRO 612, dated March 8th 1956 in the Gazette of India, Extraordinary, 1956, to come into force effective April 1, 1956[47].

2. Three distinct types of transactions can be observed, as tabulated in Illustration 5:

3. Taking over the business of United Traders, the fully owned subsidiary did not require any accounting, as no consideration was paid for it. United Traders appears to be the selling agent of Lever Brothers (India), since the profit and loss account of United traders reflected only finished goods inventory and trading profits are transferred to the holding company in 1955 accounts.

4. The liquidation of the two subsidiaries of Lever Brothers (India), The North West Soap Company Private Limited and The Premier Soap Company of India Private Limited seem to be accounted as a pure sale of assets with the profit on sale of Rs.300 thousands being reported separately.

5. On a scrutiny of the balance sheet and comparison with figures of the previous years which are for the standalone company prior to the merger, the consideration of Rs.20 million appears to be for the net assets taken over on merger, as reflected by increase in assets of Rs.25 million detailed below all of which are not accounted for by the increase in operations of the combined entity *(Illustration 6)*.

6. The balance sheet of Lever Brothers (India) for 1955 had Trade Marks & Goodwill of Rs.0.3 million. With the merger of three companies, there is an addition to Trade Marks & Goodwill of Rs.0.323 million in the year 1956. This could be the existing value of Trademark and Goodwill in the books of the three companies.

7. The above mentioned factors indicate that this merger could have been accounted for as a pooling of interest method of accounting for amalgamations. In hindsight this looks a fair decision as the companies being merged were all fully owned subsidiaries of Unilever Limited, London. The merger was only a change in form and there was no new business that was being created.

Therefore it is possible if not probable, that the first merger approved by the courts under the Companies Act, 1956 was accounted under the pooling of interest method of accounting.

E.Demise of 'pooling of interest method' of accounting for business combination

Almost with the birth of this concept, discomfort with using 'pooling of interest method' of accounting for business combinations began. American Accounting Association published "A statement of Basic Accounting Theory" in 1966. In this document, it called for discontinuance of pooling, reasoning "it is more than

[47] Page 1, Guide to the Companies Act, 1956, A Ramaiya, fourteenth edition, 1998

Illustration 5

Sl. No.	Transaction type	Consideration
1	Three wholly owned subsidiaries of Unilever merged with Lever Brother (India) Limited	2 million equity shares of Rs.10 each; the three companies merging into Lever Brothers (India) Limited were valued on par with Lever Brothers (India). The paid up equity capital increased from Rs.20 million, pre-merger level to Rs.40 million post-merger
2	Liquidation of two wholly owned subsidiaries of Lever Brothers (India) Limited	A profit on liquidation of subsidiary companies of Rs.0.307 million is reflected in the profit and loss account. Cost of investment in these two companies was reflected in 1955 balance sheet at Rs.3.199 million.
3	Lever Brothers (India) Limited taking over the business of its wholly owned subsidiary United Traders Private Limited, which ceased to carry on any business, for the time being (emphasis in italics by the author of this report)	No consideration was paid.

Illustration 6

	December 31		Rs.Million	
Balance Sheet classification	**1955**	**1956**	**Increase**	**% of 1955**
Net Fixed Assets	27.918	35.193	7.275	26%
Loans and Advances	2.497	6.521	4.024	161%
Current Assets	26.82	58.133	31.313	117%
Cash and Bank balances	5.811	9.718	3.907	67%
Unsecured loans	0.000	1.388	-1.3877	N.A
Current liabilities and Provision	12.849	32.77	-19.921	-155%
Total	**50.197**	**75.407**	**25.210**	

questionable that such a treatment which essentially ignores the new exchange values created by a significant market transaction such as combination of two companies can be said to be relevant for investment decision."[48]

Objection to 'pooling of interest method' of accounting for business combinations arose due to the following consequences:

i. Creditors' interest adversely affected as it can lead to reduction of capital: On sale of assets acquired on merger, subsequent to merging separate balance sheets at book value, accounting profits can be shown although no profit would have been reported if the fair value of transaction had been used for accounting.

ii. Prospective Shareholders' adversely affected as there would be overstatement of profits: As the assets after merger are accounted at the historical cost to the acquired company, depreciation and amortization is under provided resulting in overstatement of profits.

iii. Regulators and investing public interest affected as the performance between similar companies rendered incomparable due to differing yardsticks used for recording capital employed.

Today pooling of interest method of accounting for amalgamations is withdrawn under both the dominant schools of accounting, the US GAAP and the International Accounting Standards.

In fact, FASB when they concluded that only the purchase method, should be used to account for all transactions that meet the definition of business combination, listed the advantages as enhanced relevance, reliability and comparability[49], well illustrated in the Nortel and Lucent acquisitions.

Similarly, International Financial Accounting Standard 3 on Business Combinations explained the reason for issuing this standard as "….analyst and other users of financial statement indicated that permitting two methods of accounting for substantially similar transactions impaired the comparability of financial statements."[50]

In India, Indian accounting standards 14: Accounting for Amalgamations is what prevails. In para 42 dealing with treatment of reserves specified

[48] Page 12, The history of the pooling of interest method in the Jurisdictions of G4+1 Member organizations
[49] Page 1, of Earnest & Young's, guidance note for Clients and Friends on FASB 141 and 142 dt, February 2004

in a scheme of amalgamation states "where the scheme of amalgamation sanctioned under a statute prescribes the treatment to be given to the reserves of the transferrer company after amalgamation, the same should be followed." The only additional requirement is specified by the general clarification 4/2002 issued by the Accounting Standards Board of the Institute of Chartered Accountants of India. This requires that the treatment given to reserves be described and highlight the deviation from the treatment required under Accounting Standards 14.

Conclusion

Evolution of the 'pooling of interest method' of accounting for amalgamations clearly demonstrated, that when accounting practices and accounting standards depart from basic accounting concepts, like in this case historical cost convention, they have a limited shelf life. Life span in these cases is directly proportional to who is benefited by this practice and how much are they benefited. The power of the beneficiaries and the extent of benefit derived by them is demonstrated in the how vociferous and vigorous their involvement is in its defense.

This aspect was reflected in accounting for stock options too, where costs were not recognized on the principle that it could not be precisely quantified. However changes of these magnitudes were made consequent to crashes following the stock market booms. These stock market booms were fueled to a significant extent by these accounting policies.

In fact it is appropriately remarked that in bull markets people talk of business and valuation models and in bear markets people talk of accounting policies and accounting principles.

DHĀRANA

INTERNATIONAL JOURNAL OF BUSINESS FROM BHARATIYA VIDYA BHAVAN'S M. P. BIRLA INSTITUTE OF MANAGEMENT, BENGALURU

Vol.9, #1 (2015) pp 56-71 ISSN 0974-0082

Security Returns Spectrum- An Analysis of Seasonality and Sensitivity of Indian Stock Markets

R. Deepak*

Abstract

Calendar anomalies have been found to be prevalent in major markets throughout the world. The thesis extends the existing literature on calendar anomalies by considering indices (broad and sectoral) over a longer time frame. The specific comparisons between multiple indices helped retest the conclusions on several calendar anomalies examined previously in other countries but not analyzed in Indian Stock markets to reach conclusion with few confounding factors. The results were modelled using econometric models to handle the issues of normality in the univariate time series analysis. The results obtained show 360 degree causal relationship, interlinking one calendar anomaly results with other anomalies more so in the recent times. The results obtained also show calendar anomalies converging with patterns observed across major global economies.

Keywords & Phrases: Seasonality, Anomalies, Econometric models and Indices.

1.0 Introduction

A phenomenon can be global in nature, only if, it has the capability to cut across borders, by truly adapting itself to the regional diverse factors and most importantly, capable of giving identical results. The markets become truly integrated, when the advancements in satellite technology made it possible for everyone, anywhere, in the world to receive uninterrupted information consistently and competitively. Information Technology and Institutional advancements facilitated dissemination of information quickly across economies and thus helped to understand and recognize the true intrinsic values of asset prices and to find various opportunities which were truly global in nature. Inspite of these advancements a phenomenon which has consistently baffled researchers across various disciplines, by being mysterical in nature, irrespective of abundant literature available has been the "patterns in stock returns".

The current stock market prices are often considered to be the indicators of investors' current and future expectations. The patterns in stock returns reflect these expectations of the investors which might be based on rational and seemingly irrational behavior.

Considering this, the stock markets would then be considered as the indicators of future economic trends.

* *The author was awarded the Ph.D. degree by Manipal University in August, 2014. Mukesh K. Chaudhry and N.S. Viswanath were Guide & Co-guide respectively .*

The presence of patterns in stock returns through empirical analysis is found to be complex to explain, and do not agree with the current asset pricing theories. These price change predictions or patterns, known as anomalies, can be an indication for investors to adopt unique trading strategies to make abnormal profits, or an indication of errors in current asset-pricing theories. The study tries to examine the former possibility, which violates the idea of market efficiency. The EMH is considered to be the central paradigm in finance. According to EMH, past prices of shares should have no predictive power in judging the future prices. The EMH relates to how quickly and accurately the market reacts to new information. New information refers to new data which constantly enters the market such as government's reforms, economic reports, company announcements, political statements, or public surveys. If markets are informationally efficient, then security prices would incorporate the new information rapidly and accurately. In particular, stock returns would follow a random walk, which is unpredictable and without pattern. The market inefficiencies have been generally, documented in three categories. The first category is based on the belief that employing specific trading strategies based on past information which are freely available to all investors can be utilized in making extraordinary profits. But, excess returns should vanish when investors as a whole massively make decisions on such information. The second category believes in earning abnormal returns by selecting stocks based on firm based information which is also freely available to all investors. The third category of market inefficiency has been documented to make extraordinary profits by analyzing the unexpected return patterns due to news announcements such as calendar based news, which is the research theme of the study. Studies on empirical regularities in security returns have rejected the hypothesis of markets being efficient and models especially, the asset pricing models to be not adequate. These results have paved way for research on explaining the market anomalies. The studies spanning nearly a century provided very interesting but, versatile explanation to the occurrence of seasonal anomalies which were unique to respective markets across the globe. The initial investigations however, provided evidence of seasonal anomalies in the U.S. capital markets and other developed markets but the pattern and types of anomalies varied from one study to another. With further investigations, the presence of calendar anomalies was understood to be omnipresent occurring in stock markets throughout the world. Thus the empirical investigations on the behavior of the stock market patterns across the world have raised several interesting questions about market efficiency of several developed and developing economies. The search for an explanation of stock market anomalies, however, has largely been unsuccessful. None of the attempts to modify the Capital Asset Pricing Model (CAPM) to account for taxation, transaction costs, skewness of preference and asymmetric information adequately explain the anomalies. Thus, our understanding of the economic or statistical causes of the apparent excess returns generated by anomalies is incomplete.

2.0 Review of Literature

The following calendar effects are taken into account for the study namely: The month-of-the-year effect, the day-of-the-week effect, the turn-of-the-month effect, the half-month effect, half-year effect and the Holiday effect were considered for study. The most important literature and possible explanations for the above mentioned calendar effects are summarized below;

2.1 Month-of-the-Year Effect

According to EMH, the mean stock returns spread over the different months of the year should be equal. The presence of seasonal patterns in the monthly returns is called the month-of-the-year effect. It is observed from the literature that numerous studies have been done on month-of-the-year effect. Wachtel (1942), Rozeff and Kinney (1976), Lakonishok and Smidt (1988), Rozeff and Kinney, Roll (1983), Keim (1983) and Reinganum (1983), Schwert (2003), Gultekin and Gultekin (1983), Agarwal and Tandon (1994) found the presence of January effect in U.S. and other developed economies. Though there exists abundant literature examining the presence of January effect, the explanation provided in the literature to the cause of January effect are not yet proven satisfactory across different countries. Some of the possible explanations to the presence of January effect are mainly the sample selection bias, tax-loss selling hypothesis, tax-loss selling hypothesis from the

point of view of retail and institutional investors and portfolio revaluation by managers.

2.2 Day-of-the-week Effect

Day-of-the-week effect is the most discussed calendar anomaly in literature on calendar anomalies. Day-of-the-week effect states that the daily mean stock returns in context of an efficient market should be equally distributed over different days of the week. Any violation reflects irregularity and gives chances for investors to make profits by exploiting this difference. The well known anomaly is the weekend effect, which states that mean Monday returns are consistently negative while mean Friday returns are positive in nature. The Day-of-the-week effect was documented first by Fields (1930) in stock return pattern of Dow Jones Industrial Average (DJIA). It was observed that the stock returns were continuously positive from Friday to Saturday except for Monday returns. The patterns lead to higher closing prices on Fridays (Saturday, if trading day). Later various studies by researchers mainly French (1980), Fama (1965) Clark's (1973), Jaffe and Westerfield (1985), Agarwal and Tandon (1994), Lakonishok and Smidt (1988), Schwert (2003), Gu (2004), Gibbons and Hess (1981) added further evidence to the presence of the anomaly. Closed market effect, Settlement effect, market capitalization, announcements effect were some reasons considered for explanation of Monday effect.

2.3 Half-Month Effect

Half-month effect states that high returns primarily occur during the first half of the month, while the second half of the month mean returns are almost zero or negative. One of the earliest papers to document half-month effect was by Ariel (1987). He found that the last trading day of the past month and first nine days of the new month were having higher returns than the average returns of the month. Similarly later, Lakonishok and Smidt (1988), Jaffe and Westerfield (1989), Penman (1987) and Peterson (1990) Mills and Coutts (1995) examined the indices in major countries and found conclusive evidence of half-month effect. Though studies have been done in other countries, no conclusive evidence has been found. Very few explanations were noted to be the reasons for this anomaly such as dividend payments and contamination of the data considered, announcements on first half of the month. Buying decisions of investors around the end of the month. Throughout the literature, it has been found that inclusion of the last trading day of the month, which yields significantly higher returns than the average daily returns might by due to methodology used by Ariel in his study and there is little evidence in favor of this anomaly and little evidence to support it.

2.4 Turn-of-the-month Effect

Turn-of-the-month effect states that high positive returns are concentrated during the last and first trading days of each month. In evidence of the half-month effect, it was found that high positive returns seem to occur around the turn of the month especially significant high returns seem to occur on the last trading day of the month and first three trading days of the new month. Lakonishok and Smidt (1988) examined the anomaly and found turn-of-the-month to be independent of other anomalies and to persist in several sub-periods over the examined data frame. They observed that excluding January effect or turn of the year effect still resulted in significant turn-of-the-month anomaly. After the results obtained by Lakonishok and Smidt (1988), similar studies were conducted in other countries to the presence of the turn-of-the-month anomaly by Agarwal and Tandon (1994), Kunkel, Compton and Beyer (2003), Kallunki and Martikanen (2001), Jakobs and Levy (1988), Odgen (1987) etc. None of the explanation given are considered satisfactory for explaining the anomaly across developed and developing economies.

2.5 Holiday Effect

Holiday effect states that day preceding a holiday yields much higher stock returns compared to the average daily returns. The initial documentation of the holiday effect was done by Fields (1934). He argued that since depressed Monday returns is caused by market closing, the day after a holiday where markets are closed should also yield negative returns. But the results showed not seasonal patterns after the holidays. Similar studies by Lakonishok and Smidt (1988), Ariel (1990), Kim and Park (1994), Agarwal and Tandon (1994), Brockman and Michayluk (1998), Vergin and McGinnis (1999), Chong, Hudson, Keasey and Littler (2005), Pettengill (1989)

found returns around holidays to be not a random occurrence but for which there is no conclusive or satisfactory explanation.

3.0 Problem Statement, Objectives and Hypotheses

3.1 Problem Statement

The literature review provides evidence that the research on calendar anomalies has received less attention and thus this lack of research in India on calendar anomalies across broader and sectoral markets makes study of calendar anomalies important and imminent. The literature has further revealed that there are a lot of calendar anomalies which have not been examined for their presence across broader and sectoral markets in the Indian Stock markets for a longer time frame. The Literature review clearly emphasizes that in examining the seasonality or calendar anomalies in emerging markets such as India, methodology should be more robust and should be able to capture the issues of normality, autocorrelation, heteroscedasticity etc. Since the seasonal effects are straightforwardly detectable in market indices or large portfolio of shares rather than in individual shares (Boudreaux, 1995) broader and sectoral indices should be considered for the study in investigating presence of seasonal anomalies which represent the broader and diverse sectors of Indian Economy. The specific comparisons between multiple indices would help study with fewer confounding factors and to reach a broader conclusion which is ignored in many earlier investigations. Further, it would be pertinent to retest the conclusions drawn by the earlier studies inview of the changes in the widereconomic scenario in India, widened choice of benchmark portfolios and methods of measurement and techniques. Thus considering the stock markets as the indicators of future economic trends, and price change predictions or patterns as indications for investors to adopt trading strategies to make abnormal profits, or indications of errors in asset pricing theories, the study tries to examine the former possibility of presence of calendar anomalies in the context of the Indian stock markets, which violates the idea of market efficiency. In case these anomalies exist and are apparent, differentiating from most other research, we would examine if investors would benefit from the results and use these results in investment decision-making.

In light of this backdrop, the following objectives and sub-objectives are arrived at for the current research investigation:

3.2 Objectives of the Study

3.2.1 To investigate the presence of calendar anomalies in Indian stock markets.

The sub-objectives are:

a. To investigate whether month-of-the-year effect is present in Indian stock markets.

b. To analyse the presence of turn-of-the-month effect in Indian stock markets.

c. To assess whether semi-month effect is present in Indian stock markets.

d. To look for whether half-year effect is present in Indian stock markets.

e. To identify whether holiday effect is present in Indian stock markets and

f. To search whether the weekend-effect is present in Indian stock markets.

3.2.2 To make appropriate suggestions to individual investors and institutional investors on various trading strategies in investment decision-making and to suggest possible policy changes required based on whether calendar anomalies exist in Indian stock markets.

3.3 Hypotheses of the Study

The study intends to test the following Null Hypotheses:

H_{01}: All months of the year have the same rate of return.

H_{02}: Mean returns during turn-of-the-month and rest of the month are same.

H_{03}: Mean returns between first half of the month and second half of the month are same.

H_{04}: Mean returns between first half of the year and second half of the year are same.

H_{05}: Mean returns during holidays and rest of the days are the same.

H_{06}: Mean returns on all the days of a week are equal.

4.0 Data Collection and Research Methodology

4.1 Sample Selection For The Study

In order to search for the presence of calendar anomalies, nineteen indices comprising of both broader and sectoral indices listed on the both BSE and NSE exchanges were considered for the study. Which are as follows:

S&P BSE SENSEX, S&P BSE CAPITAL GOODS (BSE-CG), S&P BSE CONSUMER DURABLES (BSE-CD), S&P BSE FMCG (BSE FMCG), S&P BSE HEALTHCARE (BSE HC), S&P BSE AUTO, S&P BSE METAL, S&P BSE Oil & Gas (BSE O&G), S&P BSE-PSU, BSE-TECH INDEX, BSE Mid-Cap, BSE Small-Cap INDEX, CNX NIFTY, CNX NIFTY JUNIOR, CNX MIDCAP, CNX IT, BANK NIFTY and CNX INFRA.

Literature review on seasonal anomalies conducted in India concentrate mainly on BSE Sensex and NSE CNX Nifty index respectively. Though these two indices are barometer of the performance of Indian economy, both the indices give more weightage to specific sectors as shown in Table 1 and Table 2. BSE Sensex gives more weightage to financial services sector, Fast Moving Consumer goods (FMCG) sector, Oil and Gas sector, Information technology and media & publishing sectors. Thus companies with large free float market capitalization can bias the movement of the BSE Sensex index prices. In order to concentrate on Mid-cap and Small-cap stocks which were given less importance in BSE Sensex, Mid-cap and Small-cap indices were formed. As observed from Table-2, financial services, Capital goods, Healthcare, Housing related companies are given more weightage based on free float in Mid-cap and Small-cap indices. If seasonal anomalies exist in Indian stock markets then the study has to be justified by generalizing the phenomenon across sectors first and then to the broader economy, which is the research gap. It was thus felt that the true presence of seasonal anomalies could be understood by considering sectoral indices study separately. To understand seasonal anomalies, it is necessary to understand if these sectors exhibited seasonal anomalies separately which inturn would have confounding effects on the broader indices.

Table 1: Sector-wise distribution of indices listed on BSE considered for the study

SECTORS/INDICES	BSE SENSEX	BSE MIDCAP	BSE SMALL CAP	BSE FMCG	BSE HC	BSE OIL AND GAS	BSE IT	BSE CD	BSE TECK	BSE PSU	BSE AUTO	BSE METAL	BSE CG
Finance	26.93	21.68	10.28	0	0	0	0	0	0	26.54	0	0	0
FMCG	14.61	7.79	5.05	100	0	0	0	0	0	0	0	0	0
Oil & Gas	13.72	2.38	1.67	0	0	100	0	0	0	31.04	0	0	0
Information Technology	13.11	5.7	4.97	0	0	0	100	0	74.07	0	0	0	0
Media & Publishing	13.11	2.55	2.9	0	0	0	0	0	7.56	0	0	0	0
Transport Equipments	9.95	7.67	4.28	0	0	0	0	0	0	0	100	0	0
Transport Services	9.95	2.39	0.9	0	0	0	0	0	0	1.09	0	0	0
Capital Goods	6.14	7.57	12.64	0	0	0	0	0	0	4.02	0	0	100
Chemical & Petrochemical	6.14	5.37	5.03	0	0	0	0	0	0	0	0	0	0
Consumer Durables	6.14	2.71	3.21	0	0	0	0	100	0	0	0	0	0
Diversified	6.14	1.74	1.92	0	0	0	0	0	0	0	0	0	0
Healthcare	5.17	10.18	5.73	0	100	0	0	0	0	0	0	0	0
Housing Related	5.17	7.81	10.61	0	0	0	0	0	0	0	0	0	0
Metal,Metal Products & Mining	4.96	2.01	6.39	0	0	0	0	0	0	19.83	0	100	0
Miscellaneous	4.96	2.49	8.5	0	0	0	0	0	0	2.04	0	0	0
Power	2.84	1.81	1.9	0	0	0	0	0	0	15.05	0	0	0
Telecom	2.58	0.68	1.68	0	0	0	0	0	18.37	0.1	0	0	0
Textile	2.58	1.47	4.54	0	0	0	0	0	0	0	0	0	0
Tourism	2.58	1.46	1.55	0	0	0	0	0	0	0	0	0	0
Agriculture	0	4.46	5	0	0	0	0	0	0	0.3	0	0	0
Other	13.72	0.06	1.25	0	0	0	0	0	0	0	0	0	0

Source: Author

Table 2: Sector-wise distribution of indices listed on NSE considered for the study

SECTORS/INDICES OF NSE	NSE NIFTY	NSE NIFTY JUNIOR	NSE MIDCAP	NSE IT	BANK NIFTY	NSE INFRASTRUCTURE
FINANCIAL SERVICES	28.53	30.12	17.28	0	100	0
ENERGY	15.71	4.83	9.78	0	0	32
IT	14.45	4.46	8.67	100	0	0
CONSUMER GOODS	13.14	19.51	7.24	0	0	0
AUTOMOBILE	7.84	5.31	5.39	0	0	0
PHARMA	5.16	7.5	6.09	0	0	0
CONSTRUCTION	4.95	0.75	6.38	0	0	36.23
METALS	3.92	3.3	9.29	0	0	0
CEMENT & CEMENT PRODUCTS	3.34	0	1.22	0	0	0
TELECOM	1.91	4.01	2.42	0	0	20.08
INDUSTRIAL MANUFACTURING	1.04	4.1	5.81	0	0	9.14
HEALTHCARE SERVICES	0	2.01	0	0	0	0
FERTILISERS & PESTICIDES	0	1.2	2.52	0	0	0
MEDIA & ENTERTAINMENT	0	3.57	4.05	0	0	0
SERVICES	0	7.56	8.51	0	0	2.55
CHEMICALS	0	1.77	5.35	0	0	0

Source: Author

4.2 Sources of Data and Period of Study

For the present study mainly secondary data was considered. The data used in the study are the daily closing values of the nineteen market indices listed on Bombay/Mumbai Stock Exchange (BSE) and National Stock Exchange (NSE). The data for nineteen indices were collected from PROWESS, a corporate database maintained by Center for Monitoring Indian Economy Private Limited (CMIE) and was checked for quality from respective stock exchanges website databases i.e., BSE India website (www.bseindia.com) and NSE India website (www.nseindia.com). Daily, weekly, monthly and yearly share price data of nineteen indices were considered for the study. The period of study for each of the indices has been shown in Table-3 below. The other information pertaining to the study was obtained from various websites, journals and books mentioned below in the references.

In order to study Holiday effect, Hindu Lunar Holidays during which the Indian stock markets especially BSE and NSE stock exchanges remain closed for trading were considered from the year 1990 to 2011 as shown in Table 4 below.

Sl.no	Index	Base Period	Base Index value	Date of Launch	Data for study
1	S&P BSE SENSEX	1978-79	100	Jan 1,1986	Feb1,1991 to july 31,2011
2	S&P BSE CAPITAL GOODS	Feb 1,1999	1000	August 9, 1999	Aug 9, 1999 to july 31,2011
3	S&P BSE CONSUMER DURABLES	Feb 1,1999	1000	August 9, 1999	Aug 9, 1999 to july 31,2011
4	S&P BSE FMCG	Feb 1,1999	1000	August 9, 1999	Aug 9, 1999 to july 31,2011
5	S&P BSE HEALTHCARE	Feb 1,1999	1000	August 9, 1999	Aug 9, 1999 to july 31,2011
6	S&P BSE IT	Feb 1,1999	1000	August 9, 1999	Aug 9, 1999 to july 31,2011
7	S&P BSE PSU	Feb 1,1999	1000	June 04,2001	June 04,2001 to july 31,2011
8	S&P BSE TECK	Apr 2,2001	1000	July 11,2001	July 11,2001 to july 31, 2011
9	S&P BSE AUTO	Feb 1,1999	1000	August 23, 2004	Aug 23, 2004 to july 31,2011
10	S&P BSE METAL	Feb 1,1999	1000	August 23, 2004	Aug 23, 2004 to july 31,2011
11	S&P BSE OIL AND GAS	Feb 1,1999	1000	August 23, 2004	Aug 23, 2004 to july 31,2011
12	S&P BSE MID CAP	2002-03	1000	Apr 11,2005	Apr 11,2005 to july 31,2011
13	S&P BSE SMALL CAP	2002-03	1000	Apr 11,2005	Apr 11,2005 to july 31,2011
14	CNX NIFTY	Nov 3, 1995	1000	Apr 3,1993	Nov 3,1995 to july 31, 2011
15	CNX NIFTY JUNIOR	Nov 3,1996	1000	Jan 1, 1997	Jan 1, 1997 to July 31, 2011
16	CNX MIDCAP	Jan 1, 2004	1000	Jan 1, 2005	Jan 1, 2005 to July 31, 2011
17	CNX IT	Jan 1,1996	1000	Jan 1, 1997	Jan 1, 1997 to July 31, 2011
18	BANK NIFTY	Jan 1, 2000	1000	Jan 1, 2000	Jan 1, 2000 to July 31, 2011
19	CNX INFRA	Jan 1, 2004	1000	August 23, 2004	August 23, 2004 to July 31, 2011

Table 3: Data on broader and sectoral indices considered for the study
Source: www.bseindia.com and www.nseindia.com

YEAR	MAHA SHIVARATRI	RAMA NAVAMI	RAMZAN ID	GANESH CHATURTHI	DUSSERA MAHANAVAMI	DIWALI-LAXMI PUJA	DIWALI- BALI PRATIPADA	BAKRID	GURU NANAK JAYANTHI	MOHURRAM
1990	23 March 1990	03 April 1990	27 April 1990	24 August 1990	28 September 1990	18 October 1990	19 October 1990	04 July 1990	07 November 1990	02 August 1990
1991	13 February 1991	24 March 1991	17 April 1991	11 September 1991	16 October 1991	05 November 1991	06 November 1991	23 June 1991	21 November 1991	23 July 1991
1992	02 March 1992	11 April 1992	04 April 1992	31 August 1992	06 October 1992	25 October 1992	26 October 1992	11 June 1992	14 November 1992	11 July 1992
1993	19 February 1993	01 April 1993	25 March 1993	19 September 1993	24 October 1993	13 November 1993	14 November 1993	01 June 1993	04 November 1993	30 June 1993
1994	10 March 1994	20 April 1994	14 March 1994	09 September 1994	13 October 1994	03 November 1994	04 November 1994	21 May 1994	23 November 1994	19 June 1994
1995	27 February 1995	09 April 1995	03 March 1995	29 August 1995	02 October 1995	23 October 1995	24 October 1995	11 May 1995	07 November 1995	09 June 1995
1996	17 February 1996	28 March 1996	21 February 1996	16 September 1996	21 October 1996	10 November 1996	11 November 1996	29 April 1996	25 November 1996	28 May 1996
1997	07 March 1997	16 April 1997	09 February 1997	06 September 1997	10 October 1997	30 October 1997	31 October 1997	18 April 1997	14 November 1997	18 May 1997
1998	25 February 1998	05 April 1998	30 January 1998	26 August 1998	30 September 1998	19 October 1998	19 October 1998	08 April 1998	04 November 1998	07 May 1998
1999	14 February 1999	25 March 1999	20 January 1999	13 September 1999	19 October 1999	07 November 1999	08 November 1999	29 March 1999	23 November 1999	27 April 1999
2000	04 March 2000	12 April 2000	28 December 2000	01 September 2000	06 October 2000	26 October 2000	27 October 2000	17 March 2000	11 November 2000	16 April 2000
2001	21 February 2001	02 April 2001	17 December 2001	22 August 2001	25 October 2001	14 November 2001	16 November 2001	06 March 2001	30 November 2001	05 April 2001
2002	12 March 2002	21 April 2002	07 December 2002	10 September 2002	14 October 2002	04 November 2002	05 November 2002	23 February 2002	19 November 2002	25 March 2002
2003	01 March 2003	11 April 2003	26 November 2003	31 August 2003	04 October 2003	25 October 2003	25 October 2003	12 February 2003	08 November 2003	14 March 2003
2004	18 February 2004	30 March 2004	15 November 2004	18 September 2004	21 October 2004	12 November 2004	13 November 2004	02 February 2004	26 November 2004	02 March 2004
2005	08 March 2005	17 April 2005	04 November 2005	07 September 2005	12 October 2005	01 November 2005	02 November 2005	21 January 2005	15 November 2005	20 February 2005
2006	26 February 2006	06 April 2006	25 October 2006	27 August 2006	01 October 2006	21 October 2006	22 October 2006	11 January 2006	05 November 2006	09 February 2006
2007	16 February 2007	27 March 2007	14 October 2007	15 September 2007	20 October 2007	09 November 2007	10 November 2007	21 December 2007	24 November 2007	30 January 2007
2008	06 March 2008	13 April 2008	02 October 2008	03 September 2008	08 October 2008	28 October 2008	29 October 2008	09 December 2008	13 November 2008	19 January 2008
2009	23 February 2009	03 April 2009	21 September 2009	23 August 2009	27 September 2009	17 October 2009	18 October 2009	28 November 2009	02 November 2009	01 January 2008
2010	12 February 2010	24 March 2010	10 September 2010	11 September 2010	16 October 2010	05 November 2010	06 November 2010	17 November 2010	21 November 2010	17 December 2010
2011	02 March 2011	12 April 2011	31 August 2011	01 September 2011	06 October 2011	26 October 2011	27 October 2011	07 November 2011	10 November 2011	06 December 2011
2012	20 February 2012	01 April 2012	20 August 2012	19 September 2012	24 October 2012	13 November 2012	14 November 2012	26 October 2012	28 November 2012	24 November 2012

Table 4: Important National Holidays for Indian exchanges from the period 1990 to 2012
Source: www.bseindia.com and www.nseindia.com

4.3 Data Methodology

The following steps were followed in the present study for the analysis of behavior of the returns of sample indices considered for the study:

i) **STATIONARITY TESTS:** The data of all the nineteen indices were considered for the study. Daily, monthly and yearly closing prices of the nineteen indices as shown in Table 4 above were considered for the study. Before proceeding with further tests, closing prices were tested for stationarity. It was observed that the data considered over specified periods for all the indices were non-stationary in nature. The Augmented Dickey-Fuller test (ADF) on the closing price values was applied to test if the series considered was stationary or not-stationary. Thus, the actual tests were not performed on the daily prices themselves but on the first differences of their natural logarithms as shown below:

$$R_t = \log_e p_t - \log_e p_{t-1}$$

Where R_t represents the return on an index, p_t is the price of the index at the end of the day't', and p_{t-1} is the price of the index at the end of day't-1'.

For the return series R_t, the ADF test consists of a regression of the first difference of the series against the series lagged k times as follows:

$$\Delta r_t = \alpha + \delta r_{t-1} + \sum_{i=1}^{p} \beta_i \Delta r_{t-i} + \varepsilon_t$$

Where, $\Delta r_t = r_t - r_{t-1}; r_t = \ln(R_t)$

The null hypothesis is H_0: δ=0 to be tested against H_1: δ<1. The acceptance of null hypothesis implies nonstationarity. Thus all the indices were transformed to stationary time series by differencing or by detrending depending upon whether the time series were difference stationary or trend stationary. Since the time series data of all the indices considered were log-differenced and thus stationary in nature, the order of integration (differencing) is one.

ii) **Descriptive Statistics:** Under Descriptive statistics for returns of all indices the following measures like average returns (Mean), Standard Deviation, Median, Minimum and Maximum values, Number of observations, Percentage of positive months, Skewness and Kurtosis, and finally the Jarque-Bera test statistics and its probability were included.[1]

iii) **Comparison of Mean Returns:** Comparison of mean returns for each month/weekday was performed statistically using the difference in mean Test (Ajayi, Mehdian, & Perry 2004; Wong, Hui & Chan 1992). The test statistically compares the mean return of month/weekday/semi-month/turn-of-month to mean return of a consecutive month/ weekday/semi-month/rest of months respectively. The hypothesis states that there is no difference between the mean returns of consecutive month/ weekday/semi-month/turn-of-month etc.

The hypothesis is stated as follows;

$$H_O : \alpha_i - \alpha_j = 0 \quad against \quad H_1 : \alpha_i - \alpha_j \neq 0$$

Where, for the weekly data, *i*=1(Monday),….., 5(Friday) representing the weekday and *j*=1(Tuesday),….,5(Monday) representing the weekday that is consecutive to *i*. The hypothesis is tested with a difference of means test; where α_i represents the mean return for each weekday (*i*=1(Monday),…5(Friday)), where α_j represents the mean return for each weekday (*i*=1(Tuesday),… 5(Monday)), σ_i is the standard deviation of return for each weekday *i*and N is the sample size. DM_j is the t-statistic to test the hypothesis.

$$DM_j = \frac{\alpha_i - \alpha_j}{\sigma_i / \sqrt{N}}$$

For the monthly data, *i*=1(January),….., 12(December) representing the months and *j*=1(February),….,5(January) representing the months that is consecutive to *i*. The hypothesis is tested with a difference of means test; where α_i represents the mean return for each month (*i*=1(January),…5(December)), where α_j represents the mean return for each month (*i*=1(February),… 5(January)), σ_i is the standard deviation of return for each month *i*and N is the sample size. DM_j is the t-statistic to test the hypothesis. Similarly difference in means tests were conducted considering other seasonal anomalies.

[1] *Reference: Levin and Rubin, "Statistics for Management", seventh edition*

iv) Non-Parametric Tests: Apart from different parametric methods, non-parametric methods were also employed to test seasonality because of their robustness arising from lack of restrictive assumptions such as population normality and homoscedastic variance. Both ***Kruskal-Wallis (H) test[2] and Mann-Whitney U test[3]*** were applied to the return series since these are the most scientific and logical non-parametric tests employed across literature for calendar anomalies.

The Kruskal-Wallis Test is employed for testing the equality of mean returns. It requires the entire set of observations to be ranked and then arranged into n_j matrix where n_j represents the rank of the returns and columns represent the month-of-the-year/day-of-the-week/semi-months etc. Statistically, the value of 'H' is calculated as follows: (Levin and Rubin).

$$H = \frac{12}{n(n+1)} \sum \frac{R_J^2}{n_j} - 3(n+1)$$

Where R_j is the sum of ranks of all items in j^{th} column

n_j is the number of cases in the j^{th} column &

N is the sum of observations in all the columns.

Mann-Whitney U Test was also used to test the difference between the mean return of the day exhibiting highest return during the study period and remaining days for the day-of-the-week or for month-of-the-year as a group.

Statistically, the value of 'U' is calculated as follows:

$$U = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1$$

Where n_1 = number of items in study period

n_2 = number of items in remaining days/months group

R_1 = sum of the ranks of the items in study period

R_2 = sum of the ranks of the items in remaining days/months group

[2]is a non-parametric alternative to the one way analysis of variance F-test

[3]Wilcoxon ranked sum test which is essentially identical (though uses different test statistic) to Mann-Whitney U test is also considered in the study. Wilcoxon ranked sum test is also a non-parametric test used alternatively to two-sample t-test. The test is much less sensitive to outliers than the two sample t-test.

v) Ordinary Least Square (OLS) Regression Model with Dummy Variables: In order to identify the seasonal patterns in the indices, ordinary least square (OLS) regression with dummy variables was considered for the study (Chan, Anya and Thomas, 1996), which is as follows:

$$R_t = \sum_{i=0}^{h} \alpha_i D_{it} + \varepsilon_t$$

Where R_t = the return on the portfolio at time t;

α_i = the return component attributable to the i^{th} characteristic;

$D_{i,t}$ = the dummy variable taking on the value 1 where the i^{th} observation has the characteristic *i* and 0 otherwise; and

ε_t = an error term

In regression analysis the dependent variable is frequently influenced not only by ratio scale variables (e.g. income, output, prices, and costs) but also by variables that are essentially qualitative or nominal scale in nature such as color and religion. Dummy variables usually indicate the presence or absence of a "quality" or an attribute by constructing artificial variables that take on values of one or zero. One indicates the presence of that attribute and zero indicates the absence of that attribute. Variables that assume such values are called as dummy variables. Such variables are thus essentially a device to classify data into mutually exclusive categories such as presence or absence of an attribute. In our study, the dummy variables incorporated were exclusively considered as dummy or qualitative in nature. These regression models are also called Analysis of variance (ANOVA) models (Damodar N. Gujurati, 2005). Using the OLS regression model with dummy variables, the model for testing seasonal anomalies such as Month-of the-year effect, Day-of-the-week effect were formalized.

For testing monthly seasonality, the model used is as follows;

$$R_t = \alpha_1 + \alpha_2 D_{Feb} + \alpha_3 D_{Mar} + \alpha_4 D_{Apr} + \alpha_5 D_{May} + \alpha_6 D_{June} + \alpha_7 D_{July} + \alpha_8 D_{Aug} + \alpha_9 D_{Sept} + \alpha_{10} D_{oc} + \alpha_{11} D_{Nov} + \alpha_{12} D_{Dec} + \varepsilon.$$

The dummy variable takes a value of unity for a given month and a value of zero for all other months. For all *t,* no separate intercept term was run. In cases where the set of dummy variables was not collinear

with an intercept term, a separate intercept term was employed. The intercept terms were specified with dummy variables for all the months except for January month. Thus the omitted month is the benchmark month. The coefficient of each dummy variable measures the incremental effect of that month relative to the benchmark month of January. Thus the existence of monthly seasonal effect will be confirmed if the coefficient of atleast one dummy variable is statistically significant (Pandey, 2002). The intercept term α_1 indicates mean return for the month of January and coefficients α_2 to α_{12} represents the average differences in returns between January and each other month. These coefficients should be equal to zero if the returns for each month is the same and if there is no seasonal effect. ε_t is the white noise error term.

For testing day of the week effect, the model used is as follows;

$$R_t = \alpha_1 + \alpha_2 D_{Tue} + \alpha_3 D_{Wed} + \alpha_4 D_{Thur} + \alpha_5 D_{Fri} + \varepsilon$$

The intercept terms were specified with dummy variables for all the days except for Monday. Thus the omitted day is Monday. The coefficient of each dummy variable measures the incremental effect of that day relative to the benchmark day which is Monday. Thus the existence of day of the week effect will be confirmed if the coefficient of atleast one dummy variable is statistically significant. The intercept term α_1 indicates mean return for Monday and coefficients α_2 to α_5 represents the average differences in returns between Monday and each other days. These coefficients should be equal to zero if the returns for each day is the same and if there is no seasonal effect. ε_t is the white noise error term.

vi) Holiday Effect: Ten Holidays were considered for the study from the Stock exchanges calendar for the period 1990 to 2011. Cads by (1992) and Ariel (1990) tested holiday effects confining to pre-holiday and post-holiday periods. For testing the holiday effect, dummy variable was set to one for the three days prior to and three days following the holiday, creating, for a one-day holiday where the market is closed, a window of one week with no observation for the actual day of the holiday. In the event that holiday fell on a Sunday without compensating market closure on the Monday or Friday, the dummy variable window would be the preceding Thursday and Friday and following Monday, Tuesday and Wednesday.[4]

vii) Econometric Approach:

The literature review provides evidence that while examining seasonality in the emerging economies such as India, most studies adopted the methodology similar to the study of the developed stock markets (Keim, 1983; Kato and Schallheim, 1985; Jaffe and Westerfield, 1989). These studies have failed to handle the issues of normality, autocorrelation, heteroscedasticity etc. Thus in order to understand seasonal anomalies, we intend to follow a more robust econometric approach. A combined regression time series model with dummy variables specified with an autoregressive integrated moving average (ARIMA) and generalized autoregressive conditional Heteroscedasticity (GARCH) model is found to be robust to handle the issues of normality, autocorrelation and heteroscedasticity respectively.

In our study, we attempt to test the presence of seasonal anomalies mainly month-of-the-year effect and day-of-the-week effect in both return and volatility equations. From the literature, we know that majority of the studies document seasonal anomalies in only mean returns without considering issues of normality, serial autocorrelation and heteroscedasticity[5]. Thus to overcome all these problems we followed the methods as mentioned below where we will address both autocorrelation and time-varying variance issues and correct for them.

---

[4]Lakonishok J. and Smidt S. (1988) found that in examining the day of the week, the last trading day before a holiday and the first trading day after a holiday were excluded to avoid confounding day-of-the-week and holiday effects. We have followed this method in our analysis.

[5]According to literature, using of only OLS methodology in regressing market returns on dummy variables representing various calendar events has two major drawbacks. First, returns in the emerging markets tend to be serially correlated due to market efficiency and the existence of asymmetric information (Bekaert and Harvey,1997), and if autocorrelation is not corrected, this leads to model misspecifications and incorrect inferences (LeBaron, 1992). Secondly, the variance of the error term that OLS assumes to be constant might be in reality time varying or Heteroscedastic.

As mentioned before, in all the studies surveyed in the literature, investigated calendar anomalies using the Standard Ordinary Least Square (OLS) methodology in regressing market returns on dummy variables representing various calendar events which are mainly month-of-the-year effect and day-of-the-week effect in our case. The equation is as follows:

$$R_t = \sum_{i=0}^{h} \alpha_i D_{it} + \varepsilon_t \quad \text{.....(1)}$$

Where R_t = the return on the portfolio at time t;

α_i = the return component attributable to the i^{th} characteristic;

$D_{i,t}$ = the dummy variable taking on the value 1 where the i^{th} observation has the characteristic i and 0 otherwise; and

ε_t = an error term

To eliminate the possibility of having autocorrelated errors, we include the lag values of the return variable to the above equation-1. Thus equation becomes.

$$R_t = \sum_{i=0}^{h} \alpha_i D_{it} + \sum_{i=1}^{p} R_{t-1} + \varepsilon_t \quad \text{.....(2)}$$

Where, R_t represents returns, D_{it} are dummy variables which get the value of 1 if $i = t$ and zero otherwise with i ϵ (Monday, Tuesday, Wednesday, Thursday, Friday for weekdays and April to March for months). The number of dummies included will have to be the number of trading days minus one (including constant) or number of trading days (excluding constant).[6]

The equation 2 above, assumes the existence of a constant variance, which may result in inefficient estimates, if there is a time varying variance. Therefore, we include the changing variance into estimation. Here we assume that the error term of the return equation has a normal distribution with zero mean and time varying conditional variance of $h_t(\varepsilon_t = N(O,h_t))$. Though from the literature, we find various types of modeling of conditional variances, Engle (1982)[7] suggests a model that allows the forecast variance of return equation to vary systematically over time. Here the assumption is that conditional variance, h_t, depends upon the past squared residuals from the return(R_t) equation, $h_t = V_C + \sum_{j=1}^{q} V_j \varepsilon_{t-j}^2$, which is known as Autoregressive Conditional Heteroscedastic (ARCH) Models. Bollerslev (1986)[8] then extended the ARCH process by making h_t a function of lagged values of h_t as well as the lag values of ε_t^2. i.e.,

$h_t = V_C + \sum_{j=1}^{q} V_{Aj} h_{t-j} + \sum_{j=1}^{r} V_{Bj} \varepsilon_{t-j}^2$. This type of modeling is known as GARCH models. Here this specification requires that $\sum_{j=1}^{q} V_{Aj} + \sum_{j=1}^{r} V_{Bj} < 1$ in order to satisfy the non-explosiveness of the conditional variances and that each of V_A, V_B, and V_C is positive in order to satisfy the non-negativity of conditional variances. Thus the time varying variance model by using a GARCH process would be $h_t = V_C + \sum_{j=1}^{q} V_{Aj} h_{t-j} + \sum_{j=1}^{r} V_{Bj} \varepsilon_{t-j}^2$ where, the volatility is measured by conditional variance.

Thus, we employ Bollerslev's (1986) GARCH (p,q) model as our platform and add to it calendar dummy variables to investigate calendar anomalies on the variance similar to Berument and Kiymaz (2001) and Apollinario *et.al.* (2006). The GARCH (p,q) model assumes that the conditional time-varying variance is both a function of past innovations (ARCH component with order *p*) and past volatility (GARCH component with order *q*). Hence the model would be as follows

$$h_t = V_C + \sum_{j=1}^{q} V_{Aj} h_{t-j} + \sum_{j=1}^{r} V_{Bj} \varepsilon_{t-j}^2 + \delta_{st} D_{st} \quad \text{.....(3)}$$

where, s ϵ(Monday to Friday for weekdays and April to March for months) and D_{st} are defined above.

---

[6]The reason for this is to avoid the dummy variable trap which gives rise to perfect collinearity among the dummy variables and the constant term (Damodhar N. Gujarati, 2007).

[7]Engle, R. 1982. "Autoregressive Conditional Heteroscedasticity with Estimates of the variance of United Kingdom Inflation." Econometrica, volume 50, pp: 987-1007.

[8]Bollerslev, T. 1986. "Generalized Autoregressive Conditional Heteroscedasticity." Journal of Econometrics, volume 31, pp: 307-327.

The model is estimated using the Quasi-Maximum Likelihood Estimation (QMLE) method introduced by Bollerslev and Wooldridge (1992)[9]. This estimator, however, is inefficient, with degree of inefficiency increasing as departure from normality increases (Engle and Gonzalez-Rivera, 1991). Hence it is imperative to test explicitly the validity of the normality assumption using two tests at the end. The first is Jarque-Bera statistics and the second is the ARCH-LM test[10]. In addition, we test explicitly for the possibility of existence of a risk premium (variance) in the return (mean) equation known as the GARCH-in-Mean model (GARCH-M) test[11].

viii) Model Specification Tests: In order to investigate the validity of time-series models, specifications tests are very crucial. For our study, a 'bottom-up' strategy[12] will be used when performing specification tests.

In other words, bottom-up strategy would involve the following steps;

a. ***Specifying the order of mean equation*** (equation-1), followed by

b. ***Attempting to specify the Auto-Regressive order of the mean equation*** (equation-2). Here autocorrelations in the return series will be examined employing both Auto-Correlation Function (ACF) and the Partial Auto-Correlation Function (PACF). Furthermore, the standard Box-Pierce procedure is also followed. Lastly, Akaike Information Criteria (AIC) and Schwarz Information Criteria (SIC) values were considered to specify the ARMA order of the mean equation.

In detail, for the study, the residual correlogram, which is a graph that plots series of correlations between residuals against a time interval is used. Using Correlogram and Bartlett bands which represent 95% confidence bounds we will identify statistically significant auto- and partial-correlation lags in order to narrow the search for the optimal ARMA specification. For clarity and easy interpretation of the series under study as white noise, Box-Pierce Q-statistic and Ljung-Box Q-statistic and their p-values were considered. As we know, Box-pierce Q-statistic and Ljung-Box Q-statistic and their p-values are usually considered under the null hypothesis of white noise for the number of terms in the sum that underlies the Q-statistic.

Box-Pierce Q-statistic is approximately distributed as a χ^2_m random variable under the null hypothesis that y is white noise i.e.

$$Q_{BP} = T\sum_{\tau=1}^{m}\hat{\rho}^2(\tau)$$

A slight modification of Box-Pierce Q-statistic which is designed more closely to follow the χ^2 distribution in small samples is Ljung-Box Q-statistic, which is also distributed approximately as χ^2_m random variable, under the null hypothesis that variable considered is a white noise. The Ljung-Box Q-statistic is represented as follows:

$$Q_{LB} = T(T+2)\sum_{\tau=1}^{m}\left(\frac{1}{T-\tau}\right)\hat{\rho}^2(\tau)$$

Ljung-Box Q-statistic is same as the Box-pierce Q-statistic except that sum of squared autocorrelations is replaced by a weighted sum of squared autocorrelations, where the weights are (T+2)/ (T-τ).

After executing various ARMA specifications, the model with the lowest Akaike Information Criteria (AIC) and Schwarz Information Criteria (SIC) values were considered. The AIC and SIC are goodness of fit measures- the lower the value, the better the model is at accounting for the variation in the data. Adding additional lags to the model

---

[9]The advantage of this method is that even in case where the residuals are not conditionally normally distributed, the ARCH parameter estimates and the covariance matrix are still consistent given that the conditional mean and the conditional variance are correctly specified.

[10]The GARCH-LM test is a Lagrange Multiplier test to examine whether the standardized residuals exhibit additional ARCH effects.

[11]Engle et.al, 1987.

[12]Following Tooma and Sourial (2004) and recommendations of Wooldridge(1991), Hagerud (1997) , Kamaly A. and Tooma A.E. (2009)

will only reduce the value of the criteria only if the fall in the residual sum of squares outweighs the penalty for the loss of degrees of freedom from adding additional parameters.

The Akaike Information Criteria (AIC) is effectively an estimate of the out-of-sample forecast error variance, but it penalizes degrees of freedom more harshly. It is used to select among various ARMA models.

$$AIC = e^{\left(\frac{2k}{T}\right)} \frac{\sum_{t=1}^{T} e_t^2}{T}$$

where, k is the degrees of freedom used in model fitting.

The Schwarz Information Criteria (SIC) is an alternative to the AIC but penalizes degrees of freedom more harshly than AIC.

$$AIC = T^{\left(\frac{k}{T}\right)} \frac{\sum_{t=1}^{T} e_t^2}{T}$$

Thus optimal Auto-Regressive order of the mean equation would be found out by considering AIC and SIC values but, in case of disagreement between AIC and SIC values, SIC values would be given preference as it penalizes degrees of freedom more harshly than AIC[13].

c. ***Testing for the conditional variance equation and testing the validity of normality assumption.***

   As discussed above, two tests will be conducted. The first is Jarque-Bera statistics and the second is the ARCH-LM test.

d. Lastly, ***we test explicitly for the possibility of existence of a risk premium (variance)*** in the return (mean) equation known as the GARCH-in-Mean model (GARCH-M) test.

[13]*Cosimano and Jansen (1988) argue that the presence of the autocorrelation in the residual terms may misleadingly indicate the presence of the ARCH effect. Hence, to the OLS regression analysis, sufficient numbers of lags are included in order to avoid the auto-correlated errors.*

4.4 Limitations of the Study

The following are some of the limitations of the present study which are as follows;

a) The present study is restricted to only Indian stock markets;

b) It considers indices belonging to two major stock exchanges namely BSE and NSE stock exchange respectively;

c) It is based mainly on secondary data; and

d) The present study considers only nineteen indices listed on both BSE and NSE stock exchanges due to lack of data availability. The index for which the data availability was less than three years was ignored from the study.

5.0 Findings of the Study

The research mainly aimed at understanding;

i. Whether the selected indices confirm the existence of a certain anomaly?

The studies found presence of all major calendar anomalies in the Indian stock markets.

With respect to Day-of-the-week effect, high positive returns were observed on Wednesday and Monday for broader indices and sectoral indices respectively. The largest mean returns was observed on Monday especially for sectoral indices (when compared to higher returns of Friday and lowest returns on Monday as observed in developed countries) which point towards lagging effect of Indian sectors taking cues from the global markets. The results confirm towards "wait and watch principle" followed by investors. These high returns towards the beginning of the week followed by lowest returns on Tuesday is in contrast to the evidence obtained from other markets.

Considering Month-of-the-Year effect, from the analysis we can notice that, the mean monthly returns are significantly different from zero mainly in the Months of January, February, and December. The higher Positive December mean returns followed by negative returns in the months of January and February could be caused by a change in investor's behavior, anticipating January effect and March effect in Indian stock markets and

other stock markets since the fiscal year in India starts in April and ends in March, whereas it is January to December in other developed countries. Furthermore, a closer look at the sub-period values reveals that, December month is statistically significant in recent period i.e., 2002-2011. The significant February effect observed in Indian markets in the first sub-periods seems to have changed. Thus from the analysis, we can conclude that though tax loss hypothesis helps explain monthly effect in Indian stock markets for a brief period, but all the indices indicate a disappearing March/April effect over the whole sample period. Even after considering the time-varying volatility, the results reconfirm the OLS regression results. December is found to be very significant in all the broader indices except for BSE Sensex index wherein January is observed to be significant. Whereas in case of sectoral indices, December was observed to be significant for all the indices except for BSE FMCG, BSE Teck, BSE O & Gand CNX INFRA Indices respectively. Thus the results obtained indicated higher integration of Indian markets than ever in the recent period.

In the order of the occurrence of Holidays on weekdays, Wednesday and Friday are observed to be the days highly likely to have holidays than rest of the other days. If we sub-divide the calendar year based on occurrence of holidays, important holidays such as Ganesh Chaturthi, Dussehra, Diwali and Bakrid occur mainly during the later part of the calendar year i.e. between September and December. Especially, these holidays seem to occur mainly in the second half of the month. Similarly, other holidays namely Mohurram, Maha Shivaratri and Rama Navami usually occur during January and April months. Considering these holidays, the percentage of occurrence of holidays on Tuesday is found to be highest (27%) followed by Wednesday (20%). The holidays namely Maha Shivaratri, Rama Navami, Ramzan are observed to occur towards the first half of the calendar month during the entire study period. Thus, there is very likely chance that holiday effect is the reason for semi-month effect and Wednesday effect as the behavior of Wednesday return behavior is found to be dissimilar to security returns around holidays (Ariel, 1990).

Lastly, considering the Turn-of-the-month effect, when compared to sectoral indices, broader indices seem to reveal anomaly among daily returns towards the turn-of-the-month. The sectoral indices have minor or no indication for turn-of-the-month effect, while broader indices especially mid-cap and small-cap indices seem to show significant turn-of-the-month effect. Thus, turn-of-the-month effect seems to be mostly present in the broader indices.

ii. If anomalies exist, whether these anomalies are stable and consistent over time and across indices considered i.e., are they true anomalies?

Considering the results of the econometric analysis, we observe disappearing pattern of major anomalies. These anomalies observed showed consistency with the existing literature on Indian sector.

6.0 Observations, Suggestions & Conclusions

6.1 Observations And Suggestions

The following are some of the important revelations' of the study;

a. Integration of the markets is observed to be happening at a rapid pace and trading strategies adopted have to consistently revised and retested as returns are observed to be not stable and consistent over the entire study period and sub-periods. Thus investors should be aware of the changing environment in the financial markets throughout the world.

b. Day-of-the-week effect was observed to be present in the Indian capital markets.

c. It is found true that the, investments are observed to be high on Mondays causing Monday effect in the pre-rolling settlement period, and after the introduction of rolling settlement, Monday effect is insignificant. In the recent times after 2002, Wednesdays have highest returns and Tuesday has the lowest returns in majority of the indices.

d. The higher proportion of announcements after the close of trading on Friday than on any other day of the week (Patell and Wolfson, 1982) and the pattern of trade by FIIs in India matching with

the occurrence of pattern of day anomalies might give us clues on occurrence of day-of-the-week effect in India stock market. Thus, lower Tuesdays returns followed by higher Wednesday returns in Indian stock markets point towards markets taking more time to absorb the news announcements and decisions by companies, policy makers and institutional investors throughout the world.

e. FIIs play a very significant role in ensuring momentum of the Indian capital markets and thus a constant vigilance by regulators with respect to the investment patterns/trading strategies adopted by FIIs and its relevance with calendar anomalies can help regulators in ensuring disappearance of day anomalies in Indian stock market.

f. The analysis finds semi-month effect and turn-of-the-month effect to be present in Indian stock markets.

g. Holiday effect is observed in the Indian stock market. The mean returns around holidays namely Ganesh Chaturthi, Dussehra, Bakrid and Mohurram are significantly lower when compared to other days.

h. Month-of-the-year effect is observed in the Indian stock markets. The results show patterns changing in the recent periods. Tax-loss hypothesis though helps in explaining February effect in the first sub-period (1991-2001), the theory is insignificant as we observe patterns changing in the recent time periods. We infer month-of-the-year effect aligning with the effects seen globally. December effect is observed in the recent period and a trading strategy of buying in the month of January and February and selling in the month of April and August (for short term gain) or November and December months (for long term gain) would be profitable to the investors in case of majority of the indices.

i. The results obtained from the study can be used in forming various trading strategies by the retail, Institutional and non-Institutional investors to make abnormal profits. The study also finds higher risk during these periods and hence is advisable to form trading strategies knowing the risks associated with it.

j. We observed that, calendar anomalies exist in both broad and sectoral indices respectively. The study also found non-linearity between risk and returns, which is contrary to the capital market theory in terms of higher returns considering lower risks for the portfolio's. Thus, the market regulators can take appropriate steps to stabilize the market by taking some corrective steps and adopting various regulatory measures.

k. The study found changes in the pattern of the anomalies over various sub-periods in case of all the five anomalies considered for the study. This encourages us to believe that the appropriate regulatory measures taken by the regulators over the years have been successful to control these anomalous behaviors in the capital markets, which inturn has helped protect the interest of the investors.

l. The global integration of the domestic markets, more so in the recent years reinforces regulators to recommend and impose still tougher rules and regulations to ensure transparency in reporting information by the companies and also in reporting transactions done by the foreign and domestic investors in the future such as mutual funds.

6.2 Conclusions

The study examined the Indian stock market, to determine whether the empirical anomalies of seasonality detected in the U.S. market and other international market is also present in India. In the study, we observe that the Indian stock market presents different patterns in stock returns and the study brings forth distinct conclusions to prove the validity of several popular beliefs regarding calendar anomalies across various sub-periods. It is observed that the strategies to make profits may lose ground very quickly with global economies changed outlook to liberalization, political stability, increased foreign trade and commerce, and rise of multinational companies. The study finds that the markets may be fast converging to a point where opportunities will become faint, especially after 2002. With Advanced trading systems put in place and markets seamlessly integrated by operating

24 hours in different time zones across the world, markets seem to become efficient with India being more in sync with the global markets now than ever. The study provides conclusive results to the presence of calendar anomalies, but, at the same time, points finger towards the extent of influence the stock markets throughout the world has had on Indian counterpart which appears slow in the initial periods but very fast in the recent times mainly after 2002.

Considering the results obtained for all the calendar anomalies, one can find the results indicating towards a 360 degree causal relationship. There seems to appear a causal impression of one calendar anomaly on the other i.e., there appears to be interlinking of one calendar anomaly results on the other anomaly more so in the recent times. The studies done before concentrated on explaining the anomalies completely independently which might have been the rationale for not arriving at any conclusive evidence on explaining the cause of these anomalies.

Thus it can be concluded that, the results observed indicates the presence of significant calendar anomalies which also seem to be associated with releases of information, and the indices act as proxy for differentials in the speed with which companies release information to the market, and anomalies are displayed due to inadequate adjustment of prices to available information. Calendar anomalies exist in Indian stock markets, but, the calendar anomalies seem to get converged with the patterns observed across major global economies which might be the result of integration of the markets. Holiday effect can be considered as a key calendar anomaly in explanation of other calendar anomalies mainly day-of-the-week effect, Month-of-the-year effect and semi-month effect. With Indian capital markets striving to achieve global standards, calendar anomalies would be just a reflection of markets to the global clues and information and would thus provide no opportunities to the investors to make abnormal profits. The convergence of the patterns also points towards higher integration and less insulation of the Indian markets today than in the earlier time periods. The Indian stock markets seem to be more sensitive to the movements and clues provided by the global stock exchanges. Hence, though the markets are considered inefficient, they are slowly moving towards integration and thus efficiency. Indian market can be considered as the best example of this phenomenon.

BOOK REVIEW
Reviewer: N.S. Viswanath

S. BISALIAH, S. MAHENDRA DEV, SYED SAITULLAH & DHRITISREE SARKAR: ASSET AND LIABILITY PORTFOLIO OF FARMERS – MICRO EVIDENCES FROM INDIA: ACADEMIC FOUNDATION, NEW DELHI-110 012 FIRST EDITION, 2014, pp.1-212.

The book under review is as on asset and liability portfolio of Indian farmers. The theme has been analyzed on the basis of panel data sets obtained from two major institutions– Central Statistical Organization (CSO) and National Sample Survey Organization (NSSO). The data sets related to the time points between 1991-92 and 2005-06. The authors have made numbers to reveal facts. The investors' portfolio structure of Indian cultivator house holds have been analyzed in terms of farm business, non-farm business, household and financial assets.

The determinants of non-farm business assets and the liability structure have been analyzed using financial analytical tools. The data analysis has been attempted by cultivator household type by asset accumulation and by liability patterns. The concept of financial inclusion, leading to cultivator type differentials, credit worthiness and expenditure patterns, have been lucidly explained to draw evidence based results. The results partly explained the nature of asset accumulation in respect of small cultivator households and on liability of big cultivator households. The major determinants of household have critical difference in terms of the type of assets and pattern of expenditure. The education, age, household size, net worth and farm size have been established to have positive impact on non-farm business assets. The farm business asset is yet to acquire minimum influence on the nature of income delivered from household assets or non-farm business assets. Financial income is considered a major policy instrument along with cultivator household characteristics. The best of urban facility and the best of rural serenity are yet to come! The income distribution and spread of expenditure are yet to make a mark. Some major policy instruments are suggested based on inferences. Assets accumulation should be concentrated on house- hold assets to be acquired and on non business financial assets. The policy is to drive towards augmenting income from non-business assets. With respect to expenditure the debt portfolio has to be restructured by creating enlarged credit base. This requires updated knowledge of markets to allocate for capital expenditure and to make info available at all times for the cultivator households to take right decisions. The book is an incredible document for financial institutions and policy makers at the Federal Bank and at the level of different states as Agriculture is a State subject in the constitution. There should be convergence in terms of policies, strategy and actions to enable them to reach all agricultural households. The design, layout and printing of the book are immaculate and deserve a special praise.

Editor-in-Chief
Dr. N.S. Viswanath

Joint Editor-in-Chief
Dr. B. Shekar

Editors
Prof. K.L. Ramadas
Dr. R. Deepak

DHARANA

INTERNATIONAL JOURNAL OF BUSINESS FROM BHARATIYA VIDYA BHAVAN'S M. P. BIRLA INSTITUTE OF MANAGEMENT, BENGALURU

Established: June 2007
ISSN 0974-0082
Vol.9, ISSUE 1 (January - June, 2015)

Administrative & Editorial Office:

M. P. Birla Institute of Management
BHARATIYA VIDYA BHAVAN
#43, Race Course Road, Bengaluru 560 001, India
• Ph: +91-80-2238 2798, 4277 2000
• Email: nsv@mpbim.com

DHARANA an International journal of business, published in January and July, every year, by Bharatiya Vidya Bhavan's M. P. Birla Institute of Management, Bengaluru