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CONTENT

EDITORIAL

We are pleased to present to you the VII th edition of PDPU Journal of Energy and Management. The following are the highlights of the papers presented in the journal.

The first paper on role of corporate good governance in achieving environmental sustainability towards fulfilling SDG Agenda-2030 by Dr. H. K. Patnaik focused on the environmental sustainability and its linkage to innovative approach and good corporate governance practices for achieving SDG agenda -2030. Examples and strategies from different corporate sectors are provided to help corporates to plan, implement, monitor, review and improve the business strategy good governance characteristics that include but not be limited to accountability, transparency, rule of law, responsiveness, equity and inclusiveness, effectiveness and efficiency as well as intense participation.

The second paper Mr. Mrugesh Pawar explored the reasons for decaying of Indian power distribution sector and provided solution through 'smart grid' technology. Largely from the horse mouth, the paper captures several vital information and data about all the 'Smart Grid' programs in India as well as abroad; and have observed several implementation issues. For example, increased involvement of Politicians, Bureaucrats, Policy Makers, Regulators, Big Consulting Companies, MNCs, Local Big IT and Power Companies, Small Group of Contractors etc. has killed the basic objectives of smart grid implementation. Further, DPR are being prepared and the costing of the projects are suspiciously being prepared by some select consulting groups who have made a close internal link (between politicians, Bureaucrats, Chief Officers/ Executives of Electricity Companies, and some select suppliers/vendors).

The third paper on learning and forgetting in industrial systems by Mr. Vivek Pathak provides an overview of the antecedents and consequences of Human Interface while learning and forgetting in Industrial systems. Different case studies are presented and analyzed leading to an understanding through inter linkages of Human interfaces during an important safety practice of permit to work system in different organizational context. Findings from a series of case studies from previous experiences are reviewed and de-constructed in order to understand the potential impact of such adventurism. Various derivative inter-linkages also lead to an examination of organizational culture, leadership role and human behavior. This study reveals the intricacy involved in such complex involvements and confused outcomes by learning and then forgetting thereby proving their contribution as potential causes leading to an incident or accident in future.

Finally, Madhu Bharti focused on infrastructure sector, specifically, housing sector and emphasized on different approaches to a common goal and identify possible interventions. The secondary data based paper found that rapid urbanization has lead to housing shortage in the developing countries. In India the responsibility of mitigating the 18 million housing shortage lies with the state governments. Access to quality shelter is still a big challenge before the nation and requires immediate actions. Many successful and some not so successful approaches have been tried in India. As housing lies in the domain of state governments in India, each state has come up with its own solutions. Similarly many countries have tried approaches relevant in their context.

C. Gopalkrishnan, Director General
Chief Editor

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ROLE OF CORPORATE GOOD GOVERNANCE IN ACHIEVING ENVIRONMENTAL SUSTAINABILITY TOWARDS FULFILLING SDG AGENDA-2030

H. K. Patnaik

ABSTRACT: It is very clear that the potential of our long-term viability of well-being on this planet is reciprocal to our commitment, ethical governance practices and stewardship in sustaining the natural world and its natural resources with a pragmatic approach to Social solidarity, Environmental responsibility and Economic efficiency that can assure a continued better life and healthy planet. Environmental dimensions of Sustainability is now therefore, being perceived to play an important role to link and understand not only the life processes but also its non-living entities that influence and regulate the structure and complexity of ecosystem functions, flow of energy and materials, supporting capacity as well as assimilative capacity of earth and ultimately enhancing the quality of Life.
Corporates by large have understood that these sustainability effort has a collective impact on businesses and work towards preserving energy, cost and resources that ultimately benefits the society while having a positive impact on businesses. There are ample success stories from corporates in India and abroad demonstrating their concern and contribution towards reducing environmental foot prints, biodiversity & resource conservation, emission reduction, Energy and water neutrality, Waste reuse and recycling, social inclusiveness and participatory approach towards development. However to achieve a sustainable growth in today's competitive global market scenario, Corporates need to focus on an integrated holistic approach to all 17 sustainable development goals with innovative strategy and good governance practices. The paper has focused on the concept of environmental sustainability and its linkage to innovative approach and good corporate governance practices for achieving SDG agenda -2030. Examples and strategies from different corporate sectors are provided to help corporates to plan, implement, monitor, review and improve the business strategy good governance characteristics that include but not be limited to accountability, transparency, rule of law, responsiveness, equity and inclusiveness, effectiveness and efficiency as well as intense participation.

KEYWORDS

Environmental sustainability, Corporate governance, SDG-Agenda, Innovation strategy

Introduction

Nature, when prudently used for our necessities can support and sustain its long-term viability, as it has a tremendous ability to care for itself through ecosystem functions, natural adoptions, ecological homeostasis and rejuvenation potential. However, Unscientific interference with nature; over-exploitation of resources and unsustainable practices leads to ecological imbalances, environmental degradation, and resource depletion that ultimately pose a global threat of climate change, mass extinction, natural disasters and Poor Quality of life. Though the magnitude and perspectives are different, both the developing and developed countries are facing the same challenges of environmental threats such as critical health issues, severe natural disasters and unstable economic growth in their respective arena. For developing countries these pressures are, population growth, inefficient process and product technology, poor health sector, low per capita income & weak governance (Popp, 2010) which is further aggravated by lack of cognizance, over exploitation, domination by few corporates, burocratic gimmicks and prejudiced political will. From a developed country's perspective, it is the over exploitation of natural resources, repressive abuse of ecosystem services, more per-capita demand of energy and fossil fuel, inclusion of toxic chemicals and harmful agents to environment, which led to unrestrained toxic emission and accumulation of GHG (Green House gas), increasing

pollution load as well as snowballing pressure on biodiversity & ecosystem services. Now, the threats are not only limited to human health, resource depletion and unsustainable growth but also reached a point of no return that may drag us to mass destruction of life on this planet.

Environmental Sustainability

Sustainability is the ability to continue a defined behavior indefinitely (Herman Daly,1990). Daly, who is considered as one of the early pioneers of ecological sustainability, looked at the problem from a natural capital maintenance viewpoint and pronounced that, Environmental sustainability is the rates of renewable resource harvest, pollution creation, and non-renewable resource depletion that can be continued indefinitely and if, they cannot be continued indefinitely, then they are not sustainable. In essence, to sustain is to continue our capacity to live life on this planet with basic requirement and instinct. The concept of sustainable development means all forms and methods of socioeconomic development, whose foundation is the first to ensure a balance between the socioeconomic systems and elements of natural capital ("SD Millennium"-2000). At its core, sustainability is about being accountable with resources – people, land, energy, water, materials and capital." Generally, there are three broad understanding of the sustainability practices.

I. Respect and Safeguard our Single Common Home

Sustainability is the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs (by the United Nations World Commission on Environment and Development). Though it is not universally accepted, the UN's definition is standard and has been expanded over the years to include universality (challenging to act by all), inclusiveness (integrated approach) and observable transformations. It has progressively recognized and adopted 5 "P"s (such as Planet; People; Peace, Prosperity and Partnership) of sustainable development to bring desired transformations. It is now realized that Sustainable development is only achievable with respecting and safeguarding our common home(Planet) for future generations,; putting an end to poverty and hunger in all forms and guarantee dignity and equality; promoting peaceful, diverse, harmonious societies, free from fear and violence; ensuring sustainable economic growth and lifestyle and strengthening global solidarity.

II. Responsible Consumption and production within Carrying capacity of Earth

Sustainability is the capacity to improve the quality of human life while living within the carrying capacity of the Earth's supporting eco-systems. The International Union for Conservation of Nature (IUCN) has provided this definition based on observed facts that the global production and consumption patterns are destroying nature at persistent and dangerously high rates.

As populations have increased and we have relied on the earth's natural resources such as minerals, petroleum, coal, gas and so on, the earth's natural ecosystems and creatures (from birds to insects to mammals) have declined. We have changed the sacred balance of nature as environmentalist David Suzuki puts it, which has had a negative impact on both humans and other living systems. This has further intensified by our exploitive materialistic behaviour and unscientific development plans.

III. Ecological Equilibrium – Homeostasis

Homeostasis is the ability of ecological systems to maintain stable system properties despite perturbations (Ernest, 2008). According to the World Bank, sustainable development is about people - better lives now and a healthy planet for future generations. According to the late David Pearce, sustainable development means that each generation should pass on at least as much "capital" as it inherits, the Pearce approach defines capital in broad terms, to include physical capital (machinery and infrastructure); intellectual capital (knowledge and technology) and environmental capital (which includes quality and the stock of natural resources).

As defined by environmentalist Paul Hawken, sustainability is about stabilizing the currently disruptive relationship between earth's two most complex systems—human culture and the living world. It is the ability and capacity to regenerate the natural resources and ecosystem services; we consumed and/or interrupt in a time bound manner. He has written about the realization (and the science behind it) that we are using and destroying the earth's resources faster than they can be regenerated and replenished.

These interpretations has some common anxieties such as; How to pass on the existing safe natural resources to next generations; How we can plan for a carrying capacity based development to continue our growth and aspirations and; How we can behave

responsibly to safeguard the growth of physical capital with Environmental and intellectual capital warranting Universality, Integrity and visible Transformation. These worries has of late compelled the world community to think of Environmental sustainability and means to achieve a state of ecological homeostasis to save life on earth.

Environmental dimensions of Sustainability is now therefore, being perceived to play an important role to link and understand not only the life processes but also its non-living entities that influence and regulate the structure and complexity of ecosystem functions, flow of energy and materials, supporting capacity as well as assimilative capacity of earth and ultimately enhancing the quality of Life. It demands key strategies and scientific planning against the backdrop of the growth of human population, uncontrolled anthropogenic activities, erratic consumption pattern, and the rampant exploitation of environment by human behaviour. With this background, It is a felt need now, that good governance, ethical attitude and sound management practices be adopted with transparency, accountability and trust, so that the nature, life and ecosystem services can be protected and maintained for not only the future generations but also for the better health of this only planet assuring sustainable co-existence of co-habiting species.

Businesses are big users of natural resources, so it makes sense that they would also be expected in operating as "green" as possible without compromising the vitality of their operations. Many businesses are finding that a good way to do this by incorporating conservation principles into their mission, culture and strategic planning. Companies are trying to develop a culture that encourages all employees and other stakeholders to reserve energy, cut costs, reduce waste and enhance other environmental factors. The progression of such conservationist efforts also benefits companies because it reduces dependency on natural resources, reduction in energy and material loss, better market value as well attracts like-minded people to them, such as employees, shareholders and customers. Most companies also find that their efforts improve the public's view of their companies, which has a direct positive impact on their bottom line.

Making such changes requires companies to revisit what their corporate governance policies and practices are and what they need to improve. Ultimately, these efforts will be worthwhile, as they increase the corporation's credibility and provide them with a competitive edge through motivation and cultural change.

Corporate Good Governance

Corporate Governance is about promoting corporate fairness, transparency and accountability"(James D. Wolfensohn (Ninth President World Bank). Governance structure specifies the distribution of rights and responsibilities among different participants in a company such as board, management, shareholders and other stakeholders; and spells out the rules and procedures for corporate decision making.

Corporates by large have understood that these sustainability effort has a collective impact on businesses and work towards preserving energy, cost and resources that ultimately benefits the society while having a positive impact on businesses.

Environmental Sustainability and Good Governance

Good governance in principle and practice is foundationally about the processes for making and implementing decisions. It's not only about making 'correct' decisions, but also about the best possible process for making those decisions.

These decision-making processes, and good governance, share several characteristics which are key to the implementation of the Sustainable Development Agenda. In summary, these characteristics would include but not be limited to accountability, transparency, rule of law, responsiveness, equity and inclusiveness, effectiveness and efficiency as well as intense participation.

The SDG-2030 agenda clearly has a great commitment to good governance and its vital role in achieving sustainable growth. It consists of 4 sections: (i) A political Declaration (ii) a set of 17 sustainable Development Goals and 169 targets (iii) Means of Implementation & (iv) a framework for follow up and review of the Agenda (European Commission Report, 2019). Out of 17 SDG Goals, Goal 6 to Goal 11 are towards commitment concerning better quality of life and sound business practices, Goal 12 to 15 are defined as green agenda and Goal 16 -17 are fully focused on Good Governance and effective implementation. Goal 16 specifically indicates, "Effective governance institutions and systems that are responsive to public needs to deliver essential services and promote inclusive growth". The 2030 Agenda is also indivisible, in a sense that it must be implemented as a whole, in an integrated rather than a fragmented manner, recognizing that the different goals and targets are closely interlinked.

Each year, more businesses find ways to implement

conservation efforts as part of their strategic, tactical and operational procedures. They gain the benefit of positive impact for their green efforts. Reducing energy, waste and costs has obvious benefited companies in various ways. Taking a conservationist perspective also allows companies new opportunities to promote innovations and creative ways of doing things that save energy, resource and continual support by their stakeholders. Corporations have envisaged that the cost savings they realize from their conservation efforts can afford them opportunities to expand to new markets, boost them above the competition, and perhaps, even get ahead of future regulatory issues.

Today's business environment presents many uncertainties for companies. Technology and innovation are boosting new developments and business models, but intense competition may mean that such businesses never manage to outgrow the start-up phase. Climate change, the gap between socioeconomic groups and public pressure plus lingering uncertainty regarding the strength of financial markets after the 2008/2009 financial crisis have caused governments and regulatory bodies to introduce strict regulatory reporting requirements introduce privacy laws and restrictions on emissions.

The table below tried to establish how a business house could tackle the environmental sustainability issues through good governance and innovative approach and ultimately achieve the long-term SDG goals before it is otherwise imposed to curtail their growth.

Environmental Sustainability Issue	**Governance Strategy**	**Innovation Aspects**	**Linking to SDG**
Resource Depletion	Enhancing Efficiency & Competency	Technological Innovation	12 - Responsible Consumption and Production
Energy Demand	Sound Policy Making, Boost Renewable Energy	Mission Oriented Innovation	7. Affordable & Clean energy
Pollution impact and waste Accumulation	Accountability & Integrity	Inclusive & Social Innovation	2. Good Health and Well-being; Make cities and human settlements, inclusive, safe, resilient and sustainable (11)
Threat to surrounding environment, Ecosystem and ecosystem services including biodiversity	Environmental Governance with accountability, Integrity, Transparency and commitment to Healthy Ecosystem	Mission Oriented innovation	10 - Reduce Inequalities, 15. Life on Land 16. Promoting peaceful and inclusive societies for sustainable development
Climate Change	Finance, Agenda Setting and Good Governance	Mission Oriented innovation	Climate Action (13)
Threat to natural resources like Land, water, soil	Policy decisions to adopt water positive and energy positive business strategy, Intergenerational equity, subsidiarity and non-discrimination.	Grassroots and Collaborative innovation	Clean water & sanitation (6) No Poverty (1) Responsible production and consumption (12)
Threat to the carrying capacity of the region	Promoting sustained inclusive, harmonious and sustainable growth within supporting and assimilative capacity of the region.	Pro-poor and inclusive innovation	Decent work and Economic growth (8) Zero Hunger (2) Reduced inequalities (10)
Marine Pollution and its impact on Marine Resources	Participation, Local and Regional partnership, Respecting International treaties and agreements and collaboration with expert agencies	Mission oriented and collaborative Innovation	Life below water (14)

TABLE 1. Environmental sustainability and good governance

Many corporate sectors have been working on same strategy to ensure their sustainable growth recognizing the importance of equitable prosperity and opportunity, democratic governance, minimizing dependency on natural resource like water, fossil fuel consumption, healthy and productive natural system and continual economic growth.

Innovation is at the heart of sustainability initiatives taken by the corporate sector the world over. Many multinational industry leaders have illustrated how their corporate strategy has achieved environmental sustainability through innovations:

- Nike and Adidas have both stepped up seriously. Nike has focused on reducing waste and minimizing its footprint, whereas Adidas has created a greener supply chain and targeted specific issues like dyeing and eliminating plastic bags.
- Unilever and Nestlé have both taken on major commitments; Unilever notably on organic palm oil and its overall waste and resource footprint, and Nestlé in areas such as product life cycle, climate, water efficiency and waste.
- Walmart, IKEA and H&M have moved toward more sustainable retailing, largely by leading collaboration across their supply chains to reduce waste, increase resource productivity and optimize material usage. It also has taken steps to address local labour conditions with suppliers from emerging markets.
- Pepsi and Coca-Cola have both developed ambitious agendas, such as increasing focus on water stewardship and setting targets on water replenishment.
- In biopharma, Biogen and Novo Nordisk have both worked toward energy efficiency, waste reduction, and other ecological measures. They have also focused on social impact via partner initiatives in the areas of health and safety.
- In financial services we see how banks like ANZ and Westpac in Australia both advance local communities with good sustainability practices and by embedding sustainability in their business processes and culture.
- Car manufacturers like BMW and Toyota have made strides on energy efficiency and pollution reduction, not to mention Tesla as an outsider really challenging the industry's overall footprint.

These firms have all made strong commitments to sustainability and embarking on more sustainable journey in large part through good corporate governance by warranting transparency and addressing material issues.

As per a current report in the Hindu Business line (2019) on Indian corporate houses, there are few good examples of environmental aspects being addressed by corporates towards achieving environmental sustainability through constantly inventive approach.

- Mitigating climate change impact

ITC, the Indian MNC that manufactures a range of FMCG products, has been carbon positive for 14 years in a row. It has also been water positive for 17 consecutive years and solid waste recycling positive for the last 12 years. Currently, over 41 per cent of total energy consumed by the company is from renewable sources, and 24 of its buildings have been LEED Platinum certified.

- Energy & Resource Demand

IT major Infosys too has been chipping in. It has reduced its per capita electricity consumption by 55 per cent from 2008 base year levels and its per capita water consumption has been reduced by 60 per cent. It also implements carbon offset projects and aims to become carbon neutral by 2020. As reported by the company, many innovative Technologies like prefabricated construction, radiant cooling, smart automation and innovative solar PV plants are being implemented in their campuses to meet these targets. They have successfully implemented carbon offset projects in rural India that include household biogas units, efficient cook stoves, solar lighting, and positively impacting over 11 of the 17 Sustainable Development Goals (SDGs)."

TCS', the other leading corporate has implemented environmental sustainability strategy through standardized processes, monitoring the environmental impact performance and strong partnerships with stakeholders, including employees as well as customers. As per the report, TCS has already achieved its 2020 target to reduce the specific carbon footprint by 500 per cent.

Energy Efficiency Services Ltd (EESL), set up by the Centre in 2009, claims to be handling the "world's largest energy efficiency portfolio within the country". This includes making affordable energy efficient appliances accessible in the hinterland, implementing solutions such as smart meters and e-mobility initiatives in various States. According to Venkatesh Dwivedi, director (projects), the company aligns with SDG 7 on affordable and clean energy for all. "Our Street Lighting National Programme alone reduces 4.26 million tonnes GHG emission annually," he adds.

- Waste Minimization and Pollution Abatement:

Cement, steel, mining and automobiles are often identified as sectors that are guilty of polluting the environment. But corporate Houses such as Holcim, ACC, Ambuja Cements etc. have reversed the concept not only achieved environmental sustainability but also helps other polluting industries to achieve their targets to minimize waste, reduce GHG emissions and environmental degradation. These corporates are using waste generated by other industries to co-process as alternative fuel and resources. Ambuja Cement as reported in their sustainability report have reduced the carbon footprint by nearly 31 per cent from 1990 base levels. Among other innovative approach, Ambuja cement has been using the waste output of coal-based power plants and achieved reduction in ground pollution by co-processing alternative fuels, biomass and plastics in place of non-renewable fuels such as coal.

Mondelez India has also been certified by E&Y to be water and carbon positive and zero waste to landfill. As reported, they claimed that as part of their extended producer responsibility, they are committed to collect, segregate and recycle plastics.

- Resource Depletion and Climate Change

NMDC Ltd, a State-owned iron ore mining major has adopted responsible mining as company's work ethic and aligned itself with sustainable development goals. As an early signatory to UN Global Impact Network, NMDC has leverage their business opportunity to minimize risk and seek to overcome social and business challenges such as scarcity of resources and climate change at an early stage.

- Biodiversity Conservation & Reducing Carbon Foot print

There are several other companies trying to make the right eco-friendly moves. Tanishq, the jewellery brand of the Tata Group, has initiated several projects at its main manufacturing facility at Hosur, outside Bengaluru, including a Miyawaki-style forest in front of its new warehouse facility to increase biodiversity. The company planted 2,750 native trees which fall into the fruit bearing, bird attracting, flowering, medicinal and ornamental varieties. The project reduces carbon footprint by 60 tonnes per annum.

Forests are also on the agenda of Hyderabad-based real estate developer, the Phoenix Group. It has proposed to set up a 500-acre biosphere to serve as a carbon sink for the Hyderabad capital region. It is also adopting a forest and undertaking re-foresting which includes translocating trees on the Hyderabad-Bijapur Highway. Says Joe King, the CEO,

Many other corporate houses have also achieved milestones in different aspects of environmental sustainability through good Governance. Few of these initiatives includes;

1. Energy Conservation & Renewable Energy: Many IT sectors and other reputed corporates have corporate strategies to achieve energy conservation and using alternate energy. Infosys through Installation of wind turbines at their Pune, Bangalore and Mangalore campus, Installation of occupancy sensors, Introduction of LED lamps, Installation of Variable Frequency Drives (VFD) in condenser pumps on chillers etc; ONGC through environment friendly and energy efficient technologies saving over INR 500 crores, many Cement and steel plants through energy recovery system and alternate energy production strategy.
2. Green Building: Many of the Indian corporates including IT sectors, NGOs, Government Houses, Oil & gas sectors have reduced energy consumption through green building designing and construction, less power intensive utility equipment etc.
3. Water and Waste management, Most of the Cement, Power, Steel, Chemicals, pharma and extraction Industries have now adopted to Zero discharge, Water and Waste neutral and waste to energy or Resources concept to minimize their environmental foot prints.
4. Protection of Ecosystem & Biodiversity Conservation: As a step towards conservation and restoration of Ecology and Biodiversity, many corporates including ONGC, Dhamra-Adani Port in Odisha, Aditya Birla, Tata Group, Ambuja cement and Vedanta etc. have taken initiatives through technical co-operation and adoption of scientific strategy and implementable plans.
5. Marine Pollution: Companies like ONGC, Adani, GSPC-NIKO, Vedanta, etc. have gone for marine Ecosystem conservation through various coastal management planning, Oil Spill contingency plans, Mangrove plantation initiatives and other coast stabilization initiatives.

Conclusion & Recommendations

Good Governance and Innovations to save the environment are happening the world over, with India too pitching in with hundreds of new ideas and projects. While some are micro solutions relevant only to specific sectors and geographies, others have the potential to scale up into major businesses that can take the bull by the horns and make some difference to environmental sustainability. Good corporate governance and social responsibility help Industries to keep things in good balance. It also supports the company's efforts to develop control mechanisms, which will also increase shareholder value and promote satisfaction with shareholders and stakeholders. It is in a corporation's best interest to be innovative, environmentally sensitive, socially responsible and inclusive governance practices to ensure their economic growth and sustainable development.

The significance of good governance in today's progressive and aggressive business environment is indispensable. According to a report in the Financial Times, it's "crucial to the achievement of a new frontier of competitive advantage and profitability."

The agenda and approach towards sustainability is not generic and depends highly on the materiality issues, financial & competitive market position as well as the aspiration, participation and commitment from different stakeholders including top management. The integrated planning and approach to achieve sustainability must emerge through a sustained interactive process with time bound smart objectives and continual endeavor. Following are few good lesson-learning examples of sustainability practices for senior management team to improve their sustainability agenda.

*- **Think beyond Compliance***

Corporates must now target to see beyond regulatory and statutory compliances, be it water consumption, toxic discharge, waste management, energy efficiency, resource utilization, online monitoring and control system as well as employees benefits, human rights and labour responsibility. Non-compliance is becoming an issue that concerns investors. Recent BCG/MIT data shows that investors increasingly shy away from compliance risks. A full 44% of investors say that they divest from companies with poor sustainability performance. Many good Industry houses are now considering these aspects as profit making ventures, be it waste to energy, water conservation, energy recovery, emission reduction or social good will. Many proactive corporates have now quantified these "beyond compliance" measures to be profitable for their Industries and in achieving a better work environment.

*- **Align Materiality with sustainability***

Corporate needs to make sure that the strategy of the company and the sustainability efforts are aligned through good governance practices. Often we see divergence, which of course makes the sustainability efforts fragile, lacking real commitment and prioritization. There are many good examples. Take Unilever's "Sustainable Living" which has the ambition to decouple growth and output as well as reduce its resource footprint by focusing on waste reduction, resource efficiency, sustainability innovation and ecological sourcing (like in organic palm oil). Similarly, Toyota is well known for innovation in hybrid engines, but less so for reducing their dependence of rare earth minerals. These minerals were required for hybrid and electric engines. But by developing alternative motor technologies Toyota reduced its import dependence and operational risk, and in doing so reduced its financial risks in case of price increases.

*- **Reactive to proactive approach***

Many of today's leading companies have stepped up their governance practices due to business crisis. Companies like Nike, Coca-Cola, Telenor, IKEA, Siemens and Nestlé have adopted ethical business practices with transparency to overcome many such challenges. For example, Nike faced boycotts and public anger for abusive labor practices in places like Indonesia throughout the 90s, but turned the tide around. In 2005, it became a pioneer in establishing transparency by publishing a complete list of the factories it contracts with and a detailed 108-page report revealing conditions and pay in its factories. It also acknowledged widespread issues, particularly in its south Asian factories. By recognizing the impact of sustainability in a crisis these companies have, all developed more proactive sustainability strategies through good governance.

*- **Transparency***

Is a pre-condition for assessing and improving environmental sustainability practices. You cannot judge without transparency, simple as that. Transparency builds on the idea that an open environment in the company as well as with the community will improve performance. The only way for companies to accomplish transparency is through open communications with all key stakeholders built on high levels of information disclosure, clarity, and accuracy – as well as an openness to recognizing faults and improving conditions through reliable good practices.

- Good Governance

The fundamentals of good governance and bigger constructive participation within and among the organization, its surround environment and the community is of immense necessity to ensure sustainable development. A full 86% of respondents in a recent survey by MIT/BCG agree that boards should play an active and strong role in sustainability. But, only 42% report that their boards are substantially engaged. Boards are often critical in collaborations with key stakeholders such as NGOs, governments and international Organizations. It is testified that, engaging your ecosystem is critical for efficient sustainability practices, in particular in solving crises and in shaping broader solutions.

In summary, sustainability is a major challenge and can only be achievable through integrative and innovative approach to deal with environmental, social and financial issues and opportunities. There is a felt need to refrain corporates from over-exploitation of natural resources, unethical business practices, callous social attitude and disgracing the stakeholders. To sustain the economic growth and business continuity, corporate good governance has a vital role to play to provide vision, transparent approach, environmental stewardship, social inclusiveness and stakeholder's confidence.

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A STUDY ON IMPLEMENTATION OF 'SMART GRID' TECHNOLOGY IN INDIAN POWER SECTOR

Mrugesh Pawar

ABSTRACT: The paper explored the reasons for decaying of Indian power distribution sector and provided solution through 'smart grid' technology. Largely from the horse mouth, the paper captures several vital information and data about all the 'Smart Grid' programs in India as well as abroad; and have observed several implementation issues. For example, increased involvement of Politicians, Bureaucrats, Policy Makers, Regulators, Big Consulting Companies, MNCs, Local Big IT and Power Companies, Small Group of Contractors etc. has killed the basic objectives of smart grid implementation. Further, DPR are being prepared and the costing of the projects are suspiciously being prepared by some select consulting groups who have made a close internal link (between politicians, Bureaucrats, Chief Officers/Executives of Electricity Companies, and some select suppliers/vendors).

KEYWORDS

Smart Grid, Discom management, Power sector

Introduction

Indian Power Sector, particularly power distribution sector is passing through its worst phase. It is in huge crisis, rather decaying since last many decades. Enough efforts have been made by various governments, lots of reforms have been introduced, but unfortunately, the end results are zero, even negative. As per the latest RBI report, it has been observed that, even the latest scheme 'UDAY' of central government has been declared as the biggest failure.

On the other hand, 'Smart Grid' technologies worldwide have been renowned to be the best solution for integrating the power sector value chain (i.e. Generation, transmission, systems operation and power distribution), providing online, fully automated effective results and been recognized as a powerful instantaneous tool for energy accounting, energy management, energy optimization, renewable energy integration, reducing AT&C losses, enhancing revenue, increasing customer satisfaction levels and improving the overall performance of the power sector. 'Smart Grid' in India can modernize electricity delivery system so that it monitors, protects and automatically optimizes the operation of its interconnected elements – from the central and distributed generator through the high-voltage network and distribution system, to industrial users and building automation systems, to energy storage installations, to domestic end-use consumers and their thermostats, electric vehicles, appliances and other household devices. Further, it can enable the consumers to produce electricity at their doorstep through various renewable energy resources, and can feed it into an infinite grid without any hassle.

The current study aims at exploring the reasons for decaying of Indian power distribution sector. The study also attempts to identify a solution from the 'Smart Grid' perspectives.

Background of the study

'Electricity' has been one of the key important commodities for human being. Each and every instruments, components, apparatus, gadgets, machines, systems, everything is running on electricity. Without electricity, the human life is null. No matter which sector we consider (Domestic, Commercial or Industrial) every segment of our socio-economic systems, everywhere, the 'electricity' has become the most essential commodity, without that the life is nothing. With the new era of computerization, digitalization, fast automated and remotely monitored/controlled systems, all functions and operations of the systems are 100% dependent on quality, reliable and continuous supply of electricity. At the same time, 'electricity' is such a typical commodity, that can never be seen, (it is totally intangible), cannot be touched, neither can be bundled nor be packaged in anything. And at the same time, it cannot be stored even. Thus whatever is generated must be consumed immediately. Thus generating the electricity, transporting/transmitting it, distributing it from its originating source up to its consumption point, it has got a very typical and complex path and attracts extraordinary care. Also with the introduction of all new innovative type of electricity generating source, such as renewable energy sources, waste-to-energy sources and other new upcoming innovating techniques, the handling and completing successfully the 'electricity value chain' has become more challenging than the earlier. It is capital intensive, attentive, and instantaneous time-responding, activity.

Distribution company performance and Smart Grid

Though Generation, Transmission and Systems Operations have been made efficient, transparent, and effective, the final downstream vertical, the Distribution sector has been the root cause of entire value chain to failed. This is because, the Distribution sector is unable to distribute power efficiently, effectively and unable to generate the revenue at its full scale. This is causing to lose money in very large volume making entire system to collapse.

What exactly is happening that, all the generators putting their huge capital, installing power plants, generating electricity at full scale, Transmitters are transmitting the power at their best efficient networks, receiving electricity from various generating stations, and transmitting it and delivering it to distribution companies towards their load centers, but unfortunately, the DISCOMs (Distribution Companies) of all the states in India are not properly functioning, and not able to generate the revenue from their consumers for the electricity which they are selling to them. This is breaking the whole value chain, and making all the verticals to end-up in a huge loss.

It has been observed and concluded by all the governments that, in India almost all the DISCOMs aren't not having even a proper and accurate 'energy accounting' system properly deployed, that means they don't even have a proper accounts and checks on, exactly how much electricity has been delivered, and sold to the consumers at a particular time at which rate? If this basic information, detail is not made available, how the actual energy accounting can be done? And how the real billing and revenue generation can be made? There is no proper MBCC-Metering, Billing, Collection and Customer Care system deployed. Eventually a distribution company ends-up into an irrecoverable loss. This is known as 'AT&C – Aggregate Technical and Commercial' Loss, a main root cause for all DISCOMs to make loss. Since there is no proper accounting, billing, and revenue collection by DISCOMs, Transmission and Generation Companies suffers a lot (as DISCOMs don't generate revenue, they become default in making payments to TRANSCos, ISOs and GENCos). Hence Generating and Transmission Companies also make losses for no reason. Thus an entire value chain in power sector gets broken. Since this phenomenon keep on repeating continuously, the losses to all DISCOMs, TransCos, GENCOs and ISOs keep on piling up, eventually forcing into declare bankruptcy for all. These are the factually situations presently eructing almost in all the states of the country. Also on the other hands, so many renewable energy projects (particularly Solar PV – projects) are being deployed in mass level all over the countries by lots of private entities; they are ending up in a huge loss because of non-payment of money to them by DISCOMs, causing a big question of survival to them.

To resolve these serious issues, central government had launched a special scheme called: 'UDAY'. 'Ujjwal DISCOM Assurance Yojana (UDAY)' is the financial turnaround and revival package for electricity distribution companies of India (DISCOMs) initiated by the Government of India with the intent to find a permanent solution to the financial mess that the power distribution is in. It allows state governments, which own the DISCOMs, to take over 75 percent of their debt as of September 30, 2015, and pay back lenders by selling bonds. DISCOMs are expected to issue bonds for the remaining 25 percent of their debt.

Recently, RBI-Reserve Bank of India, has published one report into which it is clearly mentioned that, the 'UDAY' scheme has been a big failure, even after its launching for last four years, by the end of financial year 2018-19, the total loss of DISCOMs has gone up to almost a figure of 15132 Crores rupees for the whole nation. There are more than 80000 Crores of rupees still due for payment by DISCOMs to be paid to all Generating Companies.

So, what should be the remedy for all? Yes, there is only one effective solution to resolve all of these burning issues; that is implementation of 'Smart Grid' technology in entire power sector, particularly in power distribution sector.

Use of smart grid for Discom management

'Smart Grid' in India can modernize electricity delivery system so that it monitors, protects and automatically optimizes the operation of its interconnected elements. The following paragraph explains the concept of Smart Grid and its applications.

The philosophy of 'Smart Grid' is to make the 'Grid' more intelligent, self talking, self healing, self communicating, self decision making, system which will help attaining enhanced situation awareness and responsiveness, enabling operational excellence for the utility, and improved experience for the consumer through system operations, automation and controlling the consumer premise for load control" . Smart Grid means, Intelligent Grid [making it, Inter Operating, Electronics, Leaching to, Improved, Grid, Enterprises]. The Smart Grid is;

- A combination of hardware, management and reporting software, built atop an intelligent communications infrastructure,
- In the world of the Smart Grid, consumers and utility companies alike have tools to manage, monitor and respond to energy issues.
- The flow of electricity from utility to consumer becomes a two-way conversation, saving consumers money, energy, delivering more transparency in terms of end-user use, and reducing carbon emissions.

In a nutshell, there should be an efficient and effective system which can,

a). Deliver an un-interrupted, reliable, quality, and an instantaneous power supply to their consumers at an affordable price, (at a minimum possible cost to serve factor)

b). Generate revenue, effortlessly, honestly, correctly, without any loss of time and money, (at a minimum possible cost and least 'Aggregate Commercial and Technical' Losses)

c). By having a best coordination among the four major pillars (Generation, Transmission, Systems Operations and Distribution) of Power value chain.

d). With the new era of adding maximum sources of renewable energy generation, the new additional task is to encourage and facilitate all individual consumers to produce electricity at their doorstep through renewable energy resources, and feed-it-into an infinite grid to reduce overall cost of power, and increase 'SEVA' (Socio-Economic Value Addition) to the value chain.

Why? When and How?

With the help of Smart Grid technology, one can bring a radical change into the entire power value chain:

Because, 'Smart Grid' systems uses an integration of Power-Energy Systems with IT-ICT-OT-IoT-AI/BI, UI/UX, ML/DL, RPA, and Big Data Analytics and Management, Macro-to-Micro Data Management Services, using all latest techniques of MeAn (MongoDB, ExpressJS, AngularJS, & Node.JS); R-programming, Ruby and other Block-Chain Technology based Financial / Energy Mgmt./ IoT/C&CC/Hyper-BP systems.

By using 'Smart Grid' technologies, one can make Energy Management arena fully automated, and instantaneously responding plus effective by making best use of Information Management arena.

Under the 'Smart Grid' concept, there are four major domains which bring revolutionary change into the power sector.

(i) Generation Automation

(ii) Transmission Automation

(iii) Automation into System Operation techniques

(iv) Distribution Automation

These domains get fully automated and instantly responsive in the following areas of:

(i) Generation Automation

- Supply Side Management
- Generation synchronization optimization
- Decentralized Distributed Generation optimization
- Operations optimization
- Assets Management and performance efficiency
- Revenue Optimization

(ii) Transmission Automation

- HV and EHV Transmission Automation & Optimization
- Grid Disciplines, Self Healing of Transmission Lines
- Asset Optimization & Management
- Automated Power Flow Optimization
- Energy Flow Optimization
- Automated System Fault Identification, Isolation, Restoration and Break-down Management
- Automated Energy Accounting and Revenue Management Systems
- HVAC, EHVAC, HVDC and Ultra High Level Transmission Management
- NMS – Network Management System, OMS-Outage Management Systems (Redirecting of Power Flows)

(iii) Automation into System Operation techniques

- Automated Systems Operation, Balancing, and Accounting
- Operation Systems Contingency Management
- Automated Energy Flow Management, Generation-Load Balancing, and Settlements
- Renewable Energy Integration, Synchronization, Energy Flow Management, and Scheduling and Balancing
- Energy Flow Settlement, and Systematic Accounts Management
- Power Trading, and Open Access
- WAMS – Wide Area Management Systems
- NMS-Network Management Systems and OMS-Outage Management Systems (Rescheduling, Redirecting of Power Flows)
- Adaptive Islanding and Micro Grid Integration
- Self Healing of Infinite Grids

(iv) Distribution Automation

- Advance Metering Infrastructures (AMI)
- Automated MBCC – Metering, Billing, Collections and Customer Care Systems
- AT&C – Aggregate Technical & Commercial Loss Management & Optimization
- Automated Asset Management
- Distribution Automation
- Automated DSM-Demand Side Management
- Automated DR-Demand Response, CEM-Corporate Energy Management; HEM-Home Energy Management
- REM-Renewable Energy Management
- DNMS-Distribution Network Management Systems
- DER-Decentralized Energy Re-integration
- Automated Energy Accounting and Audit Systems
- Automated Fault Identification, Isolation, Restoration Systems
- Automated Connection – Disconnection Systems
- Automated Prepaid-Postpaid Metering Systems
- Automated DDEGD-Decentralized Distributive Energy Generation and Distribution Systems
- Automated Consumer / 'Prosumer' Energy Management and Accounting Systems
- Asset Management, Operation and Maintenance Systems

Thus if a 'Smart Grid' system is selected and deployed, smartly into the power system arena, it can make miraculously best system forever, and give best efficiency and outcomes as desired by the systems to lift up their performance.

Only the things to be taken in consideration are:

- Selecting the right technology, at right place with right choice and right timing
- No blind copying or following of the advance techniques, but making them contextual, result oriented, efficient and cost effective
- Sequencing and prioritizing the 'Smart Grid' projects with respect to their cost, time, and results (return on Investments and Socio-economic value addition) to the desired and effective stakeholders
- Balancing among Cost, Time and Performance (revenue returns)
- Need based prioritization and selection of projects
- Looking for 'Long-term' sustainable benefits rather than 'short-term' gains
- Making a proper What-if Analysis before selecting and implementing the project
- Conducting proper 'Impact-Analysis' studies before finalizing the project
- Preparing true 'As-Is'; 'To-Be' and SRS Reports after making thorough studies of the requirements with cost-benefit analysis
- Having a proper check-correct system during and after executing or implementation of project
- Having effective closed-loop feedback control and correction management system properly deployed for all 'Smart Grid' projects to have individual and collective analysis, check and control over the operations of systems

Pros and cons of 'Smart Grid' Technologies

Pros:

- Can bring a revolutionary and radical change in entire values chain of the power and energy management systems
- Can make the systems completely integrated, self monitoring, self-healing and self-correcting
- Can reduce the time of operations, increase performances in terms of efficiency, revenue generation, AT&C loss reductions, and system optimizations
- Can reduce human intervention and human errors factors
- Can make the system fully responsive and self-communicating self-accounting
- It guarantees to improve technical and commercial efficiency of the entire power value chain, and thus improving overall performance of the systems

Cons:

- If not properly selected, can bounce back
- Vulnerable for cost effectiveness
- Can go into the hands of wrong people, wrong management, wrong technology provider, wrong executer and spoil whole of the project purposes
- Can kill the basic purpose and objectives of the projects, if it is incorrectly designed, derived and implemented by selecting the wrong strategy and incorrect technologies
- Because it is a bundle of new innovative but emerging immature techniques, sometimes may get failed or give unexpected results
- Integration of different technologies are deeply involved into making the whole system efficient and effective, sometimes mismatching of technologies can create undesired situation in the power value chain, may harm to each other
- Improper selection and misappropriation of funds, or wasted interested of some group of people can create negative impact and wrong impress about the techniques and systems
- 'Half knowledge is always more dangerous', this idiom can be applied if the decisions making team is having no proper knowledge or have wasted interest in selecting and deploying the technologies

Lacunas and System Flaws

- Up till now five major 'Smart Grid' Projects have been deployed in the country: (i) NDMC-New Delhi (ii) BESCOM-Bangalore (iii) DISCOM-Bhubaneswar (iv) DISCOM-UGVCL-Gujarat and (v) NDPL-New Delhi. Out of these five only two projects can be defined as successful, i.e. NDPL, and NDPL up to certain extent. Rest all projects have been proven to be waste of everything (waste of time, waste of money, and wastage of resources)
- The main reasons for failure of projects are: (i) appointing wrong team for decisions making about the project selections (ii) appointing wrong consulting agencies who designed the projects and the terms and conditions of the 'Tenders' (iii) having wasted interests of Project owners, Project approvers, funds providers, and implementing agencies, making the entire project into dump.
- There have been lots of cases of funds misappropriation and funds siphoning, misusing the power of positions, and cartel / price rigging for the projects
- Instead of customizing the Projects and identifying the proper objectives and capabilities of the projects, there were the numerous cases of blind following of foreign technologies, that too adopting it from the suppliers/ vendor who had wasted interests in selling their products and solutions, moreover the implementing agencies were also with carrying their doubtful integrity, grabbing the projects by bribing the officers. All these cascading occurrences got accumulated and created lots of negative impacts, eventually killing the whole purpose of deploying the valuable project, and the technology.
- The consulting agencies who designed the bidding terms and conditions had adopted totally a wrong approach for the reason best known to them, moreover they suspiciously hiked the total cost of project (in multi fold almost 20 times more than its fair value) by estimating wrong and exaggerated prices for the products and solutions, selecting wrong, improper and costly items, products and project tasks, maybe for favouring only to some select suppliers/vendors. All these mal-practices cumulatively made the whole project completely failed

Observations and Findings

- The author and their team members (under their separate 'Smart Cities' development programs) have visited more than 25 Cities and Towns in various countries around the world (all high-class developed, moderate developing and poor under developed nations), and travelling since last eight years. Similarly their team members are continuously travelling and visiting all major cities and towns in India, and observing very closely, what exactly happening around the world , as well as in India?
- With their individual and collective efforts, they have gathered vital information and data about all the 'Smart Grid' programs in India as well as abroad; and have observed so many surprising activities, especially, in 'Indian Power Sector' and other sectors, those are as follows:

- All the 'Smart Grid' programs, and other important socio-economic programs, have been lost their real objectivities, and have been hijacked by some special group/gang of Politicians, Bureaucrats, Policy Makers, Regulators, Big Consulting Companies, MNCs, Local Big IT and Power Companies, Small Group of Contractors, Project Executors, Implementers, System Integrators, and Product/Solutions Suppliers/Vendors!
- The real and basic purpose of the Projects (i.e. its socio-economic value additions, performance improvement of public utility service agencies, improving the service level and facilities of the public organizations towards the common people) are killed. Nobody is bothered about the genuine objectives and goals of the projects. None is bothered for the end-results and real outcomes of the Projects.
- All such high value projects are seen only from the point of view that how much extra money can be grabbed and earned through it? Initially, how much maximum propaganda can be done to attract maximum possible public attention can be drawn and its essentiality factor can be increased for getting it approved under government aid programs.
- In the name of Nation's Development, and Systems Improvement programs, and Infrastructure Development Programs (Smart City), plus other so called Global-prestigious 'Renewable Energy, Global Warming, Climate Change, Energy Conservation, Energy Security, Energy Storage, Electric Vehicles, programs, there is nothing but a fund siphoning at a very large scale.
- Starting from Policy makers, and Chief Consultants, who are designing and deriving these programs, and earmarking government funds and aids, and who are preparing the DPRs, and Global Bidding (Tender) Documents, are (in a very harp and Smart way), selecting the Technologies and Projects, which can get fit to only some specific group of companies, suppliers, and vendors who have monopolies into those areas!
- The DPR are being prepared and the costing of the Projects are suspiciously being prepared by some select consulting groups who have made a close internal link (between politicians, Bureaucrats, Chief Officers/Executives of Electricity Companies, and some select suppliers/vendors). They are mentioning, very highly escalated prices (in scales of 15 to 25 times more than its real price) the prices for all the components, products, solutions, required to be procured and deployed in these 'Smart Grid', and 'Smart City' related projects. The prices are set in such a way that everybody's wasted interest and all KB-Kick Back components are already covered into that of all agencies (politicians, bureaucrats, chief officers/executives, consultants, suppliers, vendors, system providers, system integrators, system executors, etc). Thus the basic price of the Projects itself get hiked at its initial stage itself, and that too in a multi fold ways. (Example, a Project whose real fair value is say Rupees 15 Crores covering everything to be deployed and executed, but now its Basic Tender price will be escalated to the tune of 90 to 95 Crores by the consultant and project designer, it will be made justified also, by way getting it pre-audited and approved by three to four government authorities, (who are already taken care of). Now it will be floated into the public for global bidding!
- The prices for implantation and execution of the projects are also set in such a way (almost four to five times more than its fair value) that the wasted interest of everybody (who is involved into this malpractice, 'chain of mischievous people') is taken care of. Thus everything is well set in advance
- Pre Qualification and other selection criteria's, are being purposefully set into the DPR, and Bidding Documents, smartly in such a way that only few select agencies can get qualify for the bidding and they only can participate into the tender/bidding process. It is very minutely checked and ensured that no any unknown or other party (who is not involved into this gang) get qualified or selected into these Programs.
- Once the Bidding and qualification process is over, the Project is awarded to any one agency who has bid the lowest price. (This lowest bid price, in actual is almost five to seven times more than its real, fair value).
- There is one another setting among all bidders too. All the bidders are closely connected to each other

externally. They all are the part of the price rigging scam. None will bid for any tender for less than some specific bottom price derived by this gang, and All the bidders will share the Projects region wise or it value wise (i.e. in one region if one party has been selected and awarded the Project, then it will not get another Project in other region, then there will be an another party's turn). Thus the entire similar category Projects will be distributed proportionately to all the bidding parties as per their offers of the KB-Kick Backs.

- One another technique of siphoning the funds is delaying the project, and then escalating its basic price once again! This is like after kick-starting the Project, initially it will pick up the pace for first few months, then after it will be delayed purposefully, by putting one or other excuses. After seven to nine months, the project will be declared as delayed for further one year. (This will also be technically justified very smartly by these gangs). Now again the price of the project will be escalated at least for 1.5 times more than its bid value. Thus one more window for fund siphoning shall be opened!
- It might be looking very surprising, shocking, funny or hypothetical? None can accept these facts! But it's real, there are such practices going on in India. It's almost open secret, every employee within all these organization knows about it. They know the real, fair values of each and every task, products, and solution, and they also know all these gimmicks, but since they want to survive themselves, and because they don't' want to lose their job, they're keeping mum into these matters.
- Generally, there is no any proper, in detail audit being carried out! The Audits even if up to the CAG level are carried out, nobody in the CAG has that much in-depth knowledge or idea about all these kinds of gimmicks. Most importantly, the auditing fellows at CAG or any such agency level, are expert in accounting and other mathematical tallying method, but they are not from the core domain of these fields, and hence no any idea about all these internally, smartly played games. They are not even aware about such price escalation of the project components at its initial grass-root designing level, and they can't even cross check or verify it, because they don't have the source to identify them, and not even they have such power or authority to go into such a deep level and challenge the whole corrupt system.
- All these observations are not hypothetically imagined or fabricated? But they are found out after carrying out a detailed secrete investigation, after interacting with all grass-root level people and employees of the different organizations, agencies, consulting companies, implementing agencies, after detailed discussion with some honest, loyal and patriotic government employees, some information revealed by some whistle-blowers, by even some people, who are already involved into such malpractices directly/ indirectly, and now because their conscious are biting them, they are hove come forward and revealed all these secrets.
- And, if we look at the facts of the recent past, that even after spending thousands of Crores of rupees in India for uplifting, reforming the power sector under APDRP, R-APDRP, REC, PFC, and so many other such schemes, even the recent example of latest 'UDAY' scheme launched just four years ago have been totally failed, and thousand of Crores of rupees (the public money, the world bank's money) have been wasted, rather been siphoned by some few select people, agencies and some Politicians, Bureaucrats, MNCs, and some other people involved into all these scams!
- If really we want to expose all these? Let's have a genuine survey with all the concerned people, conduct a survey anonymously, ask the questions in a squirrel away and allow all the stakeholders to present their honest opinions and experiences without disclosing their name and identity. Let's have even an online 'open public referendum' asking all these facts putting in the air via questions (open ended questions or in MCQ form), and interview the people confidentially, and gather these information, it will give 100% result as what is observed up till now, it may come out even more surprising and shocking than this too!
- It's an open question, where all those money have gone? Is there any check and audit on to it? So many new technologies have been adopted and deployed in the nation, has it given any remarkable outcome which can be shown or demonstrated gracefully, proudly as an achievement for the Nation? These are all public money which are getting siphoned by some few corrupt people, ultimately those are being paid directly or indirectly by all citizens of the country. Even if the amounts are coming from World Bank or other Financial Institutions globally, eventually they are becoming a burden on the common people of the country, Ultimately, by way of direct or indirect taxes, or in other indirect way, the common public of the nation is paying for it all.
- So this is a very clear but serious offensive case of cheating and looting the public money by these corrupt people.

Suggestions and Recommendations

Looking to all of shocking observations, as mentioned above, it is suggested and recommended that:

- Let us conduct an open on-line referendum or conduct a secrete survey or investigation in a very transparent, fair and bold manner
- Let us bring all such mal-practices on the surface in the public domain, and let the public do investigation at their own
- The fair and bold, transparent questionnaire, in a very smart way shall be framed by us. We shall generate such a strategic framework of public survey material and float into the public domain and get it answered and validated by the people, of the people, for the people of the largest democracy in the world.

Constructively, there are some genuine and effective suggestions from the author team side for best implementation and getting fruitful and effective outcomes of the program, as under:

Take the charge of the entire public project domain, and re-design and re-derive the whole 'Smart Gird' based technology enhancement and deployment program, and do it again very systematically:

- **Re-structure the whole program as mentioned below:**
- Break-down the model into seven categories:
  - (i) Technical
  - (ii) Functional
  - (iii) Financial
  - (iv) Commercial
  - (v) Human Capital
  - (vi) Policy Frame working
  - (vii) Regulatory Aspects
- But before breaking it down and re-structuring them, first identify the basic needs, urgent needs, long-term achievements, spontaneous goals, instant requirements, return-on-investment, socio-economic value additions, and last but not the least, look at the contexts and prioritized all the projects according to instant requirement, long-term sustainable achievements, and maximum outcomes at minimum input.
- Very first thing to do is taking the whole charge of the program and the projects from all such suspicious and proven group of people of having wasted interests. Keep them away from all the future programs and activities
- Very importantly, derive a framework with highest level of transparency, honesty, loyalty, and ethical values into the people who are now being involved into all future programs
- Design and Derive one effective, instantaneous on-line 'Program and Project' Execution Management Checking, Monitoring, Control, Reporting and Systems Flaws Identification and correction Model. In which, we can also guide and support in designing and deriving it.
- Identify the right people, the perfect capable, honest, loyal and work-efficient Human Capital, provide them all tasks with defining and deriving full responsibility, accountability, and penalty
- Select right Program, right Project for the right entity; identifying the urgent needs, long-term goals, and sustainability of the projects
- Work out for techno-commercial feasibility, socio-economic benefits, and practical applicability, give highest significance value to the time, value for people and value to the money
- Prioritize the Projects based on their sustainability, optimum outcome, and highest long-term benefits to the mass of people, rather than some few select group of people
- Make the entire model as 'stakeholders' model' involving all stakeholder's efforts and inputs in a well disciplined manner.
- Each and every Program and Project must be monitored, controlled and improvised during their deployment stages.
- There must be a transparent, instantaneous, on-line auditing, accounting, monitoring, controlling, analytical and business intelligent system, which can make a closed-eye watch on all the projects and make a check and balancing of all the projects for all sort of resources (Man, Money, Time, Material, Product, Technology, Process) optimization.
- There are many good, ethical people and domain experts available but they are not coming forward because the projects and programs have been hijacked by some groups of wasted interest and corrupt people. Similarly there are better high-technologies, high-end products, and solutions available in the world, but they are unable to come in the market because the market has been captured by some few self-oriented people with malign mindsets who have dominated in the market; squeezing and suppressing the genuine parties; stopping them to come out with tier best products, solutions and techniques.

Conclusion

The Hypothesis and the research statements of this study are partially getting true. They are partial because of the constraints coming out due to some Human behavioural aspects getting superimposed on to the Technological aspects. There is nothing Impossible in this world, if we wish we can turn *'impossible'* things into *'I am possible',* only the matter is about the sincerity, loyalty, honesty, ownership, citizenship and finally ethics and self-consciousness.

- If we collectively wish to do something better for the Nation and the society, and if our will-power is strong enough to handle all the situations, we can definitely do the things and achieve our goals and can make them sustainably, perpetually achieving for even up to life-time.
- For that our fundamentals must be clear, our sole must be honest, and our goal must be smart and achievable.
- Breaking the tasks structurally in to small systematic activities, and at the same time doing the activities collectively into the constructive team is the only smart way of executing any project, this we must put into the practice.
- Making the best use of technology, but applying our own smart mind is the best way of achieving something best in the life.
- Before putting anything into practice, we must make a full critical study about all the factors affecting to that task, is another smart way of doing the work.
- Never be afraid of anything and never be hesitating for doing good things and never be resisting for accepting the truths and disclosing the wrong, unethical things happening surrounding to us. Be bold and courageous, and at the same time be strong and determined in doing good things, accepting the good things, and adopting the good technologies, concepts and solutions.

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LEARNING AND FORGETTING IN INDUSTRIAL SYSTEMS

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ABSTRACT: This paper provides an overview of a research program examining the antecedents and consequences of Human Interface while learning and forgetting in Industrial systems. Different case studies are presented and analyzed leading to an understanding through inter linkages of Human interfaces during an important safety practice of permit to work system in different organizational context. Findings from a series of case studies from previous experiences are reviewed and de-constructed in order to understand the potential impact of such adventurism. Various derivative inter-linkages also lead to an examination of organizational culture, leadership role and human behavior. This study reveals the intricacy involved in such complex involvements and confused outcomes by learning and then forgetting thereby proving their contribution as potential causes leading to an incident or accident in future.

KEYWORDS

Permit to work, Safety, Accident, Culture, Risk assessment

Introduction

Looking out in the past experience in various Industrial establishments and co-relating with the accidents that do occur on almost daily basis on roads, it becomes almost imperative to re-visit the facts from the human viewpoint. Safety is not a new field but an inherent part of industries worldwide. There are researches to understand the incidents and accidents from the bird's view of other countries, but it is not providing any solutions to the new perspective.

Research on industrial accidents investigations suggests that human errors account for 90% of accidents in nuclear industries, 80% of accidents in chemical industries, 75% of maritime accidents, and 70% of aviation accidents (Jahangiri et al., 2016). The permit to work (PTW) system has been considered as a key mechanism to minimize human errors and hence a core element of safety management systems in different organizations (Haji Hosseini et al., 2012). It being the backbone of getting various jobs done can prove to be a potential cause for an accident leading to ill reputation to any organization beside incurring financial losses.

There arises doubt in the human mind whenever we look into the gruesome facts from various newspaper reports and industrial accidents. Difficulty remains to understand as to How human mindset is un-safe in certain cultures? Is it the training or grooming or thinking or learning? Is it a culture or thought process? Is psychological or sociological? One of the researches mentions that safety in a set up depends upon safety compliance and safety participation. Safety compliances refer to various existing procedures, SOPs, Guidelines and systems that are being practiced all over the world and quite popular in the Industrial world. These compliances get ineffective after an extent unless the other half of safety participation is not practiced. Safety participation is related to Human behavior and attitude. Human behavior is an important element in practicing of applicability of safety management systems. It is not some role specified for individual perceptions.

After interviewing some safety professionals with varied experience of 1-12 years in oil and gas sector at various locations and from different background, some interesting facts have emerged. The questions were quite subjective but based upon:

1. Whether Incident/Accident investigation system has failed? Yes/No? Why so?
2. Whether Permit to work system is quite effective? Yes/No? Why so?
3. Whether safety officer is able to drive systems to its effectives? Yes/No? Why so?

The questions were based upon one to one interrogation sessions but taken up one by one. These questions have inter-linkages. Questions were chosen deliberately as they address the important elements in any industrial setup, e.g. Incident investigation and permit to work systems. These elements have human interface with an entwined role of safety officer. Hence the third question has emerged out of these deliberations. With these discussions, it has emerged that these systems need a push or pull effect in any organization amongst various human interfaces as an integral part in various groups and sub-groups.

It has emerged that there are various elements that have brought forth the fact that Incident investigations are copy paste efforts designed to suit the tastes of local and senior leadership. There is also mis-representation of facts wherein, the various causes leading to an incident are not properly identified, recorded and investigated. This is allowing the carcinogenic aspect of the disease to re-appear. Investigations are done in-order to achieve short term results and keep the organizations' reputation intact.

Human error has been defined as any improper decision or behaviour which may have a negative impact on the effectiveness, safety, or performance system. PTW, often used in high risk jobs, is a formal written system to control certain types of works which are identified as potentially hazardous. In this system, responsible individuals are supposed to assess work procedures and check the safety at all stages of the work.

In Permit to work systems, it has emerged that groups are not taking a united approach and relying upon a safety professional to close the loop as this element (PTW) is related to safety Management systems. Though safety professionals understand the PTW, their behavior change when they are left alone at site to incorporate and supervise the PTW. Since the system gets confined to few individuals they again represent the facts as suitable to keep their respective career in good faith. Permit to work system has remained a core element of safety management systems in different organizations. It being the back bone of getting various jobs done can prove to be a potential cause for an incident leading to ill reputation to any organization beside incurring financial losses. Safety cultures evolve gradually in response to local conditions, past events, the character of leadership and the mood of the workforce. How can this adaptation go wrong? Why do certain organizations come to value either the wrong kind of excellence, or pursue goals that carry serious safety penalties? In almost every kind of hazardous work, it is possible to recognize typical accident patterns. That different people are involved in these events clearly implicates causal-factors relating to the workplace and the system at large. Local traps, involving error provoking tasks and work conditions, have the power to lure people into repeated sequences of unsafe acts (James Reason Achieving a safe culture: theory and practice).

SHERPA is one of the most valid methods to identify and predict human errors. In this method, human errors are classified into five groups: action error, checking error, retrieval error, communication error, and selection error (Stanton & Salmon, 2004).

Until recently, relatively little attention had been paid to this human interface complexity within the PTW system. There might be some standard instructions for making it work in any organization. If a job is finished safely, then the matter gets closed. If an incident happens, then incident investigation takes over wherein examination of PTW system is one of the components for investigation. There are surprisingly little known factors that lead to Human Interface and its impact on PTW system. The current paper provides an overview of a research program that tries to examine the antecedents and consequences of Human Interfaces in the PTW system. We are examining the impact of inherent communication, interpretation of instructions, worker's behavior in stress, leadership role and margin of error. Furthermore, this work is of examining the effectiveness of the PTW system at the job site which is full of hazards and how the model can be fine tuned to its stress free support and potential effectiveness.

Hoboubi et al., (2014) studied "the human error probabilities (HEPs) in a PTW using an engineering approach and estimated the HEP to range from 0.044 to 0.383". In another study conducted by the same authors human errors in the PTW system were identified and analyzed using the predictive human error analysis technique. The most important identified errors in that

study were inadequate isolation of process equipment, inadequate labelling of equipment, a delay in starting the work after issuing the work permit, improper gas testing, and inadequate site preparation measures. Haji Hosseini et al., (2012) evaluated the factors contributing to human error in the process of PTW and found a significant correlation between the errors and training, work experience, and age of the individuals involved in work permit issuance.

However, as mentioned above, a limited number of researches have analyzed the PTW process from the human error point of view. Moreover, none of the research has studied the role of human interface on PTW using case study method. Thus, the present study aimed to identify and analyze human errors in PTW process.

Various cases that were encountered in past belonged to two different set of organizations with altogether different set of cultures. These small incidents are part of actual experiences that the author experienced during the course of his career.

One of the companies being referred to a Government owned Public Sector Undertaking. This company is the largest state-owned natural gas processing and distribution company in India. It has the business segments related to Natural Gas, Liquid Hydrocarbon, Liquefied Petroleum Gas Transmission, City Gas Distribution and Exploration & Production. It owns the country's largest Natural Gas and LPG cross country pipeline network.

The other company is in the business of manufacturing Fertilizers and is part of a very large private conglomerate in India. It is among the largest private sector fertilizer companies in India. It owns one of India's most energy efficient manufacturing facilities. This company manufactures and markets urea, agricultural seeds and agrochemicals. It is the 8th largest urea manufacturer in India.

In PTW system, prior to any job being undertaken at Plant premises, the job site is initially witnessed by three departments of an organization – Operations, safety and Maintenance. Professionals from three departments visit the job site, discuss and make recommendations vide Job Hazard analysis. The same is then referred with Risk Assessment for deriving Hard controls. These Hard controls need to be taken care of at job site. The same need to be witnessed by safety representative. Based upon his clearance, the Operation issues the PTW to maintenance. Then follows the safety supervision by the Maintenance engineer through third party contractor, safe work witnessing by safety and hassle free safe handover back to operations. The flow as described remain quite stressful during the job being undertaken as it involves professionals and workers from the three departments. Looking into PTW, it becomes a planning which involves human interfaces wherein an outcome can be successful safe completion or an unexpected incident.

The work permit system is a key mechanism to minimize human errors guaranteeing workers and facilities' safety. The proper application of this system depends on all involved employees including work permit issuers, supervisors, and workers (Barry, 2002). The process of work permit issuance is one of the critical and human error tending tasks (Mostia, 2002). Any error committed by the involved employees can diminish system's safety leading to accidents.

Interpreting Case Studies

In order to understand the Human interface in the permit to work system, the following Case studies were decoded:

PTW as a formality

Safety officer reached his desk on Monday after spending a weekend. He got a call from O&M department (retrieval error) that they planned a job on pipeline during this weekend (selection error) wherein some draining of muck from LPG pipeline was involved (checking error). The job was completed safely (Action error) without any hindrance. Since the job was completed, safety officer was requested to sign on the blank space of PTW format wherein his signature was required (Communication error). The format was available in the control room and after the signature of safety officer the PTW process was completed. This helped them regularize the future audit requirement (Action error).

Analysis

PTW are signed jointly after site inspections. This case evidenced a communication gap which was addressed by getting signature of safety officer later on. It seems that PTW system here is a document completing exercise in order to emerge corrigible in an audit instead of practicing safety.

Work without safety inspection

In one of the jobs involving pipeline cleaning for muck, the outsourced firemen were deployed at the work site (selection error) and were ordered by O&M to pour water on the drain point of the PIG barrel to clear the muck (Action error). Safety officer was not called imagining the fast completion of task (communication

error). LPG barrel was not isolated assuming the abundant muck blocking the drain point. In the haste, no permit was taken as the job (retrieval error) involved senior professionals who wanted to regularize the uninterrupted LPG flow to customers. Unfortunately, it was small quantity of muck (checking error). LPG started draining, drain point could not be closed because of cold burn situation.

Analysis

It seems that work completion without hindrance leading to profit making is more important instead of practicing the safe processes. There is involvement of outsourced manpower which is inexperienced about the inherent hazards of LPG drainage. Here experience sharing between two groups was not evidenced.

Firemen deciding strike

Firemen were sent for standby duty for various permits issued in the plant premises. Maintenance Managers for maintenance team arranged refreshments for them at site. Since, firemen belonged to HSE department, their issue was not taken care of by the HSE Manager. (Action error) Firemen brought the issue to the attention of HSE Manager, (retrieval error) but he ignored considering it as trivial.(selection error) Firemen took the issue to Union leader, who issued notice to management highlighting Harassment of emergency force by HSE Manager. Matter took an ugly turn and the issue reached President of the company, who in turn scolded HSE Manager to assuage the feelings.

Analysis

It seems that work from the worker is more important but not the welfare of them. Communicating about the location and hours were not evidenced. Repetitive hiding information in a group is evidenced. A complexity due to communication gap was created intra group.

Blame game

In a welding job in a Fertilizer plant, it was witnessed by Fireman standby. He requested welder to wear proper PPEs and tried to cordon the job area by fireproof blanket keeping it wet. He was restrained to do the same by the maintenance team and supervisor (Action error). In this work, a small fire broke out. Though fireman standby was able to extinguish it timely. An investigation, led to blame game where Operations and Maintenance department proved their ignorance (retrieval error). It was concluded in the report that due to negligence of Fireman standby the fire occurred (selection & communication error).

Analysis

It seems that an established process is being followed in order to save skin and go scot free. Even the expertise sharing was insisted by Fireman it was neglected by skilled group. This communication gap created a scenario where resultant effect was Fire which again was investigated incorrectly.

PTW failure

Safety officer was only deputed to job site even though the job was done by Projects team in the premises of operational pipeline. Instructions on the PTW was not available (communication error) because the contractor left the job site keeping the permit in his pocket (Action error). In between, one of the project engineers enthusiastically started touching the pressure gauge of pipe spool piece which was being hydro-tested (Selection & checking error). During the process, pressure gauge blew up, creating an injury to the engineer where his eye was saved but he was hospitalized. This incident was removed from the records (retrieval error). No incident investigation was ever conducted (Action error).

Analysis

This is a clear case of communication gap. PTW insists recording of every hazard and precautionary steps taken. Since issuing of PTW becomes a repetitive exercise, such a scenario can occur at any place where there is no cross check. It seems that there is no respect for safety systems also because of not understanding them properly.

No permit taken

On the high vessel of Fertilizer plant an eagle laid the eggs. The bird was not allowing anyone to approach near. Breakdown maintenance was scheduled on one of the pipes coming out of the vessel, but no operator or technician was ready to move to the top. Top management decided to kill the eagle (action error). Security guard was instructed by security officer to climb the tower (selection error) and shoot the eagle (selection error). No permit related to work at height was taken (communication error). Also, no prior check of the gun was done (checking error). Security guard went to the top and fired at eagle. Eagle flew but returned in the mode to attack. By then the security guard, was loading the gun. Unfortunately, while inspecting, the gun was fired accidently because it had a loose spring (checking error). Security guard died immediately, it took 5 hours to bring the body of security guard down from the high tower.

Analysis

Communication loses its effectiveness if the procedures are not communicated properly and also if there are no cross checks. Here a person was sent to a place where only skilled people are allowed and that to with the first time with a tool which not properly inspected. It seems that safety is only a lip service.

Discussion

Aforementioned are some of the fall outs in the established PTW systems in different organizations. As per Guidelines defined and standard procedures, all the precautions were recorded on paper and the PTW format even with the adequate resources available. Yet something created a trigger among different professionals to obfuscate the system in one way or the other. PTW system generally refers Risk Assessment(RA) document and Job Hazard Analysis(JHA). RA and JHA are generally prepared by the multi-disciplinary teams. It may happen that the RA and JHA captured only soft controls but not the hard controls. There could be a possibility that JHA exercise prior to issuance of PTW became another document generation activity. So, it created a situation that JHA and RA remained parallel exercises and not interlinked. This was the reason of creating further confusion. Even though the documentation and record update was up to date, its execution remained poor.

Human errors can be identified and predicted by various methods. These methods can be used to identify and evaluate human errors in the design and manufacturing, operations, and maintenance of systems and tasks' duties. Potential errors, probability of errors, consequences of errors, and techniques to reduce and control errors are outputs of human errors identification and prediction techniques.

PTW system was also existent in the Occidental Petroleum's Piper Alpha offshore platform and was suggested for improvement following the investigation. In the Piper Alpha oil and gas production platform explosions and fires aboard the oil and gas production platform in the North Sea claimed lives of one hundred and sixty-five (165) of the two hundred and twenty-six (226) persons on the installation and two of the crew of a rescue craft. The death toll was the highest. Similarly, on the Tuna platform in Bass strait fore broke out as the work was being carried out on a main oil line pump and associated valves. Four persons were injured. Deficiencies in the work permit system were identified as a major factor in both the piper alpha disaster and the Tuna accident.

It is important to note that workers are key elements of transformation in any organization towards safety management systems because they are continuously exposed to hazardous conditions even at an edge of an accident. Their specific engagement is an important tool to take a detour from preventing an accident to occur. It is important to infer that the safety management system will not work through written policies, plans, procedures and processes to reduce risks and hazards but through the behaviors of the engaged workers with the safety systems and its practices. In human performance theory, mission, goals, policies, processes and programs (i.e. safety management systems components) have latent organizational weaknesses that could rise to flawed defenses and error precursors within organizations (Reason, 1990, 1997). When accidents occur and investigations centers around the enquiry from workers. This inquiry focus most likely leads to the often quoted and misapplied statistic that the vast majority of all accidents are caused by unsafe acts (i.e. human behavior).

Human interface in PTW system is an area which creates a ground for mis-communication instead of effective communication. PTW system was designed to be an effective tool, but incidents do happen under the permit to work. If planning is so perfect, then why an incident happens? Defenses-in-depth are a mixed blessing. While they greatly reduce the likelihood of a bad accident, they also render the system as a whole more opaque to the people who manage and operate it (Rasmussen 1993). The complexity and tight coupling of complex, high-tech systems not only makes them opaque to the operators, but also make it almost impossible for any one individual to understand such a system in its entirety (Perrow 1984).

It becomes difficult to understand as to whether the various flaws that were observed in various cases happened due to bureaucratic instructions and worker behavior influenced due to error under stress or violation under disappointment. Nearly all errors are unintended, while most violations involve a conscious decision to depart from standard operating procedures (Reason 1990). Also it must be understood that the trend of the confused job outcome through these Jobs under permit happened in the companies which claimed to have a 'safety culture'. Uttal's (1983) definition of safety culture captures most of its essentials: 'Shared values(what is important) and beliefs(how things work) that interact with an organization's structures and control systems to produce behavioral norms(the way we do things around here)'. The literature suggests at least two ways of treating safety culture: something an organization is the beliefs, attitudes and values of its members regarding the pursuit of safety, and as something that an organization has the structures, practices, controls and policies designed to enhance safety.

In all the above cases, an important connection is safety officer who is influential in driving the culture of safety within an organization. But this condition of push-pull

fails because of human element involved. Behavior of a safety professional changes in the group dynamics. Only his positive attitude can withstand the behavior and performance of group towards safety. But is he successful in pushing such a change? The answer to this is not affirmative while interviewing with them.

Taking a detour to the behavior of a driver (human) driving a vehicle (system). Even if he is instructed to wear the safety belt(training) for his personal safety, he wears it not on purpose of being safe but when he never understands the inherent issue of safety. There are two behaviors observed in the driver driving the vehicle. First, when you call him often, he never picks up phone citing the reasons that he is driving the vehicle (outcome of training). Yet this behavior changes, when he receives some phone of his selfish interest. He not only picks up phone but he chats in an environment while driving the vehicle (change behavior). Now, this change behavior can lead to an accident as this is not a safe practice (illegal and unsafe act). This becomes a safe practice, if he stops the vehicle at a point and take a call (Legal and safe act). This becomes possible, if there is an appropriate planning to control such acts by virtue of appropriate planning (Management of change). Suppose, this same driver is asked to climb down again and again (repetition) to ask the address of the destination. There is observed another change in the behavior and that is he will prefer driving the vehicle without the belt for some time (stress) till he knows the actual way to the address and drive continuously (comfort zone).

In two different industrial organizations, wherein there is a great difference about the culture, there are solutions inherent to capture the human behavior and related stresses arising out of the same. In an MNC setup, where the culture of safety is quite old in the parent organization but it is customized as per local conditions, there are areas of concern to be addressed and so is approach towards them. This fact doesn't state that such a condition helps the stoppage of failure of systems at times. There may be other reasons for the stated conditions. That can be looked into later. But these things do not get easily addressed because safety systems are evolved in due course of time. During this new process of evolution, the human interface poses a problem that is not so easy to be addressed. This leads driving safety to a problem as was discovered during the process of the interview of safety officers.

The inquisitiveness arises what makes human mindset un-safe? Even equipped with education and money, yet something in the human mindset makes him or her act in not so safe practice. It has to do with the thought process because thoughts lead to action and action leads to habits. So, habits have the root cause in the mind set. What makes human mindset in certain situations so different?

In almost all scenarios, whenever a new concept is brought forth, it is resisted by negative. It might be when we were kids whenever we demanded something that was over ruled. Just as a kid asks for an ice cream, he is denied saying that he needs more of iron through green vegetable, rather than ice cream. This practice of denial keeps on the long run. If he wants to be a painter, he is told to be an engineer. If he says no, then he is cursed as if he is fit for nothing. Repetitive attack from negativity makes a human mind in certain situations full of Naysayers. This makes an impact when equipped with knowledge a person enters the industry and has to unlearn un-safe acts and practices to learn new systems and procedures. This creates a stress like situation in the human mind. He may behave well in certain conditions but he remains under stress. During this process of his staying in the hazardous conditions, he finds ways to de-stress himself. Thus on one side he learns about Compliances but his attitude remains towards non-compliance. Naysayer remains subordinate to the actual conditions. It is like a situation, when a person who enters the company's premises, he enters with an induction wherein if he rides a vehicle, he has to wear the safety belt and follow the defined route with lots of controls and monitors. This situation is stressful for the person. The moment he comes out of the company's premises, he heaves the sigh of relief while opening his safety belt.

Let us see another case on roads in certain countries. Herein, the regulations direct people to wear safety belts while riding the four vehicles and safety helmets while riding the pillion riding(Legal). This is beside lot of awareness in the media regarding the individual safety. Yet this act is completely not understood as to what prompts the responsible citizens to be un-safe while avoiding the regulations. This behavior however changes, if there are penalties being imposed at certain section of the roads by the traffic cops(enforcement). Is it on the belligerent note or negligence towards safety? There is another situation arising when driver is driving a vehicle without wearing a safety belt (unsafe act), the car beeps continuously (Engineering control). This stops when he wears the belt (safe act). Or the vehicle goes beyond a certain speed limit (unsafe condition), it again beeps (safe condition). This makes driver to slow down the speed within the recommended speed.

Analogies are taken in reference to Human behavior on

roads to understand the potentiality of an industrial setup. This is merely an effort to make things simple and zero in the exact problem of this typical unsafe behavior in the certain scenarios.

Another point is the ownership. Behavior of driver changes when he drives the vehicle owned by him. If he drives the vehicle as an employee under a contract, he is lax in his attitude towards vehicle's safety and personnel safety. This type of behavior is also observed among employees even in company's premises. Professional working under hazardous conditions in the plant premises also falter due to their respective lax attitude. This laxity not only is observed from being inexperienced but also from being over-experienced. At times, over confidence create miseries of sorts. Ownership also changes the human behavior towards safety of self and others.

Though there is enough emphasis upon training and awareness but this is not making any headway. Even after training and awareness, there are attempt by various individuals in their respective capacities towards adventurism leading to unsafe behavior. An attempt to measure and decipher the understandability of these training and awareness is a major gap. Records are generated to the satisfaction of the safety professionals but proactive effort to understand the effectiveness of the said training is missing. Even in an industrial setup wherein there is a presence of procedures, the same remain half understood by professionals. So what is being preached is not related to the written procedures. Then what is conveyed is also not understood. So a complex web of understanding and understood leads to a gap. Accidents in major industries in oil and gas sectors have a culture of training prevalent to a large extent.

Intellectual understanding from professionals have addressed the soft controls in the various risk assessments. Prevalence of gadgets and IT systems have not addressed the effective communication part. There is an absence of feedback mechanism and confinement to the safe zone of virtual world. So, the safety has become confined to documents which remain unapproachable to the workers at field. Field systems of safety do not work upon the thought pattern of workers. This creates a wider gap in an area of effective communication. How to address this gap is a challenging work in the present work environment?

These problems are assumed to be prevalent all over the world. This gets evident from the major disasters in the companies worldwide. However, the Multinational organizations who had set patterns in safety and who customize to the respective local work conditions and culture do achieve the results faster because of the hard controls already established in their respective organizations. This seems difficult in the Indian organizations wherein systems are being evolved after learning from others and lateral professional thought processes. Major disasters in the Indian oil and gas companies dominated by the PSUs lead to this introspection. These Indian organizations have robust safety procedures and defined systems yet the incomplete loop of various elements of safety management systems has led to the disasters.

Bureaucratic Indian mindset creates a further complicity. It is like Vedas un-deciphered and confined to caves. Big volume documents addressing something which has no direct relationship with the activities in field compounded with ineffective communication has led to a situation which must be understood as a whole. Perhaps the root cause is deeply psychological and sociological. Some typical ideas that we hear and activities that we do from childhood can be the contributor to this thought process:

1. Life is eternal (soft approach to understand life)
2. Everything is evanescent (this too will pass away)
3. Bowing to elders without consideration (a psychological cowering towards seniors)
4. Competitiveness to prove one's worth (Rote without learning)
5. Avoiding an inquisitive mind (Accept without questioning)

These all activities lead people not to question the existing conditions and actions. Whether the conditions and activities are safe? Whether they can be improved if seen from another viewpoint? If there are no such checks and balances, thought process remains devoid of ideas. Ideas infuse a challenge to the existence. Any new revolution was once an idea. So if ideas are not allowed and new thoughts processes are not promoted, then checks and balances remain driven by individual fancies and experiences. Interpretations become an art instead of science. Different patterns will emerge within the organization that will become like small whirlpools in a big ocean. Since safety is a system driven approach, no concrete structure emerges in the organization. Safety remains the most talked about subject and confined to papers in various documents.

It ultimately comes down to an effective communication. Just take it to the roads. Everyone all over the world stops at Red signal and moves at Green signal. It is learnt

by observing and following. No big procedures but simple instructions only that to learnt by observations and practice. Mind grasps things easily if the things are simplified. Simplification delivers clarity and thereby understanding. Perhaps safety is too complicated for the Indian mindset because of bureaucratic approach.

Definitely systems may produce barriers for safety regulation but Enforcement is another drive. Enforcement inherent in the safety systems can drive things to some extent. This enforcement needs to be implemented globally but this is a difficult proposition as countries find to arrive at a single viewpoint on safety. Hence, mandate was given to ILO to develop Guidelines for general directions. Enforcement will be successful if it is led by setting an example. Humans adjust to a certain set pattern and develop a habit to be convenient.

There appears a strange thought process "Nothing will happen to me". This thought process get a jerk when humans learn by self experience on negative things. A father is protecting a child from the doors edge by putting his palm to protect an injury to his head. He learnt it the hard way. The there is no focus on an outcome, hence this learning remains poor till an injury inflicts the wound. This stated thought process as if nothing will happen to me is either due to laziness to adopt to change or resistance to change. There can be a spiritual connotation which stresses more on Death and pain. Cultural up-bringing by continuous focusing on negativity and denial can lead to this negative thought process. Resistance to change may happen due to rebel behavior.

An important fact is that we do are not ready to listen to unpleasant truth. Term policies in Life insurance are not popular because they do not return money and then it reminds the financial benefit only after death (unpleasant truth). There is no glamour in life, whatever are the facts which lead to one truth. Dutch Philosopher Soren Kierkegaard, Danish Christian philosopher and theologian said observed - How close men, despite all their knowledge, usually live to madness? What is truth but to live for an idea? When all is said and done, everything is based on a postulate; but not until it no longer stands on the outside, not until one lives in it, does it cease to be a postulate (Dialectic – Dispute; Journals of Søren Kierkegaard 1A75, 1835).

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HOUSING POLICIES: COMMON GOALS AND DIVERSE APPROACHES TO SOCIAL HOUSING IN INDIA AND OTHER COUNTRIES

Madhu Bharti & Sriram Divi

ABSTRACT: Rapid urbanization has lead to housing shortage in the developing countries. In India the responsibility of mitigating the 18 million housing shortage lies with the state governments. Access to quality shelter is still a big challenge before the nation and requires immediate actions. Many successful and some not so successful approaches have been tried in India. As housing lies in the domain of state governments in India, each state has come up with its own solutions. Similarly many countries have tried approaches relevant in their context. This paper tries to learn from different approaches to a common goal and identify possible interventions.

KEYWORDS

Housing shortage, Developing countries, Housing policies

Background

The rapidly growing urbanization has led to a few important concerns to inclusive and improved city planning, one of which definitely is affordable housing and the possibility to mitigate the housing shortage in any of the growing city in the country. The urban poor in our country have always been marginalized in term of access to basic rights of housing with basic infrastructure facilities of clean drinking tap water, drainage, health care and other amenities. Access to quality shelter is still a big challenge before the nation and requires immediate actions.

The urban poor have inability to access decent, secure land for even the most minimum of housing needs. Empirical evidences shows that the insecurity of tenure and poverty has a direct correlation, further poverty and insecurity of tenure is a vivacious cycle which is difficult for the poor to break. Security of tenure is the important factor for eradication of poverty.

Across the world, developing countries have struggled to provide a solution to housing problem. Some countries have banked on public or institutional build housing while some countries have adopted the market driven approach with the involvement of private sector.

The total housing shortage estimated at the beginning of the 12th plan period i.e. 2012 according to the Report of the Technical Group on Urban Housing Shortage will be 18.78million of which 56% and 39% of housing shortage is in EWS an LIG housing respectively. The schemes launched by central and state Government including RAY, JnNURM, PMAY-U etc. is expected to caters to the urban housing shortage. However, the government is not in a position to serve the huge housing shortage on its own and therefore it has been making efforts to involve private sector in the process by providing incentives. The government has, through the ‘National Housing and

Habitat Policy, 2007', emphasized on promoting Public Private Partnership for undertaking housing projects. This was further revised to incorporate the changes as per the new agenda of Government of India on "Housing for All" by 2022.

The Public-Private-Partnership (PPP) model has proved to be successful phenomena in implementing a number of infrastructure projects such as roads, airports, ports, power plants etc. Therefore, there is a need to explore it further in the Housing sector for incentivizing housing for urban poor.

Aim

The aim of this paper is to study the various approaches to housing in India and other countries, the specific objectives being:

- To study the pro-poor and social housing policies of countries those have successfully mitigated the housing shortage.
- To study various policies and joint sector approaches for housing the urban poor undertaken by center government and various state governments in India.
- To identify the parameters that can be incorporated for a wider approach to housing shortage in India.

Approach for the study

In order to achieve the objectives set for the research, the following methodology has been followed;

Step 1: Identification of successful case studies regarding social housing in other developed and developing countries to understand, the context and the parameter that facilitated successful interventions.

Step 2: Study of best practices and approaches in various states of India. Learning from these case studies and identifying the relevant parameters for comprehensive approach.

Step 3: Identification of common parameters that led to success of these cases and how they can be incorporated in housing policy in India.

Structure of the report

The first part of the paper contains successful stories of implemented cases of social housing from other developing and developed countries. The second section focuses on the provisions made by central as well as different state governments to help promote affordable housing in India. The last section identifies the parameters for implementation of pro-poor PPP in housing policies and how.

International Case Studies

This section includes the case studies of how other countries have addressed the issue of shortage of housing.

Social Housing in Europe: Public and non-public sector partnership

Social Housing has been an integral component of Europe's housing provisions for more than half a century. Historically, the provision of housing varied in Europe from, more of a social contract in Western Europe region to a more corporatist approach in Central and Eastern Europe. Across Europe, housing was viewed as welfare good / consumption good depending on the socio-economic-political realities of different countries. In Eastern Europe social housing cost/rentals was linked to the social wage and controlled by government. However, to the contrary Southern Europe paid emphasis on supporting family provision i.e. generally an owner occupation. Northern Europe was seen as welfare state establishing a market enabling households to afford rented units from a non-profit organization.

In some countries like Denmark, Nederland's the social housing stock is owned by housing associations; whereas in countries like Czech Republic, all social housing is owned by municipal government. In recent years there has been a trend for social housing to move out of public ownership, often into the hands of not-for-profit housing associations with a social mission (Scanlon, Arrigoitia , & Whitehead, 2015).

In Netherlands the social housing companies played an important role by collaborating with the local urban bodies (municipalities).Where the land was provided by the municipalities at a subsidized cost and the housing companies built social housing, much of this housing was provided on rental basis to the vulnerable section of the population.

Manchester City Council: Private company for public cause

Facing the problems of deteriorating housing stock, Municipalities in UK have partnered with a private sector enterprise to re-furbished and maintain City Council homes, for a twenty-five year period and to provide comprehensive management service. The private sector partner has a responsibility of repairing, maintaining and managing the homes and the general environment of

the area. Such projects were taken up under the Private Finance Initiative (PFI) in the Housing and Regeneration sector of the Department for Communities and Local Government.

Plymouth Grove remodeled estate initiated in 2003 under the project included the provision of long term property management of the A6 Plymouth Grove/ Stockport Road Estate. It also includes the provision of new housing, the refurbishment of 600 houses as well as extensive remodeling of the estate. The scheme was success and model for such other redevelopment through PFI to follow.

Housing Policies in US:
Focus on poverty and housing

Housing policy in the United States has been viewed as a commodity-an investment for individuals and families or as a subject of speculation. Home ownership has always been the central notion behind policy in US.

The USA housing policy, which had its origin in the American Housing Act 1937, aimed at providing subsidies to the low income households by providing financial, construction and operational support to housing agencies. In 1949, American Housing ACT Congress declared its goal of "a decent home in a suitable living environment for every American family." The Act aimed at Providing federal financing for slum clearance programs that associated with urban renewal projects in American cities, increasing authorization for the Federal Housing Administration (FHA) mortgage insurance, extending federal money to build more than 800,000 public housing units and Permitting the FHA to provide financing for rural homeowners. Fannie Mae and Freddie Mac were set up to reach housing to the mass through provision of mortgage finance. Under this reform, more than 5 million housing units for low-income households and rental vouchers to nearly 2 million additional families were provided (Buckley & Schwartz, 2011).

The Tax reform of 1986, authorized low-income housing tax credit program (LIHTC) which is a form of providing low income households assistance via vouchers. This gave the poor households freedom to pool their resources along with the voucher and pay the market rent for any particular dwelling if they so desired.

The Moving to Opportunity (MTO) Program[1] implemented in the US since the 1960's is a policy aimed at fighting poverty and assisting families to move from poor neighborhoods to better housing with improved access to schools and other amenities. The results of most MTO programs (in particular for Baltimore, Boston, Chicago, Los Angeles and New York) have shown positive impact in reduction in crimes and improved education and employment. (Buckley & Schwartz, 2011).

Housing policy in Singapore:
State as the sole provider

The city state of Singapore has achieved a high homeownership rate of 91 per cent and has made remarkable progress since its Independence. In 1959, (Singapore attained self-government), only 9% of Singaporeans resided in public housing. To address the issues of housing shortage and overall development, the Singapore Housing and Development Board (HDB) was formed to provide affordable housing, by issuing the housing units on 99-year leaseholds. The Housing and Development Act (1960) gave the Housing Board lead role across the housing chain. In 1967, The Singapore Land Acquisition Act empowered the country to acquire land at low cost for public use including housing.

In addition, Singapore HDB also linked the Central Provident Fund[2] for purchase of housing units from HDB. Buyers in Singapore, who want to buy a house from HDB have to be a citizen of Singapore, more than 21 years of age and an employed person. The residents could fund the purchase of a development board flat with a bank loan, a loan from the HDB, with cash, or with funds drawn from the CPF. Singapore's HDB housing units are built in HDB town-ships having amenities including clinics, schools, commercial & retail facilities and community facilities such as parks and sports facilities.

Kuala-Lampur's Housing Initiatives:
Active state participation

The Malaysian capital city of Kuala-Lumpur is one of the three Federal Capital Territories of Malaysia. Here the City Hall of Kuala-Lumpur (CHKL) a local government authority is responsible and committed to provide housing for all in the city, to significantly reduced squatter settlements and planned to have 'Zero Squatter City' by 2015.

[1] The program is optional and covers families that live in an area where more than 40 percent of the population are defined as poor. The government covers the additional cost that emerges when the family is to change from cheaper to expensive housing.

[2] It is a savings scheme, which included contributions from employers, to set aside funds for healthcare and housing costs in later life.

The joint private and public sector participation to achieve the city objectives is guided by the agreement specifying the responsibility of the parties. To ensure the diligent participation of the private sector, the agreement first require the payments of 10% of land value of the land granted by the CHKL and 5% as performance bond of the construction cost. It is upon these payments and the approval of building plans that the developer is given the possession of site. On the progress of the development of the project, the CHKL maintains "Joint Project Management Committee" (JPMC) with 7 members, which comprises of equal representatives from the CHKL and private sector.

For this joint participation, the government offered incentives to the private sector, with a view to reducing the development cost and thus sustaining their participation in the provision of low-cost housing in Kuala-Lampur. The range of incentives provided includes easier access to CHKL land or squatter land; the reduction of parking space requirement from 1:1 to 1:4 and exemptions from the payment of development charges and improvement service funds. Also, the private developers are offered with 'one-stop approval' section in the CHKL, that provide timely approvals for the development of low-cost houses, view of streamlining the delays and cost associated with the development and building plans applications. To sustain the participation of the private sector, the low-cost housing's ceiling price has enjoyed series of revision, reflecting the inflationary trends and increasing value of land in the country.

Housing policy in China:
From state controlled to private supply

Under China's planned economy, housing provision was controlled by the single supplier, the state, under a communist ideology that asserted that social inequalities and class exploitation should be eliminated through the direct and centralized redistribution of housing, while the free market should be suppressed. The agenda issued by the State Council in 1988 for 'Implementation Plan for a Gradual Housing System Reform in Cities and Towns' marked the beginning of nationwide housing reform (Deng, Shen, and Wang, 2009).

Housing provision in China has become dominated by a three-layer provision mode which introduces private equity into public housing provision. The housing reforms resumed in the early 1990s where house building was carried out by commercial developers rather than public sector employees. Housing privatization was a main element of these reform programs. In other words, the housing reforms mainly emphasized shifting housing from a "free good", to a "subsidized good", and eventually to a "commodity", the price of which (i.e., sale price or rent) reflects true production costs and a market profit margin (Chiu 1996). The socialist system of public housing and welfare support has gave way to a new market based system (Lee, 2000).

During 1998-2003 government introduced two new programs to encourage urban household to purchase ownership housing from private developers. The Economic and Comfortable Housing Program (ECH) and the Housing Provident Fund Program (HPF) were developed with the private sector being active for provision of affordable housing for middle and low income households via purchase subsidies. Later in 1999, Cheap Rental Housing Program was established with an aim to provide housing to the low income working class people by offering rent reductions and rent subsidies. The government also provided subsidized housing or public rental housing to selected low and middle income families and relied on the market oriented commercial housing to meet the needs of higher income groups with access to mortgage financing. As a result, a vigorous urban housing market developed. Employers were allowed to offer housing subsidies to their new employees but could not involve themselves directly in housing construction, distribution, or management (Man, 2011).

Housing initiatives in Nigeria for Affordable Housing: Public-private approach

Public–Private Partnership (PPP) is a relatively new approach in Nigeria, and was introduced to address the escalating housing challenges. The idea of engaging PPP in housing development in Abuja started with the commencement of mass housing scheme in 2000 under the framework of PPP. The implementation of mass housing scheme was managed by a committee having members from the government, target group residents and developers. The developers were made to sign a development lease need to complete the project within a stipulated time. The development was required to follow the regulation and standards as per Abuja master plan. Land was allocated free of cost to the developers as government equity contribution for the project. The developers were expected to pay a small fee to the city government for permissions and approvals.

In recent years, the Cross River State Government has assisted its employees to acquire a housing of their own at reduced price by provision of long term loan. Recently, the state government through its partnership with Aso Savings and loan powered by Millennium

Investment Trust Limited has been able to provide over 450 affordable housing units to the State's Civil Servants through the Public-Private Partnerships (PPP) initiative.

Housing Policies in India

The role of housing is multi-faceted in the progress of a household as housing affects access to infrastructure, employment, health, education, poverty levels and many other indicators (Gopalan & Venkataraman, 2015). As India seeks to improve its living conditions on a large scale, and access to affordable housing becomes a major stumbling block for its citizens. Current urban housing shortage in India accounts to 18.78 million units (MoHPA, 2012-17). Over 95% of those affected via acute housing shortage belong to the Economically Weaker Section (EWS) and Lower Income Group (LIG). India is expected to gain a staggering 218 million people in its urban areas from 2011 to 2030 (United Nations 2012). Government intervention into housing is driven by a number of different rationales, ranging from human rights to fundamentals of economic growth in terms of housing (Young, 2016). The extent of government support for housing ranges from a comprehensive approach, such as the wholesale provision of public housing to a more hands-off approach of playing a facilitating role in market-based activities.

One of the challenges our cities face is the lack of adequate supply of housing to all households. The central government, state governments and the city governments all thrive to bring the urban poor in the mainstream of planned city by following inclusive planning. The central government as well as state governments make provisions for mitigating the housing shortage by providing various direct and indirect financial options (Bharti, 2019).After trying out various options many states in the country now want to reach the goal of affordable housing for all through Public Private Partnership, for which again different states have set of models, polices and schemes specified for EWS/ LIG.

Housing policies in India have come a long way since the 1950s; initially the policies were welfare centric which later on dwelled to be economic-centric policies. The role of government has also seen a shift from being provider to being the facilitator of housing(Bharti,2019). Dividing the policies in India into four phases as the first phase comprising of first two decades (1950s to 1970s) where the policies were taking shape that focused more upon integrating all sections of the society. The second phase (1970s to mid-1980s), shifting the focus to economically weaker section (EWS) of the society. The third phase (1980s to 2000s), focusing more on physical provision of housing as well as housing finance mechanisms. The last phase (2000s to present) shifting the role of government as facilitator of housing. Here, in this paper I focus on housing policies in the last phase ie. from 2000 to present.

The major reform came with the onset of Jawaharlal Nehru Urban Renewal Mission (JNNURM), 2005. The program was launched with an objective to improve state of infrastructure in cities[3]. The two sub-missions under JNNURM are Basic Services for Urban Poor (BSUP) designed to upgrade and improve the existing conditions of slums by giving them access to basic amenities like water and sanitation, health care and education etc. The second part is Integrated Housing and Slum Development Program (IHSDP), designed to tackle the poor housing for urban slum dwellers as per 2001 Census.

Rajiv Awas Yojna (RAY), launched was in 2011 with a vision to 'create a slum-free India'. Under the scheme, central support up-to 25 percent of cost of civic infrastructure (external and internal), whichever is lower was provided. The first component of RAY involved in-situ slum redevelopment of existing slums and second proposed to curb creation of slums.

The Affordable Housing in Partnership (AHP) a part of the second component of RAY made provision for public private partnership for affordable housing. The state's implementing agencies were to make effort to ensure that at least 25 percent of the total built up/constructed area of the projects proposed is for EWS/LIG units. To facilitating private investment in this sector, Government had allowed 100% FDI in housing sector and the budget (2014-15) has gone one step further in this direction by listing slum redevelopment as an accepted component under the Corporate social responsibility (CSR)[4] to attract more private funds (GOI,2014-15).

Pradhan Mantri Awas Yojna[5] - Urban launched by the BJP government in 2015 envisages 'Housing for All' by 2022. The flagship mission under the Ministry of Housing & Urban Affairs (MoHUA), Government of India aims

[3] JNNURM It was launched in 2005 for a seven year period to encourage cities to initiate steps in improving civic services and improve housing.

[4] Government policy under which corporate sector is to invest a... for social development of community.

[5] Housing scheme launched by central government in name of Prime Minister.

to achieve Transformative, Inclusive and Sustainable development through planning, development and reforms. The Mission compromises of four components:

i) In situ slum redevelopment by using land as a resource. Slums located on government land/ ULB land or private land are covered under in-situ slum redevelopment for providing houses to all eligible slum dwellers.

ii) Promotion of Affordable Housing through credit linked subsidy for beneficiaries include economically weaker section (EWS), low-income groups (LIGs) and Middle Income Groups (MIGs).

iii) Affordable Housing in Partnership with Public & Private sectors, where the private sector and public sector join together to produce the required housing stock.

iv) Subsidy for beneficiary-led individual house construction /enhancement for families who want to construct their own house or make addition to the existing housing unit.

Under each of the components eligibility, income groups, ceiling for subsidy, minimum construction, unit area and other conditions vary so as to benefit large number of people.

State Government Initiatives

The various State Housing Policies have followed the philosophy as outlined by the NHHP and formulated their policies accordingly. Major policy initiatives towards the goal of Affordable Housing include reform of rent control act, increased supply of land, reservation of land for the poor, in-situ slum up gradation, reduction in stamp duty especially for the poor, creation of State Shelter Funds for increased flow for EWS /LIG housing, interest subsidy, increased FAR, simplification of procedures for getting various permissions for building housing. Some of these initiatives had become as a necessary condition for access to central funds under the JNNURM. The above mentioned reforms are common to all state housing policies being analyzed to review their contribution to promote PPP in the affordable housing sector. The below mentioned are few such supportive initiatives from different state governments. This includes the different implementation mechanisms and tools followed/ proposed by state governments to promote housing for urban poor.

Maharashtra

Maharashtra among the third most urbanized State in India has a large slum population, specially in Mumbai. Various efforts for slum improvement and redevelopment have been made by the state in the recent past. Main approach for increasing housing stock is through involvement of private sector by providing incentivized floor space index (FSI)[6] and use of tools like, transfer of development rights (TDR)[7]. The state in its housing policy makes provision for at least 10% of the layout for EWS/LIG tenements and highlights the intention of government to provide adequate lands for LIG/EWS housing. Maharashtra state was the first state to introduce Slum Rehabilitation Act to provide free housing to the slum residents while the rest of the built units could be sold in open market to raise resources for new housing.

The Maharashtra Housing and Area Development Authority permits 20% increase of normally permissible FSI in the case of their schemes having at least 60% of the tenements under EWS/LIG category, permitting the underutilized FSI for HIG and MIG categories, thus making the schemes financially sustainable and increasing the housing stock.

Kerala

The Kerala government accorded the highest priority to housing of the economically weaker sections (EWS). The Kerala Housing and Habitat Policy aims at facilitating accelerated supply of serviced land and housing with particular focus to EWS and LIG categories. The 'Cash Loan Scheme' is popular in Kerala where the eligible applicants receive cash loan assistance for construction of housing assistance (Bharti, 2019). Subsidy and loan amount varies with reference to income group and eligibility.

Local self governments (LSGs) in Kerala have been actively involved in house construction for EWS since the participatory planning process was launched in 1996. Local Self Government Institutions (LSGs) through Municipalities and Panchayats support public / private / NGO / CBO sector participation in direct procurement of land for EWS groups which is necessary for housing

[6] Ratio of built space to the total plot area.

[7] Provision to allow the excess FSI area to be used in other areas in city.

construction. All the three tiers of Panchayats give top priority to housing projects for EWS. The Bhavanashree component under the Kutumbshree program has been successful to provide EWS housing and small loans for repair, renovation of housing units. Given the urban-rural continuum in Kerala, the state Government encourages Public-Private-Peoples-Partnership (PPPP) to undertake Integrated Housing and Township Projects in the semi urban areas.

Madhya Pradesh

Provisions have been made in the Madhya Pradesh Housing and Habitat Policy - 2007 to seek participation of private and corporate sectors to meet the requirement of social housing in the state. In addition, provisions have been made to make available government land to construction agencies at concessional rates for development of low-rise and low-density habitations in a radius of 30 kilometers to reduce the pressure of population in big cities of the state. The state adopted a multi-dimensional approach by focusing on slum development, infra-structure, and land development. Additional FSI was made available for redevelopment in slum areas. Further, 30% plots/houses developed by Urban Development Authorities//Housing Board are for the poor. MP is the only state to regularize tenure of squatters on government land through a specific State Act - Patta Act (MP Nagariyon Kshetrake Bhumiheen Vyakti Adhiniyam, 1984).

Rajasthan

As per the Habitat policy of Rajasthan, more than 80% of housing shortage is for EWS and LIG catogries. State Urban Agenda for Rajasthan is also prepared having provisions for the vision of making the state a slum free state in five years. This was proposed to be achieved by using the TDR tool and reserving 10-15% of developed land area or 20-25% of FAR whichever is more for EWS and LIG.

Various provisions made for increasing the land supply by land acquisition through settlement/negotiation, the Government of Rajasthan made following options:

i) If the land is surrendered by the owner free of cost to Government, the owner gets maximum 20% residential and 5% commercial developed area in the same scheme.

ii) If it is not possible to allot land in the same scheme area the owner gets cash in compensation.

The state government also introduced incentives as low registration fee for registration of properties and incentives for registration the property in name of women in the household.

Haryana

The state of Haryana has seen a rapid increase in urban population over time, nearly 35 percent of the State's population resides in urban centers as per 2011. However, 25 percent of the urban population of Haryana lives in slums (BPL survey,2007). The key initiatives taken by Haryana government for housing sector was earmarking of 25% of the budget for the urban poor in all ULBs and earmarking of 25% of the gross area for EWS Housing under the land pooling scheme of ULBs. The state government also enforced a condition of allotting 20% of the number of plots in the colony to EWS category of persons having a family income up to the prescribed limit. This condition was enforced while granting a license for development of any residential colony by a private developer under Haryana Urban Development and Regulations of Urban Areas Act 1975.

West Bengal

With the increasing problem to accommodate urban poor in the process of city planning, the main approach presently being adopted is joint venture projects for EWS and LIG plots and flats by Housing Board and Development Authorities. Such schemes have been given relaxation in ground coverage, front, side and rear spaces as well as minimum plot size. The new township regulations being brought out where developers will have to develop low income housing as per the National Housing Policy. Incentives for exemption of property tax has been exempted in case of units whose annual rental value does not exceed Rs. 500/-

The housing department has formed several joint sector companies with private companies where 25 percent of plots/ flats have been reserved for EWS/ LIG through cross subsidization. FAR relaxation is provided for housing for the poor so as to accommodate additional housing units and make the project financially sustainable.

Conclusion

A study of approach to housing across various countries has shown that the path followed by each country is unique to its specific requirements. However, countries irrespective of level of economic development and political systems have promoted housing for the vulnerable sections by having focused schemes for them, either by provision of direct subsidy, vouchers, access to bank loans or by improving the access to housing. Countries like China, have followed the complete socialistic model in the past have now introduced private players in the housing market. Similarly, Singapore has moved beyond the HDB as the sole provider and has made a small space for private players.

Across Europe, post WWII countries provided social housing by partnering with not-for-profit business enterprises. Land, the most important component for a housing project was provided by ULBs and construction was carried out by not-for-profit private business enterprises. This model has been successful in Netherlands and other north European countries. Similar initiatives were taken up Abuja city (Nigeria) by allocating public land for housing development. UK followed the path of social housing by providing rental apartments at a very low rent. As the maintenance of such assets was proving to be financially unviable, the PFI taken by Manchester City Council were successful in renovating housing stock in the city.

USA followed an aggressive model of ownership housing for all, supported the construction of new housing stock by private developers and made public funds available for housing through mortgage finance. Setting up of financial institutions to provide housing loans was a significant step to making housing access-able across income groups. Unfortunately, US housing sector had to bear the brunt of sub-prime crisis, with many household getting evicted from their homes. However, the LIHTCP and the MTO programs have proved to be a success as the program focused on the comprehensive economic development of the family, rather than only housing unit. Evidently the benefits from the MTO, due to its comprehensive approach and involving the beneficiary as a partner to make the desired choice are the keystone of the success of the program. African countries like Nigeria are making significant partnership with private enterprise to provide affordable housing.

The first phase of Indian housing was heavily regulated by the government, with government institutions as the sole provider/supplier. The lack of resources (manpower, financial resources, land) led to massive inefficiencies and shortages. The houses offered under the hire-purchase scheme by public authorities like DDA and other housing boards were sold at a high premium in the black market.

Indian cities have moved from a provisionary approach to a partnership approach, by involvement of private sector as the construction agency. Maharashtra was the first state to implement the Slum Redevelopment scheme and has met with considerable success in Mumbai. Other states like Rajasthan, Gujarat, and Madhya Pradesh followed by involving the private sector for slum redevelopment, though the progress in some states has been slow. Recognizing the strength of in-situ development, PMAY-U has proposed ‘in-situ development’ as an independent vertical under the scheme.

Though, some of the redevelopment schemes have been successful, there is a need to make the program demand based. Provision of social rental housing at multiple locations in the city would be welcome, as this will provide much needed residential choice to the poor. Housing and occupation choice should be able to complement each other, so that poor do not have to select either of the two.

A significant aspect to modern approach to housing in India has been use of tools like additional FSI for affordable housing, TDR from dense areas to less dense areas of the city and sale of additional FSI. The public authorities can regulate development by using fiscal tools.

Partnership of private sector with the state housing agencies where the public agencies provide land and the private sector builds housing units needs to be accelerated by providing attractive financial incentives. This can be promoted by linking the CSR funding of companies to provision of housing units.

Other NGO's should be promoted to develop rental housing in partnership with the public institutions, where the construction is taken up by efforts like setting up of new banks like the Bandhan Bank, for provision of finance for the poor need to be multiplied so that access to housing loan for the poor is increased. Micro-finance and cash loan as in Kutumbshree and other governance initiatives are significant steps in the right direction and need to be promoted across the country.

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