

ENVIRONMENTAL MANAGEMENT INFORMATION SYSTEM (EMIS) FOR SUSTAINABLE ORGANIZATIONAL DEVELOPMENT A LITERATURE REVIEW

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ABSTRACT

The study talks about significance of Environment Management Information System (EMIS) for sustainable Organizational Development. It also refers to the efforts made by few Multinational Organizations who had acknowledged the importance of some sort of Environment Management Systems.

KEYWORDS—Management Information Systems (MIS); Sustainable Development; Organizational Management; Environmental Management System (EMS).

I. INTRODUCTION

Sustainable Development

“Sustainable Development” is defined as the “development that meets the needs of the present generation without compromising the ability of the future generations to meet their own needs” (Brundland G, Our Common Future, UN, 1987). “Sustainable Development” with respect to a business organization is about its ability to use the least quantity of resources to maximize its desirable outputs. In other words, it is about using the natural resources productively, reducing the wastes and emissions, leading to a continual improvement in environmental performance. Any management tool that helps the organization to improve its environmental performance therefore helps “Sustainable Development”.

Information Systems

Information Systems (IS) are defined as a collection of hardware, software, data, people and procedures that work together to produce quality information (Wikipedia, 2014). Information Systems have been successfully used by various core functions such as finance, marketing, manufacturing, material management, Human Resources etc., of a business organization to improve its overall efficiency, effectiveness of decision making and to help growth and profits. Application of IS to Environmental Management is still in its infancy in India. A few large business organizations have started using IS tools, including ERP and CRM tools, to develop environmental information for different audience.

II. RATIONALE

The Present Situation

Discussions with experts knowledgeable in the subject area reveal that there are three situations in India with respect to application of EMIS which can be explained as follows:

- a) Business Organizations that have an Environmental Management Information System in place and use the same for processing the data and provide information to the top management for decision and action

- b) Business Organizations that use IT systems in specific areas such as Green House Gas emissions, energy consumption etc.
- c) Business Organizations that do not use any EMIS or IT Systems for managing environmental performance; collection, collation, reviewing and reporting of the data is manual in these organization.

The researcher is interested in studying these three types of organizations to understand if indeed EMIS helps the organization to improve its environmental performance.

III. LITERATURE REVIEW

Advancement of Information and Communication Technology (ICT) has a limited scope of convenient System Deployment, Implementation and finer input processing to get desirable output. Although with High Performance Computing and Knowledge Management Tools the Business Computing and Intelligence Capabilities have been improvised, there is tremendous need of promoting long-term viability of Environmental Informatics along with Artificial Intelligence Techniques. ^[4] (G. H. Huang and N. B. Chang, “Perspectives of Environmental Informatics and Systems Analysis”, *Journal of Environmental Informatics* 1 (1), 1-6, (2003)). As a subcomponent of ICT, Environmental management information systems (EMIS) evolved out of a growing need to manage environmental information in response to internal and external pressures such as regulations, consumer demands, stockholder expectation, and changes in the business environments. While over the past decade EMIS have proliferated in the corporate landscape, these systems have received little attention within the information systems research community as whole. There are significant and relatively untapped research synergies existing between information systems and environmental management for sustainable development at the organizational and technical levels. ^[9] (Omar El-Gayar and Brian D. Fritz, “Environmental Management Information Systems (EMIS) for Sustainable Development: A Conceptual Overview”, *Communications of the Association for Information Systems*, Volume 17, Article 34, 22 May 2006).

It is estimated that the penetration of EMIS within the Indian industry is insignificant; it is likely that about 50 to 60 business organizations use EMIS in one form or the other to enhance their environmental performance. Among the early users of EMIS in India are ITC Ltd., and Infosys.

ITC Ltd., the Indian Company known for its Strategic Sustainability initiatives, has identified several physical and regulatory risks that can impact the long-term sustainability of the organisation. With the help of Internal Corporate Information Systems ITC has monitored and

controlled them to take better business decisions and device appropriate strategies. Board approved Policies such as those on Environment, Health and Safety, Life Cycle Sustainability of Products and Services and Responsible Sourcing, provide the necessary direction to address the direct impacts of the Company's own operations as well as progressively extend the efforts along the supply chain. One of the key performance indicators (KPI) 38.1% of the total energy consumption of ITC was met from renewable energy sources. Using Predictive Modeling and Forecasting Techniques ITC intends to achieve a 50% renewable energy share by 2020 in a progressive manner. ITC has computed its greenhouse gas (GHG) inventory, including GHG emissions, biogenic carbon dioxide (CO₂) emissions and GHG removals, in accordance with ISO 14064:2006 Standard. ITC has adopted strategies that focus on the replenishment as well as conservation of water. As a result The Unit at Tribeni has achieved a 55.8% reduction of specific freshwater intake per tonne of product during the reporting period, in comparison to 1998-99 (ITC Sustainability Report 2014).

CASE STUDY : ITC E-CHOUPAL - A SUCCESS STORY

Asia Pacific Association of Agricultural Research Institutions (APAARI) has published a success story on ITC's e-Choupal initiative : Innovation for Large Scale Rural Transformation.

To address the challenges of environmental degradation, ITC constantly strives to minimize its environmental impact – from leading-edge manufacturing processes in its factories to building the largest, greenest hotels in India, and making it a priority to clean up the eco-footprint of all aspects of its operations as far as possible as well as expanding its renewable energy portfolio. To foster sustainable and inclusive growth, ITC has spearheaded an Integrated Rural Development Program to empower farmers and raise rural incomes. The strategy of this intervention is broadly centered around four distinct dimensions, which together enable a comprehensive development of the rural ecosystem. These dimensions are in the areas of (i) information and knowledge dissemination (ii) access to quality inputs and markets (iii) generating supplementary incomes, and (iv) natural resource augmentation. ITC e-Choupal attempted to create a virtual agricultural trading platform for the first time in India by leveraging information technology and extending low-cost connectivity to farmers across the country through a network of rural internet 'kiosks'.

As per the study, income improvements for soya farmers in Madhya Pradesh in terms of Net Profit improved to Rs. 19,239 (2012) from Rs. 5,753 (2010). Moreover E-Choupal procurement advantage for ITC is Expenditure Rs. Per Ton reduced from Rs. 849 (Mandi) to Rs. 250 (E-Choupal). In turn this kind of Management Information System helped to reduce Carbon Footprint as well as improved accountability significantly contributing to Organizational & Environmental Sustainability.

At Infosys, with the help of Information Systems Waste generation patterns are continuously monitored and the process of waste management is modified accordingly.

Optimization of customer asset management process with the help of CRM (Customer Relationship Management) tool resulted in reduction in Carbon Footprint. The performance of the compute platform improved with latest-generation multi-socket multi-core servers, but there were still some challenges as the storage had performance bottlenecks for enterprise data centers due to the adoption of server virtualization. The addition of Solid State Disks (SSD) helped address the performance issues, but the high cost of the drives posed challenges to the Total Cost of Ownership (TCO) as it required continuous operational expenditure (OPEX) investments. ^[5] (Infosys Sustainability Report 2013-14).

As the information revolution continues to accelerate, the environment remains high on public, industrial developments and political agendas around the world. These two topics are rarely connected, but information – its collection, processing, accessibility and verification – is crucial in dealing with environmental challenges such as climate change, unsustainable consumption, biodiversity conservation and waste management. The information society (encompassing entities such as the Internet, satellites, interactive television and surveillance cameras) changes the conditions and resources that are involved in environmental governance: old models and concepts are increasingly being replaced by new, informational ones.

The proposed study aims to explore how the information revolution is changing the way we deal with environmental issues, to what extent and where these transformations have (and have not) taken place. ^[10] (for example, as discussed in the Book: Arthur P. J. Mol, Environmental Reform in the Information Age: The Contours of Informational Governance, Cambridge University Press (Feb 2011)). Within its overall aim, this study seeks to synthesize the environmental sustainability literature to increase its accessibility by a diversity of policy makers, practitioners, and researchers. Environmental sustainability is a complex and multifaceted issue but the literature to date is overwhelmingly discipline-oriented. Hence, the proposal that a comprehensive, trans-disciplinary framework for business transformation based on synthesis of the literature could facilitate the level of transformation required in business, politics, and society. The framework for business transformation is trans-disciplinary, rather than multidisciplinary (more than one) or interdisciplinary (several integrated), in that the objective is to present a conceptual understanding of best practices in EMIS by Indian Industries which in turn are applicable by stakeholders across and beyond academic disciplines. The study subsequently sought to show how these outcomes could be applied to assist fundamental change in prevailing practices that restrain technology-generated environmental degradation and to promote opportunities for technology-enabled solutions. ^[14] (Steve Elliot, Trans-disciplinary perspectives on environmental Sustainability: a resource base and framework for it-enabled business transformation, MIS Quarterly Vol. 35 No. 1-March 2011).

Although Research reports from ^[16] Cisco (2008), McKinsey (Boccaletti et al. 2008), the Economist Intelligence Unit (EIU 2008), the Climate Group (2008), and the European Union (Barroso 2008) underscore the potential of IS to promote environmental sustainability, popular media accounts paint IS as a villain, as illustrated by the following newspaper headlines: "Massive Computer Centers Bad for the Environment" and "American Electronic Waste Contaminates China and India." IS scholarship is sorely needed to overturn half-truths, contribute to the body of knowledge about environmental sustainability, and develop a well-founded discourse on IS for environmental sustainability that leads to improvement of the natural environment. ^[8] (Nigel P. Melville, Information systems innovation for Environmental sustainability, MIS Quarterly, Vol. 34, No. 1, pp. 1-21, March 2010)

IV. PURPOSE OF STUDY

Industries are beginning to realize that they must be able to evaluate their environmental performance better, and on a continual, real-time basis. They must also be able to quickly identify new ways to do business in order to improve performance while reducing potential environmental risks. And, by meeting these objectives, they will ideally be able to recognize how new environmental targets should be defined and supported. Finally, they identify a key element of success as being the ability to create appropriate implementation and training plans that can be set up and provided to employees quickly, follow-ups on established performance processes carried out, and audits conducted accurately. All these activities should make performance evaluations by managers and decisions to improve the system and monitor performance much easier. Given these key management requirements, EMS implementers realize that in order to manage a changing landscape of environmental issues efficiently, if not profitably (system inputs, laws and regulations, aspects, impacts, procedures, stakeholder needs, etc.) while protecting the environment should be done using cutting-edge technologies that can streamline the process of environmental management while not compromising performance. Therefore, environmental leaders at the head office and at each plant decide to apply a strategically oriented technical approach based on a sound environmental information system framework.

The purpose of this research is to study the application of EMIS by business organizations and to understand if EMIS indeed has helped them to improve their environmental performance, with respect to:

- a) Compliance with relevant legislation and meeting policy requirements
- b) Establishing and maintaining an environmental management system (ISO-14001)
- c) Planning and implementing environmental management programmes
- d) Resource conservation (including water, energy conservation) and waste reduction
- e) Responding to strategic environmental issues such as Green House Gas emissions and Climate Change

- f) Stakeholder requirements such as extended producer responsibility, sustainability reporting etc.

Does the application of Environmental Management Information System (EMIS) help the industry to improve its environmental performance?

Objectives:

- To study the existing practices of application of EMIS in the Indian Industry
- To study the present methods used by the industry for measuring and reporting various aspects of environmental performance
- To compare the environmental performance of organizations which use EMIS and those which are yet to use EMIS

Literature review process pointed out that an environmental management information collection system modifies and analyzes environmental impact information, which is collected and stored in advance, and calculates a reduction amount of environmental impacts at each of a plurality of processes included in activities of an organization. Moreover, there are many designs, approaches & implementations been tried out regarding EMIS systems. The system contains a central database and designed day-to-day managerial functions such as pollution source management, environmental quality management, environment statistics, emission charge management and official business et al.

The technical limitations of the traditional environmental monitoring and management, it cannot adapt to the rapid settlement of a wide range of regional eco-environmental problems, and ecological and environmental protection, so major obstacle is encountered in the data collection, dynamic tracking, information processing and analysis for ecological environment monitoring. Few articles & patents introduced new concepts for the organization of increasingly complex environmental research activities on the institutional, the national, or the international level. So it can be concluded that despite the ever increasing pervasion of Information Systems (IS) in business processes the industry lacks a focus on sustainability. While concepts of sustainability have been applied to many other areas, IS is yet to demonstrate a balanced economic, ecological and social focus.

Some study shows that the selection and deployment of sustainability instruments differ from enterprise to enterprise. However, all of the enterprises studied exhibited substantial uncertainty about the extent of possible future governmental regulation that would make an adaptation of existing systems necessary causing high costs and requiring high resource deployment.

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