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Strategic environmental assessment (SEA) process for business, economics, management, and eco-tourism, towards sustainable development

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Abstract

Industry 4.0 protocol for SEA process is helpful for the sustainable business, economics, management and business, economics, management, and eco-tourism development. The SEA treaty protocol pertains to federal and official Government procedures that help make much earlier decisions than the EIA process. Therefore, it is a key tool for sustainable development. The objective of the study is to conceptualize the SEA process for the business, economics, management, and eco-tourism scientific sector based on fifteen sustainable detailed project reports. The design of the study is cross-sectional. Environmental Health Impact Assessment (EHIA) process has been conducted for China nuclear power plant/ IGCAR Nuclear Power plant at Kalpakkam, India to consider the safety and health impacts to mitigate psychological health loadings on workers and nearby residents. The significance of the research work is mainly confirmatory SEA process for achieving sustainable business, economics, management, and eco-tourism for Industry 4.0.

Keywords: Assessment; business; economics; environment; eco-tourism; sustainability.

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1. Introduction

The strategic environmental assessment (SEA) process can be broadly defined as a study and check of the business, economics, management, and eco-tourism scientific impacts of a proposed project, plan, policy, or legislative action on the environment and sustainability (Ioppolo et al., 2019). "Environmental impact assessment" (EIA) can be defined as the systematic identification and evaluation of the potential impacts (effects) of the proposed projects, plans, policies, programs, or legislative actions relative to the physical-chemical, biological, biochemical, biophysical, radioactive, cultural, socio-economic, and anthropological components of the total environment.

The primary purpose of the EIA process in business, economics, management, and eco-tourism is to encourage the consideration of the environment in project planning and decision-making process and to arrive at actions that are more environmentally wise compatible (Chaudhary, Kumar, Pramanik & Negi, 2021). The three most significant terms are " Environmental inventory ", "Environmental impact assessment," and " Environmental Statement". The most significant legislation in business, economics, management, and eco-tourism is the Environmental impact assessment Act which is the EIA process Act and is hereby a proposal considering environmental quality guidelines, regulations, and procedures to ensure that balanced decision making regarding the environment occurs in the public interest.

Sustainability Impact Assessment (SIA) can be defined as the systematic identification and evaluation of the potential sustainability impacts (effects) of the proposed business, economics, management and business, economics, management, and eco-tourism projects, plans, programs, or legislative actions relative to the physical-chemical, biological, biochemical, radio-active, cultural, and socio-economic components of the total environment (Iyer, 2020). The primary purpose of the SIA process investigates in this research process is to encourage the consideration of the environment and sustainability factors in planning and decision making and to arrive at actions that are more sustainably compatible.

Environmental impact assessment (EIA) and natural resource impact (NRIA) assessment process can be defined as the systematic identification and evaluation of the potential impacts (effects) of proposed projects, plans, programs, policies, or legislative actions relative to the physical-chemical, biological, bio-medical, biochemical, cultural, and socioeconomic components of the total environment (Anthonia & Hope, 2021). The primary purpose of the EIA and NRIA processes is to encourage the consideration of the environment in the Organization's process and to arrive at actions that are environmentally compatible as it solves many businesses, finances, and administrative scientific problems.

Business should include the integrated consideration of technical or engineering, medical, economic, environmental, safety, health, social, natural resource, and sustainability factors to achieve sustainable excellence. Before the National Environmental PolicyAct (NEPA)process in 1970 in the USA, technical and economic factors dominated the World's projects. In this article, a specific study has also been attempted for the integration of quality, safety, and sustainability management in hospital industries for measurement, monitoring, and control of coronavirus infection criticality pandemics and epidemics towards sustainable international development (Iyer, 2020). Hospital Nursing Impact Assessment that included pathogen exposure, working stress, psychological distress, fatigue, occupational burnout, stigma effects, physical and psychological violence, lack of proper personal protection equipment (PPEs), lack of nursing training, and nursing and health care awareness of quality and safety and sustainability.

1.1. Related studies

Case studies and checks have been attempted on mindless disposal of untreated industrial, generic, and source-specific wastes of unsafe chromium leather tanneries in Bangladesh Buriganga River and Indian Odissa chromite mines discharge in Bramani River, radio-active wastes in Chinese nuclear power

plant Industry 4.0 at Quinson, China to consider the safety and health impacts in a radioactive environment, nuclear power plants, specific industrial toxic pharmaceutical debris, sanitary wastes, hazardous solid wastes, agricultural wastes contaminates and pollutes the water, soil, and land beyond the threshold limits, which adversely affects air environment, land fertility, water quality, vegetation, aquatic and marine life (Iyer, 2020).

The strategic environmental assessment (SEA) process can be broadly defined as a study of the impacts of a proposed project, plan, project, policy, or legislative action on the environment and sustainability. In this research, the SEA process has been aimed to incorporate environmental and sustainability factors into constructional project planning and decision makings (business, economics, management, and eco-tourism) processes such as project formulation and appraisal of Indo-Matsushita midget electrode (battery carbon rod) plant in 1979 at Tada, sustainable bridge, road, and sanitation structure, green building, Chinese nuclear power plant Industry4.0 at Quinson, China to consider the safety and health impacts in a radioactive environment, cotton roller ginning plant and concrete that included policies, programs, plans, and legislative actions. Sustainable business, economics, management, and eco-tourism scientific development is a kind of development that meets the needs of the present without compromising the ability and efficacy of future generations to meet their own needs.

The Environmental Impact Assessment (EIA) process can be defined as the systematic study of the potential impacts (effects) of proposed projects, plans, programs, policies, or legislative actions relative to the physical-chemical, biological, cultural, and socioeconomic components of the total environmental product life cycle. The primary purpose of the EIA process is to encourage the consideration of the environment in an Organization's business, economics, management, and eco-tourism scientific process and to arrive at environmentally compatible actions. Business, economics, management, and eco-tourism scientific process should include the integrated consideration of technical or engineering, economic, environmental, safety, health, social, and sustainability factors to achieve business excellence. Before the National Environmental Policy Act (NEPA) process in 1970 in the USA, technical and economic factors dominated the World's construction projects.

Social Impact Assessment (SIA) process can be defined as the systematic identification and evaluation of the potential social impacts (effects) of proposed projects, plans, programs, or legislative actions such that social consideration is encouraged in business, economics, management, and eco-tourism scientific process and to arrive at actions that are socially compatible regarding a sustainable sanitation project. SEA process concerns to environment and sustainability effects in business, economics, management, and eco-tourism scientific process and arrives at proposed projects, plans, programs, and legislative actions that are compatible with environment and sustainability issues. The International EIA process required a multi-disciplinary approach that has been conducted very early stage of the Japanese Matsushita carbon rod project in 1982 for strategic environmental assessment. The paper highlights the SEA process conducted for certain projects that are based on the operation and process approach and associated studies for sustainable development.

Engineering product environmental lifecycle analysis (LCA) has been conducted for identifying and measuring the impact of engineering industrial products on the environment and sustaining efficacy by utilizing mass and energy balance methods. LCA considers the activities related to raw materials, transformation, ancillary materials, equipment, method, market, manpower, production, use, disposal, and ancillary equipment. As far as business, economics, management, and eco-tourism scientific safety are concerned personal protective types of equipment and materials(PPEMs) that include garments, clothing, gloves, safety shoes, hard hats, safety glasses, shields, respirators, full aprons, safety belts, and other safety items which have to be used by an individual. Such equipment is important for personal protection and safety. It is the manager's and supervisor's responsibility to ensure that they are used.

The enactment of worker's compensation law and occupational disease law shall increase materially the cost of insurance to the industry. The increased cost and the certainty with which it is applied will

put a premium on accident-prevention work. This cost can be materially reduced by the installation of safety devices. Constructional management research experience has shown that approximately 80% of all the business, economics, management, and eco-tourism scientific industrial accidents are preventable.

EIA and EHIA processes have been conducted for a nuclear power plant to consider the safety and health impacts to mitigate psychological health loadings on workers and nearby residents. SEA system is a potentially useful element of good environmental management and sustainable development; however, as currently practiced in business, economics, management, and eco-tourism scientific industries, it is far from perfection. Emphasis should be given in business, economics, management, and eco-tourism scientific industries on maintaining the economic viability of the operation, while in turn taking care to preserve the ecological and social sustainabilities of the country. The International EIA process required a multi-disciplinary approach that has been conducted very early stage of the Indo-Matsushita Midget electrode project in 1982 at Tada for technical, economic, ecological, and social sustainabilities (Iyer, 2020).

The legislation of the EIA process was established in 1970 by the enactment of the National Environmental Policy Act (NEPA) in the USA (Canter, 1996). This was the first time that the EIA process became an official tool in the business, economics, management, and eco-tourism scientific sector to protect the environment. Three of the significant terms while complying with the requirements of the NEPA process are “environmental inventory”, “environmental impact assessment process”, and “environmental impact statement”. EIAs of design and business, economics, management, and eco-tourism scientific structures were undertaken to protect the environment during the year 1950 in Japan, Europe, and North America (Glynn and Gary, 2003).

The purpose of the EIA process is to encourage the consideration of the environment in the organizational planning and decision-making process. Historically, the choice of proposed projects, policies, plans, programs, permits, procedures, or legislations was primarily based on only one criterion called economic viability. Today, it is necessary to consider three criteria of economic, environmental, and social viabilities. Environment coupled with quality and sustainability management (EQM) is an intricate constructional managerial approach that was the targeted research area to achieve socio-economic improvement and sustainability based on the triple-bottom-line approach (economical, environmental, and social) feasibility studies (Iyer, 2016).

Significance of the research work is mainly confirmatory SEA process that has been aimed to incorporate environment and sustainability factors into eco-tourism project planning and decision-making process such as project formulation and appraisal of coronavirus impact assessment of hospital industries, environmental health impact assessment of Chinese nuclear power plant Industry 4.0 at Quinson, China, to consider the safety and health impacts in a radioactive environment, carcinogenic impact assessment process of chrome composite leather-clad roller cotton ginning process and chromium effluent discharge at downstream Buriganges river at Bangladesh and unsafe chromium pollution discharge from TNCC, Ranipet that should be included in sustainable projects, policies, programs, plans, and legislative actions. Sustainable development is a kind of development that meets the needs of the present without compromising the ability and efficacy of future generations to meet their own needs.

1.2. Purpose of study

The objective of the study is to conceptualize the SEA process for the business, economics, management, and eco-tourism scientific sector based on fifteen sustainable detailed project reports (DPRs) submitted by the extension learners of the Diploma in Entrepreneurship and Business Management (DEBM) course conducted by the Entrepreneurship Development Institute of India (The EDI of India) during the research year (RY) 1999 to 2020 under the author’s counsellorship.

2. Materials and Methods

The design of the study is cross-sectional. Environmental Health Impact Assessment (EHIA) process has been conducted for China nuclear power plant/ IGCAR Nuclear Power plant at Kalpakkam, India to consider the safety and health impacts to mitigate psychological health loadings on workers and nearby residents.

2.1. Data collection

The research uses the SEA process in the study. SEA process is a predictable process that is devised into two phases (Iyer, 2015).

2.2. Procedure

The first phase is called initial environmental and sustainability evaluation (IESE) and the second phase is environmental and sustainability impact studies (ESIS). IESE has been carried out for the Japanese Matsushita carbon company's proposed project, plan, program, policy, permit, procedure, and legislative action in India to determine whether potentially adverse effects on the environment and sustain efficacy concerning physical, chemical, biological, economical, socio-economic environment and on human health and well-being are significant or whether mitigation measures can be adopted to reduce or eliminate adverse environmental and sustainability impacts. A detailed SEA procedure can be called ESIS was applied to identify and evaluate the environmental and sustainability consequences both beneficial and adverse impacts to ensure that the environmental and sustainability impacts were taken into consideration in the organization's planning and decision- making process.

SEA process is designed to identify and predict the potential impacts of the physical, biological, ecological, socio-economic, and cultural environment and on human health and well-being are adequately protected (Iyer & Mastorakis, 2013). Given below are some of the methods and techniques applied for the sustainable project formulation and appraisal of fifteen DEBM extension learners of The EDI of India attached with the professional counselor and coordinator for the various projects such as the midget electrode (Battery carbon rod) project, nuclear power plant, and business, economics, management, and eco-tourism scientific project (Iyer, 2015; Iyer, 2020).

1. Expert judgment and stakeholders' sentiments
2. Checklist and matrices
3. Multi-criteria analysis
4. Case comparisons
5. Simulation models
6. Software information system
7. Questionnaire
8. Group discussions
9. Delphi approach
10. Flow charts and decision trees
11. Contingency analysis
12. Overlays
13. Fuzzy logic

2.2.1. Step-wise Structure of SEA Process

SEA Process has been itemized by the following nine steps:

1. Preliminary activities and decision of Terms of References (TOR)

2. Scoping
3. Study of baseline data
4. Strategic environmental assessment and evaluation,
5. Evaluation of alternative measures 6. Assessment of alternative measures 7. Preparation of final documents
8. Decision-making
9. Monitoring, measurement, and control opportunities for resource transformation and project implementation and its strategic environmental assessment process.

2.2.2. Conceptual Framework for Screening and scoping of SEA Process

Screening and scoping processes are the items that are employed in the SEA processes (Figure-1).

Figure 1

Conceptual Framework for Screening and scoping of SEA Process

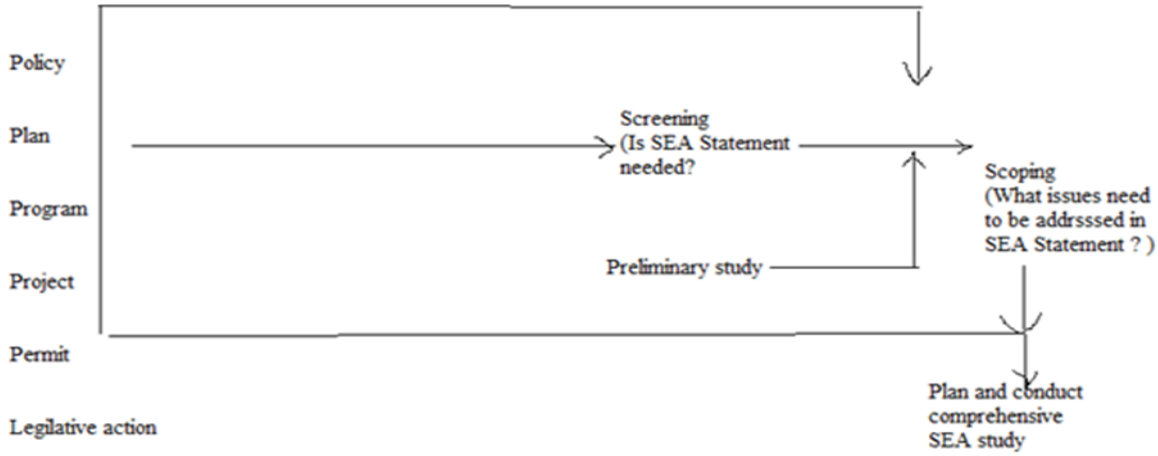
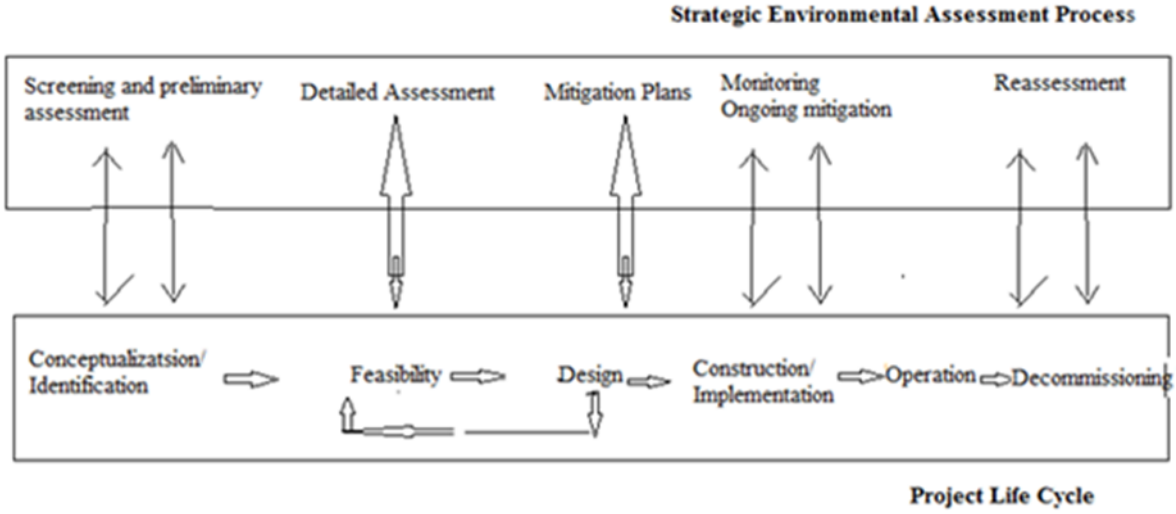


Figure 2

Strategic Environmental Assessment (SEA) Process at Different Phases of Project Life Cycle Assessment



The three most significant items are," Strategic environmental assessment inventory, environmental impact assessment, strategic environmental impact assessment statement. Business, economics, management, and eco-tourism scientific process planning and decision-making process should

include the integrated consideration of technical, economic, environmental, social, safety, health, and sustainability factors (Figure-2).

2.2.3. Strategic Environmental Assessment Management Plan (SEMP)

A strategic environmental assessment management plan is a detailed plan and schedule for measures to minimize and mitigate any potential environmental and sustain efficacy impacts. SEMP should consist of a set of measurement, monitoring, control (mitigative) and institutional measures to be taken during the implementation and operation of the proposed projects to eliminate adverse environmental and sustainability impacts, offset them or reduce them to acceptable levels. The strategic environmental assessment process aims to incorporate environmental and sustainability considerations into the strategic planning and decision-making processes of the project formulation and appraisal. International EIAs are important considerations in the project planning and decision-making process (Iyer & Mastorakis, 2013). It has been imperative to consider international EIAs in a concrete project to mitigate CO2 -the induced climate warming problem and stratospheric ozone depletion problem. The International EIA process is a potentially good environmental management (Glynn and Gary, 2003).

3. Results

During the last two centuries due to the fast urbanization and industrialization along with the advancement of Constructional Science, Engineering and Technology, there have been considerable developments in business, economics, management, and eco-tourism scientific sector with the resultant wastage of a copious amount of resources and tremendous environmental stress. Subsequently, it was realized that there were many adverse impacts on the environment and society. This unsustainable business, economics, management, and eco-tourism scientific developments have sustained environmental growth (Iyer & Mastorakis, 2013). Sustainability of design and development, quality and sustainability of life, safety on earth, and continuous process improvement of our environment is of utmost importance. Sustainable business, economics, management, and eco-tourism scientific development is a kind of development that should occur without damage to the environment. Hence, hectic developmental activities during the last two centuries have caused considerable environmental and social impacts. These impacts have been measured, monitored, and mitigated by the international environmental impact assessment process(Figure-3).

Figure 3

Construction Management by process approach

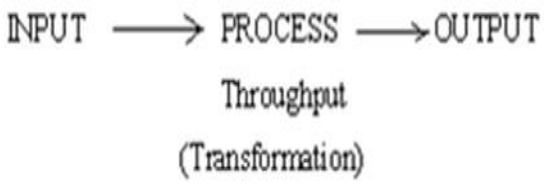


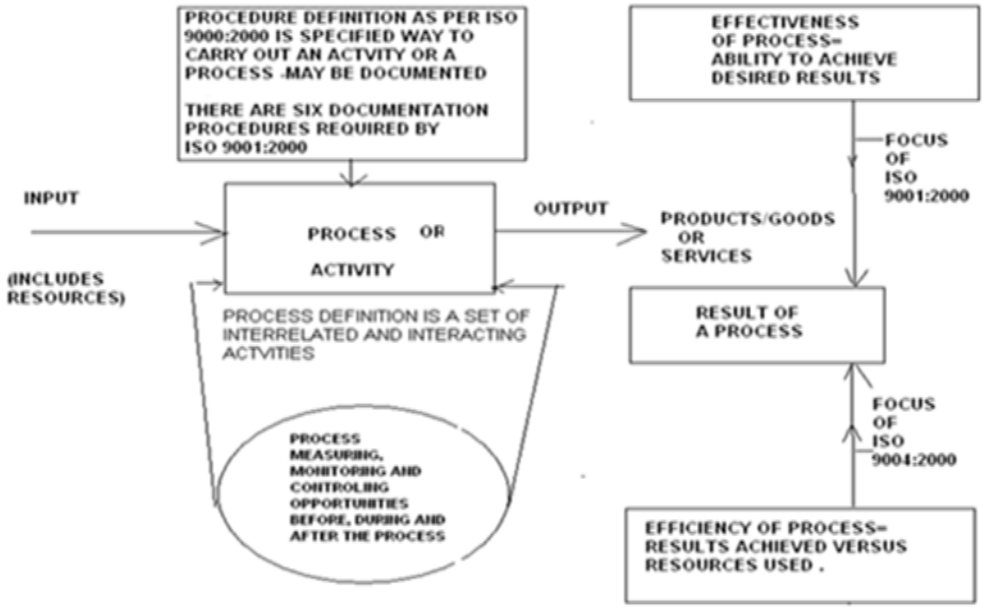
Figure-3 : Construction Management by Process Approach

International EIAs are important in the international project planning and decision-making process that mitigates potential environmental impacts in more than one country (Iyer & Mastorakis, 2013). The use of sustainable business, economics, management, and eco-tourism scientific

technology and management in environmental and sustainability matters in two areas that are sustainable development with global problems and prevention technologies that are designed to reduce the environmental effects of products and processes (Figure-4).

Figure 4

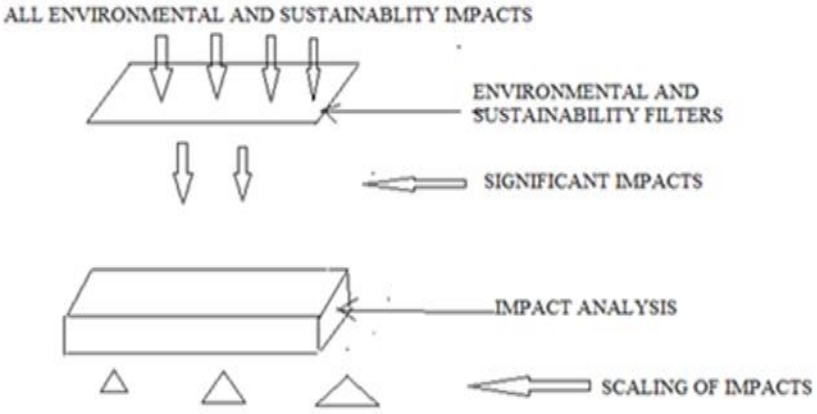
Schematic Diagram of a construction process



The integration of environmental protection and economic development is the most important strategic environmental assessment tool for achieving sustainable development (Figure-5).

Figure 5

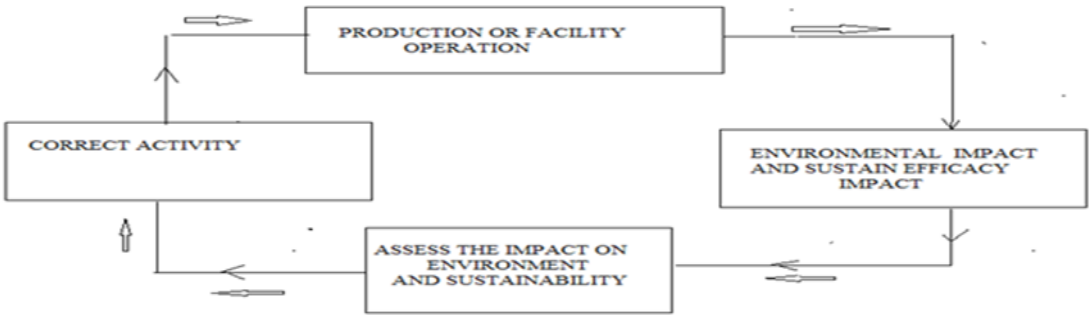
Procedure for finding out the significance of environmental and sustainability effects



Project planning and decision-making should include the integrative consideration of engineering or technical, economic, environmental, ethical, and social factors. A midget electrode project was taken as a case study for the strategic environmental assessment process (Figures-5 and 6). The International EIA process has been designed for the sustainable midget electrode project design and business, economics, management, and eco-tourism scientific to identify and predict the potential effects of the physical, biological, ecological, socio-economic, cultural environment on human health and well-being are adequately protected. Environmental Impact Statements (EIS) have been prepared for the project which consider environmental and socio-economic factors concerning development and other proposed actions. Therefore, the EIA system is a potentially useful component of good environmental management (Glynn and Gary, 2002).

Figure 6

Environmental and sustainability entitled after the fact evaluation



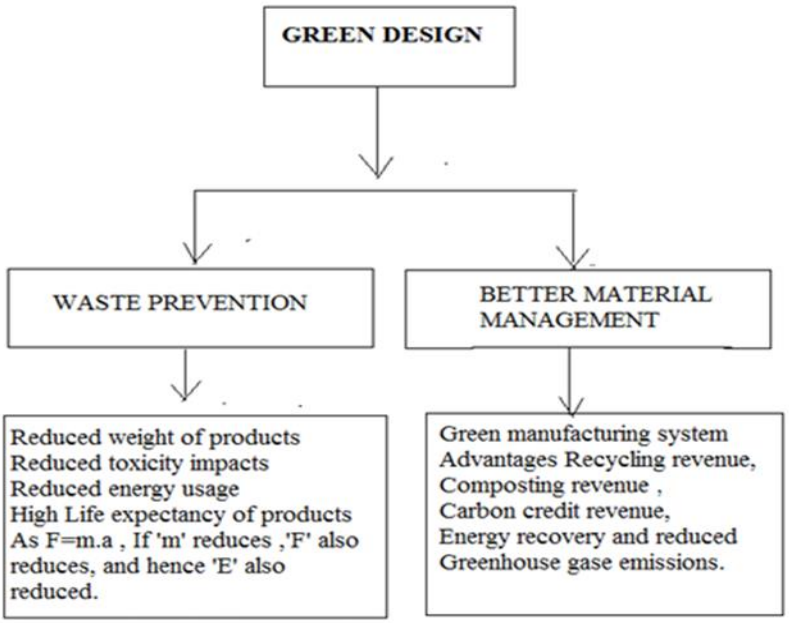
In the chromium tanning industry, chromium environmental contamination and pollution have discharged beyond safe limits, which seriously affects the life on the earth (Sreeram & Ramasami, 2003; Iyer, 2007). Toxic emissions from industries, thermal power plants, smelting pollution, auto exhaust pollution in large metropolitan areas, and photo chemical smog have been poisoning the atmosphere beyond the permissible levels which causes serious health hazards. Air pollution causes adverse environmental health and social impacts. Mindless disposal of untreated industrial wastes at downstream Buriganges river from Leather tanneries, Odissa chromite mines, and chromium bearing effluents from TNCC Site at Ranipet, TamilNadu, India, and other radioactive wastes in Chinese nuclear power plant Industry 4.0 at Quinson, China to consider the safety and environmental health impact assessment in a radioactive environment, nuclear power plants, business, economics, management and eco-tourism scientific debris, sanitary wastes, hazardous wastes, municipal solid wastes, agricultural wastes, domestic wastes have contaminated and polluted the water, soil, and land beyond the tolerable limits, which adversely affects land fertility, water quality, vegetation, aquatic and marine life (Iyer & Mastorakis, 2013). This is proving more and more hazardous as this development continuously damages the environment viz., melting of glaciers, climate change, carbon tetrachloride emission, greenhouse gas emission, ozone layer depletion. For example, due to continuous increase in CO_2 concentration in the atmosphere due to industrial emission of about 382 ppm lead to climate change. This decrease in glaciers contributes to about 29.5 % of the mean sea level rise since 1991. Water supplies stored in the glaciers were projected to decline. Besides contaminating and polluting t h e air, water, soil, and land, intensive technological activities lead to the depletion of natural resources (Iyer & Mastorakis, 2013).

This must have been required to bring our energy and intellectual capacity in tandem whereby that can meet the challenge efficiently without major disruption as well as without compromising on the livelihood of the future generation of their needs. The development would have occurred without damage to the environment and major disruption, and the process of urbanization and industrialization would have occurred sustainably by utilizing the resources efficiently. Now, these environmental problems are the present environmental challenges and opportunities for improvement. Overcome these environmental problems that shall require new and more efficient solutions, technologies, processes, and products alongside behavioral change.

Low carbon and energy-efficient technology in business, economics, management, and eco-tourism scientific industries can make contributions to mitigating the impacts of economic growth on global warming(Figure-7) (Iyer, 2015). The resultant output of green products and services which are environmental advantages with good performance and cheaper prices. The dual goals of green design are waste prevention and better material management as depicted in Figure 7. Design and business, economics, management, and eco-tourism scientific of green buildings have considerably reduced the environmental impacts associated with manufacturing, use, and disposal (Iyer, 2015).

Figure 7

Dual goals of green design and manufacturing process



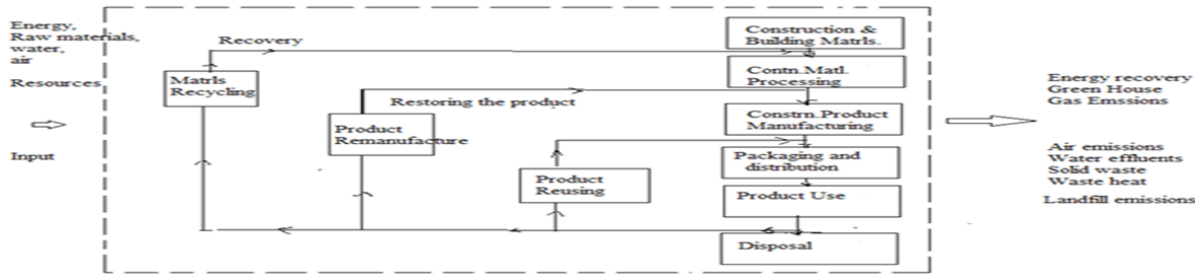
Before the enactment of the National Environmental Policy Act on Environment in1970 in the USA, only technical or engineering, and economic factors were dominant in the planning and decision-making process in most of the world's projects, plans, programs, permits, policies, and legislative actions. As per the research results, the project planning and decision-making process must include the integrated consideration of engineering or technical, economic, environmental, safety, ethical, social, and sustainability factors. This important consideration can be referred to as the "Concept of the Four Es and 1 S" in the organizational planning and decision-making process. There are ecological and biogeochemical principles and tools such as energy flows and material cycling, element ratios, mass and energy balance, element cycling, product environmental Lifecycle assessment (LCA)(Figure-8) are available to solve major environmental problems that we face in our world today such as global warming, acid rain, environmental pollution and increasing greenhouse gases.

3.1. Product environmental lifecycle analysis (LCA)

Fintech enviro product lifecycle analysis (LCA) and hybrid analysis are used for identifying and measuring the impact of industrial products on the environment and sustaining efficacy utilizing mass and energy balance methods(Figure-8) (Iyer, 2016). LCA considers the activities related to the extraction of raw materials, ancillary materials, equipment production, use, disposal, and ancillary equipment (Glynn Hendry J and Gary W. Heinke, 2002).

Figure 8

Construction product environmental Lifecycle assessment



3.2. Environmental Health Impact Assessment (EHIA) Process for Nuclear Power Plant Project Towards Sustainable Constructional Development

An environmental health impact assessment (EHIA) process is proposed in this research for Chinese nuclear power plant Industry 4.0 at Quinson, China to consider the safety and health impacts of the radioactive environment during the business, economics, management, and eco-tourism scientific phase in order to address psychological healthimpacts on workers and nearby residents (Iyer, 2016). Environmental health impact assessment can be defined as the systematic identification and evaluation of the potential environmental health impacts or effects of proposed nuclear power projects, plans, programs, policies, or legislative actions relative to the physical-chemical, biological, cultural, and socioeconomic components of the total environment. At present, there are more than four hundred thirty-seven nuclear power plants situated in the World. It may be mentioned that EHIA Suggestion for the nuclear power projects, plans, programs, policies, or legislative actions in the World (Iyer, 2016).

Nuclear power plants generate electricity using heat generated in pressurized water reactors where the nuclear reaction takes place. During the business, economics, management, and eco-tourism scientific phase of nuclear power plants use Uranium-235, Thorium-232, and Plutonium-239 as fuels in nuclear reactors causing nuclear fission. At that time the copious amount of radiation dose due to radioactive pollution escaped out in the order of about 120 billion Becquerel (120 GBq)to 240 billion Becquerel (240 GBq) that is 50 grams to 100 grams, radiation activities viz., Alpha (α), Beta (β) and Gamma (γ) as against the safe limits of 0.1 Bq /l or Bq/kg (ppm) inland, air, and water when operation, repair, and maintenance of replacing old nuclear fuels with new fuels taken place.

High exposures to radioactive pollution damage mental health and psychological burden on workers and nearby residents. As per a psychological health impact survey conducted by the author in a nuclear power plant at Quinson, China, severe psychological disorders including radioactive poisoning, depression and post-traumatic stress have been investigated to an extent among 49% of the nearby residents in and around 82% of the nuclear power plants in the World (Iyer, 2004) (World Engineers' Convention, Shanghai, China-2004). Psychological health impact loadings due to radioactive environment on workers and nearby residents have been studied in this research during the test run phase using computer simulation models. Psychological health impact assessment (PHIA) on workers and nearby residents has been addressed to mitigate psychological health impact loadings on workers and nearby residents.

3.3. Environmental Health Impact Assessment (EHIA) Process for Sustainable Industrial Development

In this research, the EHIA process has been investigated in cotton double roller (DR) ginning industries using chrome composite leather-clad (CCLC) washers and the design and development of an eco-friendly alternative (Iyer, 2007). The objective is to assess the environmental health impacts of Indian cotton ginning industries. Most of the cotton ginning operations are performed by using DR ginning machines which serve an important role in the Indian cotton ginning industries. The rollers used are made of CCLC covering fixed to a shaft. The CCLC contains about 18,000 to 36,000 mg/kg (ppm) of chromium particles (Iyer, 2007). When the seed cotton is processed in the DR ginning machine, the lint cotton is contaminated with hexavalent chromium dust of about 140 to 1990 mg/kg (ppm) which is a carcinogenic substance against the safe limits of 0.1 ppm. During the cotton ginning process due to persistent rubbing of CCLC over a stationary knife, the chromium particles are adsorbed into lint cotton such that the spun yarns and woven fabrics get contaminated by about 100 to 200 ppm which according to World Health Organization (WHO) eco-standards should not be more than 0.1 ppm. The CCLC rollers used in cotton roller ginning machines get powdered during the ginning process. As chromium is specific dust, gin and mill workers and residents are directly exposed to this carcinogenic substance and are vulnerable to environmental health hazards. To

offset this problem, pollution-free eco-friendly washers/rollers both for laboratory and commercial studies have been fabricated and experimented with. Environmental health inventory (EHI) serves as the basis for evaluating the potential environmental health impacts both beneficial and adverse of a proposed action.

An environmental health impact statement (EHIS) describes the affected environmental health or environmental health setting without the project. Design and development of the EHI is an initial step in the EHIA process. It is concluded that the EHIA process should be conducted for certain textile additive process projects, plans, programs, legislative actions, policies in the project planning, and decision-making process.

3.4. International EIA Process

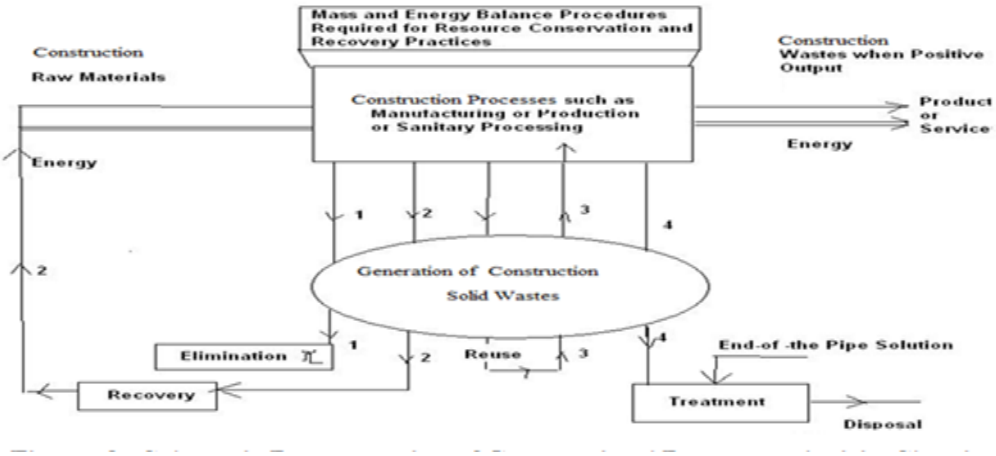
The International EIA process is a potentially good environmental and sustainability management system(EMS). International organization for Standardization (ISO)'s 14000 and 9000 standards focus on Environmental Management systems (EMS) and Quality and Sustainability Management System (QMS) of all sorts of organizations apart from more than 19500 published standards. Environmental Management System (EMS) and Quality Management System (QMS) have been separately featured in ISO. Environmental Management System (EMS) standards apply to the management system concepts of an organization's environmental issues and opportunities (Giri et.al.,2003). It defines the features of an EMS that need to be in place to ensure that the organization identifies and focuses on improving areas where they have significant environmental impacts. This system can be integrated with ISO 9000 Quality Management System (QMS) standards to achieve excellence in quality as well as environmental obligations.

The overall aim of the EMS is to provide protection to the environment and prevent pollution to manufacture eco-friendly products and services. EMS focuses on key drives of performance excellence in products and processes as well as organizations that are focused on delivering values to the customers, internal operational processes, and staff's learning. Hence, this system approach to environmental management shall achieve excellence in the overall performance of the organization. In the present study about two-thirds of business, economics, management, and eco-tourism scientific waste was recoverable due to the conduction of intensive on-site training programmes on recycling and composting processes as against the conventional business, economics, management, and eco-tourism scientific management practices which could able to recover the waste of only 10 to 15% (Vijayan Gurumurthy Iyer, 2014).

Business, economics, management, and eco-tourism scientific wastes are produced by the business, economics, management, and eco-tourism scientific sector. The study has attempted to identify and evaluate the special waste minimization hierarchy of waste management for properly managing a business, economics, management, and eco-tourism scientific waste including minimizing generation and treatment that have been generated and disposing of waste residuals. A case study has been included on the generation of business, economics, management, and eco-tourism scientific wastes and potential waste management strategies for a group or generic business, economics, management, and eco-tourism scientific processes. All business, economics, management, and eco-tourism scientific processes in cotton textile additive processes generate wastes such as printing, dyeing, finishing, and eco-design in the form of liquids, solids, or gases. Some wastes are considered hazardous. The waste minimization hierarchy of waste management is duly ranked from most desirable to least desirable(Figure-9). 1. Eliminating waste generation –Most desirable, 2. Reducing waste generation- Most desirable, 3. Reuse, recover or recycle waste materials- Most desirable, 4. Treating waste to diminish quantity and to detoxify the hazardous and non-hazardous solid wastes --Least desirable, 5. Disposing of waste residuals- Least desirable.

Figure 9

Schematic representation of Constructional process or activity showing sustainable construction waste management



Waste minimization includes only elimination, recovery, reduction, reuse, and recycles hierarchies. Waste minimization does not include treatment of waste as well disposal which is points number 4 and point number 5, these are traditional waste control strategies that involve treatment and disposal which are called end-of-the pipe solutions and are costly affairs as well as involve control of high discharge standards. Modern waste control strategies involve point number 1, point number 2, and point number 3 which are not requiring an end-of-the pipe solution for the waste management problems. Solid and hazardous waste generation is the sum of material recovery and discards. A report on a waste audit conducted for a business, economics, management, and eco-tourism scientific industry is presented for recovering two-thirds of municipal solid wastes (MSW) by recycling and composting processes (Figures- 10 and 11) (Iyer, 2014).

Figure 10

Closed loop-shaped Green Economy for sustainable construction Waste Management

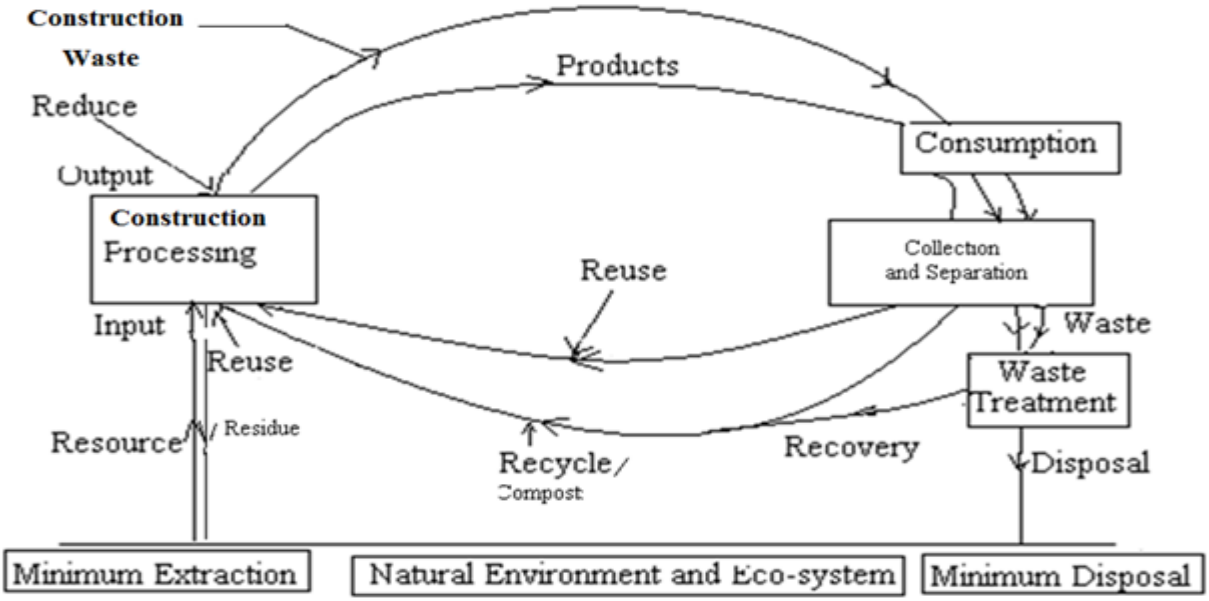
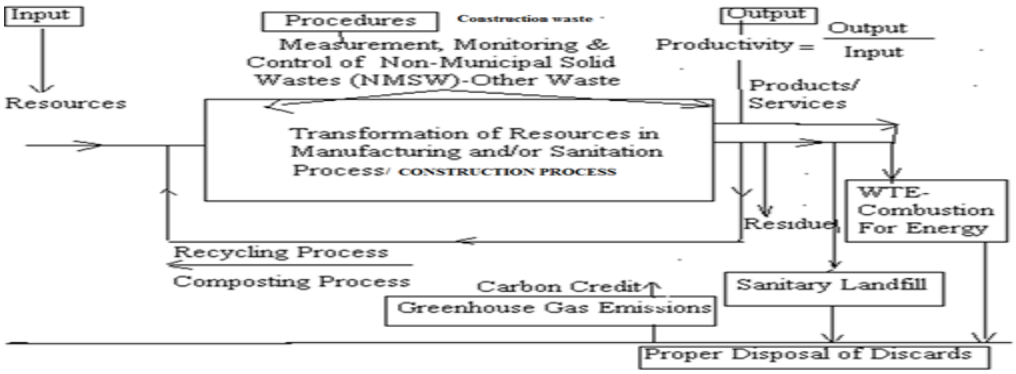


Figure 11

Sustainable construction waste management system



To achieve sustainable economical improvement, natural resources are to be utilized at optimum level to maximize efficiency as per the result analysis of optimum competitive and social markets. The efficiency of a kind of sustainable economical system is referred to in the "*A.K*" sustainable economic model that is the product of engineering or technical factor level (A) and the capital (K). The sustainable economic improvement is explained by three factors which are given below:-

1. The natural increase in the accumulation of labor potential,
2. Capital accumulation or money with which a business is started and run, and
3. Sustainable technological momentum can be referred to as total factor productivity (TFP) or efficiency in business, economics, management, and eco-tourism scientific process.

Such momentum keeps the capital development dynamic which emerges from the sustainable enterprise creation process, green products or services, new methods of production and processes, new business, economics, management and eco-tourism scientific management and transportation, new markets, and new forms of organization.

Standard Production Function (SPF) is expressed based on the operation approach as $Y = f(C, L)$

Where Y=Output, C=Capital, and L=Labour

As knowledge is a crucial factor for the economic growth, Standard Production Function (SPF) is modified based on the process approach as

$$Y = A.\, f(X1, X2, X3, X4, X5, X6)$$

'A' represents knowledge of sustainable constructional engineering or technical factor.
Y= Output

Input elements are namely, manpower, machinery, materials, method, money, and market denoted as X1, X2, X3, X4, X5, X6

f = Standard production function.

As per the given standard production function, knowledge is a decisive production variation, and a sustainable innovation level is required in engineering or technical system. The solution is the development of reformed SEA implemented business, economics, management, and eco-tourism scientific industries (Iyer, 2015).

3.5. Importance for the Conduct of Environmental Impact Assessment (EIA) and Management Study for the Business, economics, management, and eco-tourism Scientific Projects

Historically, the choice of new projects was primarily on one criterion, which is economic viability. Presently, second and third choice criteria that are environmental and social impact have become a strong yardstick, therefore a triple-bottom-line approach that is economic, environmental, and social factors to constructional project viability. The Environmental Impact Assessment (EIA) process is a systematic identification and evaluation of potential effects of proposed projects, plans, programs, plans, or legislative actions relative to the physical-chemical, medical, anthropological, biological, cultural, and socio-economic components of the total environment.

3.5.1. Steps to Conduct Environmental Impact Assessment and Management

Step-1: Identification of quantity and quality and sustainability characteristics of the concerned environment of the proposed project.

Step-2: Preparation of description of existing environmental resource conditions.

Step-3: Procurement of relevant quantity and quality standards.

Step-4: Impact predictions,

Step-5: Assessment of impact significance,

Step-6: Identification and incorporation of mitigation measures.

3.5.2. Conduct of Environmental Impact Assessment (EIA) Study For the Efficient Industrial Projects

1. Prediction and assessment of impacts on the surface water environment,
2. Prediction and assessment of impacts on soil and ground environment,
3. Prediction and assessment of impacts on the air environment,
4. Prediction and assessment of impacts on the noise environment,
5. Prediction and assessment of impacts on the biological environment,
6. Prediction and assessment of impacts on the visual environment,
7. Prediction and assessment of impacts on socio-economic environment.

8. Prediction and assessment of impacts on cultural environment,
9. Prediction and assessment of impacts on the archaeological environment,
10. Prediction and assessment of impacts on the anthropological environment.

3.5.3. Benefits of EIA in Business, economics, management, and eco-tourism scientific Industries

1. Considerable reduction in waste and the depletion of resources.
2. Considerable reduction and/or elimination of the release of pollutants into the environment.
3. Green design and green building products to minimize their environmental impact in production, use, and disposal.
4. Control the environmental impacts of sources of raw material.
5. Waste minimization and adverse environmental impact of new developments.
6. Promote environmental awareness among employees and the community.

3.5.4. Environmental Management Programs

The organization shall establish and maintain a program(s) for achieving the environmental objectives and targets. It shall include the designation of the responsible function, team, or individual and a time frame for achievement (Giri, et.al.,2003).

1. State the objective/target.
2. State the purpose (how the objective/target will support the policy).
3. Describe how the objective/target will be achieved.
4. State the program (team) leader.
5. Designate departments and individuals responsible for specific tasks.
6. Establish the schedule for the completion of the tasks.
7. Establish the program review, which will include format, content, and review schedule.

3.6. Conduct of Social Impact Assessment (SIA) Study

Social Impact Assessment (EIA) process is a systematic identification and evaluation of potential social effects of proposed projects, plans, programs, plans, or legislative actions relative to the society. The purpose of the SIA process is to bring about a sustainable and equitable biophysical and human environment (Iyer, 2014). SIA process includes the monitoring, measurement, and control opportunities including analysis and management of the intended and unintended social consequences whether both positive and negative impacts of planned interventions, and any changes that take place in the social transformation process invoked by those interventions. The SIA process should include the analysis of the use of land, culture, industrial process, economic development, and their impact on service sectors such as water use, energy use, sanitation, and traffic. SIA process is done to ensure that there is no mismatch between the constructional development and socio-cultural and economic development of the project areas.

3.7. Sustainable Water and Wastewater Quality Management

Water and waste quality are to be maintained in business, economics, management, and eco-tourism scientific sites such that the water supply to consumers is safe and hygienic. Relevant water quality standards are to be followed (Wurb,2003). A sustainable sanitation facility is to be provided. A sanitation impact assessment study has been conducted for sanitation projects and plans. Sewerage systems, stormwater drainage systems, wastewater treatment systems, industrial waste treatment systems, and sustainable septic tanks are important onsite requirements. Relevant

wastew a t e r discharge standards are to be followed. The process approach for measurement, monitoring, and control opportunities for water, wastewater, and industrial water waste quantity and quality has been followed (Metcalf & Eddy, 2012).

3.8. Safety Engineering and Management in Business, economics, management, and eco-tourism scientific Industries (Safety First)

Safety management is the systematic identification and evaluation of potential safety requirements of proposed projects, plans, programs, plans, or legislative actions. The purpose of safety engineering and management is to bring about the design and construction of sustainable engineering structures. It has been observed that some business, economics, management, and eco-tourism scientific methods and machinery used in India are to be obsolete because they were old and operated with poor performance in terms of productivity, quality, efficiency, and safety. Some of the alternative machinery, which are indigenously manufactured, also do not guarantee superior performance and necessary safety conditions because of their poor design and materials of construction. It is mandatory that check for safety requirements about machinery, bridges, roads, and buildings. Safety personnel responsible for overseeing the safety of all operating personnel must be cognizant of the latest laws and regulations regarding worker safety and occupational health (Pascal and Andrew C.Klein,1998). These are changed and/or updated from time to time.

Checking for Safety (CFS) such that to ensure that the question of safety will not be overlooked, it is well to have all plans, specifications, and drawings checked for safety, making special provisions for this in each set of specifications and the title plate of each drawing duly checking periodically for cranes, hoists, ventilation, lifts, tackles, fire protection systems, alarms, buildings, mechanical guarding and electrical and electronic equipment and heavy engineering equipment. Personal protective equipment (PPEs) and materials include garments, clothing, gloves, safety shoes, hard hats, safety glasses, shields, respirators, full aprons, safety belts, and other safety items t h a t have to b e used by an individual (Pascal and Klein,1998). Such equipment is important for personal protection and safety. It is the manager's and supervisor's responsibility to ensure that they are used. As far as occupational-disease prevention is concerned that those persons engaged in or working near operations are exposed to appreciable quantities of dust, fumes, or gas, adequate control measures must be adopted. Some major considerations involved in the application of effective control to industrial occupational disease are given.

Some of the policies, practices, and procedures to prevent exposure of personnel to unsafe materials are also provided. As far as the worker's compensation law is concerned, it must be enacted strictly in our country. The principle involved is that the worker injured or disabled in business, economics, management, and eco-tourism scientific industries should be enabled, through proper medical treatment, to return to wage-earning capacity as promptly as possible and while incapacitated, should receive compensation in l i e u of wages, and regardless of fault. The expense of medical treatment and compensation should properly be borne by the industry and become a part of the cost of its products. The laws generally provide that a worker injured in t h e industry shall be furnished the necessary medical treatment, and, in addition, compensation based on a percentage of their weekly wages, payable periodically. Dependents of employees killed in t h e industry are likewise compensated. Occupational diseases law provides provisions for compensation benefits in occupational – disease cases.

The enactment of worker's compensation laws and occupational disease laws shall increase materially the cost of insurance to the industry. The increased cost and the certainty with which it is applied will put a premium on accident-prevention work. This cost can be materially reduced by the installation of safety devices (Pascal and Klein, 1998). Research experience has shown that approximately 80% of all business, economics, management and eco-tourism industrial accidents

are preventable. As far as fire loss prevention is concerned, which is an indispensable element in business, economics, management, and eco-tourism scientific industry 4.0. It exists only with top management direction and the support of labor. The designation fire protection usually encompasses the entire field of prevention of loss by fire, including both the causes for the occurrence of fires and methods for minimizing their consequence. Some of the fire standards of protection to prevent injury and loss of life are given in this paper. Fire protection engineering practices both in building design and in safe operating practices are also included (Pascal and Klein, 1998).

In business, economics, management, and eco-tourism scientific noise safety are concerned, noise is recognized as a pollutant, both as a nuisance and as the cause of hearing impairment. There is evidence in business, economics, management, and eco-tourism scientific sites that noise causes ailments such as hearing impairment, and physiological and psychological disorders including anxiety and heart disorders. Protection from noise is required when sound levels exceed those standards. When protective equipment is required, it must be provided by a trained person, and periodic checks made on its effectiveness (Pascal and Klein, 1998).

3.9. Total Quality and Sustainability Management (TQM)

Total Quality and sustainability Management (TQM) can be broadly defined as a set of systematic activities carried o u t by an institution to efficiently achieve institutional objectives that satisfy beneficiaries at the appropriate time and price. The definition of quality is "The totality of features and characteristics of products or services that bear on its ability, efficacy, and values to satisfy a given or implied need". TQM is a comprehensive and structured approach to educational integrated management that seeks to improve the quality of educational services through ongoing refinements in response to continuous feedback. Thus, this standard definition of quality applies commonly to both products and services that are stated and unstated (Giri et.al.,2003).TQM has an important role to play in addressing quality issues surrounding constructional development.

TQM is a comprehensive and structured approach to the business, economics, management, and eco-tourism scientific sector that seeks to improve the quality of services through ongoing refinements in response to continuous feedback. TQM leads to sustainable eco-tourism development. International Organizational for Standardization's ISO 9000 series defines TQM as a management approach centered on quality and sustainability, based on the participation of all its members and aiming at long-term success through customer satisfaction and benefits to all members of the organization society. Hence, TQM is based on quality and sustainability management from the customer's point of view.

TQM processes are divided into four sequential categories: plan, do, check, and act (Figure-12). This is also called the *PDCA* cycle or *Deming's* cycle for continuous process improvement. In the *planning* phase, constructionists define the problem to be addressed, collect relevant data, and ascertain the problem's root cause; in the *doing* phase, constructionists develop and implement a solution, and decide upon a measurement to gauge its effectiveness and efficiency; in the *checking* phase, constructionists confirm the result through before-and-after data comparison; in the *acting* phase, constructionists document their results, inform others about process changes, and make recommendations for the problem to be addressed in the next PDCA cycle. ISO 9000 series focus on quality management for all sorts of organizations. It defines the features of a quality and sustainability management system (QMS) that need to be in place to ensure that identifies and focuses on improving the areas where they have significant constructional deficiencies (Giri et.al., 2003).

Figure 12

Conceptualization of culture-based environmental and quality management entitled OVPA cycle, by incorporating the expanded PDCA Cycle for Indian Construction Industries towards sustainable Construction Management.

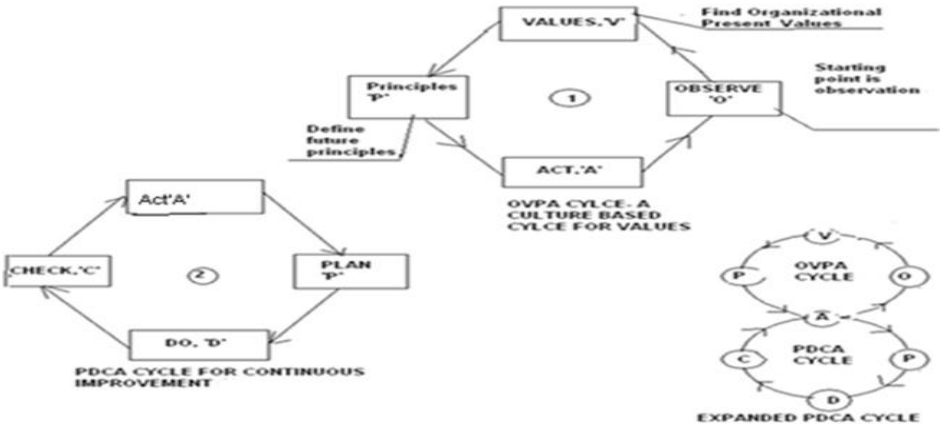
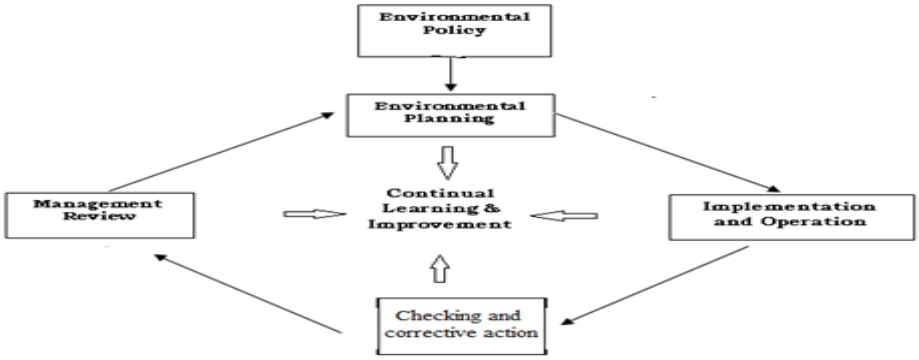


Figure 13

Environmental management system



The ISO 14000 Environmental Management System (EMS) standards apply to the management system to manage an organization's environmental and sustainability issues and opportunities (Giri et.al., 2003). It defines the features of an EMS that need to be in place to ensure that the organization identifies and focuses on improving areas where they have significant environmental impacts. This system has been integrated with ISO 9000 Quality Management System (QMS) standards to achieve excellence in quality as well as environmental obligations in coronavirus impact assessment (CIA) and midget electrode projects. The overall aim of the EMS is to provide protection to the environment and prevent pollution to manufacture eco-friendly products and services. The ISO 14000 series of standards assist organizations to excel in environmental and economic gains for continuously improving organizational performances. They are used for prevention of pollution, reduction in waste, enhancement of internal management system efficiency, optimum utilization of resources, and compliance with legal and regulatory requirements.

EMS can be divided into five events which form the sequence of a cycle (Figure 13). These five events are (1) Environmental Policy, (2) Environmental Planning, (3) Environmental implementation and operations, (4) Checking and corrective actions, and (5) Management Review. The ISO 14000 series of standards have also been designed to cover the areas of environmental issues and opportunities for the organizations to compete in the global customer-centric markets so that the products and services can be manufactured at par with the international requirements (Giri et.al.,2003).

EMS focuses on key drivers of performance excellence in products and processes as well as organizations that are focused on delivering values to the customers, internal operational processes, and staff's learning. It may be mentioned that Environment and Quality Management (EQM) is a managerial approach centered on environment and quality through beneficiary satisfaction in business, economics, management, and eco-tourism scientific industries that lead to economic improvement and sustainability (Iyer, 2016). Hence, this system approach to environmental management shall achieve excellence in the overall performance of the organization.

4. Conclusions

SEA process has been aimed to incorporate environmental and sustainability factors into business, economics, management, and eco-tourism scientific process planning and decision-making processes, such as project formulation and appraisal of coronavirus impact assessment, Indo-Matsushita midget electrode (battery carbon rod) plant in 1979 at Tada, sustainable bridge, road and sanitation structures, green building, IGCAR Kalpakkam Chennai Nuclear power plant, cotton roller ginning plant, cotton textile industries 4.0 and concrete batching plants that included polices, programs, plans, and legislative actions. The primary purpose of the SEA process is to encourage the consideration of the environment, safety, health, social, and sustainability factors and to arrive at compatible actions. EIA should be considered an official tool to protect the environment. Sanitation impact assessment has been investigated for sanitary projects and plans. EIA process is a multidisciplinary approach that must be necessary for providing a prevention mechanism for environmental management and protection in any constructional development.

EIA process is designed to identify and predict the potential effects of the physical, biological, ecological, socio-economical, and cultural environment and on human health and well-being are adequately protected. As per research results, business, economics, management, and eco-tourism scientific process Industry 4.0 should include the integrated consideration of technical or engineering, economic, environmental, safety, health, social, and sustainability factors to achieve business excellence. The SEA process protocol has been proposed for studying and checking the quality and sustainability of environmental and social assessments and management plans. SEA treaty and official Government procedures of SEA helpful for making much earlier in the decision-making process than the EIA process. Therefore, it is a key tool for sustainable development. SEA aims to incorporate environmental and sustainability considerations into the strategic decision-making processes, to formulate policies, plans, programs, and legislative actions.

Before the National Environmental Policy Act (NEPA) process in 1970 in the USA, technical and economic factors dominated the World's business, economics, management, and eco-tourism scientific projects. The objective of the study is to conceptualize the SEA process for the business, economics, management, and eco-tourism scientific Industry 4.0 based on fifteen sustainable detailed project reports submitted by the extension learners of the Diploma in Entrepreneurship and Business Management course conducted by the Entrepreneurship Development Institute of India during the research year 1999 to 2020 under the author's counsellorship.

The ISO 14000 Environmental Management System standards apply to the management system concepts of total quality and sustainability management to an organization's environmental sustainability issues and opportunities for continuous improvement. It defines the features of an EMS that need to be in place to ensure that organizations identify and focus on improving areas where they have significant environmental impacts. EMS focuses on key drives of performance excellence in products and processes as well as organizations that are focused on delivering values to the customers, internal operational processes, and staff's learning. Hence, this system approach to environmental and sustainability management shall achieve excellence in the overall organizational performance.

Engineering product life cycle analysis has been conducted for identifying and measuring the impact of business, economics, management, and eco-tourism scientific industrial products on the environment and sustain efficacy by utilizing mass and energy balance methods. LCA considers the activities related to raw materials, transformation, ancillary materials, equipment, methods, market, production, use, disposal, and ancillary equipment. As far as the business, economics, management, and eco-tourism scientific safety is concerned, personal protective equipment(PPE) and materials that include garments, clothing, gloves, safety shoes, hard hats, safety glasses, shields, respirators, full aprons, safety belts, and other safety items are to be used by an individual. Such equipment is important for personal protection and for safety.

It is the manager's and supervisor's responsibility to ensure that they are used. The enactment of workers' compensation laws and occupational disease laws shall increase materially the cost of insurance to the industry. The increased cost and the certainty with which it is applied will put a premium on accident-prevention work. This cost can be materially reduced by the installation of safety devices. The business, economics, management, and eco-tourism scientific process research experience has shown that approximately 80% of all industrial accidents are preventable for sustainable development. It is concluded that quality and sustainability management is a process approach centered on environment and quality through beneficiary satisfaction that leads to economic improvement and sustainability based on the triple-bottom-line approach. TQM has an important role to play in addressing quality issues surrounding sustainable constructional development.

Sustainable water and wastewater management have been discussed. EIA and EHIA processes have been conducted for a Chinese nuclear power plant Industry 4.0 at Quinson, China to consider the safety and health impacts of the radioactive environment to mitigate psychological health loadings on workers and nearby residents. SEA system is a potentially useful element of good environmental management and sustainable development; however, as currently practiced in business, economics, management, and eco-tourism scientific Industry 4.0, it is far from perfection. Emphasis should be given in business, economics, management, and eco-tourism sciences on maintaining the economic viability of the operation, while in turn taking care to preserve the ecological and social sustainabilities of the country. The International EIA process may be required a multi-disciplinary process approach that has been conducted very early stage of Indo-Matsushita carbon rod Industry 3.0 in 1982 at Tada for economic, environmental, and social viabilities.

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