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Reinventing Scientific Management of Resources with Special Reference to Environmental Sustainability

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ABSTRACT
Environment is the most precious subject and highly important for not only human life; but also valuable for all living beings in this world, and therefore, sustainability of environmental resources is essential for protecting and conserving environment in holistic way. So, effective management of environmental resources with global concern is vital for scientific developmental agenda. Hence, it is expected this research paper will illuminate the picture of civil social foundational pyramid for establishment of peace, progress and prosperity to global social existential norms. Such notions are explained with relativity approach in scientific temper of thought to work-out the appropriate findings, and also to put forth important suggestions and recommendations in coagulating the sustainable path to achieve the sustainable development goals (SDGs), for healthy human living pursuits through protective environmental norms of developmental strategies, for cementing better human relationships with harmonious social moving to forward looking tendencies. Accordingly, this empirical research study will help to guide social architects, policymakers, administrators, planners, researchers and others for policy making strategies in future to adopt fundamental resolutions for social development purposes in terms of reinventing scientific management resources for environmental sustainability.

KEYWORDS: *Climate Change, Ecological Balance, Inventive Creativity, Multidimensional Poverty, Professional Ethics, Smart Cities, Vasudhaiva Kutumbakam.*

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I. IDEATIONAL BACKGROUND

Environmental sustainability is a new discourse aimed at promoting new strategies to development of energy, water, air, land, and so on, which has become demand of time for sustainable development and requires integrating economic, social, cultural, political, and ecological factors[1]. It needs grassroots initiative for consideration of the local and global dimensions and the interactive nature of productive activities in modern times has necessitated space and time horizons of socio-economic endeavors pertaining to broadening areas of industrial and other activities. Sustainability needs multi-diversified horizons for accommodating intra-generational as well as international equity. Behavior and properties of resources and their utilization arise from the nature and intensity of their dynamic inter-linkages. Accordingly, sustainability has become evident from the complexities of productive activities. Resources, economy and environment are key components affect the quality of life on our planet[2]. In this respect, the Third Dubrovnik Conference on Sustainable Development of Energy, Water and Environment (EWE) Systems held in 2005 has offered the best opportunity for dissemination, exchange and promotion of new ideas to interdisciplinary, multi-cultural and multi-criteria evaluation of EWE systems[3]. Thus, resource management potentials require development of new methods for the analysis and evaluation of EWE systems. As a result, analysis of potential scientific and technological processes addressing interactions among energy, water and environment becomes imperative for new field of sustainability science that seeks to understand fundamental character of interactions between EWE systems and society[4].

Interdisciplinary partnerships for development bring together leading experts of engineering, informatics, economics, social sciences, physical, life and environmental sciences for drawing models to EWE systems and their evaluations. Hence, economics, environmental resource use and social validation necessitate adopting methodologies for assessing comparative sustainability to EWE systems, options and viabilities, among others; and such purposes well warrant reinventing scientific management of resources in relation to plans, programs and policies for environmental sustainability.

Objectives of the Study

The study covers wide range of discourses on effective use of environmental resources with protective measures to utilitarian development goals and enumerates reasons to scan productive resources for socio-economic activities to human better living pursuits in modern world. Consequently, the primary and secondary objectives consonance with sustainable development goals (SDGs) accentuates provisions of effective management to environmental resources. Primary objectives relate to human efforts supporting sustainable development contained in the Proceedings of the Third Dubrovnik Conference[5] and assess on issues pertaining to human development index (HDI), vulnerability of modern world, hazardous degeneration of life support systems, fundamental safety consciousness, quality of work life (QWL) etc.; whereas, secondary objectives deal with scientific environmental resource management goals, knowledge management system, inventive creativity, global dynamicity, resource conservation, environmental protection and so on. These objectives illuminate visions, missions and strategies of holistic sustainable development processes in relativity approach.

Scope of the Study

This empirical research endeavors to suggest measures for environmental sustainability with scientific resource management norms and guidelines and perpetuates level playing role to protect precious environment in promoting civil living initiatives with valuable means, and ensures nurturing scarce resources of nature with justice driven principles of work in equanimity concept and emancipation of human beings from severe societal sufferings to a stage of liberal living autonomy with SDGs as well as cementing effective public relationships to furnish long-run perspective of dynamic social progress. Findings and conclusion of such theoretical research effort will provide opportunities to policymakers, administrators, researchers, social thinkers, environmentalists, reformers, academicians, entrepreneurs, jurists and others to frame models of SDGs in future. The study has immense scope of embracing holistic development thought, inclusive growth perspective and forward looking tendencies with resource management utility and framing scientific decisions to progressive agenda as well as implementing policies for environmental sustainability with stakeholders' confidence. Altogether, the study strengthens the pyramid of global society in performing socio-economic activities with integrated approach for peace, progress and prosperity.

II. METHODOLOGY

The study is mainly concentrated on theoretical research practices, and therefore, secondary sources are utilized for historical analysis of things. Essential facts are reflected in terms of government reports, reports of international institutions, agencies and organizations. Policy decisions of government, international organizations and agencies are attentively observed with path-goal relational approach. Again, information technology and internet services, books, journals, periodicals, reviews and some other important sources well warrant the methodology of discussions for covering wide issues of effective resource management initiatives, environmental sustainability and human social progress in equipoise nature of doing things to profess, promote and practice the sustainability science in terms of SDGs. Thus, the entire study demarcates areas of human deprivation and societal injustices for healthy living pursuits with environmental protective measures. All these are accentuated scientifically, discussed chronologically and lamented for healthy exercises with relativity aspects for objective conceptualization purposes to adopting resource management policies, programs and procedures. As a whole, the secondary sources strengthen pillars of human society in terms of academic discourses for developing models of social progress, implementing policies for dynamic growth and framing strategies for realistic journey of life with civil liberties to existential autonomy of human life bringing processes. Hence, the secondary sources adopted under the study for scientific explanations of things have enriched the whole spectrum of resource management activities for environmental sustainability in holistic and all-comprehensive manner, to work as a rejoinder as complement to prepare the road map of SDGs.

Need for Sustainability Science

The vulnerability of modern world is an important issue to our humanity which has caused for hazardous degeneration of our life support systems. To understand the state of system we live in and threats produced by man-made agents in world of living have made us source of hazardous species by affecting our lives. Fundamental safety consciousness becomes a challenge to understand need for development with appropriate methodologies in evaluation and assessment of potential safety standards, because safety notions witnessed everyday is a key issue for individual and collective life both in long term and short term perspectives. Thus, development of sustainability science has become ultimate goal of modern society. Safety science is cumulative resource of human history[6]. Relation between the safety properties and any other property of complex system is fundamental quality indicator of the system. Quality of system depends on assessment of long term behavior to introduce sustainability as measure. Safety of any system is closely linked to change of quality of the system[7]. When we look at global scale of complex systems, the maximum entropy will mean the

death of the system. It is logical to assume that time change of sustainability of the system may be used as measure for potential changes of safety of the system. In this context, we require a new approach in the evaluation of the system to cope with the complexities.

Lack of resource utilization match has brought forth pressures on many global issues confronting society and therefore, aggregation of sustainability function is needed in the physical, social, technological, environmental and other parameters of resource use[8]. Adverse of this situation creates disastrous degradation of the system on which we live in. These issues relatively reflect on the need for study of sustainability science in appropriate setting to find out reasons for environmental degradation and bring out thereby realistic solutions, for matching balance in utilizing environmental resources to human safety measures. So, harmonious production function activities require sustainability science to achieve the goals of environmental sustainability with scientific resource management potentials.

System Approach to Environmental Sustainability

In sustainable concept, environment becomes focal point of research and therefore it is meant for resources optimal utility for holistic nature of human social development. Accordingly, system approach to resource management is concerned with sustainable elements which are healthy, potential and innovative in regard to human survival, societal dynamicity and global tranquility for peaceful co-existence of living beings. Thus, sustainable concept can be defined as: "Everything which is connected to everything in relation to systems thinking"[9]. It is ability to think about a system as a whole, rather considering development as well as resources utility as parts of individual source. System approach involves different techniques of production for healthy ecosystems. It utilizes various elements of production effectively for human survival as well as curbing perishable tendencies to environment. So, sustainable system of environment consists of people, structures and processes working together in constituting holistic, healthy and dynamic environment. The role of modern organizations, governments and individuals are important in sustainable concept[10]. It involves government planning, policy implications and implementation of decisions to environmental sustainability, human survival and global dynamicity. Development trends[11] explore environmental sustainability with utility measurement, human competencies and credibility notion to run foundation of civilization. System approach needs holistic tendencies to encountering and solving problems and generating ideas in regard to utility, measurement and optimality. System concept of environmental sustainability is concerned with interrelationships, interdependencies and interconnections and requires analysis, synthesis and understanding towards interconnections that are related to technical, social, temporal and multilevel interdependencies[12]. It perceives the world as a complex system and supports interconnectedness and interrelationships with healthy, cordial and mutual corroborative principles; and perceives connections, links or relationships among different disciplines or sectors. Environmental sustainability allows the interdependent whole to be appreciated[13] in systems view rather than seeing it as parts and pieces of how things happen. Thus, system thinking focuses on how things under study interact with other constituents of the system rather than isolating smaller parts.

There are close ties with basic concepts in system ideas, such as whole and parts, system and sub-systems, boundary and environment, emergent properties, hierarchy of systems, communication and control, synergism and effect, etc[14]. System approach is holistic thinking as it looks things as a whole. In systems of greater complexity, the system as a whole may have properties and so, organizations cannot be understood studying its parts in isolation. It involves all stakeholders in multidisciplinary and interdisciplinary research and approaches, and recognizes complexity as well as uncertainty within systems. It helps shifting knowledge and skills from single disciplinary to interdisciplinary approaches.

Reasons for Adopting System Approach

There are different reasons to adopt system approach issues in sustainable concept. As for example, to prioritizing climate change adaptation approaches, it is observed government has great role to play for health-care activities in rural communities which has relevance to climate change situations. Consequently, it is noted here that health is a priority in adaptation to climate change. The fundamental reasons for system thinking embraces the concept of interconnectedness, and therefore, it explores human aspiration goals which are actually interconnected and is explained within various UN declarations, to support economic, social and environmental objectives. Another noteworthy reason for system thinking is that it entails stakeholders' involvement and helps knowledge sharing to understand cause-effect relationships for actions and goals. Accordingly, system thinking can be used to explore problems and subsequently make decisions about management issues with a range of stakeholders[15]. Multidisciplinary researches provide that SDGs require understanding on pieces and parts for change in environmental, economic and social conditions. In short, the human development index (HDI) ranks many developing nations especially, those in Sub-Saharan Africa with a low grade. The multidimensional poverty index (MPI) calculus shows that 1.7 billion people in 109 countries live in 'multidimensional' poverty[16]. So, sustainable notion of managing resources in this age of growing

population is important due to living standards. As for example, it is observed that 1.3 billion people who are estimated to live on US$1.25 a day or less is the current demand needs sustainability of the environmental resources match in modern production activities.

Growing population, commercial needs of nations and communities lead to increasing demands for high-quality environmental conditions, e.g. water, energy, health-care, waste management, climate change adaptation and clean air. It is therefore true to say that innovations at the base of pyramid (BOP) would help in poverty reduction and meeting targeted SDGs. Integration of development-oriented research in decision-making and management will catalyze interactions among relevant disciplines[17]. All these are valid grounds for adopting system approach to developmental activities, for which developing countries have been making great strides to address such issues for their developmental needs.

Compartmentalization to Environmental Sustainability

There are some other approaches for environmental sustainability, but the system approach has been considered as ideal model for scientific management of resources and its utility to development purposes. It is considered as the best concept of modern science, in so far as it relates to human co-existential pyramid with ecosystems balance, global harmony and the principles of the Vedanta: "Vasudhaiva Kutumbakam"[18]. However, among others, there is compartmentalization approach to development which might not be effective for sustainability. Hence, it needs a holistic formula for ideal and nurturing concept. Though poverty is predominantly a rural phenomenon, urban poverty is rising fast. Women are particularly disadvantaged, while regional disparities are also evident. Income inequality, as measured by the Gini coefficient[19] is high, indicating that benefits of increased economic growth have not been distributed evenly and have gone disproportionately to a small segment of the population. The availability of clean drinking water, electricity supply, basic health-care and proper waste management system as well as excellent communication and transportation facilities, including access to roads is quite imperative in mitigating poverty to a large scale. Reductionism generates knowledge and understanding of phenomena by breaking them down into constituent parts and then studying these simple elements in terms of cause and effect. Accordingly, there is growing concern for compartmentalization in the overall system of study in regard to environmental sustainability. But, the scientific notion of harmonious balance and dynamic moving toward goals of civilization are not right to subject it to the BOP that helps in poverty reduction[20].

Hence, compartmentalization thought should not be considered ideal and safe for environmental sequential knowledge for mankind, as there is no benefit in the holistic sense of study for the purpose of human forward looking journey in nurturing, sustaining and conserving philosophy of life with regard to ecological balance, global harmony and human co-existential foundation of living goals.

Sustainable Future and Resource Utility

Sustainable concept is necessary component of holistic development and confined with human progress. The Intergovernmental Panel on Climate Change[21] (IPCC) reports that there has been ongoing rise in atmosphere's CO_2 concentration. It is a monumental danger not only to human society but to the world of nature as well. The sustainable future in built environment has wider discourse to foresight-based construction. Accordingly, our focus is primarily on the construction and development industries. Wilkinson and Reed (2008) states: "It is a process involves changing or intensifying use of land to produce buildings for occupation". So, construction and development together encompasses planning, acquisitions, development and operations as the base of resource utility. Built environment envisages construction and development sector to enlighten objective resource utility[22]. The elements of built environment are: (a) land use patterns, (b) distribution across space of activities, (c) buildings that house them, (d) transportation system, (e) physical infrastructure of roads, sidewalk and cycle paths as well as services system provides, and (f) urban design, arrangement and appearance of physical elements in a community[23]. It also includes our homes, schools, workplaces, parks/recreation areas, business areas, roads, etc. It extends to overhead in the form of electric transmission lines, underground in the form of waste disposal sites, across the country in the form of highways and subway trains. As a whole, built environment encompasses all buildings, spaces and products that are created or modified by people. The Brundtland Commission (1987: 27) defines it as: "…development that meets the needs of the present without compromising the ability of future generations to meet their own needs". It contains within it two key concepts: (a) the concept of needs, in particular the essential needs of the world's poor to which overriding priority should be given, and (b) the idea of limitations imposed by state of technology and social organization on the environment's ability to meet present and future needs.

Pearce[24] opines that sustainability is the goal of sustainable development generated to advance productivity through technological change. Four important capital assets of it are: (a) human capital or labor force, (b) man-made capital or the built assets, (c) natural capital or the environment, (b) social capital or interpersonal relationships. In this sense, sustainable development can be seen as a pathway[25] to future

sustainability. Relevance between sustainable future and resource utility is found to sustainable development strategy report of UK government (DEFRA, 2005). Thus, sustainable future is highly dependent on resource utility. Construction plays an important role in contributing to sustainable development.

Sustainable Foresight for Qualitative Development

Conceptual framework of sustainable foresight is related to qualitative aspects of development, and therefore, development is needed professional ethics, governance principles, human safety measures and security norms. So, foresight approach is predominant idea of sustainable built environment, connoting principles of professionalism, changing dynamism and human oriented agenda. To Loveridge[26], foresight is: "…essentially practical and qualitative anticipation". It should be distinguished from institutional foresight of policy and planning circles. In this sense foresight can also be thought of a conceptual framework involving a range of forward-looking tendencies of informed decision-making that include considerations and views of the long-term. Conway (2014: 2) opines: "Foresight is…the capacity to think systematically about future to inform decision making today". It is a cognitive capacity that we need to develop as individuals, as organizations and as a society. Sustainable foresight for quality development illuminates the working of modern industries and professions which have been streamed primarily to overcome future challenges. It is observed that there is a synergy with some of the ideas explored in the futures thinking of Arup at city level[27]. In quality development, there should be primary intelligence toward infrastructure, that is, the physical networks that deliver services like: transport, telecommunications, water and energy. It is because, infrastructure projects explore how science and technology can be applied to design and implementation of intelligent infrastructure for robust, sustainable and safe transport and its alternatives.

Sustainable foresight is the only yardstick of measurement for qualitative development in modern times requires nurturing productive elements for global peace, human harmonious development and natural balance restoration. Thus, sustainable foresight and quality development is the pyramid of climate change needs research and existing knowledge.

Generic Visions for Sustainability

Global forecasts to construction industry have great impact on sustainable futures thinking. Harty (2007) predicts that sustainability concerns mainly workshops, interviews, consultations, individual and organizational speculation or reviews of past work. Scenarios also reflect on sustainable futures. Godet and Roubelat[28] asserts: "Scenarios are descriptions of future situation and course of events allow one to move forward from original situation to future". Thus, generic visions of sustainability as found in studies of the USA, Germany and Australia have similar views. Empirical research studies have propounded three generic visions of sustainability, such as Vision I, Vision II and Vision III. Vision I comprises smart networked city highly mobile, pervasive, and information-rich, allows internalization of environment costs and integrated seamlessly in virtual environment to the physical world with advanced market-oriented solutions. It is globally competitive networked society with a hub where information and communication technology (ICT) provides real-time information to drive efficiencies through automation, intelligence and smooth control mechanism. Vision II concerns a compact city made for intensive and efficient urban living purposes optimizing urban land uses, buildings, services and infrastructure provisions to create dense urban settlement forms for encouraging reduced demand and more efficient uses of energy and resources. Vision III pertains to self-reliant green city with a self-replenishing large self-reliant system of circular metabolism dealing with self-sufficient bio-region for living in harmony with nature, where resources are local, demand is constraint and inputs-outputs of the city are connected cradle to cradle. Harty (2007) provides a helpful taxonomy of these issues and drivers while classifying generic visions of sustainability as: 'technological', 'environmental', 'human', 'economic', 'governance' and 'other'. However, the CITB[29] study identifies that there are ten drivers in generic visions of sustainability having importance to long-term change pertaining to construction industry. So, generic visions for sustainability relate to key drivers in futures study where change is associated with construction industry.

Generic visions for sustainability envisages schemes of technologically increased standardization and offsite construction, increased use of ICT, information-sharing platforms, increased automation, use of robotics, increased use of 3D technology such as virtual reality and computer aided design (CAD), new/smart construction materials, environmentally increased importance of sustainability, climate change/global warming/extreme weather, resources/energy conservation, oil depletion/energy crisis, reduce waste and pollution/increased recycling, increased urbanization, demographic changes, human reduction of skilled trades/consolidation of professions, shift education and training requirements, improved health and safety, welfare and working conditions, flexible working, smaller households, changing health-care needs and requirements, vulnerability and security, economic, more profitable, efficient and competitive construction industry, increased foreign competition and globalization, consolidation and de-fragmentation of construction industry, increased use of whole-life costing, private and public partnership (PPP), private finance initiative

(PFI), increased gap between rich and poor, governance, changes in government policy, increased or alignment of legislation and regulation, other wild cards, major shocks, etc. The picture of generic visions for sustainability is illuminated in study report of the Construction Industry Coulcil[30] (CIC) on built environment spectrum to examine the long-term critical role of construction's digital future in 2050.

Economic Growth and Environmental Sustainability

Economic growth has relevance to environmental sustainability. Economic activities determine demand for trained and skilled workers. Market conditions, demography, migration and population change are other components of economic growth. Rapid growth of population and changing human demands has increased demand for infrastructure, homes and public buildings. Population scenarios have been becoming more diverse[31]. Economic activities create climate change issues and environmental sustainability needs carbon mitigation and adaption policy for steady rate of economic growth. New legislations are required to cope with increasing problems. Changes in technology and innovation have significantly changed market conditions. Government should be capable of helping industry develop and improve[32]. Changing employment scenarios have impact on economic activities. So, good governance, supportive regulation and appropriate business models are required to reform employment sectors. Shift from direct employment to self-employment and subcontracting necessitates a move toward collaborative contracts[33]. Change in business models have stimulated for improvement, innovation, margins and new skills demand in industries. So, external image have become primary scale of measuring industrial recruitment important for sustainable environment. Accordingly, growth policy initiatives need a healthy balance for environmental sustainability. Government regulation, internal attitudes, flexibility, problem solving, resistance to change, macro image, confrontational attitudes, up-and-down supply chain, sexism, prejudice are recognized as being deterrents to efficiency, recruitment and diversity. Empirical studies reveal the fact that all these have direct bearing to construction sector[34] and there is incremental impact for overall economic growth.

Healthy economic growth and environmental sustainability therefore needs adequate government policy initiatives to construction sector. Construction strategies are required professional ethics and code of conduct. Government should undertake development responsibilities with ambitions for sustainable environment, in so far as new smart cities, refurnished assets and other infrastructure projects are concerned. Desirable future therefore requires working back to the present to identify policies and practices with reality[35]. Adequate standards are required for procuring materials for productive purposes to re-imagine a radically transformed future[36] rather than extrapolate current trends. Internal and external drivers do not interact together rather they operate independently. Thus, economic growth and environmental sustainability mean different issues to different people in national contexts. What is sustainable in a developed world city may have no place in a developing world city struggling to provide basic utilities.

Sustainability and Built Environment

Sustainability and built environment has good correlation. Barlow, Li Shao and Smith identify complexities of relationship among climate change resilience and built environment. To know barriers of sustainability, van De Wetering studies key trends and drivers of sustainable buildings and commercial markets. Again, Woodcraft and Baldwin examines sustainable communities. Thus, sustainability agenda pertains to growth of future cities. Internationally, it envisages implications to construction and development professions and helps understanding on evolution of smart cities to future sustainability with growing challenges and opportunities looking ahead to 2050. Tran therefore examines sustainable infrastructure in regard to built environment. Infrastructure systems (energy, transport, water and digital communications) are not only vital to modern economic activities, but also major sources of carbon emissions and environmental impacts. Farrell[37] puts special stress on sustainable design approaches and advocates how new and reactive solutions in designing to future built environment relate to surrounding community. Sustainability therefore encompasses existing components and viability of construction projects with respect to design, structure and productive variables in built environment for efficiency, effectiveness and dynamicity. The Digital Britain strategy focuses the whole-life cost of assets, reduction in initial cost of construction and reduction in greenhouse gas emissions in the built environment[38]. Interconnectivities and interrelationships between drivers are important in sustainability which is often overlooked in construction. Chan and Cooper (2011) suggest that convergence is essential criterion of construction having social, economic, political and environmental dimensions in future built environment. Professional practices of built environment have been changing widely due to technology, new business models and interpretations of sustainability. Parker and Doak therefore explore the roots of sustainable planning, policy and practice. They emulate principles of overarching discourse and possible trajectories into the future. Green[39] critically examines the role of professional knowledge to sustainable construction.

Sustainability in built environment envisions a sustainable future with focus of materials procurement, meeting client requirements, innovation rather than merely provision of low-cost labor and materials[40] to

construction. Efficient procurement, effective buyer-supplier terms, standards and responsibilities in construction and development are essential pillars of sustainable built environment.

Other Elements of Environmental Sustainability

Human peaceful survival, global level resource conservation policy and integrated approach of organizational behavior require environmental sustainable principles. To enrich potentials in utilizing environmental resources and reinforce ecological balance to productive socio-economic activities, professional, ethical and good governance business principles are essential. Organizations should therefore cope with changing professional practice[41] in utilizing resources to industrial and social activities. Sustainable procurement system and effective productive norms require nurture of eco-friendly measures. Connaughton and Hughes rightly predict that supply-chain management strengthens the base of sustainable procurement. Thompson further examines the changing role of social media in construction and real estate[42]. Social media is no longer a fringe activity for any company. But very few companies have understanding on how social media interacts exactly with consumers to expand product and brand recognition, drive sales and profitability and engender loyalty. The built environment requires more collaborative approach[43] by the established players. Collaboration provides supportive role to construction professions. Role of academia in facilitating sustainable change is immense. Collaborative researches, industrial innovations, corporate reformations, professional values and business models can simulate things for sustainable development. Reinforcing business principles require collaborative approaches and professional guidelines. Fundamental reviews of literatures and judgment provide close links between economics and behavioral sciences. Decision-makers, engineers and practitioners need effective tools of communication on green buildings[44] to propose a broader range of pitching for sustainability initiatives. Coker and Torriti suggest access to transport, energy and technology in built environment has changed dramatically.

Policy initiatives to renewable sources of energy provide human affordability, security and de-carbonization in meeting energy needs for bringing sustainable, healthy and peaceful living order. Larsen opines that sustainable built environment requires transitional change to innovation, current materials, digital technologies, processes and work practices in construction sector[45]. Digital reformations to future built environment pertaining to construction sector require transitional adjustments with social transformation for healthy living potentials. Hence, correct appraisal of foresight techniques[46] in built environment will provide sustainability to utilization of material resources, for which understanding on the future helps exploring the nature of technology disruption[47] and convergence. Thus, interaction with megatrends to 2050, with particular focus on their impacts on construction and development will contribute for exploring the shape of built environment of the future[48] with potentials of resource utility, procurement policies and productive norms with environmental compliance.

Climate Change Adaptation for Sustainability

Climate change has been happening in environment for continuously long periods threaten to reverse human progress. As per reports of the Intergovernmental Panel on Climate Change (IPCC), it is observed that there is ongoing rise in atmosphere's CO_2 concentration which is a monumental danger not only to human society but to the world of nature as well (Levene: 2013). This vivid condition is not pretty for healthy living, because heat waves are killing poor and elderly and causing precious farmlands due to draught. Bad impacts of climate change are melting polar ice caps, raising sea levels and flooding coastal lowland. These are conditions happening frequently on earth. Consequently, there has been disappearance of coral reefs which is dissolving into oblivion as oceans become warm and turn acidic. Thus, access to land and dwindling water supplies to grow food to feed burgeoning populations might lead to instability[49]. Climate change forces communities in developing countries to adapt to the extreme and unpredictable weather. Accordingly, sustainable development requires that all responses to climate change are successful in reducing poverty. For the foreseeable future, prevention of climate change[50] must address social, economic and environmental impacts on communities. So, new prioritization methodology is essential for climate change adaptation, particularly in developing countries. Health as the number one prioritization in order to the adaptation approaches of climate change requires health education, public sensitization[51], water supply, infrastructure development, microfinance and infrastructure for technology enhancement.

The African continent has been observed to be more vulnerable in the coming decades, primarily because of its low adaptive capacity (Hope Sr.: 2009). Greenhouse gas reduction is the primary goal of climate change mitigation. Adaptation processes must be aimed at coping with anticipating effects of climate change and it should be implemented at local and regional levels.

Findings of the Study

Some important findings of this research study are outlined below:

- Developing countries generally suffer from lower grade of human development index (HDI) as compared to developed countries. So, there are income inequalities, limited schooling opportunities and basic amenities of life.
- Life expectancies in developing countries like, in Sub-Saharan Africa are far below world averages due to deaths from preventable and treatable diseases.
- Human life support systems are impaired due to hazardous events which have been increasing day-by-day in civil society.
- Lack of effectiveness in utilizing environmental resources and steady state control mechanism in productive systems has ruined environmental sustainability.
- Unscientific developmental activities in different parts of the world are mainly responsible for environmental changes.
- Inadequacy of knowledge on life cycle assessment, ecological footprint and energy conservation worldwide have caused severely for environmental degradation.
- Scientific scanning of environmental resources by modern organizations has become an urgent demand of time for sustainable development which is lagging behind expectations.
- Compartmentalization approach is not ideal model for development with harmonious balance and considered as unfit in obtaining a holistic formula to nurture environment as a whole.
- Real estate lifecycle requires healthy integrated concept for environmental sustainability and human better living goals.
- Built environment (driving force behind built assets) generally suffers from normative vision of sustainable future in bringing realistic change to human quality of work life (QWL).
- Defective applications of foresight methodologies in environmental issues have deteriorated quality development.
- Sustainable foresight issues delimit the character of society-driven constant information, consumption pattern, effective competition, technology focus for minimizing environmental risks and impacts.
- Negligence in sustainable foresight has increased carbon emissions and created environmental constraints to personal mobility factors.
- Inspirational values in generic visions of sustainability are driven by wealth producing capacities only.
- Smart networked cities in the world are detrimental to environmental risks, unhealthy for peaceful living, restlessness for mobility of people, goods and services, suffers from harmony of civilizations and poignant to sustainable heritage.
- Improper use of digital technology in construction sector has badly impacted on economic growth.
- Obsolete recruitment policy, precarious employment terms, deficient technology upgrading and unhealthy safety records have ruined economic growth and sustainable environment.
- Global warming has made migrating plants and animals unable to move to cooler locations fast enough to avoid extinction.

III. SUGGESTIONS AND RECOMMENDATIONS

Fundamental suggestions of environmental sustainability are enumerated as follows:

- In this age of growing population, sustainable notion of managing environmental resources has become very much important to enhance human living standards.
- System approach as the scientific way of dealing with environmental sustainability can harmonize human efforts through the identification of the interrelatedness of development issues.
- Sustainability is the indicator of environmental protection needs scientific utilization of resources and their judicious applications in productive functions.
- A set of components are required to be developed and designed for environmental sustainability guided by specific purposes that can be recognized, understood and synthesized with interactions and interdependencies.
- Smart cities comprising buildings, parks, public spaces, streets, utility infrastructure, etc. should be constructed with environmental scanning and monitoring overall system of human healthy living parameters.
- Capital assets to be underpinned by appropriate government structures with a ‘triple bottom line’ approach for sustainable development, keeping due importance to social, economic and environmental sustainability.
- Built environment must have level playing role model for sustainable development to overcome problems of environmental challenges.
- Government skills policy should be changed as per market demand to cope up with training necessities in self-employment as well as sub-contracting sectors.

- Urban development needs adequate planning and competent policy framework on the part of local government and property developers to regenerate social outcomes with sustainable community outlook.
- Social media as catalogues in productive activities to the changing professional practice has great contribution in modern times as to different threads in sustainable built environment.
- Environmental wastes reuse and recycling initiatives will increase renewable sources of energy helpful for sustainable socio-economic development.

In coagulation of the entire research study, the following recommendations are illuminated:

- Resource management sustainability and development goals are needed integrating economic, social, cultural, political and ecological factors and different scales of productive operations.
- Development includes recognition of sustainability science in social aspects and information exchange processes for human productive activities to attain objectives of better future, greater welfare and quality of life.
- Adequate visions for sustainable development need appropriate resource utility strategies, reliable production function techniques, reformative organizational goal consistencies and optimum human capacity building norms in qualitative and quantitative terms.
- Environmental sustainability must nourish system principles not as static snapshots, but as instrument of responding behavior for bringing abrupt positive change to nurture planet earth.
- For coping with environmental uncertainties and imbalances unscientific, unlawful and unrealistic utilization of natural resources should be curbed immediately.
- Innovating inventive creativity and judicious analysis of environmental forces will provide sustainability in holistic nature.
- Built environment must be congenial for healthy living to upgrade quality of life in terms of indoor and outdoor physical environments (climatic conditions, indoor and outdoor air quality) and it should care for social environments (civic participation, community capacity and investment).
- Judicious efforts from stakeholders and environmental consciousness can overcome problems of generic visions of sustainability.
- Responding towards global environmental responsibility can solve the problems of human health, safety and comfortable living created by unscientific vision on urban futures.
- New business models in supply chain management system can yield economic growth in changing situations.
- Climate change must be curbed to harmonize ecological imbalances and minimize severe diseases spread in different regions of the world.

IV. CONCLUSION

Environmental sustainability requires promoting new strategies for utilizing environmental resources to development purposes. Hence, scientific management of environmental resources for productive purposes has become the urgent demand for the quest of sustainable development. Accordingly, integrating economic, social, cultural, political and ecological factors with grassroots initiatives and simultaneous consideration for local and global dimensions has become very much necessary for bringing multi-diversified horizons with intra-generational as well as international equity. Sustainability science therefore seeks to understand the fundamental character of interactions between systems and society. It is permeably said that development of inter-disciplinary partnerships bringing together leading experts in physical, life and environmental sciences, engineering, economics, social sciences and informatics have made it possible for drawing inclusive development models. As a matter of fact, the entire study is devoted to all such parameters pertaining to sustainability science with effective resource management planning and policies to establish the relationships between resources use and its sustainability in sparkling manner with relativity approach.

It is therefore predicted that sustainable development goals (SDGs) of the United Nations as targeted with key development issues well warrant peace, progress and prosperity of global societies for civil living existential autonomy of life bringing possibilities on the earth. Interconnectedness of environmental issues to socio-economic aspects of development is illuminated through system approach for sustainable order of living with harmonious ecological balance. In nutshell, the whole study embraces the concepts of renewable energy, climate change, public health, solid waste, environmental sanitation and other relevant issues in holistic approach with framework of appropriate strategies in prioritizing civic living parameters. Hence, redrafting strict environmental legislations and their timely compliance well warrant visionary development, missionary progress and strategic solution of environmental problems for the purpose of safeguarding the planet earth with sustainable means. Environmental sustainable consciousness among stakeholders will eliminate the lapses of lifecycle processes with adequate checks and balances in perpetual succession. .

REFERENCES:

[1]. Alkire, S. & Others. (2011): "Where did Identification Go?", Journal of Economic Inequality, 9(3): 501–505.
[2]. Barr, S. (2012): "Environment and Society: Sustainability, Policy and the Citizen", Ashgate Publishing, Farnham.
[3]. Hawila, D. & Others. (May 2014): "Renewable Energy Readiness Assessment for North African Countries", Renewable and Sustainable Energy Reviews, 33: 128–140.
[4]. Barber, J. (March 2003): "Production, Consumption and the World Summit on Sustainable Development", Environment, Development and Sustainability, 5: 63–93.
[5]. Barber, J. (2005): "Production, Consumption and the World Summit on Sustainable Development", The World Summit on Sustainable Development, Springer, Dordrecht, pp. 57-89.
[6]. Davidz, H. L. & Nightingale, D. J. (March 2008): "Enabling Systems Thinking to Accelerate the Development of Senior Systems Engineers", Systems Engineering, 11(1): 1–14.
[7]. Everett, T. & Kell, C. (2010): "Human Movement: An Introductory Text", Elsevier Health Sciences, London.
[8]. Hope Sr., K. R. (December 2009): "Climate Change and Poverty in Africa", International Journal of Sustainable Development & World Ecology, 16(6): 451–461.
[9]. Kasser, J. & Others. (March 2013): "A Framework for Benchmarking Competency Assessment Models", Systems Engineering, 16(1): 29–44.
[10]. Mingers, J. & White, L. (December 2010): "A Review of the Recent Contribution of Systems Thinking to Operational Research and Management Science", European Journal of Operational Research, 207(3): 1147–1161.
[11]. King, G. & Others. (2000): "Making the Most of Statistical Analyses: Improving Interpretation and Presentation", American Journal of Political Science, 44(2): 347–361.
[12]. Hughes, B. B. & Hillebrand, E. E. (2015): "Exploring and Shaping International Futures", Routledge, London.
[13]. Moldavska, A. & Welo, T. (December 2015): "On the Applicability of Sustainability Assessment Tools in Manufacturing", Procedia CIRP, 29: 621–626.
[14]. Moore, S. M. & Others. (2010): "The Systems Thinking Scale", STS User Manual (Unpublished Manuscript), pp. 1-27.
[15]. Goldstone, R. L. & Wilensky, U. (October 2008): "Promoting Transfer by Grounding Complex Systems Principles", Journal of the Learning Sciences, 17(4): 465–516.
[16]. Levene, M. (May 2013): "Climate Blues: Or How Awareness of the Human End might Re-instill Ethical Purpose to the Writing of History", Environmental Humanities, 2(1): 147–167.
[17]. Govender, K. (2016): "The Management of Electronic Waste: A Case Study of the Umbogintwini Industrial Complex and Southgate Business Park in KwaZulu-Natal, South Africa", Durban University of Technology, South Africa.
[18]. Deb, S. (2016): "Strategies for Human Development", Kalpaz Publications, New Delhi.
[19]. Halwindi, H. & Others. (March 2013): "Factors Perceived by Caretakers as Barriers to Health Care for Under-five Children in Mazabuka District, Zambia", ISRN Tropical Medicine, Zambia, pp. 1–10.
[20]. Karimi, B. (May 2016): "Applying the Economic, Homeland and National Security Analysis Framework", Homeland Security Affairs 12, Essay 4, Washington, D.C.
[21]. Hope Sr., K. R. (2009): "Climate Change and Poverty in Africa", International Journal of Sustainable Development & World Ecology, 16(6): 451–461.
[22]. ONS. (2009): "UK Standard Industrial Classification of Economic Activities 2007", Structure and Explanatory Notes, Standard Industrial Classification, Office for National Statistics, London.
[23]. Handy, S. L. & Others. (August 2002): "How the Built Environment Affects Physical Activity: Views from Urban Planning", American Journal of Preventive Medicine, 23(2): 64–73.
[24]. Pearce, D. (2003): "The Social and Economic Value of Construction: The Construction Industry's Contribution to Sustainable Development", NCRISP, London.
[25]. McGrai, S. & Gaziulusoy, A. I. (March 2014): "Using Futures Inquiry to Create Low-Carbon, Resilient Urban Futures: A Review of Practice, Theory and Process Options for the Visions and Pathways Project", Working Paper for the Visions and Pathways Project, Version 2.0, pp. 1-28.
[26]. Loveridge, D. (2009): "Foresight: The Art and Science of Anticipating the Future", Routledge, London.
[27]. Arup. (2014): "Cities Alive: Rethinking Green Infrastructure", Arup Group, London.
[28]. Godet, M. & Roubelat, F. (1996): "Creating the Future: The Use and Misuse of Scenarios", Long Range Planning, 29(2): 164–171.
[29]. CITB. (2015): "Construction 2030 and Beyond: The Future of Jobs and Skills in the UK Construction Sector", Construction Industry Training Board, London.
[30]. CIC. (2014): "Built Environment 2050: A Report on Our Digital Future", Construction Industry Council, London.
[31]. Alford, K. & Others. (2014): "The Challenges of Living Scenarios for Australia in 2050", Journal of Futures Studies, 18(3): 115–126.
[32]. Chan, P. & Cooper, R. (2011): "Constructing Futures: Industry Leaders and Futures Thinking in Construction", Wiley-Blackwell, Oxford.
[33]. Dixon, T. & Others. (eds.) (2014): "Urban Retrofitting for Sustainability: Mapping the Transition to 2050", Routledge, London.
[34]. Bok, B. & Others. (2012): "Construction 2030: A Roadmap of R&D Priorities for Australia's Built Environment", Sustainable Built Environment National Research Centre, Brisbane.
[35]. Eames, M. & Others. (2013a): "City Futures: Exploring Urban Retrofit and Sustainable Transitions", Building Research and Information, 41(5): 504–516.
[36]. Harty, C. & Others. (2007): "The Futures of Construction: A Critical Review of Construction Future Studies", Construction Management and Economics, 25(5): 477–493.
[37]. Farrell, T. (2014): "The Farrell Review of Architecture and the Built Environment", Farrells, London.
[38]. Brundtland Commission. (1987): "Our Common Future: Report of the 1987 World Commission on Environment and Development", Oxford University Press, Oxford.
[39]. Green, S. D. (2011): "Making Sense of Construction Improvement", Wiley-Blackwell, Oxford.
[40]. Chan, P. & Aouad, G. (2005): "Building Future Scenarios: A Reflection for the Research Agenda", in Khosrowshahi, F. (ed.): "21st Annual ARCOM Conference, 7–9 September", SOAS, University of London, UK, Association of Researchers in Construction Management, 2: 709–19.
[41]. BIS. (2013): "UK Construction: An Economic Analysis of the Sector", Department for Business Innovation and Skills, London.
[42]. Morrell, P. (2015): "Collaboration for Change: The Edge Commission Report on the Future of Professionalism", Ove Arup/The Edge, London.
[43]. DDA. (2016): "World Green Building Trends", Dodge Data and Analytics, Bedford, MA.

[44]. Fernie, S. & Others. (2006): "Change in Construction: A Critical Perspective", Building Research and Information, 34(2): 91–103.
[45]. Conway, M. (2014): "Foresight: An Introduction – A Thinking Futures Reference Guide", Thinking Futures, Melbourne.
[46]. Cook, D. (2015): "RICS Futures: Turning Disruption from Technology to Opportunity", Journal of Property Investment & Finance, 33 (5): 456–464.
[47]. Latham, M. (1994): "Constructing the Team: Joint Review of Procurement and Contractual Arrangements in the United Kingdom Construction Industry", HMSO, London.
[48]. Coyle, G. (1997): "The Nature and Value of Futures Studies or Do Futures have a Future?", Futures, 29(1): 77–93.
[49]. Ahuja, D. & Tatsutani, M. (2009): "Sustainable Energy for Developing Countries", SAPIEN. S. Surveys and Perspectives Integrating Environment and Society, 2(1): 123–124.
[50]. Arena, R. & Others. (August 2015): "Healthy Lifestyle Interventions to Combat Non-communicable Disease – A Novel Nonhierarchical Connectivity Model for Key Stakeholders: A Policy Statement from the American Heart Association", European Society of Cardiology, European Association for Cardiovascular Prevention and Rehabilitation, and American College of Preventive Medicine, European Heart Journal, 36(31): 2097-2109.
[51]. Bishwajit, G. & Others. (2014): "Trade Liberalization, Urbanization and Nutrition Transition in Asian Countries", Journal of Nutrition Health & Food Science, 2(5): 21–47.

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