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The Concept & Characteristics of Ideal Energy System and its Realization Constraints

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ABSTRACT

An energy system is a system which produces or converts and delivers energy for useful work. An energy system is primarily designed to supply energy to various processes in the dynamic world and to provide both basic needs and luxurious services to end-users. There are many energy sources of different types used in practice. The sustainability model of the universe suggests the use of renewable energy sources for harvesting energy for practical use. Renewable energy research is finding importance due to its priority of maintaining environmental sustainability. The objective and direction of renewable energy research can be properly guided by considering the properties of Ideal energy source. In this paper, we made an attempt to analyse the importance and objective of energy research and how it can be improved and speed up by showcasing an anticipated hypothetical energy system called the ideal energy system. The system model of the ideal energy system is proposed and its predicted characteristics are proposed and discussed in detail. The possibility of realization of such a system in practice is also discussed by comparing the ideal energy system characteristics with practically possible energy system using renewable energy sources and suitable technology.

Keywords: Energy, System, Ideal energy system, Characteristics of an ideal system, Renewable energy systems.

1. INTRODUCTION :

The simple definition of energy is the capacity to do the work. As per the law of physics, energy is a quantitative property of any material or object in order to do the work or heat it or its surroundings. Energy is essential for all living bodies for their basic need and for developing luxurious facilities. Energy is essential to every living organism to stay alive and for their functions like growth, maintain balance, movement of the body, body parts, and body components reproduction, every living body defense mechanisms etc. Energy is also essential for building, repairing, and maintaining body cells. Thus, energy is an essential component in the universe for living systems. As per the law of conservation of energy, energy cannot be created nor destroyed but can be converted from one form to another. Basically energy of any body or system is categorized into two types as kinetic energy and potential energy. Potential Energy of a body or system is based on its position at rest and is any type of stored energy and can be chemical, nuclear, gravitational, or mechanical. The kinetic energy of a body or system is due to its movement and is the work needed to move the body or system to a particular speed. The energy of a body or system may be either kinetic energy, potential energy or of both. The different forms of energy include mechanical energy, electrical energy, magnetic energy, gravitational energy, chemical energy, ionization energy, nuclear energy, chromodynamic energy, elastic energy, sound energy, thermal energy, rest energy, and radiant (electromagnetic or light) energy. One of the peculiar characteristics of the energy is it can be transformed from one form to another at different efficiencies. The instrument used for transfer of energy from one form to another form is called transducer. In practice the efficiency of energy transformation from one form to another is small and a lot of energy during the transformation process is lost either as heat or other forms

which not useful. It is known that the energy is a manifestation of matter and the rest mass and rest energy of a body or system are interrelated using a famous Albert Einstein's formula $E = mc^2$. Energy is a basic need of the dynamic universe and every object whether they are macro size, micro size, nano size, or atomic size, for their active part of this dynamic universe. Thus energy and matter are the fundamental ingredients of the entire universe and as per the present scientific knowledge, energy can show either wave nature or particle nature. Most of the scientific researches are based on effective production, processing, manipulation, detection, harvesting, and effective utilization of energy. In this conceptual paper, we made an attempt to analyse the importance and objective of energy research and how it can be improved and speed up by showcasing an anticipated hypothetical energy system called the ideal energy system. The system model [1] of the ideal energy system is proposed and its predicted characteristics are proposed and discussed in detail. The possibility of realization of such a system in practice is also discussed by comparing the ideal energy system characteristics with practically possible energy system using renewable energy sources and suitable technology.

2. ENERGY RESEARCH :

Energy research is one of the primary areas of research due to the objective of providing renewable, cheap, and safe energy to every user including industry, home, and individual human beings throughout the world. The major research areas in the energy sector include Renewable energy, Fossil and nuclear energy, Energy storage and grid modernization, Energy policy and economics, Energy end-use efficiency, and Energy environmental impacts. Out of these areas, the effective use of renewable energy sources and the impact of energy sourcing and utilization on the environment are getting priority and are able to attract huge funding from both developed and developing countries. Renewable energy research area has various alternative fields like bioenergy field, photovoltaics field, wind energy field, solar thermal field, and renewable fuels field. Many environmental effects like greenhouse effect, degraded air and water quality, climate change, and their consequences on a sustainable environment. Renewable energy is an energy produced from such energy systems which are based on renewable resources, usually naturally replenished with time, such as sunlight, rain, tides, wind, waves, geothermal heat etc. An energy system is a system which produces or converts and delivers energy for useful work. An energy system is primarily designed to supply energy to various processes in the dynamic world and to provide both basic needs and luxurious services to end-users. There are many energy sources of different types used in practice. The sustainability model of the universe suggests the use of renewable energy sources for harvesting energy for practical use. Renewable energy research is finding importance due to its priority of maintaining environmental sustainability. The objective and direction of renewable energy research can be properly guided by considering the properties of Ideal energy source.

3. OBJECTIVES OF THE STUDY :

This paper is conceptual in nature and uses predictive analysis methodology to build a model and analyse it. The objectives of the paper are as follows :

- To formulate a method to improve the performance of energy sources by knowing the objectives of energy research.
- To study the characteristics of the ideal energy system by considering it as an ideal system.
- To discuss the characteristics of the ideal energy system in detail using ideal system model.
- To analyse the possibility of realising such an ideal energy system in practice by comparing the ideal energy system characteristics with practical energy systems based on renewable energy sources.

4. CONCEPT OF IDEAL ENERGY SYSTEMS :

Predicting the ideal system model in terms of its ideal characteristics to study any practical system with an objective to improve it is a new research method recently introduced [1]. The literature survey on ideal systems give quite information on characteristics of many ideal systems including ideal gas [2], ideal engine [3], ideal amplifier [4], ideal technology [5-6], ideal water purifier [7], ideal drug [8], ideal business [9-10], ideal education [11-12], ideal banking [13-15], ideal electrical energy [16], ideal

software [17], ideal computing [18], ideal library system [19] and ideal strategy [20], are developed and discussed. Ideal systems are hypothetical systems predicted to find out their ideal characteristics. Such ideal characteristics of a given system can be used to improve the characteristics of the corresponding practical systems with an objective to continuous improvement towards 100 percent efficiency. For example, the properties of an ideal gas are listed in the literature [2] as (1) An ideal gas consists of a large number of identical molecules, (2) The volume occupied by the molecules themselves is negligible compared to the volume occupied by the gas, (3) The molecules obey Newton's laws of motion, and they move in random motion, and (4) The molecules experience forces only during collisions; any collisions are completely elastic, and take a negligible amount of time. Even though such systems cannot be realized in practice, it is expected that, by keeping such a hypothetical device or systems in mind, researchers get an opportunity to continuously improve the characteristics/properties of practical devices / systems to upgrade their performances. By comparing the characteristics of a practical device/system with its ideal system counterpart, it is possible to modify the device /system towards reaching the objective of achieving such an ideal device [1].

The concept of ideal voltage source and current source are already defined in many electrical and electronics textbooks and their characteristics are compared with the practical voltage source and current source. In this section, we are proposing the concept of ideal energy system in a systematic manner using system model. In system model of any concept, the characteristics of a system are divided in terms under input characteristics, system characteristics, output characteristics, and external characteristics. Based on the Google search information [21], an ideal source of energy should possess the following characteristics. (a) It should be capable of giving an adequate amount of useful energy. (b) It should be convenient to transport, store and use. (c) It should be economical, (d) It should be capable of supplying the desired quantity energy at a study rate over a long period of time. But when we study the broad picture of ideal energy system, we have consider many more characteristics like, availability, power output, volume, mass, cost, renewability, user safety, Maintenance, etc. Accordingly a systematic study of ideal energy system is required and study will help the new researchers in energy system research to re-define their objectives.

5. SYSTEM MODEL OF IDEAL ENERGY SYSTEM :

According to ideal energy system model it is a system which produces energy with ideal characteristics which are divided into input characteristics, system characteristics, output characteristics, and environmental characteristics. Based on various factors which decide the ideal energy system characteristics, a model consisting of input conditions, output conditions, environmental conditions and system requirements are derived by a qualitative data collection instrument called focus group method [22-23]. The box representation of such ideal energy system is shown in Figure 1. The expected characteristics of ideal energy system under these categories are listed below :

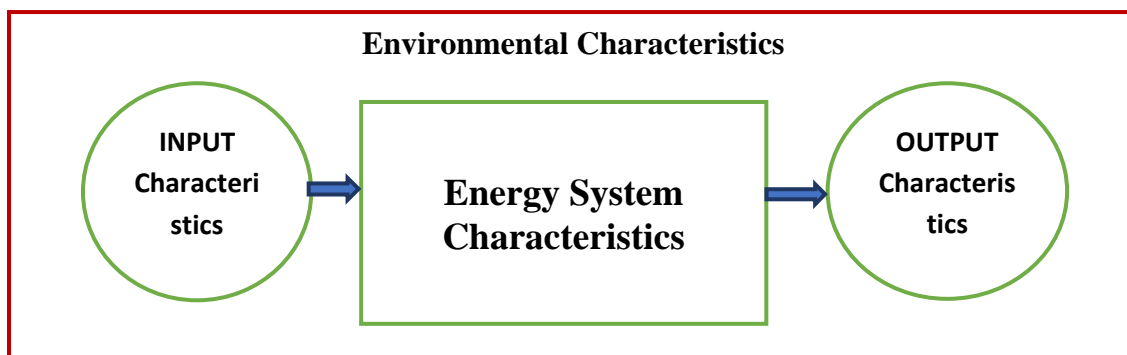


Fig. 1 : Box representation of Ideal Energy System model in terms of its characteristics

(a) Input Characteristics :

- (1) Zero input or input should be abundant and freely available everywhere

- (2) Self reliable system
- (3) Affordable system
- (4) Ubiquitous system
- (5) Takes any type of input
- (b) System Characteristics :**
- (1) Instantaneous
- (2) Scalable
- (3) No investment and no maintenance cost
- (4) Portable system
- (5) Sustainable and renewable source of energy
- (6) No effect on environment
- (7) Use Safe processes
- (8) Simple system
- (9) Huge energy storage/delivery capacity
- (10) The system should not be poisonous.
- (11) Provide great amount of energy per unit mass or volume.
- (12) Low cost processes
- (c) Output Characteristics :**
- (1) Free energy
- (2) Infinite output energy
- (3) Output energy may be in any form
- (4) Output energy is clean & green
- (5) Output is instantaneous
- (6) Output is scalable to any amount
- (7) Output should be continuous
- (8) Ubiquitous
- (9) Output energy is safe
- (10) Inexhaustible
- (d) Environmental Characteristics :**
- (1) Green energy
- (2) No environmental degradation
- (3) Renewable energy
- (4) Pure energy
- (5) No environmental pollution
- (6) Location independent
- (7) No leakage of energy to the environment & rise of entropy.

6. ANALYSIS OF IDEAL ENERGY SYSTEM CHARACTERISTICS :

(a) Input Characteristics :

(1) *Zero input or input should be abundant and freely available everywhere* : The ideal energy system Ideal energy source gives output continuously, of any amount, without any material input.

(2) *Self reliable system* :

An ideal energy system is expected to be self reliable. It does not need any stimulation or bias from an external energy source.

(3) *Affordable system* :

Since an ideal energy system is independent on any material input and external bias or stimulation, it gives output energy continuously without any input and hence such systems are affordable to everybody in terms of cost, in terms of design, in terms of fabrication, and in terms of maintenance.

(4) *Ubiquitous system* :

An ideal energy system is ubiquitous in the sense that it can give an output of any quantity, any amount of time, anywhere, in any form of output energy, without any input.

(5) *Takes any type of input* :

In case if ideal energy system which works on abundant and freely available input everywhere then it

should be capable to take any material in any format.

(b) System Characteristics :

(1) Instantaneous :

An ideal system generates its output instantaneously, whenever required. There is no time gap between input and output.

(2) Scalable :

An ideal system is scalable. i.e., it can be used for generating any amount of energy as per user requirement. As the external demand increases the system has the capacity to increase the output proportionately. The relation between energy demand and output demand is linear at any point.

(3) No investment and no maintenance cost :

An ideal energy system is a simple system in such a way that it should be fabricated using the materials freely available in environment or earth surface. Thus ideal systems do not need huge investment in terms of various resources. Further, ideal energy system does not take any input or it takes only the input which is abundantly available in nature so that such systems are self sustainable and hence have no maintenance cost.

(4) Portable system :

An ideal energy system is portable in the sense that it can be used anywhere in the world or in the universe with any kind of environment. Portable energy system provides same the amount of output in any place with the same efficiency.

(5) Sustainable and renewable source of energy :

An ideal energy source is always sustainable in such a way that it is able to meet the external growing demand without compromising the future requirement. As demand changes the output energy also changes. Sustainable energy source has two inherent properties including continuous renewability and constant efficiency.

(6) No effect on the environment :

An ideal energy source does not produce a negative effect or degrade the environment. Since an ideal energy source is renewable, it produces green energy and is not involved in polluting the environment.

(7) Use Safe processes :

An ideal energy system does not use any process which affects the normal life of living beings. There will be no by-products which are poisonous or degrade the environment. Such systems will not pose any risk or threat to the sustainability of living systems in the universe.

(8) Simple system :

An ideal energy system is a simple system in which there are no complex interconnections between various subsystems and maintaining such systems are easy and low cost in terms of using various resources to build and maintain.

(9) Huge energy storage/delivery capacity :

An ideal energy system produces any amount of energy depending on the external requirement. An ideal energy system which takes the external material as input is capable to

(10) The system should not be poisonous :

An ideal energy system produces clean and green energy at every time and at any amount of input and output load. The system does not leave any poisonous by-products while providing energy as output.

(11) Provide a great amount of energy per unit mass or volume :

In an ideal energy system, the energy density is infinite so that it can give any amount of energy at a given time as output energy. Energy density is the amount of energy stored in a given system or in a given space per unit volume.

(12) Low cost processes :

As mentioned earlier, an ideal energy system contains simple processes internally to increase or decrease the output energy whenever required at low production and maintenance cost. Every ideal system of any type, as per their definition, consumes less or zero resources so that they are always low cost or zero cost natural systems.

(c) Output Characteristics :

(1) Free energy :

In the first model of ideal energy source, it gives output energy in any form without any input. Thus

here, the output energy is available in any amount without any input so that output energy is freely available to the users.

In the second model of ideal energy source, it gives output energy by consuming freely available resources in nature. As a result, the output energy is also freely available in this type of ideal energy system.

(2) Infinite output energy :

As per the definition of the ideal energy source, the output energy can be varied between zero to infinity. Even though it cannot be achieved in practice, an ideal energy source should be able to supply energy levels required for any type of practical applications.

(3) Output energy may be in any form :

The output energy for ideal energy source may be in any form including mechanical energy, electrical energy, magnetic energy, gravitational energy, chemical energy, ionization energy, nuclear energy, chromodynamic energy, elastic energy, sound energy, thermal energy, rest energy, and radiant (electromagnetic or light) energy.

(4) Output energy is clean & green :

Since an ideal energy system is sustainable and renewable, it provides renewable clean and green energy ubiquitously to its users.

(5) Output is instantaneous :

The output of the ideal energy system is instantaneous. There is no time lag between input and output.

(6) Output is scalable to any amount :

Scalability is the capability of a system to vary the output to the desired level. In case of an Ideal energy system, the output can be varied to any extent even between zero to infinity. Ideal energy system should be scalable to any level depending on the application of energy usage.

(7) Output should be continuous :

Ideal energy system provides output continuously at any output level during the entire period of observation. The user will not find irregularity or discontinuity in such systems while collecting the energy for useful work.

(8) Ubiquitous :

As per the definition, an Ideal energy system can give any amount of energy output in any form (including mechanical energy, electrical energy, magnetic energy, gravitational energy, chemical energy, ionization energy, nuclear energy, chromodynamic energy, elastic energy, sound energy, thermal energy, rest energy, or radiant energy) anywhere, anytime, with any environment, and any amount of time continuously. Such property of ideal system makes it as a ubiquitous energy source.

(9) Output energy is safe :

Another important property of energy source is the safety of the energy system and the output energy it delivers as output. In case of ideal energy source, it gives clean, green, and safe energy as output for any and every application. Ideal systems will not give any by-products which are poisonous or degrading the environment.

(10) Inexhaustible :

An ideal energy system can give output energy any amount between zero to infinity. Hence the system can take any load at a given time and for any amount of time without a decrease in output energy. Hence an ideal energy system is inexhaustible.

(d) Environmental Characteristics :

(1) Green energy :

Green energy is the energy obtained from natural sources like sunlight, wind, water, rain, tides, plants, algae and geothermal heat. These sources produce energy without any contribution to global warming and climate change.

(2) No environmental degradation :

Since the energy produced from the ideal energy source is green energy which does not contribute to global warming, climate change, and poisonous to living beings. Hence the ideal energy system will not contribute to environmental degradation which is a challenge for the sustainability of the earth and other planets.

(3) Renewable energy :

Renewable energy is the energy in any form, produced by renewable energy resources. Such sources are naturally replenished in a short duration of time so that the replenishment is faster than consumption. The sources of such energy are sun, wind, rain, tides, and geothermal heat etc. In case of ideal energy source, it does not take any energy or material as input to provide energy as output or it takes only natural resources which are available plenty. Thus the output energy of the ideal energy source is renewable.

(4) Pure energy :

Since the ideal energy source produces green, clean, renewable and energy in a useful form at the output without any side effects or environmental degradable items, it is considered as pure energy. Such pure energy will not contribute to an increase in entropy of the universe.

(5) No environmental pollution :

An ideal energy system will not contribute to the production of green gases and other contaminants which are dangerous for human and animal life on the earth. The pollutants are a threat to the sustainability of the earth and hence human life.

(6) Location independent :

As per the performance of the ideal energy system is concerned, its output does not depend on its environmental factors like variation in temperature, variation in pressure, energy type to be obtained at output etc. Moreover, the performance of the energy source shows ubiquitous so that it is not location dependent. Thus the performance and the efficiency of the ideal energy system is independent of its location as well as its surrounding environment.

(7) No leakage of energy to the environment & rise of entropy :

An ideal energy source is a foolproof system where the energy output can vary to any level whenever required. During the non-operational time, the ideal energy source is perfectly insulated from the environment. There is no leakage of energy in the form of heat or pressure or in any other format to its surrounding environment. i.e., in an ideal energy source, the aging of the system will not affect the output performance of the system. Moreover, due to no leakage of energy in any form to the environment, the entropy of the environment is not affected by such a system.

7. CONSTRAINTS IN ACHIEVING IDEAL ENERGY SOURCE IN PRACTICE :

As discussed in the above sections it is not possible to realize an ideal energy system in practice but many characteristics of the ideal system can be achievable to a certain extent using renewable energy sources and by adopting the suitable technology. Table 1 shows the comparison of the properties of ideal energy system with practical renewable energy system using suitable technology. Based on table 1, one can hope that by identifying suitable technology and improving it through research and innovations, many of ideal energy system characteristics can be practically realizable for at least renewable source based electrical energy system.

Table 1 : Comparison of ideal energy system properties with practical energy (Electrical) system

S. No.	Ideal System Characteristics	Achievable Characteristics of a Practical Energy system
(a) Input Characteristics		
1	Zero input or input should be abundant and freely available everywhere	Input should be abundant and freely available everywhere
2	Self reliable system	Self reliable system as a renewable energy source
3	Affordable system	Can be an affordable system based on technology used
4	Ubiquitous system	Ubiquity can be achievable to some extent based on design & technology used
5	Takes any type of input	Uses renewable energy sources as input
(b) System Characteristics :		
6	Instantaneous	Instantaneous electrical energy is possible
7	Scalable	Scalable to some extent based on design & technology

		used
8	No investment and no maintenance cost	Low investment and low maintenance cost is possible depending on the type of renewable energy used and type of technology adopted
9	Portable system	Portability is possible for a small system for home applications which further depend on the type of renewable source and type of technology used
10	Sustainable and renewable source of energy	Sustainable and renewable source of energy is possible
11	No effect on environment	Very low effect on the environment for renewable solar systems with proper technology
12	Use Safe processes	Use Safe processes is possible for solar energy using proper technology
13	Simple system	Simple system is possible for a system based on optimum technology
14	Huge energy storage/delivery capacity	Limited energy storage/delivery capacity
15	The system should not be poisonous	The renewable energy systems are green and clean
16	Provide a great amount of energy per unit mass or volume	Optimum systems can be developed to provide an optimum amount of energy per unit mass or volume using suitable technology
17	Low cost processes	Low cost processes are possible for simple systems based on the renewable energy of right technology
(c) Output Characteristics :		
18	Free energy	Low cost energy for renewable energy system using optimum technology
19	Infinite output energy	Finite amount of output energy is possible and the efficiency depends on the technology used
20	Output energy may be in any form	Output energy may be in electrical energy form for many renewable energy systems
21	Output energy is clean & green	Output energy is clean & green for renewable energy systems
22	Output is instantaneous	Instantaneous output is possible which is depending on the type of the technology
23	Output is scalable to any amount	Output is scalable to some amount and is depends on technology and input material used
24	Output should be continuous	Output is continuous only for certain level of output and is further depends on technology
25	Ubiquitous	Presently not Ubiquitous but can be improved depending on the technology
26	Output energy is safe	For renewable energy system, the output energy is safe for all stakeholders
27	Inexhaustible	Renewable energy sources are inexhaustible to a certain level of output
(d) Environmental Characteristics		
29	Green energy	Renewable energy systems provide green energy which further depends on technology
30	No environmental degradation	Renewable energy systems are not creating environmental degradation which further depends on technology
31	Renewable energy	Renewable energy based systems produce renewable

		energy
32	Pure energy	Renewable energy systems are producing pure energy which further depends on technology
33	No environmental pollution	Renewable energy systems are not contributing to environmental pollution
34	Location independent	Difficult but depends on the technology used
35	No leakage of energy to the environment & rise of entropy	Possible using suitable technology for renewable energy systems

8. CONCLUSION :

The concept of ideal energy source using system model is developed in order to study the ultimate objectives of the energy system research and development. Based on system model, the input characteristics, system/process characteristics, output characteristics, and environmental characteristics of ideal energy system are predicted, listed, and discussed. The 35 identified characteristics are analysed and compared with renewable practical electrical energy systems and possibility of developing optimum energy system close to ideal system in terms many characteristics using suitable technology are discussed. The concept and characteristics of such predicted hypothetical ideal energy system allows researchers to think innovatively to improve the practical energy systems by identifying suitable technology and design.

REFERENCES:

- [1] Aithal, P.S. (2016). Review on Various Ideal System Models Used to Improve the Characteristics of Practical Systems. *International Journal of Applied and Advanced Scientific Research*, 1(1), 47-56. DOI : <http://doi.org/10.5281/zenodo.159749>.
- [2] Jaeschke, M., & Schley, P. (1995). Ideal-gas thermodynamic properties for natural-gas applications. *International journal of thermophysics*, 16(6), 1381-1392.
- [3] Knuuttila, T., & Boon, M. (2011). How do models give us knowledge? The case of Carnot's ideal heat engine. *European journal for philosophy of science*, 1(3), 309.
- [4] Eom, B.H., Day, P. K., LeDuc, H.G., & Zmuidzinas, J. (2012). A wideband, low-noise superconducting amplifier with high dynamic range. *Nature Physics*, 8(8), 623.
- [5] Aithal, P.S., & Shubhrajyotsna Aithal, (2015). Ideal Technology Concept & its Realization Opportunity using Nanotechnology. *International Journal of Application or Innovation in Engineering & Management (IJAEM)*, 4(2), 153 – 164. DOI: <http://doi.org/10.5281/zenodo.61591>.
- [6] Aithal, P.S. & Shubhrajyotsna Aithal, (2016). Opportunities & Challenges for Green Technology in 21st Century. *International Journal of Current Research and Modern Education (IJCRME)*, 1(1), 818-828. DOI : <http://doi.org/10.5281/zenodo.62020>.
- [7] Aithal, P. S. & Shubrajyotsna & Aithal, P.S. (2018). Concept of Ideal Water Purifier System to Produce Potable Water and its Realization Opportunities using Nanotechnology. *International Journal of Applied Engineering and Management Letters (IJAEML)*, 2(2), 8-26. DOI: <http://dx.doi.org/10.5281/zenodo.1323714>.
- [8] Architha Aithal & Aithal, P.S. (2018). The concept of Ideal Drug & Its Realization Opportunity using present Pharmaceutical Sciences Scenario. *International Journal of Health Sciences and Pharmacy (IJHSP)*, 2(2), 11-26. DOI : <http://doi.org/10.5281/zenodo.1469963>.
- [9] Aithal, P.S. (2015). Concept of Ideal Business & Its Realization Using E-Business Model. *International Journal of Science and Research (IJSR)*, 4(3), 1267 – 1274. DOI : <http://doi.org/10.5281/zenodo.61648>.
- [10] Aithal, P.S. (2015). Mobile Business as an Optimum Model for Ideal Business. *International Journal of Management, IT and Engineering (IJMIE)*, 5(7), 146-159, DOI :

<http://doi.org/10.5281/zenodo.163880>.

[11] Aithal P.S. and Shubhrajyotsna Aithal, (2014). Ideal education system and its realization through online education model using mobile devices. *Proceedings of IISRO Multi Conference*, Bangkok, 140 - 146, ISBN No. 978-81-927104-33-13. DOI: <http://doi.org/10.5281/zenodo.62059>.

[12] Aithal P.S. and Shubhrajyotsna Aithal, (2015). An Innovative Education Model to realize Ideal Education System. *International Journal of Scientific Research and Management (IJSRM)*, 3(3), 2464 - 2469. DOI: <http://doi.org/10.5281/zenodo.61654>.

[13] Aithal, P.S. (2016). Ideal Banking Concept and Characteristics. *International Research Journal of Management, IT and Social Sciences (IRJMIS)*, 3(11), 46-55. DOI : <http://dx.doi.org/10.21744/irjmis.v3i11.311>.

[14] Aithal, P.S. (2016). Realization of Ideal Banking Concept using Ubiquitous Banking. *International Journal of Scientific Research and Modern Education (IJSRME)*, 1(2),119-135. DOI: <http://dx.doi.org/10.5281/Zenodo.164703>.

[15] Aithal, P.S. (2016). A Comparison of Ideal Banking Model with Mobile Banking System. *International Journal of Current Research and Modern Education (IJCRME)*, 1(2), 206-224. DOI: <http://dx.doi.org/10.5281/Zenodo.198708>.

[16] Sridhar Acharya P. & Aithal P.S., (2016). Concepts of Ideal Electric Energy System for production, distribution and utilization. *International Journal of Management, IT and Engineering (IJMIE)*, 6(1), 367-379. DOI : <http://doi.org/10.5281/zenodo.161143>.

[17] Aithal, P.S., & Vaikuth Pai, T., (2016). Concept of Ideal Software and its Realization Scenarios. *International Journal of Scientific Research and Modern Education (IJSRME)*, 1(1), 826-837. DOI: <http://doi.org/10.5281/zenodo.160908>.

[18] Aithal, P.S. & Priyesh Pai, T. (2017). Opportunity for Realizing Ideal Computing System using Cloud Computing Model. *International Journal of Case Studies in Business, IT and Education (IJCSBE)*, 1(2), 60-71. DOI: <http://dx.doi.org/10.5281/zenodo.1094995>.

[19] Aithal P.S., (2016). Smart Library Model for Future Generations. *International Journal of Engineering Research and Modern Education (IJERME)*, 1(1), 693-703. DOI : <http://doi.org/10.5281/zenodo.160904>.

[20] Aithal P.S., (2016). The concept of Ideal Strategy & its realization using White Ocean Mixed Strategy. *International Journal of Management Sciences and Business Research (IJMSBR)*, 5(4), 171-179. DOI : <http://doi.org/10.5281/zenodo.161108>.

[21] Qualities of an ideal source of energy, <https://www.studyadda.com/ncert-solution/10th-science-sources-of-energy/232/26014> referred on 25/10/2018.

[22] Shubhrajyotsna Aithal, & Aithal, P.S., Bhat, G.K. (2016). Characteristics of Ideal Optical Limiter and Realization Scenarios using Nonlinear Organic Materials – A Review. *International Journal of Advanced Trends in Engineering and Technology (IJATET)*, 1(1), 73-84. DOI : <http://doi.org/10.5281/zenodo.240254>.

[23] Rogers E.M., (1995). Diffusion of Innovation, The Free Press, NY.
