An Analysis on Solar Photovoltaic Technology using IBM SPSS statistics.

*****Chandrasekar Raja, M Ramachandran, Sathiyaraj Chinnasami**
REST Labs, Kaveripattinam, Krishnagiri, Tamil Nadu, India.
*****Corresponding author: chandrasekarrsri@gmail.com

Abstract: *Solar photovoltaic technologies direct absorption of sunlight particles solar energy is useful energy solar photovoltaic technologies like photovoltaics are light photons as electricity as voltage b.v. From the conversion process. As named. This is the photoelectric effect is called this event was first used in 1954. Scientists at bell lab currently when exposed to light work from forming silicon have developed a solar cell that works cost competitiveness in multiple regions and photovoltaic systems for electricity are used extensively to aid in performance. Pv-related goods and equipment generate electricity from the sunshine. Ministry of energy PV photovoltaic technology what it means and how it works PV products and solar devices convert light energy into electrical energy. Single a cell is a photovoltaic device. Various semiconductor materials in PV cells are used. In semiconductor light when exposed, it absorbs light energy in matter called electrons and converts to negatively charged particles. This extra energy turns the electrons into electricity and allows the material to flow through. A variety of PV cells and semiconductor materials are used. Semiconductors when exposed to light, it is of light electrons absorb energy negatively in the sense of called converts to charged particles. Among the several renewable energy technologies, solar photovoltaic (PV) technology is one of the most developed and field-tested. This chapter is designed to provide a thorough introduction to PV technology and to provide the technical information required to comprehend this technology. These extra energy electrons allow current to flow through the material. SPSS statistics is a data management, advanced analytics, multivariate analytics, business intelligence, and criminal investigation developed by IBM for a statistical software package. A long time, spa inc. Was created by IBM purchased it in 2009. The brand name for the most recent versions is IBM SPSS statistics. Dye Sensitized Solar Panels, Perovskite Solar, Quantum Dot, Organic Photovoltaics. The Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .609 which indicates 60% reliability. From the literature review, the above 64% Cronbach's Alpha value model can be considered for analysis. The outcome of Cronbach's Alpha Reliability. The model's total Cronbach's Alpha score is.609, which denotes a 60% dependability level. The 64% Cronbach's Alpha value model mentioned above from the literature review may be used for analysis.*
Keywords: *SPSS Statistics, Dye Sensitized Solar Panels, Perovskite Solar, Organic Photovoltaics.*

1. INTRODUCTION

Photovoltaics (PV) is a photovoltaic semiconductor that exhibits the effect of light using objects. It is to convert to electricity physics, photochemistry, and electron are studied in chemistry. The photovoltaic effect is commercially electric and used for manufacturing and as photocatalysts. A solar photovoltaic system consumes blocks, each including multiple solar cells, they generate electricity. Pv installations are ground-mounted, ceiling-mounted, and wall-mounted and can be fixed or floating. One of the renewable technologies is solar photovoltaic technology, which may be used to construct a clean, dependable, scalable, and reasonably priced energy system. In terms of installations, China, Japan, the United States, Germany, and the United Kingdom have been designated as the top five nations. This article on photovoltaic materials performance and global-scale solar PV in leading countries gives a thorough assessment of the technology. In 2014, 80% of these five nations had solar installations [1]. Solar thermal means solar energy and two solar photovoltaic methods can be used in different ways. Are called solar-thermal devices of solar collectors and receivers heat with the help of solar energy can be converted into energy. Pv-generated direct current electricity, alternating is converted into current or stored for later use. This type of solar power is traditional and will be produced from sources more expensive than electricity. But over the past two decades, the cost gap is closing. Solar photovoltaic (SPV) technology lightning, villages, hospitals, telecommunication, and household electricity for applications such as fulfilling needs has emerged as a useful source of power [2]. Its PV technology unit cost 5 years ago a third of the place reduced, continuous technological progress and efficiency research to increase, PV, of course,

will continue at a fast-growing pace and ultimately the vital energy of the world become a provider. Pv to 4% by 2020 345 and will provide 1081 by 2030 the sun that improves the world of a report on photovoltaic electricity predicted by monocrystalline silicon solar cell efficiency it started at 15% in the 1950s and then 1970s it increased to 17% in the 1990s and continues to 28% today is increasing. Universal position, solar materials for batteries, performance, and the development of technologies are reviewed in this paper [3]. In recent years, clean renewables focused on energy floodgates of research, from economic growth which can meet the needs of social scientists who think. Solar energy is it heats the water until the first generation of electricity. Of solar powered applications list photovoltaic technologies are at the top, and the world for solar photovoltaic power supplies forecast reports, next 12 years, PV technologies 2030 and 345 by 2030 respectively, and claims to deliver 1081 [4]. Of rural electrification in developing countries as a driver, climate change solar photovoltaic (PV) as a contributor to reduction advances in technology, PV efficiency and improve scalability innovations poverty and greenness significant in reducing greenhouse gas emissions suggests that improvements can be made. Global access to solar resources and costs of PV due to innovation drive accelerate sustainable growth by decreasing pathway to renewable energy sources provides open-source software development less than proprietary software cost-effective and innovative demonstrated computer code generation [5]. Solar photovoltaic technologies, environment and to solve energy problems surveys should be conducted and the PV life cycle is from cradle to grave takes mechanism, which in extracting raw materials removing sunlight from or as far as recycling. In the literature of published data and information basically, the overall energy requirement, energy payback time, and emission rate three impact assessment methods are reviewed and summarized [6]. To avoid environmental damage, current energy systems are clean, and renewable energy systems should be replaced. Ease of installation, availability, and competitive cost due to solar using energy, omnipresent renewable energy sources are gaining popularity for use and high penetration, the technology of the solar energy system and knowledge of performance is required [7]. Solar photovoltaic (PV) past deployment of technology exceeded expectations in a decade. Because of the latest global scenarios PV installed by 2050 here we include IPCC and non-IPCC peer-reviewed and influential ash of 1,550 scenes from the literature we have compiled the collection properly. IPCC views and is predicted to link visual properties with PV effects using a statistical learning framework [8]. Among the different types of renewable energy, solar power is low in pollution, and abundant availability and because of the endless supply attracted a lot of attention. Sun solar photovoltaic technology in the environment produces both positive and negative effects. Positive and negative effects create. [9] Domestic in Australia since 2001 solar thermal water and solar photovoltaic summarize the development of systems says solar energy in Australia at several stages of the production chain commonwealth and state govt policies and subsidies implemented. On residential roofs, since 2008 small-scale solar PV systems waste water and waste gas pollutants solar in the five years up to photovoltaic (PV) technology number of founding Australians it has grown from 8000 to more than a million [10]. Titania solar cells are similar to photosynthesis direct sunlight through the process converts to electricity. This is the other sun that has performance advantages over batteries, this includes low light and shade great performance, and wide constant at scale temperature including the ability to act as a cover. Titania solar cells are transparent or may be fabricated with an opaque appearance [11]. The photoelectric conversion process is solar energy the photoelectric effect converts directly into electricity. It is very can be used for a variety of applications. There are different types of photovoltaic cells are made of semi-conducting materials [12]. Environmental concerns and climate change and to search for alternative sources of energy for utility power system managers pressured. The energy system is renewable to improve operations in using energy sources recent research developments and developments have seen encouraging results. Distributed generation (dg) is among many renewable energy sources a method of generating electricity from it is very close to loading requirements. Interconnection with utility power systems connected dgs, increased system reliability, reduced peak power demand, improved power quality, reactive power required to supply and environment it has many advantages like clean energy. [13] Solar photovoltaic technology of a site-specific assessment for that location to identify its relevance helps. Variety under Indian climatic conditions assessing the suitability of PV technologies. Polycrystalline silicon is intrinsically thin layered silicon and an amorphous single junction is a heterojunction with silicon photovoltaic with the performance of technical sequences assessment solar energy in India the test is conducted at the center. The energy yield of each technology and the efficiency ratio is evaluated [14]. Existing widespread renewables among energy sources, solar photovoltaic (PV) gw generation of electricity even as clean and safe as possible considered technical [15]. The past of solar photovoltaic technology decades of attention in policy circles attracted modest in the value chain environmental impacts, fuel prices avoiding hazards and peak e ability to meet demand private and public in solar power encourage investment. Also, solar pv benefits are in fostering "green" jobs is distributed, domestic in promoting energy security through energy production and locally generated electricity encouraging private households to use it in reducing the load on the grid with most conventional energy sources solar is still competitive because the policies are not effective due to a lot of solar installations have been done. Such a rapid expansion creates markets in the solar industry economies of unprecedented scale leading to achievement, as well as learning by doing, promoting global trade [16]. Renewable energy deployment is a key concern in the discussion of spit power mainstream and led to significant cost reductions. Variety to overcome before entry kinds of obstacles are. These barriers were increasingly

technical to the economic and changes to the organization. Existing energy policy, financial subsidies, renewable portfolio standards market-based instruments such as electricity from renewable sources installation of equipment for production, and encourage use dependent on production tax credits. These strategies are mostly for end users and target system-level results.[17]. A solar photovoltaic system is typical compared to energy sources significant social and environmental impact provides benefits and is thus sustainable contributes to development. Global pv market installations peaked at 27.4 gw in 2011 and achieved growth. These are encouraging messages because electricity is generated clean of fossil fuels provides an alternative, less developed job creation in areas, and contributes to economic prosperity [18]. Interest in the problem of global warming as solar energy, wind power, hydropower, and bioenergy for renewable energy generation like research energy conversion devices in detail has been done. Among them, fossil unlike burning fuels, carbon renewable which emits no dioxide photovoltaic devices are very energy efficient and are considered potential candidates [19]. Thermonuclear in the sun produced by operation a small percentage of solar radiation only reaches the earth. In total sun a fraction of radiation in a day reaches the earth's surface, this is called insolation called more specifically, it is a specific energy of solar radiation received by the area is, its unit is watts per square meter in general, of this idea basically solar energy is calculated the more isolated, the so much more potential for solar power will be Malaysia is on the equator high rainfall, plenty of sunshine and an area with solar radiation, however, clear skies are very rare [20].

2. MATERIALS & METHODS

Evaluation parameters: Dye Sensitized Solar Panels, Perovskite Solar, Quantum Dot, Organic Photovoltaics.
Dye-Sensitized Solar Panels: Solar cells with dye-sensitization are one kind of solar panel, they will generate high voltage and have potential, but relatively generate small amounts of power. They are electrolytes and electrodes composed of; it frequently has molecules that have been colored on them. Under the sun when these molecules are present, they emit light, which is absorbed, converted to electrons, and then produces electricity. Dye-sensitized solar cells (discs) of thin-film solar cells belonging to the group are less costly, have simple manufacturing processes, are of low toxicity, and are productive for both decades due to simplicity more than that are under extensive research.
Perovskite Solar: Perovskite photovoltaic cells employ a material called perovskite semiconductor, a form of solar cell that is very new. They are affordable, light, and flexible. The current silicon for replacing based solar panels makes it a promising candidate. A perovskite-structured composite, often made of a hybrid organic-inorganic lead or tin halide-based substance, is used in perovskite solar cells, or PSCs. The active layer is harvesting. All inorganic cesium lead halides, including methylammonium lead halides and perovskite derivatives, are inexpensive to make and straightforward to create.
Quantum Dot: Quantum dots are solar energy electrically switchable nanocrystals that make solar cells possible. They are made of conventional silicon because they are so tiny that they can absorb a photon's energy. More energy absorption than solar panels. The efficiency of this PV cell is influenced by the quantum dot size. Less effective quantum dots are smaller. Large, inexpensive quantum points can be produced and contained extremely well. It takes more time to produce. Quantum dots are a few nanometers across sized semiconductor particles, quantum is larger as a result of kinetics optically distinct from particles, and has electronic properties. They are an important topic in nanotechnology.
Organic Photovoltaics: Organic photovoltaics for silicon instead of organic semiconductor materials uses thin film solar batteries. Pv silicon cells in comparison, organic PV cells are less efficient and have a lower energy production capacity. However, silicon PV cells are organic PV cells. More pliable, lighter, and less expensive than cells. Silicon asphalt solar panels are a fantastic alternative to PVS. 2022 yes, the chef's introduction of timberline came before. The largest solar array of solar shingles many received honors for their creativity and inventiveness. I'm done with pr newswire. Become familiar with organic solar cells. Or a solar cell made of plastic is organic photoelectric is a category that utilizes electronics and conducts electricity. Small organic electronics or organic polymers change molecules a branch, absorbing light, and photovoltaics in sunlight by effect electricity generating transport from
Methods: SPSS statistics is a data management, advanced analytics, multivariate analytics, business intelligence, and criminal investigation developed by IBM is a statistical software package. Long time, spa inc. Was created by, IBM and purchased in 2009. The brand name for the most recent versions is IBM SPSS statistics. The "statistical package for the social sciences" (SPSS), a set of software tools for changing, analyzing, and displaying data, is commonly used. Multiple formats are available for SPSS. Numerous add-on modules may be purchased to increase the software's data entry, statistical, or reporting capabilities. The core program is called SPSS base. The SPSS advanced models and SPSS regression model's add-on modules are, in our opinion, the most important of these for statistical analysis. Additionally, independent programs that connect with SPSS are available from spas inc. SPSS is available in versions for windows (98, 2000, me, nt, and XP), supported by windows 2000 running SPSS version 11.0.1. Although further versions of SPSS will most likely be available by the time this book is released, we are certain that the SPSS instructions provided in each chapter will still apply to the studies outlined.

3. RESULT AND DISCUSSION

TABLE 1. Reliability Statistics

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.609	.644	4

Table 1 shows Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .609 which indicates 60% reliability. From the literature review, the above 64% Cronbach's Alpha value model can be considered for analysis.

TABLE 2. Reliability Statistic individual

	Cronbach's Alpha if Item Deleted
Dye-Sensitized Solar Panels	0.507
Perovskite Solar	0.766
Quantum Dot	0.397
Organic Photovoltaics	0.411

Table 2 Shows the Reliability Statistic individual parameter Cronbach's Alpha Reliability results in Dye-Sensitized Solar Panels 0.507, Perovskite Solar 0.766, Quantum Dot 0.397, Organic Photovoltaics 0.411.

**TABLE 3.** Descriptive Statistics

Descriptive Statistics													
	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Dye Sensitized Solar Panels	20	4	1	5	68	3.40	.222	.995	.989	-.228	.512	.710	.992
Perovskite Solar	20	4	1	5	62	3.10	.324	1.447	2.095	.271	.512	-1.432	.992
Quantum Dot	20	4	1	5	67	3.35	.327	1.461	2.134	-.233	.512	-1.155	.992
Organic Photovoltaics	20	4	1	5	71	3.55	.246	1.099	1.208	-.273	.512	-.017	.992
Valid N (listwise)	20												

Table 3 shows the descriptive statistical values for analysis N, range, minimum, maximum, mean, standard deviation, Variance, Skewness, and Kurtosis. Dye-Sensitized Solar Panels, Perovskite Solar, Quantum Dot, Organic Photovoltaics this also used.

**TABLE 4.** Frequency Statistics

Frequency Statistics					
		Dye-Sensitized Solar Panels	Perovskite Solar	Quantum Dot	Organic Photovoltaics
N	Valid	20	20	20	20
	Missing	0	0	0	0
Median		3.00	3.00	3.00	3.00
Mode		3	2	3[a]	3
Percentiles	25	3.00	2.00	2.25	3.00
	50	3.00	3.00	3.00	3.00
	75	4.00	5.00	5.00	4.75
a. Multiple modes exist. The smallest value is shown					

Table 4 shows the Frequency Statistics in Solar photovoltaic technology is Dye-Sensitized Solar Panels, Perovskite Solar, Quantum Dot, and Organic Photovoltaics curve values are given. Valid 20, Missing value 0, Median value 3.00, Mode value 3.
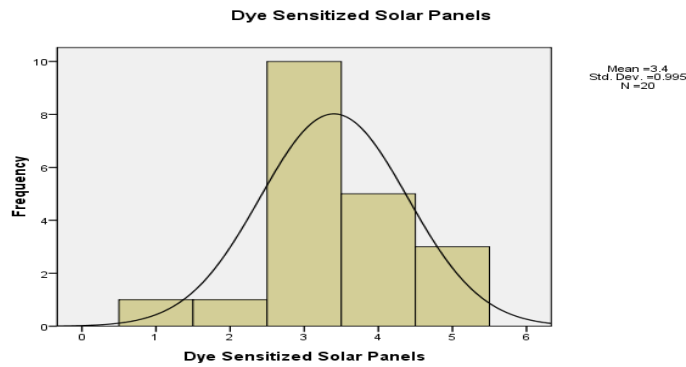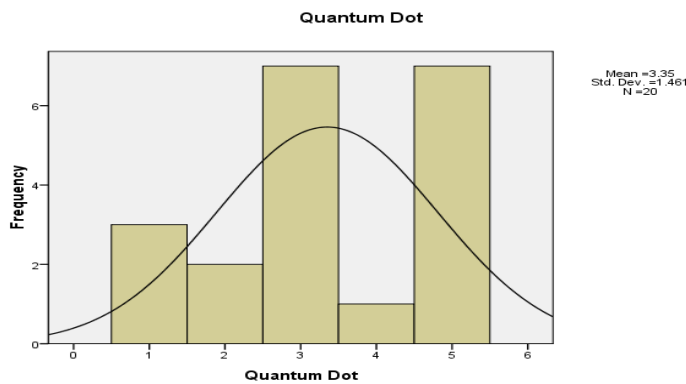
FIGURE 1. Dye-Sensitized Solar Panels

Figure 1 shows the histogram plot for Dye-Sensitized Solar Panels from the figure it is clearly seen that the data are slightly Left skewed due to more respondents choosing 3 for Dye-Sensitized Solar Panels except for the 3 values all other values are under the normal curve shows model is significantly following a normal distribution.
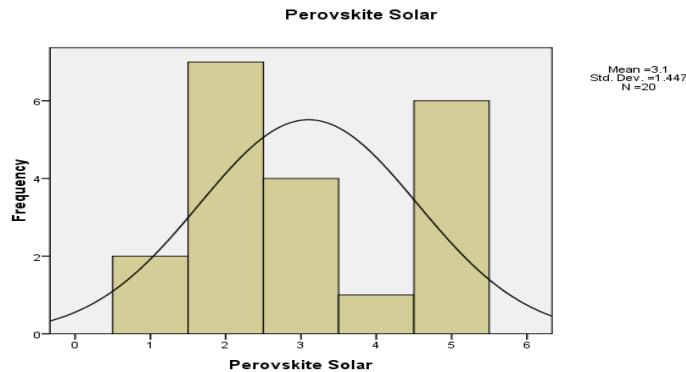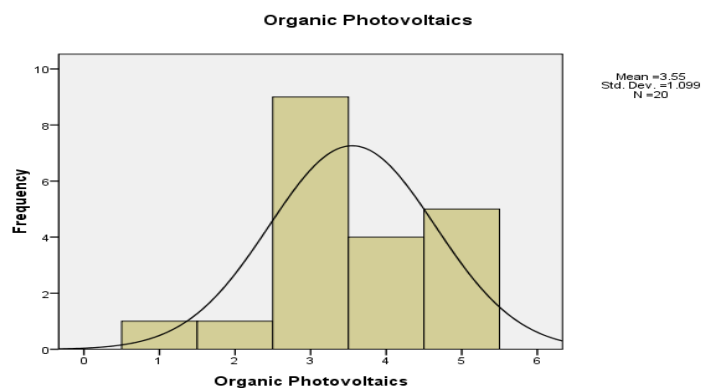

FIGURE 2. Perovskite Solar

Figure 2 shows the histogram plot for Perovskite Solar from the figure it is clearly seen that the data are slightly Left skewed due to more respondents choosing 2 for Perovskite Solar except for the 2 values all other values are under the normal curve shows the model is significantly following a normal distribution.

FIGURE 3. Quantum Dot

Figure 3 shows the histogram plot for Quantum Dot from the figure it is clearly seen that the data are slightly Left skewed due to more respondents choosing 3,5 for Quantum Dot except for the 3 value all other values are under the normal curve shows the model is significantly following a normal distribution.

Organic Photovoltaics

FIGURE 4. Organic Photovoltaics

Figure 4 shows the histogram plot for Organic Photovoltaics from the figure it is clearly seen that the data are slightly Left skewed due to more respondents choosing 3 for Organic Photovoltaics except for the 2 values all other values are under the normal curve shows the model is significantly following a normal distribution.

TABLE 5. Correlations

Correlations				
	Dye-Sensitized Solar Panels	Perovskite Solar	Quantum Dot	Organic Photovoltaics
Dye-Sensitized Solar Panels	1	0.007	.478*	.558*
Perovskite Solar	0.007	1	0.132	0.096
Quantum Dot	.478*	0.132	1	.595**
Organic Photovoltaics	.558*	0.096	.595**	1
*. Correlation is significant at the 0.05 level (2-tailed).				
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 5 shows the correlation between motivation parameters for Dye-Sensitized Solar Panels for Organic Photovoltaics having the highest correlation with Perovskite Solar is having lowest correlation. Next, the correlation between motivation parameters for Perovskite Solar for Quantum Dot is having the highest correlation with Dye-Sensitized Solar Panels having the lowest correlation. Next, the correlation between motivation parameters for Quantum Dot for Organic Photovoltaics is having the highest correlation with Perovskite Solar having the lowest correlation. Next, the correlation between motivation parameters for Organic Photovoltaics for Quantum Dot is having the highest correlation with Perovskite Solar having the lowest correlation.

4. CONCLUSION

Pv devices for storing energy or high voltage direct current electrical worldwide distribution through links are required, which incurs additional costs, and there are several specific disadvantages, variable power generation must be equilibrated. The generation of greenhouse gases and some pollution during production and installation, however, fossil fuels are only a fraction of the emissions that occur. Individual equipment and grid PV systems are linked since the 1990s, in usage photovoltaic systems are utilized specifically as a result. Photovoltaic modules were first in 2000 mass-produced, the German govt one lakh for roofing projects funded by PV due to lowering expenses which has enabled it to develop as an energy source. Solar production since 2000 by the Chinese government in capacity building is partly due to massive investment driven and achieves economies of scale. Also known as photovoltaic cells solar cells called solar cells to convert light directly into electricity. Light photons into electric current its PV from the conversion process photovoltaics get name often abbreviated, this is called the photoelectric effect. The energy of light is some semiconductor that transfers electrons in materials. This photovoltaic effect is large-scale and capable of generating electricity. Photovoltaic technology climate change because it helps to mitigate much more than fossil fuels and emits less carbon dioxide. Identified competition for land usage as one of the other main restrictions. However, solar PV cells are currently low performance, large enough to supply electricity needs demands large portions. Photovoltaic cells absorb radiation from the sun absorb and emit electrons using a semiconductor, they are used as electricity. Low maintenance for solar panels is needed. For installation and optimization then, they are a machine that can fail very reliably due to the lack of parts. 99% of the mass in the solar system is the sun. It's all hydrogen and has

higher temperatures than helium and is in the gaseous state. Nucleus reactions take place at its core and the light that the sun constantly emits generates heat. The workings of photovoltaic (PV) technology energy is transformed from solar and PV goods into electricity. A single photovoltaic unit, or cell. A solitary photovoltaic cell typically produces electricity at a rate of 1 or 2 per cell. These cells, made from various semiconductor materials, are made mostly of four humans the thickness of the hairs is less. Many to withstand the outdoors for years, in combination with glass and/or plastic cells are attached between protective materials. The power output of PV cells is increased by chaining them together to create bigger units known as blocks or panels. The Cronbach's alpha reliability result. The overall Cronbach's alpha value for the model is .609 which indicates 60% reliability. From the literature review, the above 64% Cronbach's alpha value model can be considered for analysis.

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