**Title: Module 4 Assignment – Individual Project Proposal**

**By**

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**Introduction:**

Energy consumption in the world and its application are increasing significantly day-by-day in a tremendous amount. To meet the needs of this level of energy consumption, we all must start thinking to implement strategies to improve, build, and scale modern energy systems and devices. We all need to move from fossil fuels to renewable sources like solar energy, wind energy, and hydroelectric systems. To serve them, we require better and safer products. Studer Innotec is a leading company in inverters and solar charge controllers. They have built a list of products to address the necessary issues and needs of their customers all around the world. All energy needs are different from one place to another, one company to another. Studer Innotec’s products are adapted to new technologies with smooth operations and with the highest safety standards.

Studer products were picked for their reliability, effectiveness, and strong setup and monitoring capabilities. Studer is the greatest supplier in the industry for DC to AC solutions. Also suitable for backups and domestic use. Additional assistance is excellent, including aftercare is much greater. Studer is, in my opinion, the best reliable and cost-effective inverter/charger in the marketplace currently. The most efficient is by far the most effective.

**Problem:**

One of the problems that this company is facing is data gathering and performing analytics. They require lots of insights from the teams to meet the needs of the technical supports. Also, measuring, monitoring, and tracking electrical checks are lacking in their systems. Data gathering is the concern and also bad statistical interpretations. They also have a data analysis tool that was activated by default. Where the users can find a daily basis log file in a CSV format. They also have remote monitoring analytics tools but lack the insights which we will be dealing with. To address all the issues as mentioned by the company to address and develop a detailed presentation that includes visualizations, data insights, and recommendations require better quality of data.

**Goals:**

My main goal is to optimize the solar power delivery and also to check if there is a way to reduce the genset costs. I will be providing a working interface with the following metrics and insights. I will be focusing on the intersection of data governance, business leadership, ethical issues, and solving the social responsibility issues accordingly by defining a set of goals with a proper roadmap. Information has no consequences by itself. The ethical issues stem from the activities we accomplish (or don't do) with data, such as how we acquire it, safeguard it, and then use it. Data gathering, security, and utilization all necessitate ethical decisions. The necessity for opinion lies at the heart of the issue; there are no universal truths in evaluation.

I can confidently identify, access, and explore the data they need, when they need it, and create visualizations and reports to share with their colleagues. Comprehensive data governance underpins all of the advantages of having actionable insights when dealing with the data. We must ask those questions as a team as it will help us improve our data management and governance processes' expertise. Most of the challenges and issues can be solved by maintaining data ethics with appropriate responsibilities by the teams. I will be performing this by maintaining proper strategy and vision in dealing with the tasks.

**Methods & Analysis:**

Data is important to an organization's growth in whatsoever business. This project served as a topic of interest for me, and Also examined the referenced source. I feel that data is a vital resource and that certain firms are using it to maximize their advantages. This data is essential in regards to business goods for individuals who want to be identified utilizing their real-time method. The inference has traditionally been considered distinguished by the decision-intuition makers and talent, but bringing data into the procedure can aid in reaching more smart judgments.

I will be using datasets of the off-grid solar energy production and consumption logs from the year 2015 to 2020. This is a daily log files data in CSV format over the past 5 years. Also, I will be using the Xtenders Data Analysis Tool Excel files which are available in year/ month/ week format. Some of the important variables or data points to focus on are Solar power, XT-Pout an XT-Pin a, XT-Ubat, XT-Ibat, XT-Uin. And other important parameters for the data analysis and ML modeling. I will also predict CO2 savings considering the electrical grid avg CO2 emissions and Genset. I will do some analysis on the battery voltage, charging, lifecycle analysis and explore any anomalies in the system. I need to consider climate data and observe the nearest weather stations of the solar energy installation. I will integrate this climate data with the power consumption and production data to define the trends, patterns, and correlations.

I will be using the BigML Tool to predict these variables. I will be using techniques like supervised learning that includes classification, regression, decision trees, random forests, and time-series forecasting. Because of the BigML forecasting models which include intuitive user experience and modeling and analysis components that make it easy to understand. These may be downloaded and utilized on any edge local computer to offer basic, offline forecasts, and they can be instantly launched as a component of global, real-time production environments.

I will be finding the weather data online through the official websites of the State Meteorological Agency on the open data. Also, the sponsor has provided all the necessary log files datasets. I will be integrating and utilizing them for the analysis. I will be developing a dashboard by using the tools like Power BI/ Tableau/ AWS QuickSight. Also, I will go ahead to make use of available ML algorithms as mentioned above to obtain some metrics. MS Excel and Power BI are the tools that I will be used to observe the datasets and propose few recommendations based on data cleansing, data modeling, and predictive analytics. I will be focusing on developing better-informed visuals like bar charts, line charts, scatter plots, histograms, maps, and other key performance indicators.

**Conclusion:**

I will conduct an exploratory study in this manner. We can glimpse beyond the statistics with information extraction (EDA). As I delve deeper into details, I gain greater ideas. For over 70-80% of my work, I’ll be using EDA to perform calculations and address multiple business difficulties. I'd like to employ machine learning techniques to forecast the consequences of power and energy issues. I'll use the Visualization Dashboards to examine and show the data. as a result. Look for data on weather data that are freely accessible and obtain them. Analyze the impact of Carbon dioxide emission by creating a vivid description and analyzing it.

It's all about eliminating ambiguity when gathering data. And, in a fast-paced industry, we're frequently asked to reach the greatest decisions in a short period. Only with a few pieces of data, we may enhance our assessment if we focus on the proper parameter.

**References:**

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[2] Müller, Michael & Bründlinger, Roland & Arz, Ortwin & Miller, Werner & Schulz, Joachim & Lauss, Georg. (2014). PV-off-grid Hybrid Systems and MPPT Charge Controllers, a State-of-the-Art Analyses. *Energy Procedia*. http://dx.doi.org/10.1016/j.egypro.2014.10.133