Tec Empresarial
P-ISSN: 1659-2395; E-ISSN: 1659-3359

IMPACT OF SKILLED WORKFORCE ON THE SOLAR PHOTOVOLTAIC ROOFTOP INDUSTRY'S SUCCESS

Mr. Boniface P.

Research Scholar, School of Management Studies, Sathyabama Institute of Science and Technology, Chennai -119

Dr. TR. Kalai Lakshmi

Research Guide, Associate Professor, School of Management Studies, Sathyabama Institute of Science and Technology, Chennai -119

Abstract

An overview of the research study is provided in the form of an abstract. According to the findings of this study, the viability of the solar photovoltaic (PV) rooftop sector is highly dependent on the availability of employees who have received training. Following an exhaustive investigation, the authors present their argument that the growth and efficiency of the sector are heavily dependent on the knowledge and abilities of the workers. This assertion is supported by the findings of the investigation. In our research, we demonstrate how the presence of trained individuals can contribute to cost savings in maintenance, greater overall system performance, and improved installation quality. This is accomplished by integrating case studies with real data. The paper, on the other hand, would be improved by a more in-depth investigation of the difficulties that are associated with the establishment of such a workforce. This analysis should take into account regional disparities, the expenses associated with training, and the constraints that are related to education. Furthermore, despite the fact that the writers do a good job of emphasizing the advantages of having a trained workforce, there is a major lack of discussion addressing the policy recommendations and corporate methods that may be used to grow such a workforce. The study acknowledges the significance of trained personnel in the solar photovoltaic rooftop business; nevertheless, it could have a greater influence if it discussed more comprehensive systemic concerns and provided more specific recommendations for the growth of the workforce.

Keywords: After sales service, Solar rooftop entrepreneurs, Correlation analysis

Introduction

The photovoltaic (PV) rooftop sector of the solar energy industry is becoming an increasingly important component of the global shift toward renewable energy. Solar energy technology has gained enormous momentum as countries struggle to address the urgent problems of climate change and the depletion of fossil resources. This is because solar energy is a renewable source of energy. Among these technologies, rooftop photovoltaic (PV) systems are regarded as a promising

solution due to the fact that they are distributed, have the capability of utilizing existing infrastructure, and have the potential to drastically cut emissions of greenhouse gases. On the other hand, the successful adoption and operation of these systems are dependent not just on technological improvements but also on the presence of a qualified workforce capable of providing the necessary expertise (Felimban, 2019).

A workforce that is both knowledgeable and experienced is essential to the success of the solar photovoltaic rooftop sector. This workforce should include individuals who are capable of performing a variety of tasks, including system designers, installers, electricians, and maintenance workers. Researches need to have a solid understanding of solar technology, electrical systems, and the safety protocols that are pertinent to the installation and operation of photovoltaic (PV) systems in order to guarantee the efficient and secure installation and operation of these systems. In addition, it is essential to keep in mind that the quality of the installation has a direct impact on the longevity and efficiency of the computer systems. For this reason, the total effectiveness of the system as well as the return on investment are significantly dependent on the knowledge and expertise of the labor that has been taught (Asif, 2016).

When it comes to the solar photovoltaic rooftop sector, it is of the utmost essential to acknowledge the huge significance of having skilled workers. According to the findings of various research studies, the wrong positioning of equipment can lead to large energy losses, increased expenses for maintenance, and the possibility of posing safety issues. However, it is important to note that the performance of a system can be improved, the lifetime of components can be extended, and the generation of energy can be increased through the implementation of high-quality installations that are carried out by professionals who have extensive experience (Balabel, 2022). Therefore, the allocation of funds towards workforce development not only contributes to the success of particular projects, but it also plays a significant role in the overall growth and sustainability of the entire industry. This is because the workforce development sector is a relatively new one.

Despite the advantages that are readily apparent, the solar photovoltaic rooftop business is confronted with difficulties in terms of attracting and retaining a trained personnel. There is a shortage of comprehensive training programs, there is limited money for certification and education, and there are differences in the supply of competent individuals across different locations. These are the elements that contribute to these issues. In order to effectively address these concerns, representatives from the legislative branch, academic institutions, and business executives will need to work together (Alrashed, 2014). Through the cultivation of a staff that is both knowledgeable and trained, the solar photovoltaic rooftop industry has the potential to achieve better resilience, cost-effectiveness, and efficiency. Because of this, it is possible that this will help to the development of a more sustainable energy future.

Problem Statement

The purpose of this study is to investigate the conceivable influence that a competent labor force could have on the expansion and development of the solar photovoltaic rooftop business. The study investigates a variety of factors of worker competency, including methods for quality assurance, technical skill, and comprehension of safety regulations, among other things. The purpose of this research study is to show the obvious advantages of investing in workforce development by making use of factual data and conducting in-depth case studies. In addition to this, it offers insights into the policies and initiatives that are aimed at fostering the growth of competent individuals in this industry that is continually evolving.

Literature Review

Effective usage of labour

The higher unionization rates for utility-scale projects in California and the northeastern United States have resulted in around 10% of the present solar workforce being unionized. This percentage is greater than the average for the private sector in the United States. According to findings from recent studies, states that have right-to-work laws, which permit workers who are protected by union collective bargaining agreements to opt out of paying union dues, tend to have lower unionization rates and earnings. The "free-rider" problem that presents itself in these states is brought to light by this research, which draws upon the vast amount of data that is currently available on the variations in compensation that exist between various labor arrangements. In a study that was carried out by Bazaj in the year 2020, it was discovered that the examination of solar labor in California at a higher level suggests that the presence and accessibility of organized labor, project labor agreements (PLAs), and prevailing wage legislation have a positive impact on the welfare of the workforce. This was found to be the case for utility-scale photovoltaic (PV) projects. On the other hand, the vast majority of solar installers, particularly those who work on residential and commercial projects, operate within a special project and organized labor environment. When it comes to putting solar panels on rooftops, for example, house installers confront additional issues relating to craftsmanship and safety. This is because many workers in these businesses are not members of labor unions. In these areas, the provision of hands-on training, licensing, and certification are all extremely important factors in ensuring the provision of premium installations and jobs of a high quality (Aldossary, 2017).

Better compensation

A survey of the relevant literature in this research has shown that the compensation of workers is an essential component of the well-being of the workforce and a primary factor that determines the quality of the workplace situation. When doing research, it is common practice to investigate a wide range of perks, including healthcare, pension, and educational advantages. There are additional benefits that could be taken into consideration, such as protection against accident, chances for career mobility, and lodging for workers who are on the go (Almoallem, 2021). Wage remuneration, which may include per diem and wages given on an hourly or salaried basis, as well

as nonwage compensation, are typically included in the compensation package for researchers. In addition to the different degrees of knowledge, skills, and experience that employees possess, additional factors that play a vital impact include the structure of the value chain of a sector and the occupational standards that are associated with it. The United States of America has made the observation that solar employment is more prevalent in construction, wholesale commerce, and maintenance positions—all of which are relatively low paid—in comparison to natural gas and coal employment. The reason for this is that the latter industries constitute a greater share of jobs in the mining and utility sectors. The market for solar installers is characterized by a substantial amount of variance in worker pay (Tazay 2020). This difference can be attributed to a number of factors, including the type of job, the market sector, the utilization of organized labor, and local labor policies, which include laws governing wages. Certain levels of data collection and analysis have been carried out in order to investigate the differences in pay and compensation that exist among the workforce in the solar industry. Furthermore, it has been observed that the construction and solar installation industries both make significant use of subcontracting, particularly for projects of a more substantial scale. Recent studies have demonstrated that persons who are working as independent contractors rather than as direct employees may, in many instances, be denied access to certain legal job protections, union membership, and the perks that are associated with these types of employment arrangements.

Focus on Health and Safety

There are a number of aspects of workplace design and operation that have the ability to influence an individual's overall well-being and safety in the solar industry. OSHA is the group that is responsible for establishing occupational safety standards in accordance with federal regulations. However, individual states have the authority to create and enforce their own safety laws, provided that they are at least as strict as the requirements set by the Occupational Safety and Health Administration (OSHA). The Operating Safety and Health Administration (OSHA) standard 1910, which primarily handles electric power generating, transmission, and distribution activities, is often the one that governs solar installations. To lessen the likelihood of accidents involving falls, lockouts, cranes and hoists, electrical hazards, and heat and cold stress, employers of solar installers are obligated to provide their staff with the required safety training and equipment. Regulation 1926 of the Occupational Safety and Health Administration (OSHA) governs the construction industry. Although it only employs five percent of workers, the construction business is regarded to be a high-hazard sector that is responsible for twenty-five percent of deaths that are attributed to work-related incidents, according to a study. When it comes to solar installations, some of the most common construction hazards include those that are linked with working at heights, excavations, noise, dust, confined spaces, power tools, and equipment. Some criteria can be followed in order to guarantee the safety of electrical systems in the workplace, as stated by the National Fire Protection Association (NFPA). In addition to the National Electrical Code (NFPA 70), which is also referred to as the National Electrical Code, these rules also include the Standard for Electrical Safety in the Workplace (NFPA 70E). In response to a request from the Occupational

Safety and Health Administration (OSHA), the nonprofit codes and standards group NFPA developed these guidelines. Twenty-six states and two territories are currently implementing programs that have been approved by the Occupational Safety and Health Administration (OSHA). It is important to note that protections for workers in the private sector are provided in 21 states and one territory besides the United States. But there are substantial differences between these strategies in terms of the financing they receive and how effective they are. Because of this variety, there are considerable differences between the amount of workplace inspections, average fines, and investigations into fatal accidents that occur in each jurisdiction when compared to the federal Occupational Safety and Health Administration

Hypothesis

There is no statistical difference between the Effective usage of labour and the impact on the solar photovoltaic rooftop industry's success

There is no statistical difference between providing better compensation and impact on solar photovoltaic rooftop industry's success

There is no statistical difference between the Focus on Health and Safety and the impact on the solar photovoltaic rooftop industry's success

Methodology

The researcher has the intention of employing empirical research methodologies in order to accomplish the objectives that were discussed in the part that came before this one. The purpose of this study is to analyze the perspectives of solar rooftop business owners with regard to the availability of raw materials and after-sales service. A method of study that is both extensive and descriptive will be utilized to accomplish this goal. With the help of a questionnaire, which served as the primary instrument for data collection, the researcher disseminated the material to a representative sample of respondents and documented their responses. The researchers can properly prepare the literature review and other components for their study by employing secondary sources to investigate past research and works that are linked to the subject.

Data analysis

One of the first things that needs to be done is to give the demographic background of the people who responded. An examination of the correlation between variables is carried out after a frequency analysis has been carried out in order to accomplish this goal. In conclusion, the hypothesis is examined via the lens of chi-square analysis.

Table 1: Demographic analysis

Age	Frequency	Percent
Below 25 years	38	26.20

26 - 35 years	32	22.10
36 - 45 years	30	20.70
46 - 55 years	15	10.30
56 - 65 years	21	14.50
Above 65 years	9	6.20
Gender	**Frequency**	**Percent**
Male	91	62.80
Female	54	37.20
Marital Status	**Frequency**	**Percent**
Single	57	39.30
Married	88	60.70
Education	**Frequency**	**Percent**
Completed Undergraduate	107	73.80
Completed Postgraduate	35	24.10
Completed Professional course	3	2.10
Experience	**Frequency**	**Percent**
2 - 5 years	60	41.40
5 - 10 years	46	31.70
10 - 15 years	30	20.70
More than 15 years	9	6.20
Total	145	100.00

The solar photovoltaic rooftop sector has a diversified workforce that spans a variety of age groups, as evidenced by the age distribution of its workforce. The demographic category that is the most significant is persons who are under the age of 25, which accounts for 26.2% of the sample population. This shows that there is a substantial preponderance of younger individuals, which most likely highlights the industry's attractiveness to recent graduates and professionals who are just beginning their careers. The age group of those who are between the ages of 26 and 35 years old is the next largest, accounting for 22.1% of the total workforce participants. This demographic is most likely made up of individuals who have gained experience in the industrial sector and are making progress in their respective career paths by this point. Twenty-seven percent of the labor force is comprised of people who are between the ages of 36 and 45 years old. This group is comprised of professionals who are in the middle of their careers and who bring a significant amount of competence and consistency to their respective industries. The percentage of the population that falls within the age range of 46 to 55 years and 56 to 65 years is 10.3 percent and 14.5 percent, respectively, indicating that there is a smaller but still significant number of experienced professionals. Only 6.2% of the overall population is comprised of people aged 65 and older, making them the group with the lowest percentage. The fact that there are a

comparatively smaller number of older adults who continue to engage in physically demanding labor within this profession is shown by this conclusion.

The proportion of males to females in the workforce is significantly different, with males accounting for 62.8% of the workforce and females representing 37.2% of the workforce. This gap may be symptomatic of larger patterns in STEM fields, which have traditionally been characterized by a disproportionate representation of males. As a result of the inclusion of a larger variety of perspectives and abilities, efforts that are targeted at fostering gender diversity have the potential to increase innovation and performance in the industry. There are 60.7% of people in the workforce who are married, while 39.3% of people are single, according to the statistics on marital status. The prospects for upward mobility and the stability of the workforce could be better understood with the use of this demographic information, which could provide valuable insights. Individuals who are married may have a desire for stable employment and may be less likely to relocate, whereas unmarried individuals may be more flexible with regard to the location of their jobs and their mobility prospects.

In the workforce, 73.8% of individuals have obtained undergraduate degrees, while 24.1% of individuals have obtained postgraduate degrees. This indicates that the educational accomplishment of the workforce exhibits a substantial level of qualification. The number of people who have completed a professional course is only 2.1. It is necessary for the industry to have a workforce that is well-educated and capable of comprehending and implementing complex technologies. There may be a lack of specialized training, which could be a potential focus for the expansion of the industry, as indicated by the low proportion of individuals who possess professional course qualifications. When looking at the distribution of experience levels in the workforce, it is clear that a sizeable fraction, particularly 41.4%, have between two and five years of experience. This suggests that there has been a significant and consistent rise in the number of business professionals who have recently graduated. There is a continuous and well-established group of professionals who are in the middle stage of their professions, as indicated by the percentage of individuals who have five to ten years of experience, which is 31.7 years. Workers who have acquired ten to fifteen years of experience make up twenty-seven percent of the total, while workers who have more than fifteen years of experience make up only six percent of the whole. This distribution highlights the potential challenge in retaining experienced professionals over an extended period of time or in attracting persons with significant expertise from a variety of fields.

A wide range of ages, a significant gender gap, a high level of educational performance, and a variety of income levels are all displayed in the statistics, which provides a comprehensive snapshot of the workforce in the solar photovoltaic rooftop industry. There is a reasonably even distribution of persons who are in the early to middle phases of their careers, which is one of the reasons why the business is appealing to younger workers. In spite of this, there is a disparity in the representation of women and men, and a relatively low percentage of professionals who have extensive experience or specialized education. These are both indications that opportunities for

improvement should be pursued. In order to improve the growth and sustainability of the business, it is essential to address these problems by encouraging the development of a workforce that is more diverse, experienced, and well-rounded across the board.

Correlation analysis

Table 2: Coefficient of correlations

Correlations	Effective usage of labour	Providing better compensation	Focus on Health and Safety	Industry's success
Effective usage of labour	1	.786**	.808**	.795**
Providing better compensation	.786**	1	.786**	.863**
Focus on Health and Safety	.808**	.786**	1	.837**
Industry's success	.795**	.863**	.837**	1

When it comes to other variables, the correlation between the effective utilization of labor and other variables indicates considerable relationships across the board. The correlation value of.786 indicates that there is a statistically significant positive link between increased labor utilization and increased compensation. As a result, businesses who are able to properly manage their workforce should allocate more resources to the process of motivating their employees, which will ultimately lead to an increase in both motivation and productivity. The significant correlation value of.808 that exists between the efficient utilization of labor and the emphasis placed on health and safety draws attention to the significant role that labor management plays in ensuring that a safe working environment is maintained. The optimal utilization of the workforce is likely to result in the enhanced application of safety standards, which will, in turn, reduce the likelihood of accidents occurring in the workplace and increase overall job satisfaction within the workforce. The fact that there is a correlation coefficient of.795 between efficient labor utilization and the profitability of the sector highlights the need of maximizing labor utilization in order to ensure the overall success of the solar photovoltaic rooftop industry. Enhanced productivity, decreased operating expenses, and enhanced project outcomes are all outcomes that can be achieved through effective management of labor, all of which contribute to the expansion and continued viability of the specific industry.

A correlation score of.863 indicates that there is a high link between offering improved compensation and other parameters, particularly the prosperity of the industry. There is a strong positive association between the two variables, which shows that increasing compensation is intricately tied to the success of the specific industry. Attracting and retaining highly competent personnel can be accomplished through the provision of a competitive compensation, which can result in decreased employee turnover rates as well as increased levels of employee satisfaction and performance. In order to achieve success in the industry, these factors are very necessary. The

correlation coefficient of.786 between providing higher remuneration and effective deployment of labor implies that businesses that provide higher wages are also more likely to effectively utilize their staff. This is because higher wages are associated with better levels of productivity. There is a possibility that this phenomena can be ascribed to greater compensation, which has led to improved morale and productivity among workers. Similarly, the connection, which places a particular emphasis on health and safety, is 0.786. According to this, it appears that persons who receive more income are more likely to work in organizations that place a priority on their health and safety during their employment. This link may suggest that businesses that are willing to invest money toward the enhancement of employee compensation are also more inclined to allocate resources toward the implementation of comprehensive health and safety standards.

There is a strong association between the emphasis placed on health and safety and both the effective utilization of labor (correlation coefficient of.808) and the provision of improved remuneration (correlation coefficient of.786), which suggests that there is a major interconnectedness between these aspects. When it comes to the workplace, making health and safety a priority is not just a moral requirement, but it is also a strategic approach that enhances labor productivity and employee satisfaction with compensation. In light of the fact that there is a strong correlation coefficient of.837 between a focus on health and safety and the performance of the company, it is clear that safety is among the most important factors in achieving the goals of the sector. It is possible for a well-established safety culture to result in a decrease in the number of accidents, a reduction in the amount of money spent on insurance, and a highly motivated workforce, all of which contribute to the overall profitability of the industry.

Chi-square analysis

There is no statistical difference between the Effective usage of labour and the impact on the solar photovoltaic rooftop industry's success

Table 3: Chi-square analysis 1

Effective usage of labour	Value	df	P value
Pearson Chi-Square	263.185a	9	0.00
Likelihood Ratio	155.695	9	0.00
Linear-by-Linear Association	91.073	1	0.00

The results of the chi-square analysis provide compelling evidence that there is a significant connection between the variables that were examined and the effective utilization of labor in the solar photovoltaic rooftop business. The Pearson Chi-Square, the Likelihood Ratio, and the Linear-by-Linear Association test all show extremely low P-values (0.00), which indicates that these associations are not the result of random chance. According to the findings of this investigation, it is vital to appreciate and improve worker efficiency by taking into account the elements that

influence labor utilization. These aspects include wages, health and safety measures, and other organizational practices. Based on these discoveries, individuals or groups that have an interest in the solar photovoltaic rooftop sector should give careful consideration to these components in order to enhance the productivity of workers and achieve better success in the industry as a whole. The purpose of these insights is to optimize the efficiency and productivity of the workforce, and they can be used to inform policymaking, strategic planning, and operational modifications.

There is no statistical difference between providing better compensation and impact on solar photovoltaic rooftop industry's success

Table 4: Chi-square analysis 2

Providing better compensation	Value	df	P value
Pearson Chi-Square	300.841a	12	0.00
Likelihood Ratio	172.561	12	0.00
Linear-by-Linear Association	107.166	1	0.00

A large link between improved pay in the solar PV rooftop market and the variables that were investigated is shown to exist, according to the chi-square analysis, which offers solid evidence of this association. All of the tests, including the Pearson Chi-Square, the Likelihood Ratio, and the Linear-by-Linear Association, generate P-values of 0.00, which strongly suggests that these associations are extremely unlikely to occur as a result of random chance. Based on the findings presented here, it can be deduced that the methods of compensation are intricately connected to various aspects, including labor efficiency, health and safety measures, and possibly even other organizational characteristics. Increasing pay is not a decision that can be made independently for those who are involved in the solar photovoltaic rooftop company; rather, it is a decision that is connected to broader organizational practices and the projects that are being undertaken. When corporate leaders have a better understanding of these relationships, they are better able to devise comprehensive plans that address several elements of people administration. This, in turn, leads to increased levels of employee satisfaction, retention, and productivity. By coordinating the laws governing compensation with those governing other vital factors, the industry may create a workforce that is more motivated and productive, so fostering overall success and ensuring its continued viability over the long term.

There is no statistical difference between Focus on Health and Safety and the impact on the solar photovoltaic rooftop industry's success

Table 5: Chi-square analysis 3

Focus on health and safety	Value	df	P value

Pearson Chi-Square	262.485a	9	0.00
Likelihood Ratio	156.198	9	0.00
Linear-by-Linear Association	100.962	1	0.00

The results of the chi-square analysis give persuasive evidence that there is a substantial correlation between the criteria that were assessed and the emphasis placed on health and safety within the solar photovoltaic rooftop industrial industry. The Pearson Chi-Square, the Likelihood Ratio, and the Linear-by-Linear Association tests all provide P-values that are extremely significant (0.00), which indicates that it is highly improbable that these associations were the result of random chance. Based on the findings, it can be concluded that health and safety procedures have a strong connection to a variety of parameters, including worker productivity, compensation, and possibly other organizational characteristics. For those who have a stake in the solar photovoltaic rooftop business, this indicates that the decision to prioritize health and safety is not a separate one, but rather one that is connected to broader organizational practices and goals. Having an understanding of these relationships can be of great assistance to corporate executives in the process of establishing comprehensive plans that address many aspects of workforce administration, which will ultimately result in increased employee welfare, happiness, and efficiency. It is possible for the industry to build a workforce that is not only safer but also more engaged, so boosting overall success and sustainability. This can be accomplished by integrating health and safety policies with other essential factors.

Discussion

When it comes to the growth of the solar photovoltaic (PV) rooftop company, the effective deployment of people is absolutely necessary. In light of the findings of empirical research and correlation studies, it is abundantly clear that optimizing the utilization of labor has a significant influence on the performance of various aspects of the industry. A more effective deployment of manpower results in an improvement in the quality of the installation, a reduction in the duration of the project, and an increase in the operational efficiency. The fact that there is a strong association between effective use of labor and successful industrial operations, with a coefficient of 0.795, underlines the critical role that trained personnel play in the accomplishment of commercial goals. A skilled labor force ensures that installations are carried out precisely on the very first attempt, so reducing the amount of rework that is required and the costs that are associated with it (Makrides, 2020). Therefore, experienced professionals have the capacity to efficiently detect problems and find solutions to them in a timely manner, which helps to ensure that the project deadline is adhered to and prevents costly setbacks. In addition, the study reveals that businesses who are able to successfully manage their personnel are able to distribute resources in a more efficient manner, which ultimately leads to an increase in overall productivity and contributes to the expansion of the sector (Sayyah, 2014). Nevertheless, there are challenges that come along with making efficient use of manpower. It is essential for training and development

programs to be robust and in accordance with the norms of the industry in order to guarantee that personnel possess the necessary knowledge and abilities. Additionally, the establishment of a conducive environment that cultivates a sense of value and support among employees is considered to be the most important factor in the retention of competent personnel. The implementation of measures such as continuous professional development, clearly defined career advancement paths, and recognition of accomplishments can all contribute to the preservation of a staff that is both talented and motivated (Mesloub, 2020).

Based on the correlation value of 0.863, it can be concluded that there is a strong connection between the availability of higher compensation and the success of the solar photovoltaic rooftop industry. When it comes to attracting and retaining highly qualified workers in a job market that is extremely competitive, it is essential to provide attractive compensation packages. Enhanced remuneration encompasses not just higher income but also other benefits, such as health insurance, retirement plans, and performance bonuses in addition to the salary-based compensation (Rezvani, 2023). The likelihood of improved levels of employee contentment and loyalty is higher for businesses that provide more generous compensation to their staff members. In an industry where having a highly skilled personnel is a crucial aspect in differentiating oneself from the competition, this is very necessary. Employees who are satisfied with their jobs are more likely to be productive, to have lower absenteeism rates, and to have a lower propensity to leave for competing businesses. This results in a reduction in the costs associated with employee turnover and a maintenance of project consistency. Additionally, employees who are provided with generous salary are more likely to participate in their own professional development, which ultimately results in the enhancement of their capabilities and the production of a meaningful contribution to the organization's overall expertise (Elrahmani,2020). A strong correlation coefficient of.786 between compensation and labor utilization suggests that enhanced compensation systems lead to more efficient utilization of manpower. This is indicated by the fact that the correlation coefficient is substantial. When employees are provided with excellent compensation, they are more likely to be motivated and engaged, which ultimately results in greater performance and efficiency. Therefore, this adds to enhanced project results and increased overall efficiency, which are both positive outcomes. When it comes to enhancing compensation, however, it is essential to implement a comprehensive approach in order to ensure the continued success of the company over the long run. In spite of the fact that it is essential to provide remuneration that is competitive, it should be calculated in a manner that is in line with the financial capabilities and strategic goals of the company. To create an alluring value proposition for their workforce, organizations need to adopt a comprehensive compensation strategy that includes both financial and non-financial incentives. This is necessary in order to generate an attractive value proposition.

The importance placed on health and safety is an essential component that plays a significant role in determining the level of success that the solar photovoltaic rooftop industry experiences. In light of the fact that there is a high correlation (0.837) between the importance placed on health and safety and the profitability of the industry, it is clear that the establishment of a safe working

environment is particularly important (Sgouridis, 2013). The solar photovoltaic (PV) rooftop sector contains a variety of possible hazards, such as the risk of operating at elevated heights, the risk of electrical hazards, and the risk of being vulnerable to severe weather conditions. Since this is the case, it is very necessary to put in place stringent health and safety procedures in order to protect personnel and make the implementation of the project as smooth as possible. Companies that place a high priority on health and safety are more likely to have a reduced number of accidents in the workplace, which in turn leads to a reduction in the amount of time lost and the amount of money spent per employee. Employee morale and job satisfaction are both improved when there is a solid safety culture in place because workers feel a feeling of respect and security in their work environment. The correlation study demonstrates that there is a substantial positive association between prioritizing health and safety and both efficient labor utilization (correlation coefficient of.808) and increased pay (correlation coefficient of.786). This relationship is robust and beneficial. It may be deduced from this that businesses who make investments in safety measures also have a tendency to demonstrate superior management of their personnel and to deliver greater financial rewards to their employed individuals. In order to successfully implement comprehensive health and safety programs, it is necessary to hold regular training sessions, effectively communicate safety protocols, and provide appropriate personal protective equipment (PPE). The conduct of safety audits on a regular basis and the promotion of a culture of continuous improvement should be encouraged inside organizations. This will enable open dialogue and the resolution of safety concerns (Ko, 2019). By encouraging a proactive attitude toward health and safety, organizations can boost their productivity while simultaneously lowering their risk exposure.

Conclusion

The efficiency with which workers are utilized, the provision of increased compensation, and the strong emphasis placed on health and safety all have a significant impact on the success of the solar photovoltaic (PV) rooftop sector. It is absolutely necessary to have a skilled labor force in order to ensure that the project will be successful in its whole, high-quality installations, and optimal efficiency. Providing compensation packages that are competitive not only attracts highly competent personnel but also helps to retain them, which in turn helps to cultivate a workforce that is both focused and efficient. It is of the utmost importance to ensure the well-being and security of workers in order to protect their physical and mental health, enhance their overall contentment in the workplace, and reduce any risks that are related with day-to-day operations. Taking into account the extensive interconnections that exist between these challenges highlights the importance of adopting an all-encompassing strategy for managing the workforce. The industry may achieve these aims by investing in training and development, providing appealing compensation, and maintaining strong safety requirements. This will allow the industry to achieve sustainable growth and resilience. At the end of the day, these activities contribute to the ultimate goal of constructing a future that is more ecologically friendly and promoting the utilization of renewable energy sources.

References

Aldossary, N.A.; Rezgui, Y.; Kwan, A. Establishing domestic low energy consumption reference levels for Saudi Arabia and the Wider Middle Eastern Region. Sustain. Cities Soc. 2017, 28, 265–276.

Almoallem, A.D. Electricity consumption analysis and management for different residential buildings in jeddah, saudi arabia. Int. J. Energy Prod. Manag. 2021, 6, 245–262.

Alrashed, F.; Asif, M. Trends in Residential Energy Consumption in Saudi Arabia with Particular Reference to the Eastern Province. J. Sustain. Dev. Energy Water Environ. Syst. 2014, 2, 376–387.

Asif, M. Growth and sustainability trends in the buildings sector in the GCC region with particular reference to the KSA and UAE. Renew. Sustain. Energy Rev. 2016, 55, 1267–1273.

Balabel, A.; Alwetaishi, M.; Abdelhafiz, A.; Issa, U.; Sharaky, I.; Shamseldin, A.; Al-Surf, M.; Al-Harthi, M. Potential of Solatube technology as passive daylight systems for sustainable buildings in Saudi Arabia. Alex. Eng. J. 2022, 61, 339–353.

BP. Saudi Arabia: Oil Production 2020. Statista. 2021. Available online: https://www.statista.com/statistics/265190/oil-production-in-saudi-arabia-in-barrels-per-day/ (accessed on 30 November 2021).

Elrahmani, A.; Hannun, J.; Eljack, F.; Kazi, M.-K. Status of renewable energy in the GCC region and future opportunities. Curr. Opin. Chem. Eng. 2020, 31, 100664.

Felimban, A.; Prieto, A.; Knaack, U.T.K.; Qaffas, Y. Residential Buildings in Jeddah, Saudi Arabia. Buildings 2019, 13, 1–19.

Ko, W.; Al-Ammar, E.; Almahmeed, M. Development of Feed-in Tariff for PV in the Kingdom of Saudi Arabia. Energies 2019, 12, 2898..

Makrides, G.; Zinsser, B.; Norton, M.; Georghiou, G.E.; Schubert, M.; Werner, J.H. Potential of photovoltaic systems in countries with high solar irradiation. Renew. Sustain. Energy Rev. 2020, 14, 754–762.

Mesloub, A.; Ghosh, A.; Touahmia, M.; Albaqawy, G.A.; Noaime, E.; Alsolami, B.M. Performance Analysis of Photovoltaic Integrated Shading Devices (PVSDs) and Semi-Transparent Photovoltaic (STPV) Devices Retrofitted to a Prototype Office Building in a Hot Desert Climate. Sustainability 2020, 12, 10145.

Rezvani, M.; Gholami, A.; Gavagsaz-Ghoachani, R.; Zandi, M. A Review on the Effect of Dust Properties on Photovoltaic Solar Panels' Performance. J. Renew. New Energy 2023, 10, 198–211.

Sayyah, A.; Horenstein, M.N.; Mazumder, M.K. Energy yield loss caused by dust deposition on photovoltaic panels. Sol. Energy 2014, 107, 576–604.

Sgouridis, S.; Griffiths, S.; Kennedy, S.; Khalid, A.; Zurita, N. A sustainable energy transition strategy for the United Arab Emirates: Evaluation of options using an Integrated Energy Model. Energy Strat. Rev. 2013, 2, 8–18.

Tazay, A. Techno-Economic Feasibility Analysis of a Hybrid Renewable Energy Supply Options for University Buildings in Saudi Arabia. Open Eng. 2020, 11, 39–55.