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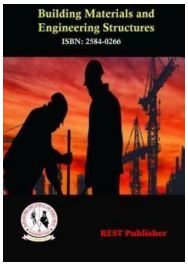

Study Of Mechanical Properties of Coconut Shell Powder Using Weighted Sum Method (WSM)

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Abstract. The most adaptable component of the coconut, the organic shell, is used to make coconut shell flour. It is appropriate for long-term usage due to its excellent durability qualities. Although the carbon content is lower and the lignin content is higher, shell is similar to that of hard woods. To make coconut shell flour, fully matured nuts' shells must first be scraped of any pithy material that may be adhering to them and then crushed into little bits. These fragments are then repeatedly processed in grinding mills, and the ground mass is then extracted in various mesh sizes after going via cyclone and vibratory sieves with phosphor-bronze mesh. One possible filler material for these composites is solid waste, such as coconut shell. To create high strength, more durable, and concrete for structural components in the construction industry, coconut shell is typically utilized in powder form in conjunction with cement. The weighted sum technique is a cross decision-making process; as there are numerous possibilities, there are also many more factors that must be considered before choosing the best one. A weighted or weighted collection of sums is a machine learning strategy that combines predictions from various models, with each model's contribution being weighed according to its capacity or level of expertise. Weighted the with mean evening gown voting ensemble related to this method benefits of using it are ease of use, especially when working with convergent problems, such as when disadvantages an all-in solution space make it impossible to find solutions and goals a simple way to ascribe weights there is no way. The alternatives are Adjusted mean square, Degree of freedom, Sum of squares, F-value, p-Value. The evaluation parameters are Regression, Linear, Square, Interaction, Residual error. From the result it is seen that Square and is got the first rank whereas is the Regression got is having the lowest rank. The value of the dataset for Coconut Shell Powder in Weighted sum method (WSM) method shows that it results in Square, breathing rate and top ranking.

Key words: Degree of freedom, Sum of squares, F-value, p-Value

1. INTRODUCTION

Large volumes of debris, specifically coconut shell, are produced during the manufacture of coconuts, a fruit of the coco palm. The majority of the uses for these materials that have been developed are of poor value or are very briefly used. Because of its chemical make-up, coconut shells powder (CSP) appears to be an intriguing possibility in this regard. The primary ecological justification for such a study is reasonable. Thus, there is a lot of interest in the use of CSP in place of commercial fillers. CSP is utilized as an alternate filler for NR in this study. [1] The following is a presentation of all the test findings on the samples of coconut husk powder that were performed and described above. The XRF results indicate that the more noticeable elements. Less than 1.00% of other elements were present in coconut shell powder. But, the gifts of silicon dioxide (sio 2 were essential because it is the component that concrete must mix with the most. It is apparent that this coconut husk powder contains 0.98% silicon oxide. [2] Model coconut powder (CSP). To detect whether phosphorus is present or absent, utilize the phosphovando moly date technique. In the meantime, the quantities of Ca and EDTA are determined using edentate disodium (EDTA). Additionally, the presence of heavy metals is detected using an atomic absorption spectrophotometer. CSP performs better in applications which require reinforcement. This particular powder form offers more mass in terms of volume. Due to the fact that strength is dependent on particle size, it possesses strong strength properties when utilized as a filler. In the meantime, the -

OH groups in the CSP's silica particles are beneficial because they encourage chemical. [3] After palm oil, rubber, and paddy, coconut (Cocos nucrifera) is Malaysia's fourth-largest crop in terms of acreage. Malaysia processes and consumes large quantities of coconut water, milk, oil, and other coconut products. The non-food component of coconuts, which are lignocellulose agricultural byproducts, is the coconut shell. As compared to mineral fillers like calcium phosphate, kaolin, mica, and talc, coconut shell powder (CSP), a lignocellulose filler, has some superior qualities. These include being less expensive, less abrasive to manufacture, biodegradable, and environmentally friendly. [4] total phenolic of the cocoa shell powder is maximized by long extraction times at low toasted temperature with long toasting times. Toasting time, then temperature, had the least noticeable impact on the amount of phenols in the extract. Given the high cost of heating, the utilization of low toasted temperatures is intriguing. Moreover, the phenolic extract typically contains more furfural (a carcinogenic chemical) at higher temperatures. [5] The results show that the flexural strength of composites rises along with the proportion of coconut shell powder. This is due to the powdered coconut shells' improved toughness. The results also show that, when comparing to all other composites, 5% of mango cockle shell will have the maximum flexural strength. This is due to the fact that tamarind tank powder will enhance grain dispersion in the composites, resulting in a composite that is stronger than all others. Flexural testing reveals a substantial improvement in its qualities. Nonetheless, a noticeable enhancement in the mechanical qualities as a whole may be seen. [6] Bio composites made of polylactic acid (PLA) and coconut shell powder (CSP). On the tensile characteristics, thermophysical conductivity, and shape of PLA/CSP bio composites, the impacts of binder content and acrylonitrile were examined. It was discovered that adding CSP to PLA bioplastics reduced their tensile strengths at break while increasing their elastic modulus. The PLA/CSP bio composites that have been treated with acrylic acid show decreased elongation at break but increased tensile strength and elastic modulus. Acrylic acid surface treatment has improved the interaction between the filler and matrix. Bio composites' thermal stability improved as CSP content rose. Compared to untreated bio composites, treated bio composites have superior thermal stability. [7] Due to the presence of nitrocellulose, which is stronger than wood, coconut shells, an agricultural byproduct, are frequently regarded as a hard wood. Coconut shells used to have little to no commercial value, and it was expensive and harmful to the environment to dispose of them. To make active carbon, mosquito coils, and nitrocellulose filler for polymer composites, coconut shells can now be converted into coconut husk powders (CSP), which is employed in modern times. [8] This finding trend is consistent with earlier research on bio composites made of polylactic acid and coconut shell powder. In contrast to unmodified rPP=CSP composites, the modified rPP=CSP composite materials with SDS displayed increased tensile strength. The increase was brought about by the coupling agent impact of SDS, which enhanced the compatibility of the filler and matrix. The enhancement has significantly improved the interplay between the filler-matrix [9] Crude extract of any element from such a plant matrix is controlled by mass transfer. The phenomenon ends when the solvent is saturated with the extracted substance and the concentration gradient is zero. Mass transfer ends after 20 minutes in the ultrasound-assisted extraction of polyphenolic from coconut shell powder, and the procedure is interruptible. The proportion of phenolic that had been extracted somewhat increased for solvent to solid ratios greater than 50. [10] Under UVC (254 nm) and UVA (365 nm) radiation, the photocatalytic degradation of three PPCP pollutants is examined using a composite made of coconut shell powder (TCNSP). The effects of several process variables, including recycling efficiency, initial PPCP concentration, TCNSP loading, light intensity, dissolved oxygen, and pH, were also investigated. The produced TiO2-Coconut Shell Powder (TCNSP) composite's physicochemical characteristics have been thoroughly studied and previously reported. [11] When scanning electron microscopy (SEM) pictures are compared, a variation in the observed morphology following the alteration with coconut husk powder may be seen. The CPE surfaces is homogenous and evenly dispersed with fine pores in its unaltered state; however, after the alteration, its pore size was raised and the pore distribution changed. AFM data were used to justify an increase in the surface roughness for coconut shell powder-modified CPE (CS-MCPE). [12] Natural fibers are less expensive and lighter than synthetic fibers, however they have less ideal mechanical qualities. A hybrid formulation is thus a practical and affordable substitute for employing only natural fibers. To enhance the mechanical characteristics of polymer composites, some researchers have changed natural fibers with diverse organic and inorganic elements as fillers. As a filler for polymer composites, coconut shell powder (CSP), which is plentiful, affordable, and environmentally benign, has been employed. [13] The major goal of the research is to evaluate the potential qualities of hemp fibers when combined with compounds made from hemp fiber and coconut shell powder were created with this end in mind utilizing a straightforward handle procedure. Natural fibers, such as hemp fibers and coconut shell powder, were altered in a Nao solution to improve their adherence and lessen moisture absorption. Following this, the composites were exposed to various liquid nitrogen temperature ranges, and their mechanical characteristics were assessed experiments and compared to ideal processing parameters like woven hemp fiber diameter, hemp layer count, coconut shell powder content, and liquid nitrogen temperature ranges. [14] Met kaolinite is used as a filler to improve electrical stability,

while alumina rehydrate is used as a fire retardant. Each form of filler has a unique set of characteristics, which are in turn impacted by factors like particle size, shape, and surface chemistry. We go through everything about filler qualities, from price to particle morphology. Several types of fillers, such as wood ash, ocean, waste cement dust, waste tire dust, carbonized bagasse (waste from sugar cane), and lime kiln dust, are employed in rubber compounds. We are aware that the rubber industry has used a variety of natural resources as fillers. The cockle shell powder shown here is the least expensive filler compared to others. [15]

2. MATERIALS & METHODS

Alternative: Adjusted mean square, Degree of freedom, Sum of squares, F-value, p-Value.
Evaluation Preference: Regression, Linear, Square, Interaction, Residual error.
The weights given to characteristics in the MCDM technique are crucial in determining how to rank the options. These weights could differ, which would modify how the alternatives are ranked. The optional rating of alternatives in the proposed system was determined using the Ranking Summation System (WSM) method. The weight for array scores and features is the outcome of WSM. The score of an option in the weighted system is the total of its estimation, where scores are the primary weights assigned to each attribute. Instead of determining sub-scores by dividing the symbolic "of performance scores, the performance scores in the weighted assembly line attach importance towards the power of weight. A focus of network research and development has always been simulation. The high number of nodes, requirement for pollution control, and evaporative geometry of the model make wireless networks of sensors (WSN) challenging to mimic accurately for many available simulation tools. The microphone configuration was chosen to maximize the movement of a headset so that sound going from the front would be increased and sound arriving from the back would be reduced. The right microphone arrangement was discovered during the simulations utilizing a spherical neck transmission function (HRTF). The efficacy of the suggested hearing aid reaches 300CX3000Hz with an average 34.6 dB reduction in the bandwidth for the forward sound compared with the forward sound source. In comparison to the prior delay and sum beam, this performance is better. We lose eight additional vectors in order to obtain the weights of the four-dimensional aspect vector. We require weights since the parsing capabilities of the four attributes vary. Quite so much weight as possible should be given to distinguishing between keywords versus non-keywords in this characteristic. We offer a brand-new clustering technique created for a focused optimization challenge. This approach, which is based on the surplus parameter, regulates the interaction between sampling fit and the number of clusters using the e cluster count will be changed automatically to better reflect the data. By methodically turning the values into objective functions, Barret searches for the best solutions one by one using the weight-sum approach. In earlier studies, this strategy frequently results in poorly dispersed liquids that cover the front barre to, and the barre to does not discover the best solutions in the places where it is concentrated. Weight reduction is a broad idea in multi-objective optimization that can be used independently or as part of other techniques. Understanding the features of the weighted linear system can therefore have a long-term effect. Although this method's shortcomings in representing Barret's optimal set have been addressed in numerous published applications and literature, there is little in-depth debate of the conceptual importance of weight training and techniques to improve the method's performance. primary preference expression. Additionally, these models use the Weighting Pad Algorithm (WS-BA) to choose the ideal mixture of both vertical and horizontal target angles for such luminaires. On a typical tennis court, the suggested system is used. Several levels of lighting, both horizontally and vertically, are reproduced for the testing. All lighting requirements are satisfied in accordance with design specifications. A focus of network research and development has always been simulation. Yet, due to their characteristics, the sheer number of nodes, the requirement for environmental consciousness, and the model's evaporative topography, wireless sensors networks (WSN) are challenging to mimic accurately using many of the simulation tools now in use. But, due to their design, these tools cannot be used efficiently.

3. RESULT AND DISCUSSION

TABLE 1. Coconut Shell Powder

	Adjusted mean square	Degree of freedom	Sum of squares	F-value	P-Value
Regression	139.530	43.250	32.780	56.870	25.680
Linear	142.970	76.830	45.760	21.230	47.850
Square	122.580	32.430	55.310	89.640	69.960
Interaction	128.280	12.320	33.210	79.420	41.640

Residual error	186.410	42.640	67.790	21.550	74.780

Table 1 shows the Alternative: Adjusted mean square, Degree of freedom, Sum of squares, F-value, p-Value. Evaluation preference: Regression, Linear, Square, Interaction, Residual error

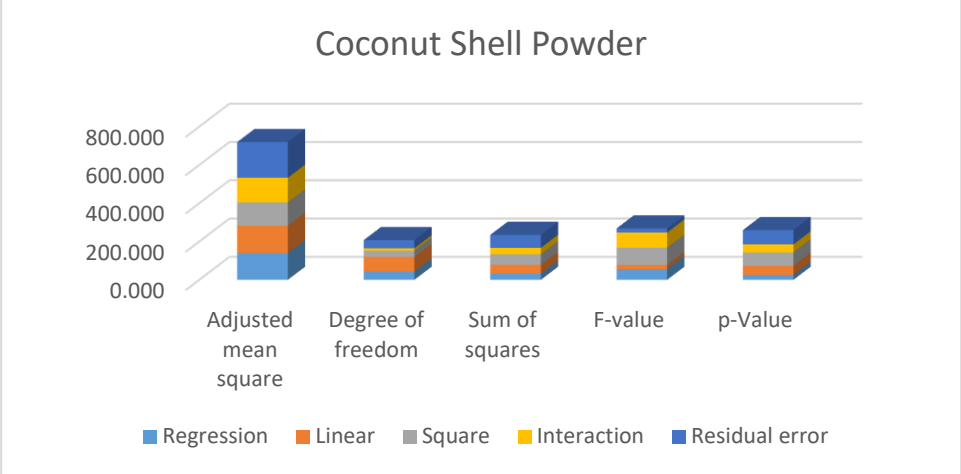

FIGURE 1. Coconut Shell Powder

Figure 1 shows the Adjusted mean square it is seen that Residual error is showing the highest value for Square is showing the lowest value. Degree of freedom it is seen that Linear is showing the highest value for Interaction is showing the lowest value. Sum of squares it is seen that Residual error is showing the highest value for Regression is showing the lowest value. F-value it is seen that Square is showing the highest value for Linear is showing the lowest value. p-Value it is seen that Residual error is showing the highest value for Regression is showing the lowest value.

TABLE 2. Normalized Data

Normalized				
0.74851	0.56293	0.48355	0.63443	0.34341
0.76697	1.00000	0.67503	0.23684	0.63988
0.65758	0.42210	0.81590	1.00000	0.93554
0.68816	0.16035	0.48990	0.88599	0.55683
1.00000	0.55499	1.00000	0.24041	1.00000

Table 2 shows the Normalized Data for Alternative: Degree of freedom, Sum of squares, F-value, p-Value. Evaluation preference: Regression, Linear, Square, Interaction, Residual errorit is also Maximum or Minimum value =C5/MAX ($C$4: $C$8), =MIN ($D$4: $D$8)/D6 Normalized Data formula used.

TABLE 3. Weight

Weight				
0.25000	0.25000	0.25000	0.25000	0.25000
0.25000	0.25000	0.25000	0.25000	0.25000
0.25000	0.25000	0.25000	0.25000	0.25000
0.25000	0.25000	0.25000	0.25000	0.25000
0.25000	0.25000	0.25000	0.25000	0.25000

Table 3 shows the Weightages used for the analysis. We take the same weights for all the parameters for the analysis**.**

TABLE 4. Weighted normalized decision matrix

Weighted Normalized Decision Matrix				
0.18713	0.14073	0.12089	0.15861	0.08585
0.19174	0.25000	0.16876	0.05921	0.15997
0.16440	0.10553	0.20398	0.25000	0.23389

0.17204	0.04009	0.12247	0.22150	0.13921
0.25000	0.13875	0.25000	0.06010	0.25000

Table 4 shows the Weighted Normalized Decision Matrix. Alternative: Adjusted mean square, Degree of freedom, Sum of squares, F-value, p-Value. Evaluation preference: Regression, Linear, Square, Interaction, Residual error it is also Weighted Normalized Decision Matrix value multiplication formula used.

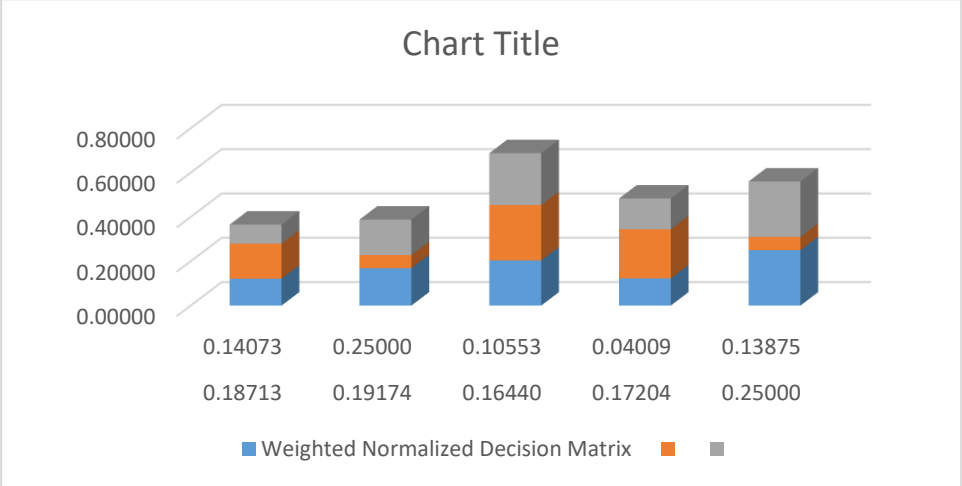

FIGURE 2. Weighted normalized decision matrix

Figure 2 shows the Weighted Normalized Decision Matrix. Alternative: Adjusted mean square, Degree of freedom, Sum of squares, F-value, p-Value. Evaluation preference: Regression, Linear, Square, Interaction, Residual error it is also Weighted Normalized Decision Matrix value multiplication formula used.

TABLE 5. Preference Score & Rank

	Preference Score	Rank
Regression	0.69321	5.00000
Linear	0.82968	3.00000
Square	0.95778	1.00000
Interaction	0.69531	4.00000
Residual error	0.94885	2.00000

Table 5 shows the graphical view of the final result of this paper the Square is in 1st rank, the Residual error is in 2nd rank, the Regression is in 5th rank, the Interaction is in 4th rank, and the Linear is in 3rd rank. The final result is done by using the WSM method.

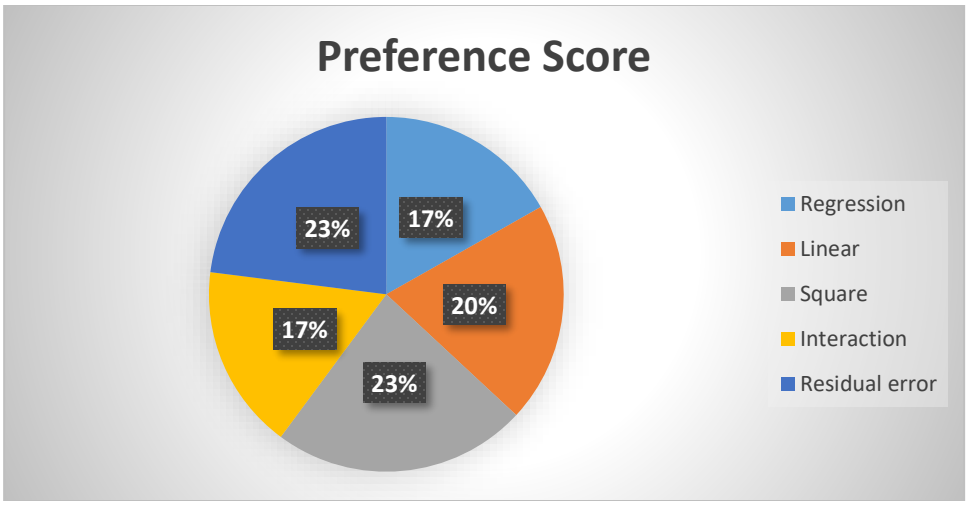

FIGURE 3. Preference Score

Figure 3. Preference Score shows the Regression, 0.69321, Linear 0.82968, Square 0.95778, Interaction 0.69531, Residual error 0.94885.

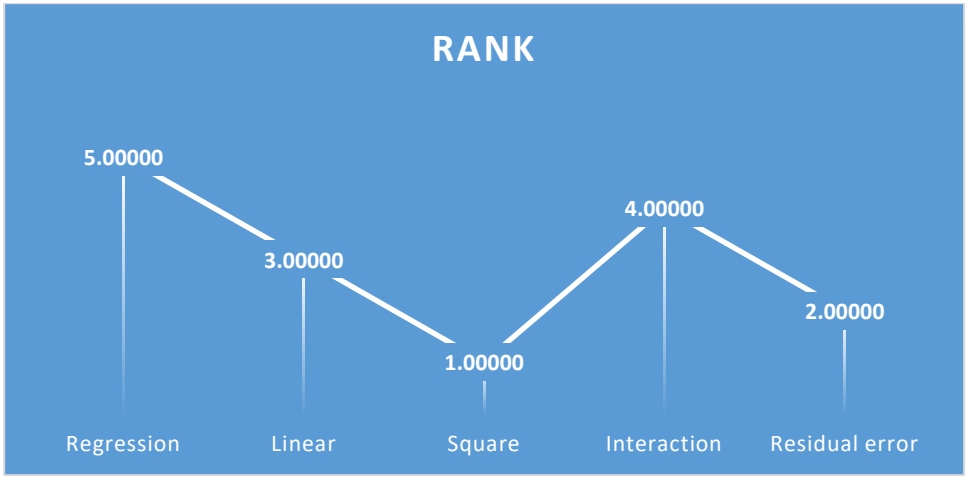

FIGURE 4. Rank

Figure 4. Rank shows the graphical view of the result of this paper the Square is in 1st rank, the Residual error is in 2nd rank, the Regression is in 5th rank, the Interaction is in 4th rank, and the Linear is in 3rd rank.

4. CONCLUSION

Additionally, the presence of heavy metals is detected using an atomic absorption spectrophotometer. CSP performs better in applications which require reinforcement. This particular powder form offers more mass in terms of volume. Due to the fact that strength is dependent on particle size, it possesses strong strength properties when utilized as a filler. In the meantime, the -OH groups in the CSP's silica particles are beneficial because they encourage chemical. Large volumes of debris, specifically coconut shell, are produced during the manufacture of coconuts, a fruit of the coco palm. The majority of the uses for these materials that have been developed are of poor value or are very briefly used. Because of its chemical make-up, coconut shells powder (CSP) appears to be an intriguing possibility in this regard. The primary ecological justification for such a study is reasonable. Thus, there is a lot of interest in the use of CSP in place of commercial fillers. CSP is utilized as an alternate filler for NR in this study. In earlier studies, this strategy frequently results in poorly dispersed liquids that cover the front barre to, and the barre to does not discover the best solutions in the places where it is concentrated. Weight reduction is a broad idea in multi-

objective optimization that can be used independently or as part of other techniques. Understanding the features of the weighted linear system can therefore have a long-term effect. Although this method's shortcomings in representing Barret's optimal set have been addressed in numerous published applications and literature, there is little in-depth debate of the conceptual importance of weight training and techniques to improve the method's performance. primary preference expression. Additionally, these models use the Weighting Pad Algorithm (WS-BA) to choose the ideal mixture of both vertical and horizontal target angles for such luminaires. On a typical tennis court, the suggested system is used. Several levels of lighting, both horizontally and vertically, are reproduced for the testing. All lighting requirements are satisfied in accordance with design specifications. From the result it is seen that Square and is got the first rank whereas is the Regression got is having the lowest rank.

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