Journal on Materials and its Characterization

Vol: 2(1), March 2023

REST Publisher; ISSN: 2583-6412

Website: http://restpublisher.com/journals/jmc/

DOI: https://doi.org/10.46632/jmc/2/1/4

Influence of Chemical Treatment of Natural Fibres Using the SPSS Method

***[1] M. Mamatha, [2]M. Ramchandran, [2]Kurinjimalar Ramu**

[1]*Chaitanya Bharthi Institute of Technology, Telangana, India*

[2]REST Labs, Kaveripattinam, Krishnagiri, Tamil Nadu, India.

*Corresponding Author Email: mamatha.mallepally@gmail.com

Abstract: *Chemical Treatments of Natural Fibre Chemical treatment of hazardous waste involves converting it into non-toxic gases by changing or altering its chemical characteristics. Various treatment methods are used, such as reducing solubility or acidity through neutralization or pH adjustment, precipitation or oxidation and reduction, hydrolysis and photosynthesis, chemical oxidation (such as ozonation, electrolytic oxidation, and hydrogen peroxide), and chemical removal (such as alkali metal dichlorine and alkali). Commonly used chemical treatment processes include metallization, activated chemical treatment processes, chemical precipitation, neutralization absorption, disinfection (using chlorine, ozone, UV light), and ion exchange. Natural fibers obtained from the plant kingdom include cotton, flax, jute, bamboo, sisal, and co-conut husks. Cotton and flax are examples of seed hairs, while jute is an example of stem (or bast) fibers. Sisal is an example of leaf fibers. Animal fibers include secretions such as wool, hair, and silk. Popular animal fibers include angora and mohair. This paper reviews various chemical properties of natural fiber-reinforced composites, including changes resulting from the use of natural fibers. Chemical treatments, such as alkali, silane, acetylation, benzoylation, acrylation, malate coupling agents, isocyanates, permanganate, and others are discussed in relation to their effect on the fiber surface. The aim of these treatments is to improve adhe-sion between the fiber and polymer matrix. As a result, water absorption of composites decreases and their mechanical properties are improved. The Statistical Package for Social Sciences, commonly known as SPSS, quickly gained popularity in the 80s and 90s, ex-tending beyond the commercial sector to the social sciences. The original name was dropped, and the name was shortened to "SPSS." Several attempts were made to introduce a word that fits the acronym "SPSS," but they often failed. In the early 2000s, "Statistical Packages and Software Services" was used for some years, but eventually dropped. "SPSS" became just a name and was no longer short for anything. There is, however, a detailed history of SPSS from 1968 to 2009, which is available to anyone interested. The industries included in this study are the non-metal mineral product industry, general equipment manu-facturing, mining and washing of coal, textile industry, food manufacturing industry, and special equipment manufacturing. The Cronbach's Alpha reliability test was conducted, and the overall Cronbach's Alpha value for the model is 0.744, indicating a 74% reli-ability rate. Based on the literature review, a model with a Cronbach's Alpha value of over 0.50 can be considered for analysis. The text appears to be correct as it is. The Cronbach's Alpha reliability test was conducted, and the overall Cronbach's Alpha value for the model is 0.744, indicating a 74% reliability rate. Based on the literature review, a model with a Cronbach's Alpha value of over 0.50 can be considered for analysis.*

Keywords: *SPSS, Cotton, Jute, Flax, Hemp, Ramie and Sisal.*

1. INTRODUCTION

When comparing chemical treatment of fibers to untreated fiber composites, it was found that the modulus of the untreated fiber composite was higher. However, a better storage modulus was observed in the silane-treated fiber compared to the NaOH-treated composite, indicating improved adhesion between the fiber and matrix. Chemical treatments of natural cellulosic fibers improve their compatibility with matrix materials by reducing their hydrophilicity. The authors of the paper concluded that chemical treatments improve the bonding properties of the fiber to the matrix [2]. Various chemical treatments, such as alkali, silane, acetylation, benzoylation, acrylation, maleate coupling agents, isocyanates, permanganate, and others, are used for fiber mat and polymer matrix. These treatments not only modify the fiber surface but also increase fiber strength. Although natural fibers have the advantage of being biodegradable and having low density, they also have poor compatibility with the matrix and relatively high moisture absorption. Therefore, chemical treatments are increasingly being considered

to enhance the surface properties of fibers [1]. Natural fibre-reinforced composites are often considered eco-friendly due to their low density, biodegradability, and renewable source of raw materials. However, the burning of these composites releases a significant amount of carbon dioxide, contributing to the greenhouse effect and global climate change. To improve the compatibility of plant fibres with hydrophilic polymer matrices, chemical treatments such as corona treatment and plasma treatment are used. Corona treatment activates cellulose for further chemical treatments and increases fibre surface polarity, while plasma treatment introduces non-reactive groups and improves fibre surface strength. However, these treatments can also lead to surface ablation and etching, which may reduce fibre integrity. Overall, these treatments improve adhesion and compatibility between the fibres and the matrix, resulting in stronger and more durable composites. It seems that in the first study, the researchers investigated the effects of three different chemical treatments on the surface of green coconut fiber, specifically using H2O2, NaOCl/NaOH, and morphology solutions. They evaluated the chemical composition, thermal stability, and surface properties of the fibers, likely to assess their potential for use in composite materials. In the second study, the focus was on examining the effects of various chemical treatments on flax-derived fibers, with the goal of comparing the results to existing literature on the topic. It is not clear from the statement what specific treatments were used or what properties were evaluated. It seems that the article is discussing the use of chemical treatments to improve the compatibility between natural fibers and polymer matrices. The treatments aim to modify the surface properties of the fibers to reduce their hydrophilicity and improve their adhesion to the matrix. Different chemicals can be used, such as alkali, silane, acetylation, benzoylation, acrylation, maleate coupling agents, isocyanates, and permanganate. Corona and plasma treatments can also be applied to activate the cellulose surface for further chemical treatments. The article also mentions that the type and concentration of the chemical solution used can affect the performance of the composite material. Overall, the use of chemical treatments on natural fibers is an important strategy to improve the properties and performance of composite materials in various applications. Chemical treatments are a significant area of modern research, with several authors focusing on treating fibers to improve bonding with the resin matrix. The strength of fibers can be increased or decreased by altering fibers structurally, so understanding what happens structurally is of great importance. For instance, the weight loss of alpha fibers after alkali treatment can be explained by a significant reduction in fiber diameter due to the dissolution of hemicelluloses. Chemical treatments have been found to reduce the radius of alpha fiber, and this reduction can be attributed to the conformation between cellulose microfibrils. Some stabilizing waxes, gums, and cementitious materials can be partially removed using chemicals. Procedures for identifying and evaluating treatments are also being developed [8]. Thank you for the information. It seems that the authors used alkali and silane treatments to improve the adhesion between natural fibres (such as jute, ramie, sisal, and crowa) and the polymer matrix in order to create hybrid natural fibre-reinforced composites (NFRC). They analyzed the thermal properties of the composites using differential scanning calorimetry, thermogravimetry, and dynamic mechanical analysis and found that chemical treatments increased the thermal stability of the composites. Scanning electron microscope images revealed that the chemical treatments also altered the morphology of the natural fibres, with alkali treatment resulting in a rough surface and composite treatment resulting in the formation of a thin coating layer on the fibre surface. However, the effectiveness of chemical treatment varied depending on the type of fibre, with sisal and ramie showing positive effects on composite properties while untreated jute and crowa blends performed better. Chemical treatments can be used to modify the surface properties of natural fibres, reducing their hydrophilicity and improving their compatibility with hydrophobic polymer matrices. This can lead to better interfacial bonding between the fibres and matrix, ultimately improving the performance of natural fibre reinforced composites. Additionally, chemical treatments can be used to remove unwanted materials from the fibre surface, such as gums and waxes, through a process called degumming. t seems like chemical treatments can have a positive effect on the tensile properties of natural fibres, but the double level chemical remedy is more effective compared to alkaline remedy and single stage remedy. The thermal behavior of chemically treated fibres may vary depending on the type of treatment and weight fractionation. Longitudinal heat conductivity can be improved in oriented fibres, while randomly oriented fibres may be better for thermal conductivity in the transverse direction. Poor adhesion between the resin and fibre can lead to decreased mechanical performance. Chemical treatments can modify the surface properties of natural fibres and improve their adhesion with the matrix. A deterministic screening design was used to investigate the effect of successive chemical treatments on fibre tensile strength, considering factors such as NaOH concentration, soaking time in aluminum salt solution, and the final pH of the slurry. Natural fibres derived from lignocellulose contain strongly polarized hydroxyl groups, which makes them hydrophilic in nature. On the other hand, matrices such as polyolefins are naturally hydrophobic, which makes them incompatible with polar-hydrophilic fibres. This poor interface between fibres and matrices can result in weak adhesion and poor performance of the composite. Natural fiber composites were compared in the study. The results indicate that alkali surface-modified natural fibers improve the properties of natural fiber-reinforced composites. Composites containing surface-modified fibers exhibit better tensile properties than untreated fibers. Composite surface modification with fiber offers better mechanical properties than the single surface modification method except the alkali approach. Fiber composites surface-modified with silane have shown good effect on strength properties.

Natural fiber contaminants such as fat, lignins, and pectins can be removed through surface modification of natural fibers [15]. The use of natural fiber reinforced composites in various environmental conditions has become increasingly popular in recent years. Many types of natural fibers are used as effective reinforcements in polymer matrices. Fibers or particles are added to polymers as fillers to achieve desired thermal, mechanical, and electrical properties. The properties of fibrous composite materials strongly depend on the fiber properties, and the use of natural fibers as reinforcement in plastics is advantageous due to their non-toxicity, biodegradability, low energy consumption, and low cost. Additionally, natural fibers have lower density and more specific properties. The unique mechanical properties of natural fibers are comparable to traditional reinforcements. It is important to note that natural fibres are being increasingly used in the automotive industry to replace synthetic fibre reinforced plastics due to their lightweight nature. However, the main disadvantage of natural fibres is their hydrophilic nature, which can reduce performance. Chemical treatments have been used to address this issue, but they can be expensive and harmful to the environment, and may lead to degradation of cellulose chains during treatment, which can affect fibre elongation. As a result, the use of chemical treatments is becoming less appealing. One method of natural fibre treatment involves stirring the fibre in separate beakers of 5% and 10% NaOH solution after drying and extraction [17-18]. Natural fibre polymer composites have diverse applications in almost every field of engineering. Natural fibres offer great potential for various industrial applications, including reinforcement in polymers, and have an excellent impact on socio-economic development. Due to being cost-effective, they are well-suited for use in low-cost housing, automotive interiors, the construction industry, packaging, storage units, and the automotive industry. Therefore, they have a major impact on the socio-economic development of a country (Chand and Fahim, 2008). There are many types of natural fibres, such as kenaf, flax, oil palm, jute, sisal, hemp, bamboo, and banana fibre. In this century, interest has increased in low-density, high-specific strength, lightweight, low processing costs, renewability, non-toxicity, and biodegradability [20].

2. MATERIALS AND METHOD

2.1. Cotton: Cotton fibres from cotton plants, specifically cotton the seed coat is the outer layer of plant seeds formed from sheets or shirts Before making, the cotton seeds are first removed from the plant must be separated, and then from the seeds The space between cotton fibres permits cotton to take in and wick moisture far from the skin. Breathable: Gaps within the fibres additionally make cotton cloth breathable. Fine Drapes: Cotton hangs from the frame in a certainly fitted sample. Durable: Cotton is powerful and definitely gets more potent while moist. Upland cotton (Gossypiumhirsutum) Egyptian cotton (Gossypiumbarbadense) Cambric, canvas, corduroy, denim, flannel, gauze. Cotton is the arena's favorite herbal fibre. Its beauty, comfort, sturdiness and versatility make it a really perfect desire for clothing, bedding, textiles and plenty of different merchandise. As an enterprise, cotton helps the livelihoods of millions of humans - directly and in a roundabout way - round the world.

2.2. Jute: Jute is a type of plant fibre widely known for its capability to be spun into strong and coarse threads. Plants belonging to the Corchorus genus are the primary producers of this fibre. Jute fibres are soft, long, and shiny with a silk-like luster, hence the name "golden fibre". The primary use of jute fibre is in fabrics for packaging a wide variety of agricultural and industrial products requiring bags, sacks, packs, and wraps. Where bulky, sturdy fabrics and ropes resistant to stretching are required, jute is widely used because of its low cost. Jute is one of the most inexpensive textiles in the world. Artisan styles of jute may be more expensive, with most types of this fabric costing around $1 per yard. This cost is similar to cotton, and is significantly less expensive than many types of synthetic fabrics.

2.3. Flax: Flax seeds are very excessive inside the omega-three fatty acid alpha-linolenic acid (ALA). They have been proven to reduce the risk of heart disorder in animal studies by means of reducing irritation inside the arteries (forty-seven). Several studies hyperlink ALA to a discounted hazard of stroke, heart assault, and chronic kidney ailment. Nutritionally they are the equal, the most effective difference may be determined in the plant itself. The confusion comes from the 2 biggest English-speaking international locations. In the UK, they distinguish among linseed and linseed, while in the US and Canada, they discuss with each as flax.24-Jan-2019.

2.4. Hemp: "Hemp seeds are specifically rich in healthful fats, including both of these fats that are acknowledged for enhancing heart health by lowering cholesterol, blood pressure, and triglycerides. Adding hemp oil to your diet may also reduce your risk of heart issues in the future. Having said that, hemp has less than 0.3% THC (which is not enough to give you the 'high'), making it commercially legal. On the other hand, marijuana is any strain of the cannabis plant that has more than 0.3% THC, and that makes it fall under a restricted drug category." "Smoking 'hemp flower' may be very enjoyable, but it may not make you feel high. That's because these legal hemp buds are high in CBD but extremely low in THC. Some of our customers mix hemp buds with their 'street weed' to mellow it out. CBD tends to calm the effects of high THC strains and edibles. It should be permissible only if it is the only option in a medical situation prescribed by health professionals. Non-intoxicating cannabis products, including CBD and hemp, are considered permissible by many Islamic jurists, especially when prescribed by a doctor as a treatment for an illness."

2.5. Ramie; "Ramie is a natural fabric from the ancient East and a super sustainable alternative to silk. Discover its applications! Also called China Grass or Ramia, ramie is a material derived from natural fibers consisting of linen or bamboo. Find out its features and how to properly care for it. Ramie is highly absorbent and feels dry for a long time. It has 20% absorbency, whereas linen has 30% and cotton has only 8%. On hot, humid days, clothes made of ramie are comfortable for most of the time. Additionally, ramie dries quickly, making it a great choice for cool, summery clothes. Stain removal and bleaching can be effectively used on ramie. It is best to wash ramie clothes when they are slightly damp. Ramie fabric is a natural cloth woven from the bast fiber of the ramie plant. We also know the fabric as China linen, grass linen, or grass fabric. The fiber is similar to flax, jute, or hemp in its fine texture. The cloth is breathable and non-itchy like pure wool and has a natural white appearance."

2.6. Sisal: "Sisal fiber is obtained from the agave plant, specifically Agave sisal and due to its strength, durability, stretchability, affinity with certain dyes, and coir, it is resistant to degradation in saltwater. High-quality fiber is converted into yarn for the carpet industry. Sisal has a wide variety of uses, including traditional rope-making. Sisal is highly absorbent and can hold liquids. If a wet sisal rug is not fully dried, it may develop mold and mildew, so it is important to use as little water as possible when cleaning it. If your sisal rug becomes wet, allow it to dry completely before placing it back on the rug pad."

2.7. Coir: "Due to its excellent moisture retention and good aeration characteristics, coir is an excellent growing medium for houseplants. Indoor plants require soil that is loose and open so that water can disperse freely and air can circulate. Generally, white coconut fiber is used for spinning in rope making because of its strong resistance to salt water, making it ideal for use in fishing nets. Brown coconut fiber, which is stronger and more widespread than white coconut fiber, is used for a variety of applications including brush-making, doormats, rugs, cushions, insulation panels, and packaging. Coir is a very dense and commercially valuable natural fiber that is highly resistant to degradation, making it ideal for producing durable products."

2.8. ***Method:*** "The publications Introductory Statistics and Research Methods provide step-by-step explanations of statistical techniques and methods for conducting statistical analysis and handling common issues that arise in data analysis. These resources explain how to avoid defects in statistical analysis in two parts. Firstly, they cover the development of easy-to-use statistical software, including SPSS that allows students to perform variable transformations, create graphs of variable distributions, and select from a range of statistical analyses at the click of a button. Secondly, they cover the application of SPSS for information management, advanced analytics, multivariate analytics, business intelligence, and criminal investigation. SPSS is a statistical software package developed by IBM that has been widely used for a long time. IBM acquired SPSS Inc. in 2009." It is important to note that since the knowledge cutoff for me is in 2021, the information provided about the versions and compatibility of SPSS may not be up-to-date. However, the general information provided about SPSS as a statistical software package is still valid. SPSS is widely used in the social sciences for data analysis and has multiple add-on modules available for enhancing its capabilities. It is available for Windows operating systems, and various independent programs that connect to SPSS are also available.

3. RESULT AND DISCUSSION

TABLE 1. Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Cotton	30	4	1	5	.202	1.106
Jute	30	4	1	5	.230	1.259
Flax	30	4	1	5	.233	1.278
Hemp	30	4	1	5	.209	1.143
Ramie	30	4	1	5	.276	1.512
Sisal	30	4	1	5	.248	1.357
Coir	30	4	1	5	.247	1.351
Valid N (list wise)	30					

Table 1 shows the descriptive statistics values for analysis N, range, minimum, maximum, mean, standard deviation Cotton, Jute, Flax, Hemp, Ramie, Sisal and Coir this also using.

TABLE 2. Reliability Statistics

Cronbach's Alpha Based on Standardized Items	N of Items
.744	7

Table 2 indicates that the overall Cronbach's Alpha value for the model is 0.744, which indicates a 74% reliability. According to the literature review, a model with a Cronbach's Alpha value above 50% can be considered for analysis. Since the value of 0.744 is well above this threshold, it can be concluded that the model has acceptable reliability and can be used for analysis.

TABLE 3. Frequencies Statistics

		Cotton	Jute	Flax	Hemp	Ramie	Sisal	Coir
N	Valid	30	30	30	30	30	30	30
	Missing	0	0	0	0	0	0	0
Mean		3.13	3.00	3.23	3.27	3.30	3.43	2.97
Std. Error of Mean		.202	.230	.233	.209	.276	.248	.247
Median		3.00	3.00	3.00	3.00	3.00	3.00	3.00
Mode		3	3	3	3	5	5	3
Std. Deviation		1.106	1.259	1.278	1.143	1.512	1.357	1.351
Variance		1.223	1.586	1.633	1.306	2.286	1.840	1.826
Skewness		-.444	.333	-.045	-.269	-.101	-.071	-.025
Std. Error of Skewness		.427	.427	.427	.427	.427	.427	.427
Kurtosis		.204	-.741	-.860	-.071	-1.517	-1.306	-.992
Std. Error of Kurtosis		.833	.833	.833	.833	.833	.833	.833
Range		4	4	4	4	4	4	4
Minimum		1	1	1	1	1	1	1
Maximum		5	5	5	5	5	5	5
Sum		94	90	97	98	99	103	89
Percentiles	25	3.00	2.00	2.00	3.00	2.00	2.00	2.00
	50	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	75	4.00	4.00	4.25	4.00	5.00	5.00	4.00

Table 3 Show the Frequency Statistics in Chemical Treatments of Natural Fibre Cotton, Jute, Flax, Hemp, Ramie, Sisal and Coir curve values are given.

TABLE 4. Reliability Statistic individual

	Cronbach's Alpha if Item Deleted
Cotton	.710
Jute	.758
Flax	.704
Hemp	.721
Ramie	.695
Sisal	.712
Coir	.685

Table 4 Shows the Reliability Statistic individual parameter Cronbach's Alpha Reliability results. The Cronbach's Alpha value for Cotton - .710, Jute - .758, Flax - .704, Hemp - .721, Ramie - .695, Sisal - .712, Coir - .685 this indicates all the parameter can be considered for analysis.

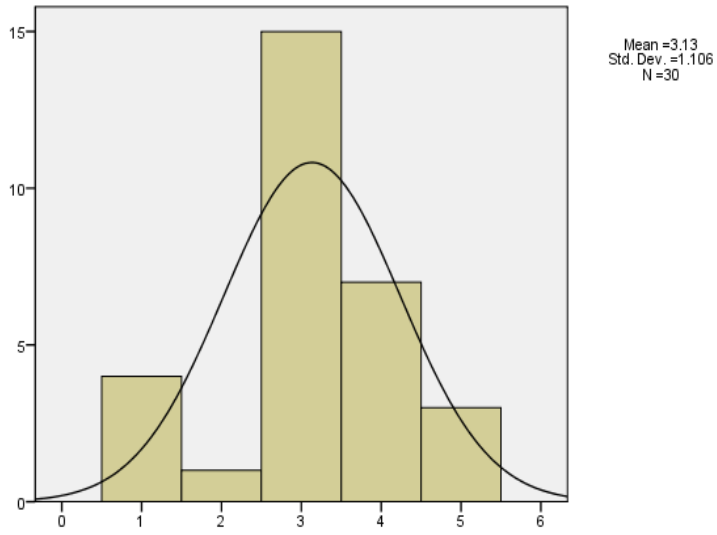

FIGURE 1. Cotton

Figure 1 shows the histogram plot for Cotton from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 3 for Cotton except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

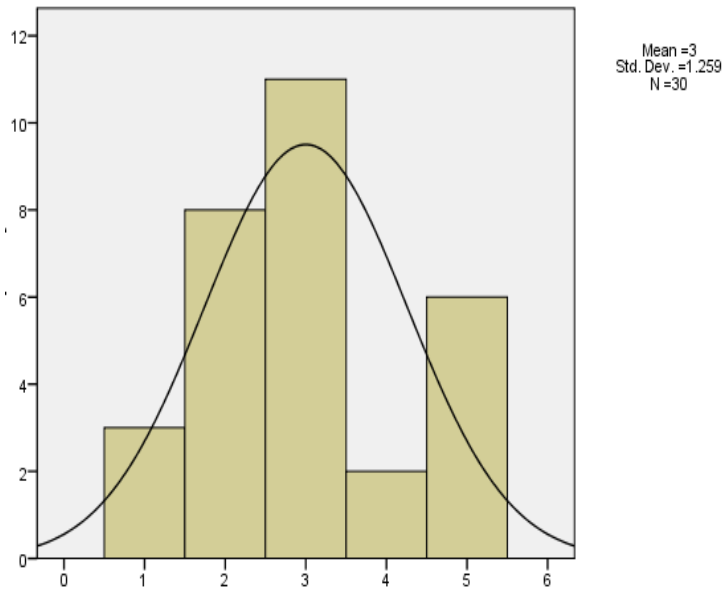

FIGURE 2. Jute

Figure 2 shows the histogram plot for Jute from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 3 for Jute except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

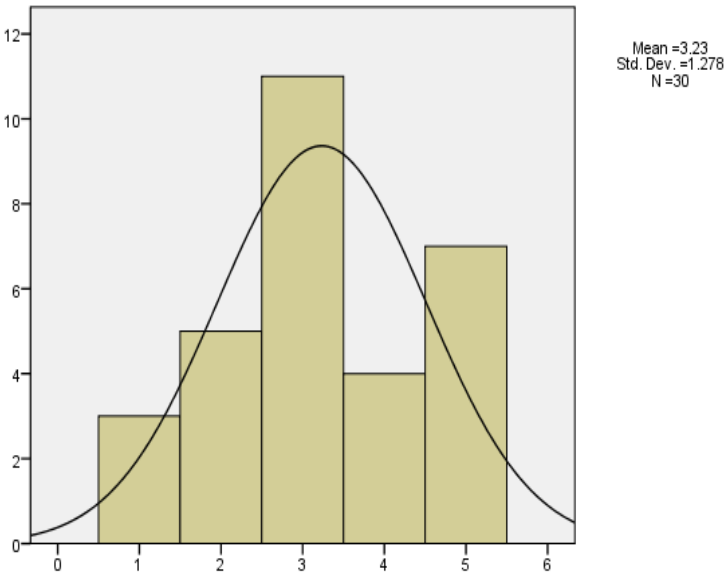

FIGURE 3. Flax

Figure 3 shows the histogram plot for Flax from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 3 for Flax except the 3 value all other values are under the normal curve shows model is significantly following normal distribution.

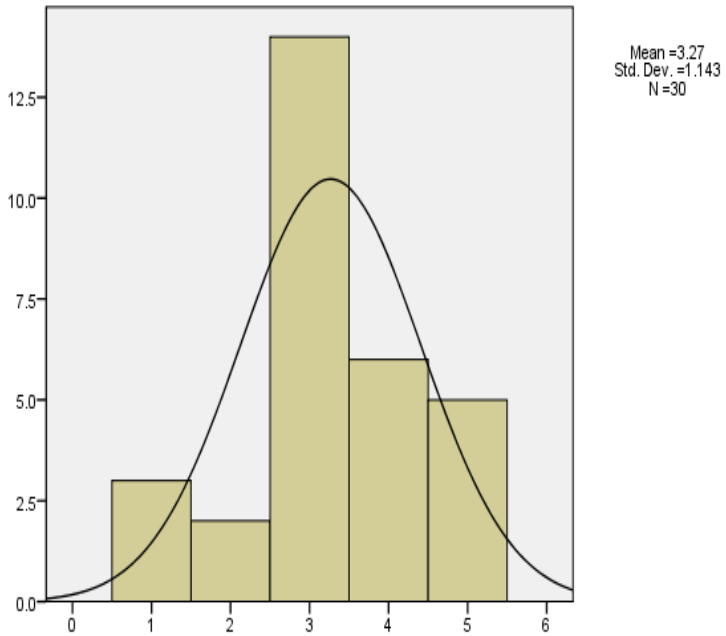

FIGURE 4. Hemp

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

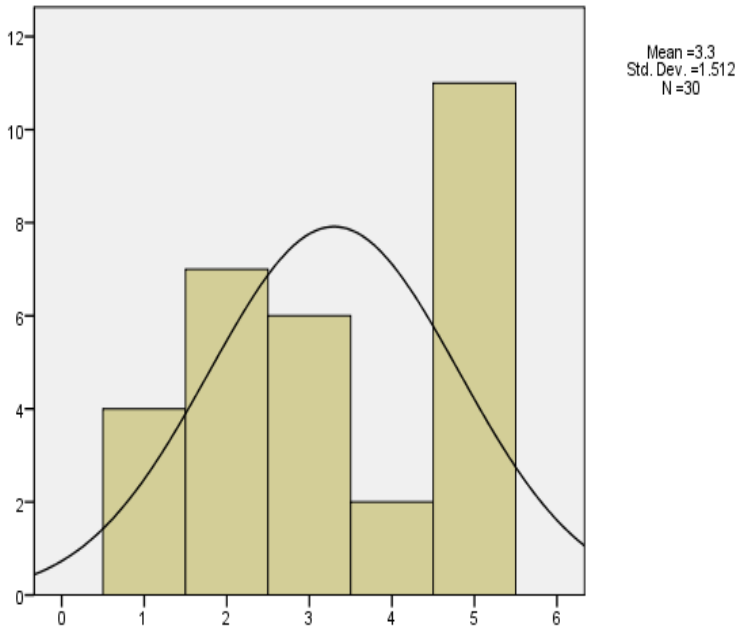

FIGURE 5. Ramie

Figure 5 shows the histogram plot for Ramie from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 5 for Ramie the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

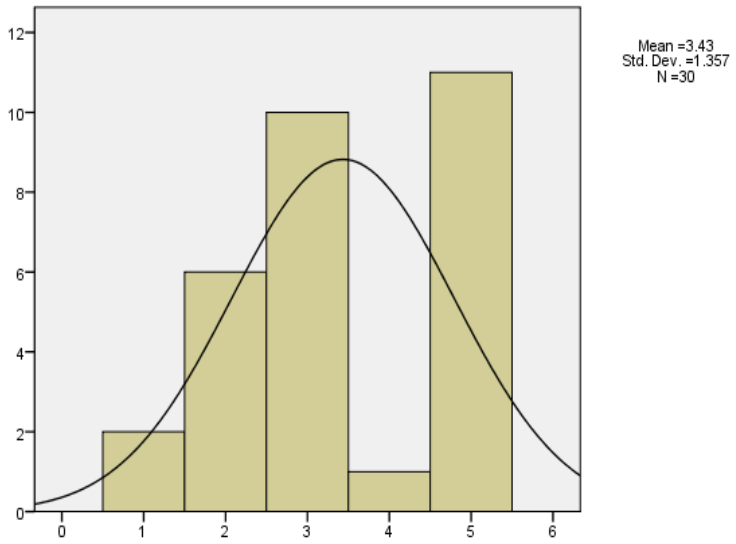

FIGURE 6. Sisal

Figure 6 shows the histogram plot for Sisal from the figure it is clearly seen that the data are slightly left skewed due to more respondent chosen 5Sisal except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

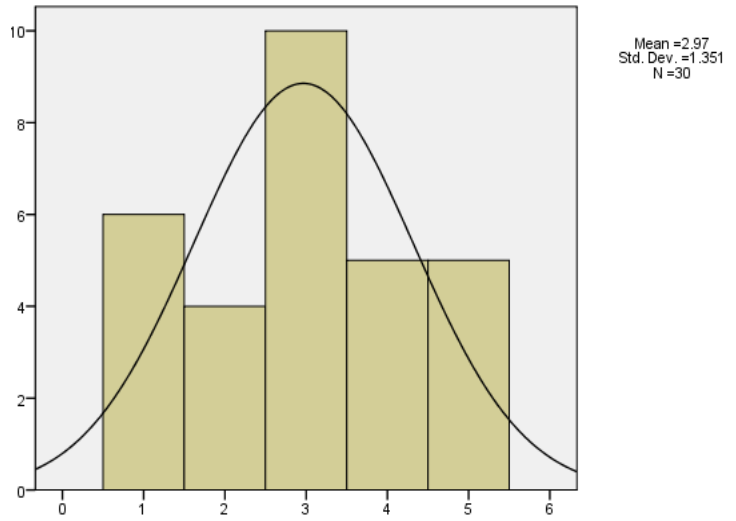

FIGURE 7. Coir

Figure 7 shows the histogram plot for Coir from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 3 for Coir except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

TABLE 5. Correlations

	Cotton	**Jute**	**Flax**	**Hemp**	**Ramie**	**Sisal**	**Coir**
Cotton	1	.149	.368*	.407*	.264	.305	.372*
Jute	.149	1	.214	.096	.290	.020	.203
Flax	.368*	.214	1	.499**	.319	.198	.344
Hemp	.407*	.096	.499**	1	.172	.212	.296
Ramie	.264	.290	.319	.172	1	.506**	.427*
Sisal	.305	.020	.198	.212	.506**	1	.497**
Coir	.372*	.203	.344	.296	.427*	.497**	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 various types of natural fibers. Each type of fiber is compared with the others, and the results show the highest and lowest correlations for each. For example, for Cotton, the highest correlation is with Ramie, and the lowest correlation is with Flax. For Jute, the highest correlation is with Hemp, and the lowest correlation is with Ramie. The same pattern continues for other fibers such as Flax, Hemp, Ramie, Sisal, and Coir, with each fiber having a highest and lowest correlation with the others. These correlations can be useful in understanding the relationships between different types of natural fibers and can inform decisions about their use in various applications.

4. CONCLUSION

Chemical treatment is a common method used to modify the properties of natural cellulosic fibers such as cotton. The treatment process involves converting hazardous waste into non-toxic gases and changing the chemical characteristics of the waste to decrease solubility. When comparing chemically treated fiber composites to untreated fiber composites, it was found that the storage modulus of the untreated fiber composite was lower. However, a better storage modulus was observed in the silane-treated fiber compared to the NaOH-treated composite. Chemical treatments of natural cellulosic fibers improve their compatibility with matrix phases as they reduce the hydrophilicity of the fibers. Cotton fibers, for example, are obtained from the seed coat of cotton plants and are used to make various textile products. The space between cotton fibers allows them to absorb and wick moisture away from the skin, making cotton a popular choice for clothing and other applications. It is true that cotton fabric is breathable due to the gaps between the fibers. This allows for air to flow through, making it a popular choice for clothing in warm weather. Cotton is also known for its durability, as it becomes stronger when wet. This makes it a great choice for items that will be washed frequently or exposed to moisture. Flax seeds are indeed high in omega-3 fatty acids, specifically alpha-linolenic acid (ALA). ALA has been shown to have a number of health benefits, including reducing inflammation in the arteries and reducing the risk of heart disease. Hemp seeds are also high in healthy fats, including omega-3 and omega-6 fatty acids. These fats have been shown to improve heart health by reducing cholesterol, blood pressure, and triglycerides. It is true that hemp contains less than 0.3% THC, which is not enough to produce the psychoactive effects associated with marijuana. Therefore, it is legal to use commercially. Marijuana, on the other hand, contains more than 0.3% THC and is classified as a controlled substance. Ramie is a natural fabric that comes from the stem of the Boehmeria Nivea plant, which is native to China. It is a highly sustainable alternative to silk, as it requires very little water and pesticides to grow. Ramie has been used in textiles for thousands of years, and is known for its strength, durability, and lustrous appearance. Ramie fabric is lightweight and breathable, making it perfect for summer clothing. It is also highly absorbent, which makes it a popular choice for towels and other household textiles. Ramie is resistant to bacteria and mildew, which makes it a great option for outdoor fabrics like umbrellas and patio furniture. To properly care for ramie fabric, it is important to avoid using hot water or harsh detergents. Instead, hand wash in cool water with a mild soap and lay flat to dry. Iron on a low heat setting while the fabric is still slightly damp to prevent wrinkling. Overall, ramie is a versatile and sustainable fabric that offers many benefits for both clothing and household textiles. On hot, humid days, clothes made of ramie are at ease for maximum of the time. Non-metal mineral product industry, General equipment manufacturing, Mining and washing of coal, Textile industry, Food manufacturing industry, Special equipment manufacturing. The Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .744 which indicates 74% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis.

REFERENCES

[1]. Reddy, Rajala Ashok, K. Yoganandam, and V. Mohanavel. "Effect of chemical treatment on natural fibre for use in fibre reinforced composites–Review." Materials Today: Proceedings 33 (2020): 2996-2999.

[2]. Chittora, Pankaj, Sandeep Chaurasia, Prasun Chakrabarti, Gaurav Kumawat, Tulika Chakrabarti, Zbigniew Leonowicz, Michał Jasiński et al. "Prediction of chronic kidney disease-a machine learning perspective." IEEE Access 9 (2021): 17312-17334.

[3]. Gutu, Birhanu, Genene Legese, Nigussie Fikadu, Birhanu Kumela, Firafan Shuma, Wakgari Mosisa, Zelalem Regassa et al. "Assessment of preventive behavior and associated factors towards COVID-19 in Qellam Wallaga Zone, Oromia, Ethiopia: A community-based cross-sectional study." PloS one 16, no. 4 (2021): e0251062.

[4]. Kumar, Rakesh, Neha Grover, Rajesh Singh, Samta Kathuria, Anil Kumar, and Aditi Bansal. "Imperative Role of Artificial Intelligence and Big Data in Finance and Banking Sector." In 2023 International Conference on Sustainable Computing and Data Communication Systems (ICSCDS), pp. 523-527. IEEE, 2023.

[5]. Krishna Kumar TP, M. Ramachandran, Chandrasekar Raja, Ashwini Murugan, “Understanding of E-Learning Programs using WPM MCDM Method”, REST Journal on Banking, Accounting and Business, 1(2), (2022):13-19.

[6]. Sharma, Akhilesh Kumar, Gaurav Aggarwal, Sachit Bhardwaj, Prasun Chakrabarti, Tulika Chakrabarti, Jemal H. Abawajy, Siddhartha Bhattacharyya, Richa Mishra, Anirban Das, and Hairulnizam Mahdin. "Classification of Indian classical music with time-series matching deep learning approach." IEEE Access 9 (2021): 102041-102052.

[7]. Li, Xue, Lope G. Tabil, and SatyanarayanPanigrahi. "Chemical treatments of natural fibre for use in natural fibre-reinforced composites: a review." Journal of Polymers and the Environment 15, no. 1 (2007): 25-33.

[8]. Wahlang, Imayanmosha, Arnab Kumar Maji, Goutam Saha, Prasun Chakrabarti, Michal Jasinski, Zbigniew Leonowicz, and Elzbieta Jasinska. "Deep Learning methods for classification of certain abnormalities in Echocardiography." Electronics 10, no. 4 (2021): 495.

[9]. Karthi, N., K. Kumaresan, S. Sathish, S. Gokulkumar, L. Prabhu, and N. Vigneshkumar. "An overview: Natural fibre reinforced hybrid composites, chemical treatments and application areas." Materials today: proceedings 27 (2020): 2828-2834.

[10]. Tasisa, Yirgalem Bekele, and Kogila Palanimuthu. "Psychosocial Impacts of Imprisonment among Youth Offenders in Correctional Administration Center, Kellem Wollega Zone, Ethiopia." *Medico-legal Update* 21, no. 2 (2021).

[11]. Fuqua, Michael A., ShanshanHuo, and Chad A. Ulven. "Natural fibre reinforced composites." Polymer Reviews 52, no. 3 (2012): 259-320.

[12]. Palanimuthu, Kogila, Eshetu Fikadu Hamba Yigazu, Gemechu Gelalcha, Yirgalem Bekele, Getachew Birhanu, and Birhanu Gutu. "Assessment of Stress, Fear, Anxiety and Depression on COVID-19 Outbreak among Adults in South-Western Ethiopia." Prof.(Dr) RK Sharma 21, no. 1 (2021): 440.

[13]. Sharma, Akhilesh Kumar, Shamik Tiwari, Gaurav Aggarwal, Nitika Goenka, Anil Kumar, Prasun Chakrabarti, Tulika Chakrabarti, Radomir Gono, Zbigniew Leonowicz, and Michał Jasiński. "Dermatologist-level classification of skin cancer using cascaded ensembling of convolutional neural network and handcrafted features based deep neural network." IEEE Access 10 (2022): 17920-17932.

[14]. Brígida, A. I. S., V. M. A. Calado, L. R. B. Gonçalves, and M. A. Z. Coelho. "Effect of chemical treatments on properties of green coconut fibre." Carbohydrate Polymers 79, no. 4 (2010): 832-838.

[15]. Kogila, P. "Prevention of home accidents among mothers of toddler." The Journal of Nursing Trendz 8, no. 3 (2017): 15-17.

[16]. Biagiotti, Jerico, Debora Puglia, Luigi Torre, Jose M. Kenny, AitorArbelaiz, Guillermo Cantero, Cristina Marieta, Rodrigo Llano-Ponte, and Iñaki Mondragon. "A systematic investigation on the influence of the chemical treatment of natural fibres on the properties of their polymer matrix composites." Polymer Composites 25, no. 5 (2004): 470-479.

[17]. Palanimuthu, Kogila, Birhanu Gutu, Leta Tesfaye, BuliYohannis Tasisa, Yoseph Shiferaw Belayneh, Melkamu Tamiru, and Desalegn Shiferaw. "Assessment of Awareness on COVID-19 among Adults by Using an Online Platform: 26 Countries View." Medico-legal Update 21, no. 1 (2021).

[18]. Sepe, R., F. Bollino, L. Boccarusso, and F. Caputo. "Influence of chemical treatments on mechanical properties of hemp fibre reinforced composites." Composites Part B: Engineering 133 (2018): 210-217.

[19]. Solanki, Yogendra Singh, Prasun Chakrabarti, Michal Jasinski, Zbigniew Leonowicz, Vadim Bolshev, Alexander Vinogradov, Elzbieta Jasinska, Radomir Gono, and Mohammad Nami. "A hybrid supervised machine learning classifier system for breast cancer prognosis using feature selection and data imbalance handling approaches." Electronics 10, no. 6 (2021): 699.

[20]. Wahlang, Imayanmosha, Arnab Kumar Maji, Goutam Saha, Prasun Chakrabarti, Michal Jasinski, Zbigniew Leonowicz, and Elzbieta Jasinska. "Brain magnetic resonance imaging classification using deep learning architectures with gender and age." Sensors 22, no. 5 (2022): 1766.

[21]. Aswini, S., S. Tharaniya, RJ Joey Persul, B. Avinash Lingam, and P. Kogila. "Assessment of Knowledge, Attitude and Practice on Immunization among Primi Mothers of Children." Indian Journal of Public Health Research & Development 11, no. 3 (2020): 583-587.

[22]. Rokbi, Mansour, HocineOsmani, AbdellatifImad, and NoureddineBenseddiq. "Effect of chemical treatment on flexure properties of natural fibre-reinforced polyester composite." procedia Engineering 10 (2011): 2092-2097.

[23]. Uuml, Nurcan, Meltem Kuuml, and Zehra Şengun. "Evaluatıon of Stress Levels in Both Parents of Newborns Hospıtalızed in the Neonatal Intensıve Care Unit." Mathews Journal of Pediatrics 8, no. 1 (2023): 1-6.

[24]. Neto, J. S. S., R. A. A. Lima, D. K. K. Cavalcanti, J. P. B. Souza, R. A. A. Aguiar, and M. D. Banea. "Effect of chemical treatment on the thermal properties of hybrid natural fibre-reinforced composites." Journal of Applied Polymer Science 136, no. 10 (2019): 47154.

[25]. Rathor, Ketan, Sushant Lenka, Kartik A. Pandya, B. S. Gokulakrishna, Susheel Sriram Ananthan, and Zoheib Tufail Khan. "A Detailed View on industrial Safety and Health Analytics using Machine Learning Hybrid Ensemble Techniques." In 2022 International Conference on Edge Computing and Applications (ICECAA), pp. 1166-1169. IEEE, 2022.

[26]. Sathish, S., N. Karthi, L. Prabhu, S. Gokulkumar, D. Balaji, N. Vigneshkumar, TS Ajeem Farhan, A. AkilKumar, and V. P. Dinesh. "A review of natural fibre composites: Extraction methods, chemical treatments and applications." Materials Today: Proceedings 45 (2021): 8017-8023.

[27]. Rathor, Ketan, Keyur Patil, Mandiga Sahasra Sai Tarun, Shashwat Nikam, Devanshi Patel, and Sasanapuri Ranjit. "A Novel and Efficient Method to Detect the Face Coverings to Ensurethe Safety using Comparison Analysis." In 2022 International Conference on Edge Computing and Applications (ICECAA), pp. 1664-1667. IEEE, 2022.

[28]. Debnath, Papiya, Pankaj Chittora, Tulika Chakrabarti, Prasun Chakrabarti, Zbigniew Leonowicz, Michal Jasinski, Radomir Gono, and Elżbieta Jasińska. "Analysis of earthquake forecasting in India using supervised machine learning classifiers." Sustainability 13, no. 2 (2021): 971.

[29]. Hossain, Syed Imam, Mahbub Hasan, Md N. Hasan, and Azman Hassan. "Effect of chemical treatment on physical, mechanical and thermal properties of ladies finger natural fibre." Advances in materials science and engineering 2013 (2013).

[30]. Jawalkar, C. S., and Suman Kant. "Critical review on chemical treatment of natural fibres to enhance mechanical properties of bio composites." Silicon 14, no. 10 (2022): 5103-5124.

[31]. Kumar, Ashish, Ketan Rathor, Snehit Vaddi, Devanshi Patel, Preethi Vanjarapu, and Manichandra Maddi. "ECG Based Early Heart Attack Prediction Using Neural Networks." In 2022 3rd International Conference on Electronics and Sustainable Communication Systems (ICESC), pp. 1080-1083. IEEE, 2022.

[32]. Malenab, Roy Alvin J., Janne Pauline S. Ngo, and Michael Angelo B. Promentilla. "Chemical treatment of waste abaca for natural fibre-reinforced geopolymer composite." Materials 10, no. 6 (2017): 579.

[33]. Rathor, Ketan, Anshul Mandawat, Kartik A. Pandya, Bhanu Teja, Falak Khan, and Zoheib Tufail Khan. "Management of Shipment Content using Novel Practices of Supply Chain Management and Big Data Analytics." In 2022 International Conference on Augmented Intelligence and Sustainable Systems (ICAISS), pp. 884-887. IEEE, 2022.

[34]. Pallavi D R, Kurinjimalar Ramu, M. Ramachandran, Prabakaran Nanjundan, "Assessment of Ranking of Critical Success Factors of Enterprise Resource Planning Adoption Using TOPSIS ", REST Journal on Banking, Accounting and Business, 1(2), (2022):27-33.

[35]. John, Maya Jacob, and Rajesh D. Anandjiwala. "Recent developments in chemical modification and characterization of natural fibre-reinforced composites." Polymer composites 29, no. 2 (2008): 187-207.

[36]. Rakshit, Srabanti, Labanya Mandal, Bikas Chandra Pal, Jayashree Bagchi, Nabendu Biswas, Jaydeep Chaudhuri, Avik Acharya Chowdhury et al. "Involvement of ROS in chlorogenic acid-induced apoptosis of Bcr-Abl+ CML cells." Biochemical pharmacology 80, no. 11 (2010): 1662-1675.

[37]. Godara, S. S. "Effect of chemical modification of fibre surface on natural fibre composites: A review." Materials Today: Proceedings 18 (2019): 3428-3434.

[38]. Krishna Kumar TP, Vimala Saravanan, M. Ramachandran, Manjula Selvam, "A Market Segmentation Assessment Weighted Scoring for Using WSM Method A Study for Different Market", REST Journal on Banking, Accounting and Business, 1(3), (2022):1-8.

[39]. Chhipa, Abrar Ahmed, Vinod Kumar, Raghuveer Raj Joshi, Prasun Chakrabarti, Michal Jasinski, Alessandro Burgio, Zbigniew Leonowicz, Elzbieta Jasinska, Rajkumar Soni, and Tulika Chakrabarti. "Adaptive neuro-fuzzy inference system-based maximum power tracking controller for variable speed WECS." Energies 14, no. 19 (2021): 6275.

[40]. Chowdhury, Sayan, Tulika Mukherjee, Souvik Sengupta, Somenath Roy Chowdhury, Sibabrata Mukhopadhyay, and Hemanta K. Majumder. "Novel betulin derivatives as antileishmanial agents with mode of action targeting type IB DNA topoisomerase." Molecular pharmacology 80, no. 4 (2011): 694-703.

[41]. Paul, Sherely Annie, AbderrahimBoudenne, Laurent Ibos, Yves Candau, Kuruvilla Joseph, and Sabu Thomas. "Effect of fibre loading and chemical treatments on thermophysical properties of banana fibre/polypropylene commingled composite materials." Composites Part A: Applied Science and Manufacturing 39, no. 9 (2008): 1582-1588.

[42]. Senkevich, Sergey, Vadim Bolshev, Ekaterina Ilchenko, Prasun Chakrabarti, Michał Jasiński, Zbigniew Leonowicz, and Mikhail Chaplygin. "Elastic Damping Mechanism Optimization by Indefinite Lagrange Multipliers." IEEE Access 9 (2021): 71784-71804.

[43]. Chittora, Pankaj, Sandeep Chaurasia, Prasun Chakrabarti, Gaurav Kumawat, Tulika Chakrabarti, Zbigniew Leonowicz, Michał Jasiński et al. "Prediction of chronic kidney disease-a machine learning perspective." IEEE Access 9 (2021): 17312-17334.

[44]. Alsubai, Shtwai, Ashit Kumar Dutta, Ahmed Hussein Alkhayyat, Mustafa Musa Jaber, Ali Hashim Abbas, and Anil Kumar. "Hybrid deep learning with improved Salp swarm optimization based multi-class grape disease classification model." Computers and Electrical Engineering 108 (2023): 108733.

[45]. Rajesh, M., and JeyarajPitchaimani. "Mechanical characterization of natural fibre intra-ply fabric polymer composites: Influence of chemical modifications." Journal of Reinforced Plastics and Composites 36, no. 22 (2017): 1651-1664.

[46]. Gusain, Akshita, Tilottama Singh, Shweta Pandey, Vikrant Pachourui, Rajesh Singh, and Anil Kumar. "E-Recruitment using Artificial Intelligence as Preventive Measures." In 2023 International Conference on Sustainable Computing and Data Communication Systems (ICSCDS), pp. 516-522. IEEE, 2023.

[47]. Das, Tania, Kumar Singha Roy, Tulika Chakrabarti, Sibabrata Mukhopadhyay, and Susanta Roychoudhury. "Withaferin A modulates the Spindle Assembly Checkpoint by degradation of Mad2–Cdc20 complex in colorectal cancer cell lines." Biochemical pharmacology 91, no. 1 (2014): 31-39.

[48]. Fiore, V., T. Scalici, F. Nicoletti, G. Vitale, M. Prestipino, and A. Valenza. "A new eco-friendly chemical treatment of natural fibres: Effect of sodium bicarbonate on properties of sisal fibre and its epoxy composites." Composites Part B: Engineering 85 (2016): 150-160.

[49]. Chowdhury, Sayan, Tulika Mukherjee, Rupkatha Mukhopadhyay, Budhaditya Mukherjee, Souvik Sengupta, Sharmila Chattopadhyay, Parasuraman Jaisankar, Syamal Roy, and Hemanta K. Majumder. "The lignan niranthin poisons Leishmania donovani topoisomerase IB and favours a Th1 immune response in mice." EMBO Molecular Medicine 4, no. 10 (2012): 1126-1143.

[50]. Sukumaran, C., B. Karpagavalli, R. Hariharan, and V. Parthiban. "Preclusive Strategies of Obesity to Lead a Healthy Life-A Review‖." Pharmaceutical Sciences and Research 1, no. 1 (2022): 42-45.

[51]. Kumar, Vivek, Kapil Joshi, Puneet Kanti, Jagdeep Singh Reshi, Gunjan Rawat, and Anil Kumar. "Brain Tumor Diagnosis using Image Fusion and Deep Learning." In 2023 International Conference on Sustainable Computing and Data Communication Systems (ICSCDS), pp. 1658-1662. IEEE, 2023.

[52]. Mohini Pooja Huggahalli, M. Ramachandran, Vimala Saravanan, Ashwini Murugan, "Analysis of Operations Manager System Using Weighted Sum Model (WSM) Method", REST Journal on Banking, Accounting and Business, 1(3), (2022):26-33.

[53]. V Vijaya Lakshmi, M. Ramachandran, Chinnasami Sivaji, Vidhya Prasanth, "Evaluation of Hazardous Wastes using PROMETHEE Method", REST Journal on Banking, Accounting and Business, 1(3), (2022):34-41.

[54]. Siddika, Salma, Fayeka Mansura, Mahbub Hasan, and Azman Hassan. "Effect of reinforcement and chemical treatment of fibre on the properties of jute-coir fibre reinforced hybrid polypropylene composites." Fibres and polymers 15, no. 5 (2014): 1023-1028.

[55]. Abin George, Arti Modi, M. Ramachandran, Chandrasekar Raja, Prabakaran Nanjundan, "Evaluation of Private Banks using PROMETHEE Method", REST Journal on Banking, Accounting and Business, 1(3), (2022):42-50.

[56]. Kumar Pandey, Rakesh, Asghar Gandomkar, Behzad Vaferi, Anil Kumar, and Farshid Torabi. "Supervised deep learning-based paradigm to screen the enhanced oil recovery scenarios." Scientific Reports 13, no. 1 (2023): 4892.

[57]. Kumar, Rakesh, Samta Kathuria, Rupa Khanna Malholtra, Anil Kumar, Anita Gehlot, and Kapil Joshi. "Role of Cloud Computing in Goods and Services Tax (GST) and Future Application." In 2023 International Conference on Sustainable Computing and Data Communication Systems (ICSCDS), pp. 1443-1447. IEEE, 2023.

[58]. Asifulla A, M. Ramachandran, Kurinjimalar Ramu, Ashwini Murugan, "Market Segmentation Evaluation by WPM Method", REST Journal on Banking, Accounting and Business, 1(4), (2022):7-13.

[59]. Sharma, Akhilesh Kumar, Gaurav Aggarwal, Sachit Bhardwaj, Prasun Chakrabarti, Tulika Chakrabarti, Jemal H. Abawajy, Siddhartha Bhattacharyya, Richa Mishra, Anirban Das, and Hairulnizam Mahdin. "Classification of Indian classical music with time-series matching deep learning approach." IEEE Access 9 (2021): 102041-102052.

[60]. T. Naresh Babu, M. Ramachandran, Sathiyaraj Chinnasamy, Ashwini Murugan, "The Evaluation of Third-party Logistics Services Using Complex Proportional Assessment", REST Journal on Banking, Accounting and Business, 1(1), (2022):14-22.

[61]. Shuhimi, Fairuz Fazillah, MohdFadzli Bin Abdollah, M. A. Kalam, H. H. Masjuki, Ashafi'E. Mustafa, SushellaEdayu Mat Kamal, and HilmiAmiruddin. "Effect of operating parameters and chemical treatment on the tribological performance of natural fibre composites: A review." Particulate Science and Technology 35, no. 5 (2017): 512-524.

[62]. Ishwar Rama Pavaskar, M. Ramachandran, Sathiyaraj Chinnasamy, Prabakaran Nanjundan, "International Business Management using Weighted Sum Method (WSM) Method", REST Journal on Banking, Accounting and Business, 1(4), (2022):23-30.

[63]. Sukumaran, C., M. Ramachandran, Vimala Saravanan, and Sathiyaraj Chinnasamy. "An Empirical Study of Brand Marketing Using TOPSIS MCDM Method." REST Journal on Banking, Accounting and Business 1, no. 1 (2022): 10-18.

[64]. Krishna Kumar TP, M. Ramachandran, Kurinjimalar Ramu, Ashwini Murugan, "Analysis of Reverse Logistics System using COPRAS MCDM Method", REST Journal on Banking, Accounting and Business, 1(4), (2022):31-37.

[65]. Chowdhury, Sayan, Tulika Mukherjee, Somenath Roy Chowdhury, Souvik Sengupta, Sibabrata Mukhopadhyay, Parasuraman Jaisankar, and Hemanta K. Majumder. "Disuccinyl betulin triggers metacaspase-dependent endonuclease G-mediated cell death in unicellular protozoan parasite Leishmania donovani." *Antimicrobial agents and chemotherapy* 58, no. 4 (2014): 2186-2201.

