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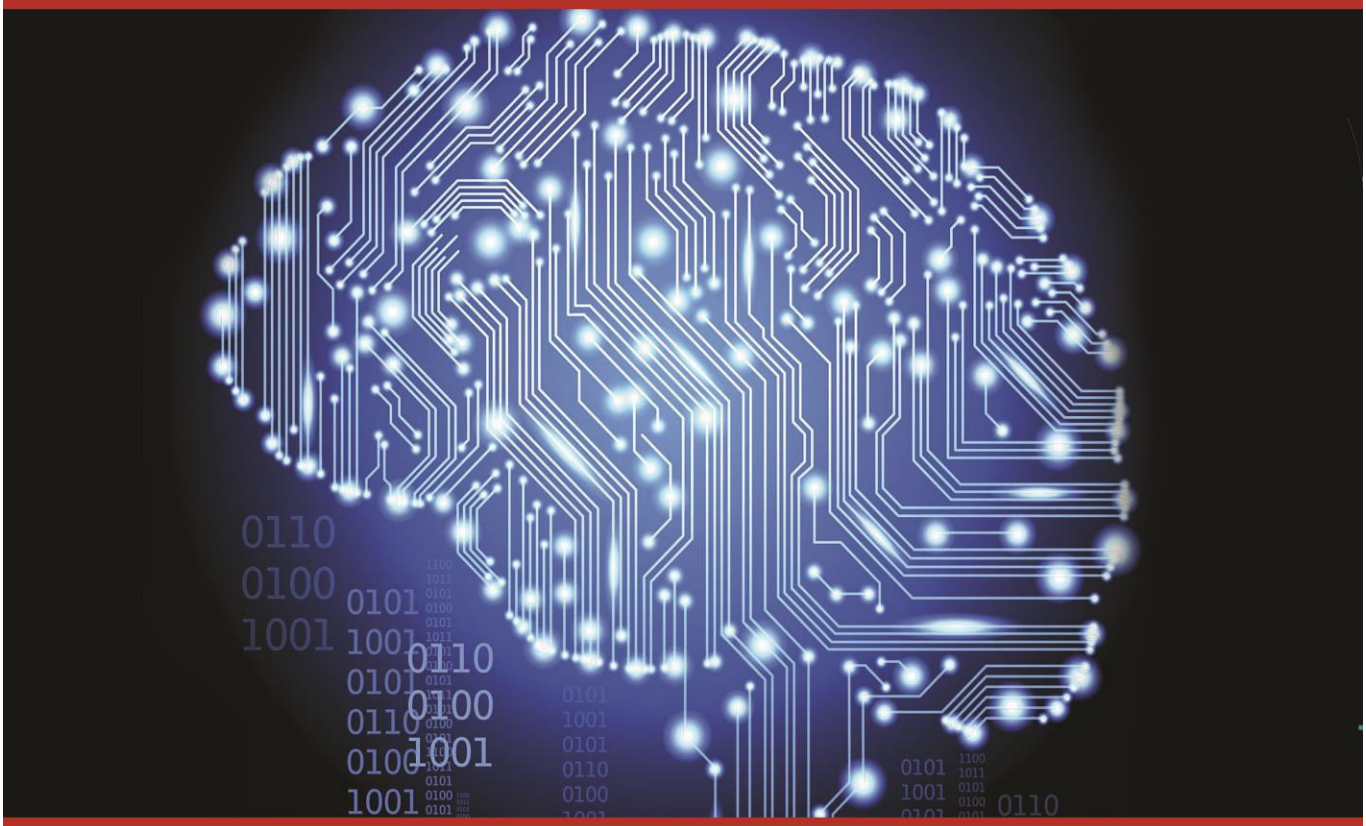

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FOREWORD

I am pleased to put into the hands of readers Volume-4; Issue-12: Dec, 2018 of **"International Journal of Advanced Engineering, Management and Science (IJAEMS) (ISSN: 2354-1311)" ,** an international journal which publishes peer reviewed quality research papers on a wide variety of topics related to Science, Technology, Management and Humanities. Looking to the keen interest shown by the authors and readers, the editorial board has decided to release print issue also, but this decision the journal issue will be available in various library also in print and online version. This will motivate authors for quick publication of their research papers. Even with these changes our objective remains the same, that is, to encourage young researchers and academicians to think innovatively and share their research findings with others for the betterment of mankind. This journal has DOI (Digital Object Identifier) also, this will improve citation of research papers.

I thank all the authors of the research papers for contributing their scholarly articles. Despite many challenges, the entire editorial board has worked tirelessly and helped me to bring out this issue of the journal well in time. They all deserve my heartfelt thanks.

Finally, I hope the readers will make good use of this valuable research material and continue to contribute their research finding for publication in this journal. Constructive comments and suggestions from our readers are welcome for further improvement of the quality and usefulness of the journal.

With warm regards.

Dr. Uma Choudhary
Editor-in-Chief
Date: Jan, 2019

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Nigerian Companies and the Prohibition on Political Donations: A Paradigmatic Shift as a Panacea for Compliance

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Abstract— *Democratic rule is generally acclaimed as a better form of governance, but its operation does not appear to come cheap. This is especially so in Nigeria where new democratic dispensations are heralded by expensive electioneering campaigns. The funds for these campaigns are sourced from willing donors or through subtle coercion. Corporate organizations are easy prey to politicians. This paper is provoked by the frequency and blatancy with which corporate organizations in Nigeria donate to political parties and for political purposes without any sanctions despite the unambiguous prohibition in S.38 (2) of the Companies and Allied Matters Act (CAMA). This exposes the inability of the provision to halt or reduce this practice to the barest minimum and also reveals the unpopularity of the provision. The paper argued that it is not possible to completely extricate organizations from the political dynamics in their host committees and proffered some mitigating factors which will make the provision more acceptable to the people and more respected. The paper discovered normative reasons why the prohibition in S.38 (2) of CAMA is largely ignored.It therefore recommended wide ranging amendments to the provisions so as to enhance compliance, improve its enforcement strategies, reflect present day realities and align it with international best practices.*

Keywords— Political Finance, Campaign Funding, Political Donations, Company Law, Electoral Act.

I. INTRODUCTION

Funding is a critical component of political activities and without money it would be problematic for political parties to propagate their philosophies and agenda to the public and this will make it difficult for the electorates to be well informed and educated as to proper choices during elections. Expectedly, Political activities and campaigns in Nigeria and indeed in some other jurisdictions are usually accompanied by humongous financial expenditure. In Nigeria for instance, campaigns are organised as mini carnivals with enormous fanfare with each party doing it utmost to outdo and out spend the other. This is done with a view to impress the voters as though this could replace ideological discourse. The issue whether Nigerian political parties are ideologically based is not the focus of this paper, but it is interesting to note the comment by Oji, (2014) that:

> Most parties in Nigeria lack ideologies and are not issue oriented, and rather they are manipulated by political entrepreneurs who invest on the parties and expect concurrent returns such investments.

Political party activities and funding in Nigeria are usually associated with contemptible instances of corruption which comes in form of illicit funds, vote buying and manipulations. The devastating and saddening effects of these gifts led Thomas (2016) to rhetorically ask, "who is using their cash to possibly bend the ear of the future President?" It is for this reason that normative and institutional framework have been put in place to regulate political donations by companies thereby placing restrictions and limitations on political funding by corporate entities. Unfortunately and quite regrettably, the effort to regulate political donations and campaign financing is enforced more in breach than compliance. Many laws have been put in place in Nigeria including constitutional fortification on donations to political parties and campaign funding in other to guide and the operations of political parties and restrict their expenditure profile.

The superlative law, the 1999 Constitution of the Federal Republic of Nigeria as amended contains provisions that are designed and constructed to institutionalize probity, accountability and due process in the financial architecture of political parties. Section 225 sub sections 2 of the 1999 Constitution in very unambiguous terms requires and obligates every political party to submit to the Independent National Electoral Commission (INEC) a detailed annual statement and analysis of its sources of funds and other assets together with a similar statement of its expenditure in such form as the commission may

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require. INEC is also given the authority under Sub-section 5 of section 225 to give directions to political parties regarding the books or records of financial transactions which they shall keep and, to examine all such books and records.

To further underscore the fundamental character of the provision relating to probity and accountability by political parties and the oversight responsibility of INEC, section 226 (1) provides that the Independent National Electoral Commission, shall in every year prepare and submit to the National Assembly a report on the accounts and balance sheet of every political party. Sub section (2) of the section further provides that:

> It shall be the duty of the commission, in preparing its report under this section, to carry out such investigation as will enable it to form an opinion as to whether proper books of account and proper records have been kept by any political party, and if the Commission is of the opinion that proper books of accounts have not been kept by a political party, the Commission shall so report.

Again, the constitution mandates INEC to monitor and scrutinise foreign funding and donations to political parties in Nigeria. In Specific terms, the constitution in section 225 Sub sections 3, prohibits political parties from holding or possessing assets outside Nigeria or be entitled to retain any funds or assets remitted or sent to it from outside. Sub section 4 of the same section states that any funds or other assets remitted or sent to a political party from outside Nigeria shall be paid over or transferred to the commission within twenty-one days of its receipt with such information as the commission may require. It is apparent from the above constitutional provisions that INEC should play a central role in checking the financial dealings and status of political parties and ensuring compliance to this constitutional obligation. It is in line with this constitutional philosophy and the need to regulate and limit political funding that the Companies and Allied Matters Act equally prohibits corporate entities from political donations. The utility and plausibility of this prohibition is not farfetched as such donations and gifts are subject to abuses and susceptible to corruption.

Usually, fund raising ceremonies are organized by political parties to fund campaign extravaganzas. Both individuals and corporate organizations are expected to donate generously. At these ceremonies companies actually donate generously and publicly too. There is no gainsaying the fact that these are illegal donations according to S.38 (2) of the Companies and Allied Matters Act. The section unambiguously prohibits any form of donation or gift to a political party, political association, or for any political purpose. For purposes of clarity the section states thus:

> A company shall not have or exercise power either **directly or indirectly** to make a donation or gift of any of its property or funds to a political party or political association, or for any political purpose; and if any company, in breach of this subsection makes any donations or gift of its property to a political party or association, or for any political purpose, the officers in default and any member who voted for the breach shall be jointly and severally liable to refund to the company the sum or value of the donation or gift and in addition, the company and every such officer or member shall be guilty of an offence and liable to a fine equal to the amount or value of the donation or gift.

It is pertinent to note that the proscription on donations and gifts by companies for political purposes as contained in Section 38(2) of CAMA is precise, all-encompassing and unequivocal, leaving no lacuna or opportunity for circumvention. For instance, the section prohibits companies from making such gifts or donations directly itself or tangentiallythrough a proxy or by representation. This means that a company may still be culpable even if such donation is made through delegation or even a Director or Shareholder. Again, the section creates a legal platform for lifting the veil of incorporation so as to directly hold the officers of the company or the members or both who took the decision to make the gift or donation. To underscore the ultimate appeal of the section, it also creates corporate and individual criminal liability.

Sadly, this provision is observed more in breach by Nigerian companies, especially since the sanctions attached appear to be a cosmetic provision. This is made obvious by the fact that no company has been found culpable under the section in discuss despite the numerous instances of donations to political parties in fragrant breach of the law. This paper recognizes the fact that companies are profit making organisations and it makes good business sense to donate to a party envisaged to be strong enough to win the elections. The understanding behind these gifts need not be written down. There is usually an unmistaken, but unwritten and a non-contradictory pact between the giver and the receiver that such gifts will curdle and court governmental favours to the company when the recipient eventually wins. Otherwise, the question may be asked

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why a profit making organization would give out its shareholders' funds if it was not expecting good returns.

In spite of the express prohibition, this provision is largely breached and treated with levity. It thus becomes compelling to ask why this is so and what could be done to make this provision more appealing or easier for companies to comply. Is an outright ban practicable in view of the fact that companies are expected to be good and interactive citizens in the environment within which they operate? Is it absolutely or inescapably necessary to bar companies from political interactions in view of the fact that they will be affected by governmental policies? This paper proposes to attempt answers to these questions in addition to suggesting some mitigating interventions which will most likely satisfy the yearnings of all and bring the law closer to the realities of our time. It is our believe that legislative provisions that are not rooted in the people's beliefs and life style or legislative provisions that are too draconian and far from reality, will not enjoy the people's respect.Even though this research is primarily doctrinal, it enjoys the benefit of diverse approaches including the comparative, analytical and evaluative. For all these, heavy reliance is placed on published materials such as books, journals, documents, reports, papers, communiqués, newspapers, etc. Additional materials are sourced from reliable internet sites.

II. MONEY IN POLITICAL ARENA

Democracy the world over appears to be an expensive form of government. The institutionalization of democratic government is not cheap either. It is at this point that funds are needed for campaigns. In Nigeria for instance, the different political parties appear to side-line the purpose of campaigns and rather concentrate and compete with each other on the fanfare. Musicians, comedians and traditional dancers are paid to entertain the audience. Textile factories are paid to produce customized fabrics for each campaign. This aspect usually dominates the campaigns thereby over-shadowing and rendering insignificant, discussions on the parties' ideologies and other important issues. This could be because the parties actually lack ideologies and are not issue based and so the fanfare is actually a diversionary ploy. However, these diversionary gimmicks cost money. This money must be sourced from different quarters and the companies are easy targets. The way out is for the Independent Electoral Commission to mandate the political parties to drastically reduce the fanfare and expensive extravaganzas and engaged the people more on ideological conversations.

Right from the 1959 elections, individuals and companies funded the electioneering campaigns because the 1958 Nigeria (Electoral Provisions) Order in Council made no provisions for governmental funding. The adverse effects of these gifts and donations by companies to political parties or associations is what prompted the insertion of S.38(2) into CAMA. Companies through such gifts "… bought the consciences of political leaders who will have no choice but to be amenable to their demands" (Ekpo, 2000). Accordingly, it exerted corrupting influences on political office holders resulting in over-valued contracts which were often times not executed. This contributed immensely to official wastefulness and poor management of public resources (Ikhariales, 1999).

It was against this background that the Law Reform Commission concluded thus:

> We are all witnesses to the abuses of political donations and gifts in recent political history. We think that no one is in doubt that there is need to plug this loophole for corruption and graft… It is intolerable for the funds and assets of a company in which every shareholder has an interest to be used to foster the interest of a political party in which some do not believe. We therefore recommend that a company should be deprived of the power to make donations or gifts to political parties or associations.

Sadly, in spite of the adoption of the Commission's recommendations, this practice is still going on unchecked and done as if it were legal. The prohibition in S.38 (2) is strengthened by S.221 of the 1999 Constitution which bans any other association other than a political party from sponsoring the election of a candidate. The Constitution in section 228 (c) rather authorizes the National Assembly to provide annual grants to the Independent Electoral Commission for disbursement to political parties. Flowing from the provisions of S.221 of the Constitution, a company, not being a political party is prohibited from contributing to the funds of a political party.

Both Ss.38 (2) of CAMA and 221 of the Constitution are highly commendable in view of the mischief they set out to curb. However, this paper is worried by the provisions of section 90 of the Electoral Act 2010which expects a presidential candidate to spend a maximum of ₦200m, a Governorship Candidate to spend ₦100m, Senate, House of Representative and House of Assembly candidates to spend ₦40m, ₦20m and 10m respectively. These amounts according to section 90 (8) are exclusive of the amounts paid to pick up nomination forms or amounts paid for declaration of interest. The declaration of interest and the picking of nomination forms do not come cheap either, for instance, in the All Progressive Congress (APC), a presidential candidate expresses his interest with

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₦5m and picks the nomination form with ₦40m while a governorship aspirant would pay N2.5m for expression of interest form and N20m for nomination form making it N22.5m. The amount is graduated down to the State House of Assembly as contained in the APC 2018 Guidelines for the Nomination of Candidates for Public Office, APC National Secretariat, 2018.Effectively, a presidential candidate in APC is officially expected not to exceed ₦127,500,000m in his campaigns while a governorship candidates is not expected to exceed ₦205,500,000m in his campaign expenses.

In an attempt to scale down the high cost of participation in politics, the National Assembly has reviewed the nomination fees downwards and made it uniform for all parties by including it in the bill to amend the electoral Act (Inyang, 2017). The Electoral Act No. 6, 2010 (Amendment) Bill 2017, has made provision for the abolition of arbitrary fixing of nomination fees by politicalparties. It reduces the fee for presidential candidate to N10m, governorship, N5m, Senate 2m, House of Representatives N1m and House of Assembly, 500,000. The high cost of participating in politics in Nigeria may discourage people who would have been interested but for financial constraints. The current Nigerian President MohamuduBuhari confessed that he was able to buy the APC nomination form with money borrowed from a bank through the help of a Bank Chairman (Adekunle, 2014).The question may be asked, why he had to go through a Bank Chairman if he was ordinarily qualified for a loan. This takes us back to companies and complicity in funding electioneering. Another issue that this raises is what would have happened to the loan if the recipient of such an arranged loan had not been successful. How would the loan have been paid back to the bank? This probably would have become another case of a non performing loan. Invariably, this is corporate sponsorship of a political candidate taking another coloration.

As interesting and as well intentioned as these prohibitions may be; it is doubtful if the Federal Government of Nigeria can comfortably fund the current number as more political parties have recently been registered. This is a continuous exercise we have well over 90 political parties and it may be impossible to fund them through appropriation by the National Assembly under S.228 of the Constitution. This is even more disturbing given the current economic recession in Nigeria. It must be emphasized here that the amounts expended byObasanjo, a former President of Nigeria for 8 years and a huge beneficiary of corporate sponsorship for his elections is more than would have been needed to fight a successful war" (Obasanjo, 2003). This statement must be taken seriously since it was made by a retired General in the Nigerian army. The enormity of the situation also led an erstwhile Chairman of the Independent Electoral Commission (INEC), Iwu to call for the taxing of such donations so as to discourage the practice. Jonathan, a former Nigerian President is widely reported to have raised over N21b from both corporate organizations and others for this 2015 elections. Taxing may generate funds to the federal Government, but it will not discourage the practice. Rather, it will encourage such donations to be made discretely. What can deter is enforcement of the sanctions attached to the law (Adetula, 2015).

However, S. 90 of the Electoral Act 2010 as amended in 2011 gives INEC the power to limit donations to political parties. Accordingly, political parties are not expected to keep anonymous monetary contributions or gifts.In addition, S.93 (2) mandates political parties to "keep an accounts and asset book" where all contributions received in excess of ₦1m are recorded with names and addresses of donors. This is to assist the political parties in compiling their report on this to INEC after the announcement of election results. Unfortunately, there is no punishment in the section for none compliance.

III. THE ENFORCEMENT QUAGMIRE

In spite of the clear prohibition in S. 38(2) CAMA, gifts to political parties, politicians and political meddling by companies in Nigeria has continued unabated and may be said to be encouraged by those who ought ordinarily to be the custodians of the law in Nigeria. It can be asserted here without fear of contradiction that since the coming into effect of CAMA, all Nigerian Presidents and their political parties have benefited from corporate gifts for their campaigns. This is why this law is largely ignored by the Attorney-General who naturally is an appointee of the President. In 2000, Williams, berated the Attorney-General (AG) of Nigeria for failing to prosecute Julius Berger for donating to the People's Democratic Party which was the ruling party in Nigeria then. He expressed the fact that every law should be law. The frustration in getting an unwilling AG to prosecute a criminal was witnessed by Nigerians in *Gani Fawehinmi v. Akilu*.This frustration in the lack of enforcement of S.38(2), led the petitioner in *Obasango v. Yusuf*to seek the annulment of the election of Obasanjo on the grounds that he had a public fund raising ceremony for his elections where corporate organizations donated. Unfortunately, even though the court held such gifts to be illegal, it dismissed the suit for want of jurisdiction.

Also, a breach of S. 38(2) is a classic case for a derivation action by a shareholder under S. 300(9) of CAMA. However, despite the frequency of breach, there is dearth in such reported cases. The question that may be asked here is why this is so? This paper posits that the answer to this may be multi-faceted. First, it may be that those

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responsible for publicizing the law have failed to do so. Second, the shareholders see nothing wrong in supporting a political cause that may be beneficial to their company in the long-run. Thus, if a law is discountenanced by its custodians and the citizenry, it is time to revisit the law in order to enable it attend its desired objectives as well as enjoy the respect of all.

Moreover, our laws should be dynamic and evolve with changing times in a globalised world. Sadly, the outright prohibition contained in S. 38(2) is reproduced as S. 37(2) in the bill to amend and replace CAMA which is currently pending at the Nigerian National Assembly. The danger in this is that, even if CAMA is eventually replaced this blanket prohibition, which is no longer trendy in other jurisdictions, it will still be a part of the Nigerian Company Law, even when it serves no practical purpose without enforcement.

IV. PERSPECTIVE FROM INDIA AND THE UNITED KINGDOM

The problem of corporate intrusion into the political arena especially via campaigns funding is by no means a Nigerian phenomenon. These problems occur in other jurisdictions also, but the difference lies in the way this issue is treated in each jurisdiction.

4.1 **Corporate Donations in India**

In India, donations by companies to political parties and donations for political purposes have increased in recent times. It has been reported that such donations have risen to as high as 151% between 2014 and 2015 (Ghadha, 2015). Within this period also, corporate organisations have been reported to contribute 90% of the total donations to political parties with the Bhartic group leading by donating a third of the funds needed by BharatiyaJanata Party (B.J.P.). This increase may be because an outright prohibition against political donations by corporate had been abolished with the exception of government companies and companies which have not existed for up to three years.

Now by S. 182(1) of the 2013 Indian Companies Act, companies apart from the two groups earlier mentioned, can donate for political purposes. Such contributions are not expected to exceed 7½% of the company's average net profit in the past three years. This must also appear in the company's annual accounts. This has to be done with the authorization of the company's board of directors through a resolution.

It is interesting to note that donations for genuine charitable purposes can be made by the board of directors. However, by S. 181 of the Indian Companies Act 2013, if the amount to be donated exceed 5% authorisation of the general meeting before the gift can be made.Political donations by companies are expected to be reflected in the company's profit and loss account for the period. It is intriguing to note that while political donations need the boards' approval, that for charitable purposes which exceed 5% of the company's net profit needs the approval of the shareholders. Could this have been dictated by the need to take expeditions decisions on the issue? This paper submits that the shareholders interest is best served if both are made to receive shareholders' authorization.

Irrespective of the above observation, the Indian position is far better than the blanket ban in Nigeria. The Indian Act recognizes the need for companies to interact with their communities, since they could be adversely affected if they remain aloof and a bad government is elected into power. A breach of this law attracts punishment for both the company and its officers. Upon breach, the company may be made to pay a fine which may be five times the amount contributed, while its officers are liable to the same fine and in addition to an imprisonment for up to six months as contained in S. 182 of the Indian Companies Act.This law is more likely to be obeyed because it creates leverage for compliance unlike S. 38(2) of CAMA.

4.2 Political Donations under the English Companies Act 2006

Under the English Companies Act 2006 elaborate provisions are made on this issue. Part 14, comprising of 17 sections is dedicated to it. Definitions of the phrases, political donations, political parties, political organisations and political expenditure are clearly given sections 363, 364 and 365. These definitions are absent in CAMA. One therefore has to resort to some other legislation for the meanings of these phrases in Nigeria. The English Act demonstrates a clear and serious intention to place things in their proper perspectives devoid of ambiguities.

By Ss. 367 and 368, an ordinary resolution of members is all that is required to authorize the directors to make such donations. Also, S. 368 expects the authorisation to last for four years unless the articles or the directors determine that it should be for a shorter period. The authorizing resolution must set a monetary limit. A breach of these provisions renders the directors jointly and severally liable to refund the amount in issue with interest to the company. In addition, they are bound to compensate the company for any loss or damage incurred as a result of the breach. Interestingly, these provisions may be enforced by a group of members holding not less than 5% of the companies share value or not less than 50 of its members or 5% of members of the company, if the company is not limited by shares. This is of course limited to the conditions contained in S. 371 of the Act.

It should be stressed here that this paper favors authorization to make political donations through a simple resolution of members as contained in S. 367 of the English Act as opposed to a situation where the board

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authorizes itself as contained in S. 182 of the Indian Act. In the latter case, the board may whittle away shareholders' funds to further the political ambition of their members.

V. CONCLUSION AND RECOMMENDATIONS

This paper set out to assess the effectiveness or otherwise of the prohibition in S. 38(2) of CAMA, expose the level of compliance with a view to proposing some mitigating parameters which may most likely improve the compliance level. The paper considered the historical antecedents of this prohibition and noted the mischief it was meant to curb, it also noted that this mischief still exist in present day Nigeria. The paper realized that there tend to be general apathy towards enforcement by both the shareholders and the Attorney-General. The paper therefore concluded that this is an indication of the unpopularity of the law. It surmises that the practice of corporate donating for political purposes have become so entrenched that it has become normative in Nigeria.

This however is encouraged by the ignorance of shareholders as those who ought to enlighten them have failed to do so for obvious reasons. This paper therefore concludes that the frequency, blatancy and even tacit approval of this practice does not derogate the fact that this practice is offensive to the spirit behind the enactment is S. 38(2) of CAMA and therefore, something ought to be done to encourage compliance.

This article also took a cursory look at the manner of electioneering campaigns in Nigeria and decried the lack of ideologies and issue based campaigns. It observed that the diversionary fanfare campaigns are more expensive and therefore should be discouraged. This will reduce the cost of campaigns and also the pressure on companies to donate and in addition enable more descent people with lean purses to aspire to political positions. A perusal of relevant provisions of the Electoral Act and the APC Guidelines for Nomination of Candidates revealed humongous amounts the candidates are expected to spend during their campaigns. This paper therefore concludes that this will rather encourage a breach of the prohibition in S. 38(2) of CAMA and neither can Nigeria in its present economic quagmire adequately fund the present number of political parties in the country.

Unfortunately, while CAMA's sanctions in S. 38(2) may be said to be mere paper tigers for lack of enforcement, the provisions in S. 93 of the Electoral Act can be said to be a toothless bull-dog for lack of punishment for breach. S. 93 would have greatly assisted CAMA if it provides punishment for its breach. The provision on corporate donations for political activities in India and the United Kingdom was examined. It was discovered that these two jurisdictions have abandoned the outright proscription in favour of provisions which rather regulate such donations. This is a better and more practicable approach than the ban in S. 38(2) of CAMA.

It is important to re-emphasis here that the new Act being envisaged to replace CAMA will serve no useful purpose in the modernization of CAMA on this issue as the provisions in S. 38(2) has simply been repeated as S. 37(2). Invariably, when and if the law comes into effect, Nigeria will continue to lag behind the rest of the world on this issue.

Flowing from the above, the following recommendations are considered apposite.To nib this problem in the bud, the Electoral Act should have new provisions which will reduce the influence of money in electioneering campaigns. The parties should be made to base their campaigns on relevant issues and not on side attractions which cost money. There is need therefore to amend S. 90 of the current Electoral Act so as to reduce the maximum monetary expectations of candidates for campaigns. This in effect will reduce the desperation and the tendency to pressurize campaigns for assistance.

S. 38(2) of CAMA is in dire need of amendment. It should be amended so that companies apart from government owned companies can donate out of their net profit. The Act needs to specify the percentage of the net profit for the year which cannot be exceeded. The approval to do so should be given to the board by the members. Such donations should be well recorded and should reflect in the company's annual accounts. The record should indicate the political party or the political cause to which the money is donated. There should be robust enforcement framework to deter breach.

The Nigerian Corporate Affairs Commission should be properly funded and staffed so as to perform its regulatory functions in companies effectively. The Electoral Act should be amended so as to include provisions which disqualify candidates who receive gifts from corporations in breach of the amended S. 38(2). Enforcement of the civil and criminal sanctions attached to the provisions in CAMA should be taken seriously.

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Dual Tree Complex Wavelet Transform, Probabilistic Neural Network and Fuzzy Clustering based on Medical Images Classification – A Study

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Abstract**—** *The venture suggests an Adhoc technique of MRI brain image classification and image segmentation tactic. It is a programmed structure for phase classification using learning mechanism and to sense the Brain Tumor through spatial fuzzy clustering methods for bio medical applications. Automated classification and recognition of tumors in diverse MRI images is enthused for the high precision when dealing with human life. Our proposal employs a segmentation technique, Spatial Fuzzy Clustering Algorithm, for segmenting MRI images to diagnose the Brain Tumor in its earlier phase for scrutinizing the anatomical makeup. The Artificial Neural Network (ANN) will be exploited to categorize the pretentious tumor part in the brain. Dual Tree-CWT decomposition scheme is utilized for texture scrutiny of an image. Probabilistic Neural Network (PNN)-Radial Basis Function (RBF) will be engaged to execute an automated Brain Tumor classification. The preprocessing steps were operated in two phases: feature mining by means of classification via PNN-RBF network. The functioning of the classifier was assessed with the training performance and classification accuracies.*

Keywords**— fuzzy, neural network, computer aided design, radial basis function.**

I. INTRODUCTION

Automated classification and detection of tumors in diverse Medical Resonance Image (MRI) is aggravated for the requirement of high precision when dealing with a human life. [1] In addition, the computer support is employed in medical institutions due to the verity that it might provide the outcomes of humans. It has been established that double examination of medical images outcomes acquired could direct to improved tumor detection. But the double inspection procedure necessitate high cost, that's why fine software are employed to aid humans in medical institutions for the advanced precision as well as to diminish the operating cost. The requisite schemes of monitoring and diagnosing the diseases assist for detecting the occurrence of meticulous features by a human observer. Because of many patients who come for the treatment should have incessant surveillance, so that quite a lot of practices for automated diagnostic systems have been initiated to effort to resolve this crisis. Such procedures offer qualitative fallouts for the diagnosis and also the feature classification problem.

In this venture the automated classification of brain Magnetic Resonance Images (MRI)[16],[17] by using Learning Machine approach with Spatial Fuzzy Segmentation technique are being exploited in this proposal. The application of PNN for the classification of MRI problems in the former scheme does not comprise certain styles. In this proposed scheme, PNN embraces the clustering and classification tactics in particular for MR images possessing tribulations with huge training notions. Thus subsequent to the complete pre-processing phases, classification or clustering slants is indispensable to the progress of Neural Network system predominantly in medicine troubles.

Segmentation of brain tissues in GM, WM and tumor on medical images is not only vital in serial treatment monitoring of "disease burden" images but also acquiring familiarity with the progress of image directed surgical lines of attack[18]. Extorting the brain tumor part is the chief step in setting up spatially localized radiotherapy (e.g., Cyber knife, I MRT) which is more often than not operated manually on contrast improved T1-weighted magnetic resonance Images (MRI) in present clinical laboratories. Where the T1 MR Images attained after administration of any dissimilar agent like gadolinium, blood vessels and part tumor pretentious parts, act as the contrast that can pass to the Blood-Brain barrier which are viewed as hyper intense regions. [19] There are assorted endeavors for brain tumor segmentation in system which employs a single modality which coalesces the multi

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modalities and exploits priors acquired from population atlases.

II. DUAL TREE COMPLEX WAVELET TRANSFORM

The Complex Wavelet Transform (CWT) is a complex-valued extension in normal Discrete Wavelet Transform (DWT). It is a 2D wavelet transform which offers multi resolution, sparse representation, and vital description of the arrangement of an MRI image. [2] Further, it affords a high scale of shift-invariance trait in its magnitude. There is a downside to this transform is that it exhibits 2d (where, d is the dimension of the signal that is being transformed) redundancy in contrast to a separable Discrete Wavelet Transform. The exploitation of complex wavelets transforms in image processing was initially done in 1995.

In the computer technologies, by employing the perception of visual contexts, a person can effortlessly focus on the candidate domains, where substances of interest are be discovered, and then evaluates some more features through the CWT method for those essential regions. These features which are not required for global regions, are of use in precise detection and recognition of smaller objects. Likewise, the CWT is sometimes applied to diagnose the activated voxels of cortex and in addition the temporal Independent Component Analysis may be employed to divide the fundamental independent bases whose number is evaluated by Bayesian information criterion.

2.1 Texture Analysis Overview

Texture is that inner property of all surfaces that exhibits the visual patterns, with each having properties of homogeneity. It comprises significant data about the structural arrangement of the surface such as; clouds, leaves, bricks etc. Texture portrays the association of the surface to the adjacent environment. It is a feature that shortly expresses about the analogous physical composition of a surface.

Texture have their properties:

- Coarseness
- Contrast
- Directionality
- Line-likeness
- Regularity
- Roughness

Texture is one of the most imperative and absolute narrative feature of an image, which is typified by the spatial distribution of gray levels in a neighborhood. To detain the spatial dependence of gray-level values that donate to the acuity of texture a 2D dependence texture scrutiny matrix is exploited. This 2D matrix is prepared by decoding the image file.

2.2 Methods of Representation

There are 3 prime methods employed to explain the texture as:

- Statistical schemes, depicts the textures employing the statistical properties of the grey levels of the pixels that embraces a surface image. These properties are appraised using the Grey Level Co-Occurrence Matrix (GLCM) or the wavelet transformation of the surface.
- Structural schemes illustrate the textures as which is being comprised of simple primitive structures called “texels” or texture elements. These rudiments are arranged consistently on a surface on basis on some surface arrangement regulations.
- Spectral schemes have its foundation on some properties of the Fourier spectrum and it expresses the global periodicity of the grey levels of a surface by calculating high-energy peaks in the Fourier spectrum.

For optimal classification, the statistical slants of portrayal are opted. Because it is in these practices that effect in evaluating texture properties. The most commonly practised statistical depictions of texture are:

- Co-occurrence Matrix
- Tamura Texture
- Wavelet Transform

2.3 Co-occurrence Matrix

It was projected by R.M. Haralick, the co-occurrence matrix for the texture features offers the grey level spatial dependence of texture of an image [3]. An arithmetical definition of the co-occurrence matrix:

- Take the position operator as ***P(i,j)***,
- consider an n x n matrix **A**
- The element ***A[i][j]*** is the value of points with grey level intensity ***g[i]*** occurs in the position specified by ***P***, with grey level ***g[j]***.
- Let ***C*** be the ***n*** **x** ***n*** matrix from ***A*** with the total number of point pairs that satisfy ***P***. ***C[i][j]*** is the value of the joint probability that a pair of points that is satisfying ***P*** will have values ***g[i]***, ***g[j]***.
- ***C*** is called as the co-occurrence matrix defined by ***P***.

For instance; consider an 8 grey-level image illustration and a vector *t* that considers only one neighbor, we would find:

1	2	1	3	4
2	3	1	2	4
3	3	2	1	1

Fig.1: Image example

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	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
1	0	1	2	0	0	0	0	0
2	0	1	0	2	0	0	0	0
3	0	0	1	1	0	0	0	0
4	0	1	0	0	1	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0

Fig.2: Classical Co-occurrence matrix

Primarily the co-occurrence matrix is discovered, with the orientation position and distance between image pixels. Then consequential statistics are detached from the co-occurrence matrix as the texture embodiment. Haralick proposed the practical texture features

- Energy
- Contrast
- Correlation
- Homogeneity
- Entropy

For each Haralick texture feature, a co-occurrence matrix is acquired. These co-occurrence matrices correspond to the spatial distribution and the reliance of the grey levels within a confined area. Each ***(i,j)*** th entry in the co-occurrence matrices signify the probability of moving from one pixel with a grey level of '***i***' to another with a grey level of '***j***' under previously defined distance and angle. From these outcomes in matrices, sets of statistical courses are scrutinized, called as feature vectors.

Energy: It is a gray-scale image texture measure of similar points that depicts the distribution of image gray-scale homogeneity of weight and texture in equation 1.

$$E = \sum_x \sum_y p(x,y)^2$$ -eq (1)

p(x,y) is the Grey Level Co-occurrence Matrix(GLCM)

Contrast: It is the key diagonal in near the moment of Inertia that evaluates the value of the matrix consisted and the images of local changes in number values, exposes the image clarity and texture of shadow depth in equation 2.

Contrast $$I = \sum\sum (x-y)^2 p(x,y)$$ -eq (2)

Entropy: It quantifies image texture degree of randomness, the space co-occurrence matrix for all values are equivalent then it realizes the minimum value in equation 3.

$$S = -\sum_x \sum_y p(x,y) \log p(x,y)$$ -eq (3)

Correlation Coefficient: It is the joint probability occurrence of the specified pixel pairs.

Correlation: sum (sum ((x- μx) (y-μy) p(x, y)/$\sigma_x\sigma_y$))

Homogeneity: It computes the proximity of the distribution of rudiments in the GLCM to its diagonal in equation 4.

Homogeneity =sum (sum (p(x , y)/(1 + [x-y]))) –eq(4)

2.4 Probabilistic Neural Networks (PNN):

Probabilistic Neural Network (PNN) and General Regression Neural Networks (GRNN) have their analogous architectures, but there is a disparity: Probabilistic Neural Network (PNN) executes classification [4], where the object variable is classified, whereas the General Regression Neural Network (GRNN) [13] performs regression where the object variable is incessant. If we opt for a PNN/GRNN network,[12] DTREG will by design pick the precise type of network in foundation on the category of target variable.

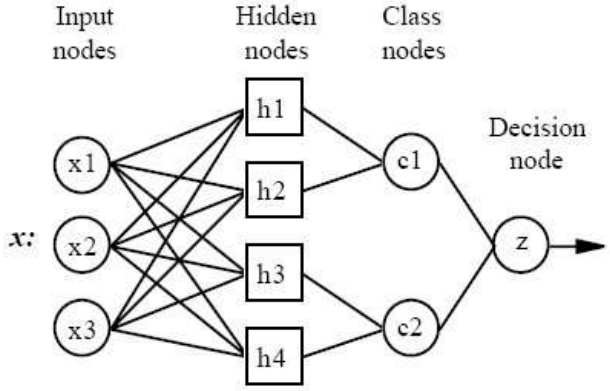

Fig.3: Architecture of a PNN

2.4.1 PNN networks layers:

1. ***Input layer*** — A single neuron is utilized for each predictor variable. For the categorical variables, *N*-1 neurons are employed, where *N* is the number of categories. The input neurons regulate the range of the values by calculation process as subtracting the median and dividing by the interquartile range.
2. ***Hidden layer*** —The neuron amasses the values of the predictor variables for the case along with the object value. When expressed with the *x* vector of input values from the input layer, a hidden neuron evaluates the Euclidean distance of the test case from the neuron's center point and then smears the RBF kernel function by use of the sigma value(s). The consequent value is then moved on to the neurons in the pattern layer.
3. ***Pattern layer / Summation layer*** — the subsequent layer in the network is dissimilar for PNN networks and for GRNN networks. The

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definite target category of each training case is accumulated with each hidden neuron; the weighted value emerging out of a hidden neuron is fed only to the pattern neuron that is compatible to the hidden neuron's category. The pattern neurons add the values for the class they signify (hence, it is a weighted vote for that category). Former neuron is the denominator summation unit the latter is the numerator summation unit. The denominator summation unit adds up the weight values resulting from each of the hidden neurons. The numerator summation unit adds up the weight values multiplied by the definite object value for each hidden neuron.

4. ***Decision layer*** — The decision layer is unlike from PNN and GRNN networks. For PNN networks, the decision layer contrasts the weighted votes for each target category amassed in the pattern layer and exploits the largest vote to forecast the target category. For GRNN networks, the decision layer partitions the value stored in the numerator summation unit by use of the value in the denominator summation unit and employs the outcome as the predicted target value.

The subsequent diagram is a concrete embodiment or projected network employed in our venture:

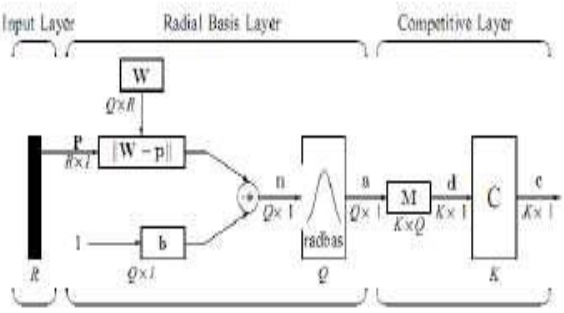

Fig.4: Projected network employed in PNN

2.4.2 Functional flow of PNN

The function flow of the PNN which includes major three layers [5] input, radial basis and competitive layers.

III. WORKING PRINCIPLES OF PNN NETWORK

Although the execution is very dissimilar, Probabilistic Neural Networks are conceptually similar to *K-Nearest Neighbor* (k-NN) models. The fundamental notion is that a foreseen target value of an article is probable to be about the similar as other articles that have close values of the predictor variables. Consider this figure 5.

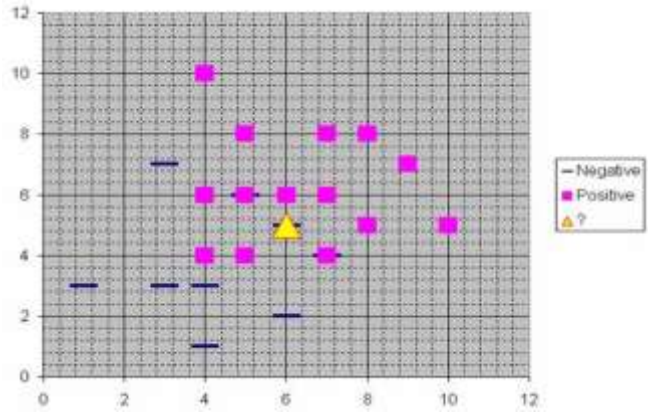

Fig.5: Working Model

Now, suppose we are putting effort to forecast the value of a novel case signified by the triangle with predictor values *x*=6, *y*=5.1. Should we foresee the target as positive or negative? Observe that the triangle is position approximately precisely on top of a dash depicting a negative value. But that dash is in a quite strange position contrasted to the other dashes which are clustered underneath the squares and left of center. So it could be that the fundamental negative value is an odd case.The adjacent neighbor classification operated for this instance depends on how many neighboring points are thought of. If 1-NN is exploited and only the closest point is considered, then obviously the novel point should be categorized as negative since it is on top of a known negative point. Conversely, if 9-NN classification is employed and the closest 9 points are considered, then the consequence of the surrounding 8 positive points may overbalance the close negative point.A Probabilistic Neural Network builds on this base and simplifies it to consider all of the other points. The distance is calculated from the point being analyzed to each of the other points, and a *radial basis function* (RBF) [11] (also called a *kernel function*) is put into the distance to compute the weight (influence) for each point.

3.1. Advantages and disadvantages of PNN networks:

1) It is typically much quicker to train a PNN/GRNN network than a multilayer perceptron network.
2) PNN/GRNN networks often are more precise than multilayer perceptron networks.
3) PNN/GRNN networks are comparatively numb to outliers (wild points).
4) PNN networks generate precise predicted target probability scores.
5) PNN networks come up to Bayes optimal classification.
6) PNN/GRNN networks are slower than multilayer perceptron networks at categorizing new cases.

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7) PNN/GRNN networks necessitate more memory space to amass the model.

3.2.1. Removing unnecessary neurons

One of the drawbacks of PNN models contrasted to multilayer perceptron networks is that PNN models are huge because of the fact that there is one neuron for each training row. [14] This effects the model to run slower than multilayer perceptron networks when employing scoring to predict values for new rows. DTREG offers an alternative to cause it get rid of redundant neurons from the model after the model has been constructed.

Eliminating needless neurons has three reimbursements:

1. The size of the amassed sculpt is diminished.
2. The time necessary to apply the model during scoring is lessened.
3. Detaching neurons often enhances the accuracy of the model.

The process of eliminating pointless neurons is an iterative process. Leave-one-out validation is employed to measure the blunder of the model with each neuron being eliminated. The neuron that effects the least increase in error (or possibly the largest reduction in error) is then eliminated from the model. The process is recurred with the residual neurons until the stopping criterion is achieved.When superfluous neurons are rejected, the "Model Size" section of the scrutiny report illustrates how the error varies with various numbers of neurons. You can view a graphical chart of this by clicking Chart/Model size.There are three criteria that can be chosen to steer the exclusion of neurons:

1. ***Minimize error*** – If this option is preferred, then DTREG eliminates neurons as long as the leave-one-out error remains steady or decreases. It stops when it discovers a neuron whose exclusion would cause the error to increase above the minimum found.
2. ***Minimize neurons*** – If this option is preferred, DTREG excludes neurons until the leave-one-out error would surpass the error for the model with all neurons.
3. ***Number of neurons*** – If this option is preferred, DTREG diminishes the least significant neurons until only the specified number of neurons remain.

3.3 PNN:

NEWPNN generates a two layer network [6]. The first layer has RADBAS neurons, and computes its weighted inputs with DIST, and its net input with NETPROD. The second layer has COMPET neurons, and computes its weighted input with DOTPROD and its net inputs with NETSUM. Only the first layer has prejudices. NEWPNN sets the first layer weights to P', and the first layer biases are all set to 0.8326/SPREAD effecting in radial basis functions that cross 0.5 at weighted inputs% of +/- SPREAD.

3.4 Methodology:

An elucidation of the derivation of the PNN classifier was provided. PNNs had been utilized for categorization issues.[15] The PNN classifier offered good precision, very small training time, robustness to weight changes, and negligible retraining time. There are 6 stages involved in the projected prototype which are initiating from the data input to output. The initial stage is should be the image processing system. Principally in image processing system, image acquisition and image enhancement are the steps that have to do. In this manuscript, these two steps are skipped and all the images are composed from accessible resource. The proposed model necessitates transforming the image into a format capable of being influenced by the computer. The MR images are transformed into matrices form by using MATLAB. Then, the PNN is exploited to categorize the MR images. Finally, performance based on the outcome will be scrutinized at the end of the development stage.

IV. FUZZY CLUSTERING MODEL

Fuzzy clustering plays a vital position in resolving crisis in the domains of pattern identification and fuzzy model recognition [7]. A diversity of fuzzy clustering techniques have been projected and most of them are pertaining to the distance criteria. One predominantly employed algorithm is the Fuzzy C-Means (FCM) algorithm. It exploits reciprocal distance to evaluate fuzzy weights. A more competent algorithm is the new FCFM. It calculates the cluster center using Gaussian weights, utilizes large initial prototypes, and adds processes of eliminating, clustering and merging. In the subsequent sections we confer and contrast the FCM algorithm and FCFM algorithm.Spatial Fuzzy C Means method inte grates spatial data, and the membership weighting of each cluster is manipulated after the cluster distribution in the neighborhood is considered. The first pass is similar as that in standard FCM to compute the membership function in the spectral domain. In the second pass, the membership data of each pixel is mapped to the spatial domain and the spatial function is evaluated from that. The FCM iteration proceeds with the new membership that is integrated with the spatial function. The iteration is stopped when the maximum difference flanked by cluster centers or membership functions at two successive iterations is less than a least threshold value.

The Fuzzy C-Means (FCM) algorithm was initiated. The notion of FCM is employing the weights that diminishes the total weighted mean-square error by equation 6:

$$J(w_{qk}, \mathbf{z}^{(k)}) = \Sigma_{(k=1,K)} \Sigma_{(k=1,K)} (w_{qk}) \| \mathbf{x}^{(q)} - \mathbf{z}^{(k)} \|^2$$

$$\Sigma_{(k=1,K)} (w_{qk}) = 1 \quad \text{-eq(5)}$$

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$w_{qk} = (1/(D_{qk})^2)^{1/(p-1)} / \Sigma_{(k=1,K)} (1/(D_{qk})^2)^{1/(p-1)}$,

$p > 1$ –eq(6)

The FCM permits each feature vector to fit in to every cluster with a fuzzy truth value (between 0 and 1), which is evaluated using Equation (6). The algorithm allocates a feature vector to a cluster in accordance to the maximum weight of the feature vector over all clusters [8].

4.1 A New Fuzzy c-means Implementation Algorithm Flow

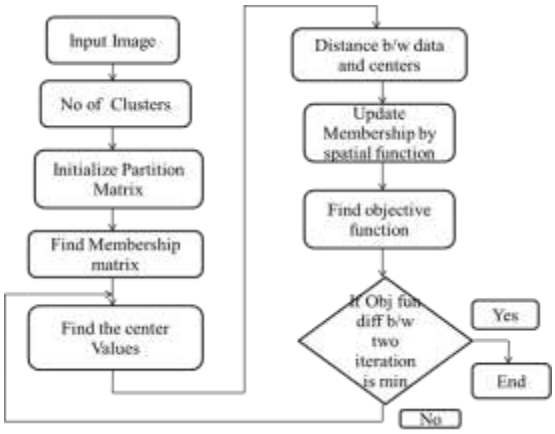

Fig. 6: Fuzzy C-means Algorithm Flow.

In order to weigh against the FCM with FCFM, our execution permits the user to opt for initializing the weights using feature vectors or arbitrarily. The process of initializing the weights using feature vectors allocates the first K_{init} (user-given) feature vectors to prototypes then calculates the weights.

4.2 Standardize the Weights over Q.

During the FCM iteration, the evaluated cluster centers get closer and closer. To prevent the quick convergence and always clustering into one cluster as in equation 7.

$w[q,k] = (w[q,k] - w_{min})/(w_{max} - w_{min})$ –eq(7)

before normalizing the weights over Q. Where w_{max}, w_{min} are maximum or minimum weights over the weights of all feature vectors for the scrupulous class prototype.

4.3 Eliminating Empty Clusters.

In consequence to the fuzzy clustering loop we add a step to exclude the empty clusters. This step is put outside the fuzzy clustering loop and before computation of tailored XB validity. Without the abolition, the minimum distance of prototype pair utilized in Equation9 may be the distance of empty cluster pair. We entitle the method of abolishing small clusters by passing 0 to the process so it will only remove the empty clusters. In consequence to the fuzzy c-means iteration, for the rationale of contrast and to choose the optimal outcome, we add Step 9 to compute the group centers and the customized Xie-Beni clustering validity κ :

The Xie-Beni validity is a product of compactness and separation measures [9],[10]. The compactness-to-separation ratio ν is defined by Equation(8) and (9).

$\nu = \{(1/K)\sum_{(k=1,K)}\sigma_k^2\}/D_{min}^2$ -eq(8)

$$u'_{ij} = \frac{u_{ij}^p h_{ij}^q}{\sum_{k=1}^{c} u_{kj}^p h_{kj}^q}$$

$\sigma_k^2 = \sum_{(q=1,Q)} w_{qk} \| \mathbf{x}^{(q)} - \mathbf{c}^{(k)} \|^2$ -eq(9)

D_{min} is the minimum distance between the cluster centers. The Modified Xie-Beni validity κ is defined in equation (10).

$\kappa = D_{min}^2 / \{\sum_{(k=1,K)}\sigma_k^2 \}$ –eq(10)

The variance of each cluster is computed by summing over only the members of each cluster rather than over all Q for each cluster, which compares with the unique Xie-Beni validity measure.

$\sigma_k^2 = \sum_{\{q:\ q \text{ is in cluster } k\}} w_{qk} \| \mathbf{x}^{(q)} - \mathbf{c}^{(k)} \|^2$ –eq(11)

The spatial function is comprised into membership function as given in Equation (11).

V. CONCLUSION

A new-fangled algorithm for Brain Tumor Classification is proposed. This novel scheme is a blend of Dual tree Wavelet Transform, Probabilistic Neural Network and the fuzzy clustering with the implementation of GLCM. By employing these algorithms a competent Brain Tumor Classification technique was built with maximum recognition rate. Simulation outcomes exploiting Brain Tumor database illustrated the capability of the projected method for most favorable feature extortion and proficient Brain Tumor classification. The capability of our proposed Brain Tumor Classification system is established on the basis of acquired outcomes on Brain Tumor image database. On other Brain Tumor image databases the other grouping are there for training and test samples. In this proposal only 5 classes of Brain tumors are considered, with regard to an instance of 15 test images for example, but this technique can be extensive to more classes of Brain tumors.

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Work Motivation and Job Satisfaction of Employees before and after Company Reorganization: A Case of an Electric Cooperative in the Philippines

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Abstract**—** *This study was conducted to determine and compare the work motivation and job satisfaction of the employees before and after the cooperative reorganized sometime in 2015. Using descriptive comparative research design with survey questionnaire as data gathering instrument, the study involved 70 purposively chosen respondents from the said cooperative found out that motivation and job satisfaction levels of the respondents significantly increased after the reorganization. The study recommends that the current management continue striving to keep the level high.*

Keywords— work motivation, job satisfaction, company reorganization.

I. INTRODUCTION

Companies and business entities normally encounter challenges in the course of their operations, and when challenges and difficulties go out of hand, the administration sometimes resort to reorganization. According to Cambridge [1], reorganization is a change in the way that something such as a company is organized. It is done to improve and to extend the life of a company facing bankruptcy through special arrangements and restructuring.

Reorganization effects changes or overhaul in a company's organizational structure for various reasons that may include improving efficiency or costs-cutting [2]. The reorganization usually happens after a change of leadership which resorted to reorganization for two times already as in the case of NEECO 1.

As a backgrounder, NEECO 1 is a non-stock, non-profit electric cooperative duly organized by virtue of Presidential Decree No. 269. It started its operation on November 24, 1973, and since then it has provided electricity to five (5) municipalities in Nueva Ecija, Philippines namely; San Antonio, Jaen, Gapan, Cabiao and San Isidro. This electric cooperative is one of the 121 Rural Electric Cooperatives in the Philippines being supervised by the National Electrification Administration (NEA), a Philippine Government Owned and Controlled Corporation (GOCC).

In 45 years of its operation, about 27 leaders took turn s in managing the cooperative upon approval of the National Electrification Administration, its supervising agency. It first underwent reorganization in March 1993. The second reorganization took place on December 15, 2015 as part of its strategic map to continually enhance human resource competencies and sustain programs promoting employees' welfare and motivation [3].

With the reorganization, the remuneration and retirement package for the employees were expected to increase and the cooperative's operations were also expected to improve. The reorganization resulted to dramatic changes. Certain positions were abolished while new positions were created. Some employees were promoted; while some were retained in their positions. However, there were also cases of demotion and transfer to other departments, which elicit negative repercussions. There was actually distortion in the previous organizational setup which was rather informal devoid of clear policy guide. There were non-aligned positions as to fields of specialization, hence discontentment arose on the employees concerned.

Despite the good faith upon which reorganizations have resorted to, studies have shown that it has negative impact on the employees [4].While many favored restructuring, still there were those displeased and exhibited displeasure with how the change was facilitated or with its outcomes in terms of efficiency.

Restructuring is also believed to de-motivate employees because it oftentimes leads to loss of job or

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demotion [5], which affected the remaining employees' job description. This claim was supported by the finding of Kirinji [6] who during the interview process in connection with her research entitled Effects of Corporate Restructuring on Employees' Motivation in Kenya Commercial Bank, Ltd., participants were found to have become less motivated than before the reorganization. Fifty percent of faces were no longer there and the attrition rate increased. Triangulated data, however, revealed that despite the employees' attitude and low morale due to reorganization, some employees still indicated their commitment to their company despite alleged instances of polarization within their departments. These were proofs that reorganization may either have negative or positive effects.

Cognizant of the reality of the effects of re organization, the proponents of this study ventured on this research to determine the bearing of reorganization to the motivation and job satisfaction of the NEECO 1 employees before and after their reorganization in 2015.

II. STATEMENT OF THE PROBLEM

The study focused on the work motivation and job satisfaction of the employees Nueva Ecija Electric Cooperative I before and after its reorganization. Specifically it answered the following questions.

1. How may the work motivation of the NEECO I employees be described before and after reorganization?
2. How may the job satisfaction of the NEECO I employees be described before and after reorganization?
3. Is there any significant difference between work motivation and job satisfaction of NEECO I employees before and after the reorganization?

III. METHODOLOGY

This study used descriptive comparative design wherein work motivation and job satisfaction of NEECO I employees before and after reorganization were first described and then compared to determine existence of any significant difference. A total of 70 purposively chosen NEECO I employees were used as respondents of the study. These employees were selected because they were already with the Cooperative when the reorganization took place.

A content validated 4-point-scaled survey questionnaire as the primary instrument to gather the needed data. The following scales were the basis for data analysis and interpretation:

Motivation Scale	Verbal Description	Job Satisfaction Scale	Verbal Description
1.00 to 1.74	Very slightly Motivated	1.00 to 1.74	Very slightly Satisfied
1.75 to 2.49	Slightly Motivated	1.75 to 2.49	Slightly Satisfied
2.50 to 3.24	Motivated	2.50 to 3.24	Satisfied
3.25 to 4.00	Highly Motivated	3.25 to 4.00	Very Satisfied

IV. RESULTS AND DISCUSSION

1. NEECO I Employee Work Motivation Before and After Reorganization

Table 1 below shows the motivation level of the respondents before and after reorganization at NEECO I. With an overall mean motivation level of 3.21, it is evident that the employees were generally motivated to work before reorganization. It further reveals that they were highly motivated to perform their daily task (mean=3.41), come to work daily (mean = 3.37); participate in NEECO I initiated activities (mean = 3.33); take in extra work (mean = 3.29); and attend training and seminars related to work. On the other hand, they were not as highly motivated to perform work assignments with team mates (mean = 3.23); attend meetings (mean = 3.20); make written reports (3.09); educate consumers (mean = 3.01) and pursue higher education (mean = 2.89). This also implies that before reorganization, NEECO 1 employees tend to be the typical employees who would come to work and do task as expected although there were indications that somehow, their motivation level has been waning when they would have to make written reports or when they would be required to socialize or mingle with the public or even with workmates.

Table.1: Motivation level of NEECO I Employees before and after Reorganization

Work related Activities	Before		After	
	Mean	Verbal Description	Mean	Verbal Description
1. coming to work daily	3.37	Highly Motivated	3.69	Highly Motivated

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2. performing daily routine task	3.41	Highly Motivated	3.64	Highly Motivated
3. performing work assignments with team mates	3.23	Motivated	3.59	Highly Motivated
4. taking in extra work assignments	3.29	Highly Motivated	3.60	Highly Motivated
5. making written reports	3.09	Motivated	3.47	Highly Motivated
6. educating consumers/members on proper use of electricity	3.01	Motivated	3.46	Highly Motivated
7. attending meetings	3.20	Motivated	3.49	Highly Motivated
8. participating in initiated activities	3.33	Highly Motivated	3.60	Highly Motivated
9. attending training and seminars	3.27	Highly Motivated	3.59	Highly Motivated
10. pursuing higher education	2.89	Motivated	3.37	Highly Motivated
Overall weighted mean	3.21	Motivated	3.55	Highly Motivated

On the other hand, the figures or results changed after the reorganization. It became apparent that the employees have generally become highly motivated with an overall weighted mean rating of 3.55. This indicates that after the reorganization, the employees motivation level increased even in doing what they did not like doing before, such as performing tasks with team mates (mean=3.59); making written reports (mean= 3.47); educating consumers and members about proper use of electricity (mean=3.46) attending meetings (mean=3.49) and pursuing higher education (mean= 3.37). Apparently, the employees have become more socially inclined after the reorganization. With this, it is likely that they will also be more comfortable working with others, and this may translate to increased efficiency.

2. NEECO I Employee Job Satisfaction Level Before and After Reorganization

Table 2 shows the job satisfaction level of the respondents before and after reorganization at the Nueva Ecija Electric Cooperatives I.

With an overall weighted mean of 3.06, the employees' job satisfaction level was evident at the satisfied level, and this is an indication that the employees were only generally satisfied with their work before the reorganization. Their satisfaction level was highest in terms of retirement package (mean= 3.17). Some respondents disclosed they were anticipating retirement before the reorganization was implemented in 2015. This is the common notion among employees of organizations for quite a number of reasons; from fear of demotion to resentment to changes in the work environment. Their next higher level of satisfaction was with the leadership (mean = 3.14). It was very likely that their leader at that time left a good impression to the said employees.

Table.2: Job Satisfaction level of NEECO I Employees before and after Reorganization

Job Satisfaction level in terms of:	Before		After	
	Mean	Verbal Description	Mean	Verbal Description
1. organizational Structure	3.04	Satisfied	3.56	Very Satisfied
2. leadership	3.14	Satisfied	3.64	Very Satisfied
3. programs and projects	3.13	Satisfied	3.63	Very Satisfied
4. working relationship within	3.13	Satisfied	3.61	Very Satisfied
5. reward system	2.99	Satisfied	3.51	Very Satisfied
6. training opportunities	2.99	Satisfied	3.53	Very Satisfied
7. physical facilities and equipment	3.04	Satisfied	3.51	Very Satisfied
8. opportunities for promotion	2.91	Satisfied	3.57	Very Satisfied
9. salaries and benefits	3.06	Satisfied	3.74	Very Satisfied
10. retirement package	3.17	Satisfied	3.74	Very Satisfied
Overall weighted mean	3.06	Satisfied	3.61	Very Satisfied

Further analysis of the result of the study indicates that the employees were least satisfied with the promotional opportunities they had before (mean= 2.91). This was followed by the reward system and training opportunities in

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the workplace which both obtained a weighted mean rating of 2.99. With the said figures, there is a reason to believe that the employees of NEECO 1 before reorganization were likely not inspired with their work situation; and since there is a direct link between job satisfaction and performance [7], it is also likely that, at that time, the employees did not perform their organizational function to the maximum

3. Comparison of the Motivation level of NEECO 1 Employees Before and After Reorganization.

Table 3 shows the result of analysis of the work motivation levels of the respondents before and after reorganization in 2015.

The two-tailed test, computed at .05 alpha level, revealed a *t* value of 3.97 which was higher than the critical t value of 1.98. The result is an indication that there is a significant difference in the work motivation of NEECO I employees before and after reorganization.

Table 3: Statistics Table on the Comparison of NEECO I Employees' Motivation Level Before and After Reorganization.

Motivation	*After*	*Before*
Mean	3.55	3.21
Variance	0.2350	0.2796
n	70	
t Stat	3.97**	
T critical two tail	1.98	

4. Comparison of the Job Satisfaction Level of NEECO 1 Employees before and after Reorganization.

Table 4 shows the result of analysis of the job satisfaction levels of the respondents before and after reorganization in 2015.

The two-tailed test computed at .05 alpha level revealed a *t* value of 5.98 which was higher than the critical t value of 1.98. This value indicates that there was a significant difference in the job satisfaction of NEECO I employees before and after reorganization.

Table.4: Statistics Table on the Comparison of NEECO I Employees' Motivation Level Before and After Reorganization

Motivation	*After*	*Before*
Mean	3.61	3.06
Variance	0.2585	0.3248
n	70	
t Stat	5.98**	
T critical two tail	1.98	

V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary of findings

The findings of the study were summarized as follows:

1. The motivation level of the employees of NEECO 1 before reorganization was 3.21, verbally described as "Motivated'; while their motivation level after reorganization was 3.55 verbally described as "Highly Motivated".
2. The job satisfaction level of the NEECO I employees before reorganization was 3.06, verbally described as "Satisfied"; while their satisfaction level after re-organization was 3.61, with verbal description of "Highly Satisfied".
3. The computed t-value in the comparison of the motivation level of the employees before and after the reorganization was 3.97, which was higher than the 1.98 critical value.
4. The computed t-value in the comparison of the job satisfaction level of the employees before and after the reorganization was 5.98, which was higher than the 1.98 critical value.

Conclusions

Based on the findings of the study, the following were thus concluded:

1. The work motivation level of the employees of NEECO I increased after the company reorganized in 2015. They were more motivated to work after the reorganization.
2. The job satisfaction level of the employees of NEECO I increased after the company reorganized in 2015. They were more satisfied with their job after the reorganization.
3. The increase in the motivation level of the NEECO I employees after the reorganization of the company was significantly high at .01 level. There is a significant difference in the work motivation of the NEECO I employees before and after the reorganization.
4. The increase in the job satisfaction level of the NEECO I employees after the reorganization of the company was significantly high at .01 level. There is a significant difference in the job satisfaction of the NEECO I employees before and after the reorganization.

Recommendations

Based on the findings and conclusions of the study, the following are thus recommended:

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1. The current management should continue with the innovation he has started after reorganization to keep its employees highly motivated.
2. The management should also find more ways to keep its employees highly satisfied.
3. The management may consider further improvement of the company's reward system and may also consider updating of its physical facilities and equipment so as keep the employees job satisfaction high.
4. Future researchers may also continue the investigation to determine impact of NEECO 1 reorganization five years after.

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Machine Learning and Big Data Analytics in IoT based Blood Bank Supply Chain Management System

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***Abstract*—** *Blood is a perishable product with uncertainties in both supply and demand and blood stock management is therefore a judicious balance between shortage and wastage.Blood service operations are a key component of the healthcare system. Requirement of blood is increasing gradually due to accidents, surgeries etc. Blood transfusion play an important role in healthcare. The intention of Blood Bank Supply Chain is to demand estimate, inventory management and distribute adequate blood.Internet of Things (IoT) has rehabilitated the traditional e-healthcare system.Big data analytics refers to the process of collecting, organizing and analyzing large sets of data ("big data") to discover patterns and other useful information in a blood bank system. -Big DataAnalyticsandMachine Learning aretwo important areas ofdatascience. A key benefit of Machine Learning is the analysis and learning of massive amount so fun supervised data, making it a valuable tool for Big Data Analytics where raw data is largely unlabeled and un-categorized. With advance research in health sector, there is variety of perishable data available in health care especially in the Blood bank domain. This paper provides review and importance big data technologies and IoT paradigms used in health care sector.*

Keywords*— *Internet of Things(IoT), Big Data, Machine Learning,Blood Bank, Supply Chain Management, Regional Blood Center (RBC), Hospital Blood Bank (HBB), Radio Frequency Identification (RFID).

I. INTRODUCTION

Internet of Things (IoT) has been emphasized as one of the new smart tool for the health care industry. IoT incorporates recent IT technologies that facilitate applications, devices, and objects to communicate among themselves through the connected networks (Tarouco et al., 2012). The IoT technologies primarily consist of data generation, collection, processing and distribution as well as big data management and service application. Initially, it has been used in the transportation monitoring and tracking, information pricing of products, and map navigation. However, the advance IT technologies such as wireless, cloud based network, smart phones, wearable devices, and high speed network connection have incorporated these IoT services into daily life activities. It has become a useful and necessity tool in the market and its popularity has been on the rise after the introduction of many new concepts such as Smart City, Smart Home, and Smart Health (Kang et al., 2015). According to the health context, the IoT has been widely used in various healthcare services (Fernandez and Pallis, 2014). In the IoT-based healthcare, there are interactions between things (applications) and humans (practitioners and patients) in order to obtain real-time data and support decision-making activities for care deliveries and other associated services. Moreover, the IoT would increase the utilization of resources in the healthcare environment, for example, managing limited resources for elderly care in the community more effectively (Feki et al., 2013; Li et al., 2011). The IoT-based healthcare system is able to connect to available resources in order to operate healthcare actions via the internet network. According to the benefits of the resource mobility, IoT concept could also be applied to manage other resources in the healthcare domain such as specimen, vaccines, and blood products. Blood is one of the most important resources in the healthcare system (Nagurney, Masoumi and Yu, 2012). Blood supply is also collected from human beings who have willingness to donate. Uncertainties in blood demand and supply are inevitable. Blood is perishable product, and its lifetime is within a short time period after collecting. This immense growth and evolution of data in health industry has given rise to lot of challenge like data collection, storage, transfer, processing and analysis [2]. . A key driver of this revolution is arguably “big data”, which represents large volumes of machine-readable data [1]. Big data analysis is most important because the data

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is continuously changing based on interval of time to store big data most of companies are using cloud setup.Machine learning offers a solution to find patterns and association from thedata, which enables healthcare professionals to take precise decisions.Hence, if health care is combined efficiently with big data and machine learning, it results in effective storage, processing and analysis which can help to improve decision making process and finding better treatment solutions for present diseases [3].

II. OVERVIEW OF IOT AND BIG DATA

A. Internet of Things (IOT)

The term Internet of Things (IoT) generally refers to scenarios where network connectivity and computing capability extends to objects, sensors and everyday items not normally considered computers, allowing these devices to generate, exchange and consume data with minimal human intervention. Here we can divide the whole system into three basic components, ie., the **Device,Gateway**, and **Cloud**.

A ***device*** includes hardware and software that directly interact with the world. Devices connect to a network to communicate with each other, or to centralized applications. Devices might be directly or indirectly connected to the internet.

A ***gateway*** enables devices that are not directly connected to the Internet to reach cloud services. Although the term gateway has a specific function in networking, it is also used to describe a class of device that processes data on behalf of a group or cluster of devices. The data from each device is sent to ***cloud***platform, where it is processed and combined with data from other devices, and potentially with other business-transactional data.The internet of things has numerous applications in healthcare, from remote monitoring to smart sensors and medical device integration.

B. Big Data

Big data is the buzzword today. It is everywhere, especially in the healthcare industry. Traditionally, the huge amount of data generated by the healthcare industry was stored as hard copy. This data has the capability to support a wide range of healthcare and medical functions. The entirety of data that is related to patient health care and well-being makes up big data. Big Data has changed the way we manage, analyze and leverage data in any industry. One of the most promising areas where big data can be applied to make a change is healthcare. Big Data in healthcare is being used to predict epidemics, cure disease, improve quality of life and avoid preventable deaths. With the world's population increasing and everyone living longer, models of treatment delivery are rapidly changing, and many of the decisions behind those changes are being driven by data

Overview of Machine Learning in Health Care

Machine learning is one of the emerging area because it provides the ability to automatically attain deep insights, identify hidden patterns, and create predictive models from the preprocessed data, all without requiring explicit programming instructions and human interventions. Machine learning algorithms are classified as Supervised, Unsupervised and Reinforcement techniques. Deep learning also one of the machine learning algorithm and it is one of the significant algorithm used in health care sector. Successful application of machine learning in healthcare depends with intelligent algorithms and rich data sets. Self-driving car and websites that recommend items based on the purchasing decisions of other peopleare all examples of machine learning being used in the real world [12].

Machinelearningis one the valuable and necessary tool for the e-health care system that is used to combineandmakesenseofhealthcaredata. Perfect accurate diagnosis is achieved by Machine learning along with domain experts. The analysis of data is classified into descriptive, diagnostic, predictive, prescriptive and decisive categories. After the preprocessing of data, the analysis may be descriptive or diagnostic. But while we are analyzing present and historical data, the analysis will be predictive, prescriptive and decisive. Preprocessing plays a major role in the machine learning process. Preprocessed data is given as an input to the machine learning algorithm. Recently lots of innovative research going on in the medical field along with big data and machine learning. One phase of machine learning consists of data preprocessing plus learning. Efficient classification and prediction can be attained by proper machine learning algorithms. Models used in machine learning areClassification, Clustering and Regression [12].

III. BLOOD BANK SUPPLY CHAIN MANAGEMENT (BBSCM)

Practically, blood service operations involve blood collection, processing, inventory management, distribution, blood-banking management, and transfusion.

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Fig.1: A simplified illustration of the blood supply-chain system

Blood Center collects whole blood from donors, processes it into blood products at a Regional Blood Center and distributes them to hospitals in the network in order to transfuse to the patient.***Regional Blood Center (RBC)*** has principal operations for blood collection, processing and testing, production, inventory management, and distribution to hospitals.RBC is responsible for managing this inventory and allocating available blood units to hospitals according to requisitions from their local blood banks.

Each ***Hospital Blood Bank (HBB)*** has to manage blood inventory and its operations within the hospital. Doctors put requests for the certain amount and groups of blood products for patients' treatments. When available blood products are assigned for any patient, these units will be crossmatched to verify the compatibility with each particular patient. The period between blood crossmatching and releasing any unused units is called "a period for reserving blood". The longer this period is, the higher the probability that blood will expire before its actual use. Finally, the crossmatched units will be transfused to the patient for treatment.

IV. IOT IN BLOOD BANK SUPPLY CHAIN

According to the development in technologies, it would be beneficial to consider the possible advantages from using the IoT paradigm in the blood supply chain management.This paper provides conceptual guidelines in transforming blood service operations management to enhance blood utilization with the IoT-based applications paradigm.

A.Tracking

1) Inventory count and location tracking

Real-time inventory count would be applied to check the collaborative inventory in order to automated count the overall blood stock levels in the HBBs. Hence, the RBC can obtain these counted blood stock data for future blood collection and replenishment planning. Moreover, the location tracking of each blood unit would enhance blood transshipment among the HBBs in case there are any blood emergency demand requests made from the HBBs and the RBC cannot supply enough blood units to respond to those requests.

2) Safety and traceability

The blood traceability system is an online platform which is connected into the RFID-blood bag and barcode. It is able to integrate the sharing information and coordination among blood service organizations in the supply chain in order to mitigate blood transfusion risks to the patient, such as human error, incorrect blood products, and errors in medication administration (Dzik, 2007).

B. Identification and Authentication

1) Auto ID/bar code enabled transfusion administration

The identity check between each patient and particular blood product is the crucial task to avoid mistake in the transfusion. The RFID-blood bags and the traceability system can ensure that the correct blood type with the correct quantity is always delivered to the right patient when there is a request (Koshio and Akiyama, 2009).

C. Automatic Data Collection

1)Blood inventory management

Blood inventory is a major task in the supply chain. The main aim is to maximize blood utilization in such a way that blood shortage and outdated rates are at minimum levels. RFID and barcode are used to connect each blood bag to the blood inventory system can lead to the ability to manage blood information more efficiently.

2) Blood tracking and tracing

Real-time blood tracking and tracing system will help the RBC to reload its own inventory and allocate blood products to the hospital blood banks according to the specific demand from each hospital.

D. Sensing

1)Transportation monitoring

Temperature control during transportation is vital for maintaining blood quality. Using sensing technology and real-time temperature tracking in blood transportation can ensure the quality of blood products.

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2) Patient monitoring

It is necessary for the medical practitioners to be alerted if the patient suffers any complication symptoms after receiving blood. A wearable bio-signal device that binds the patient to the system can be used to monitor and transmit data automatically back to the medical staff for any prompt treatments during postoperative blood transfusions.

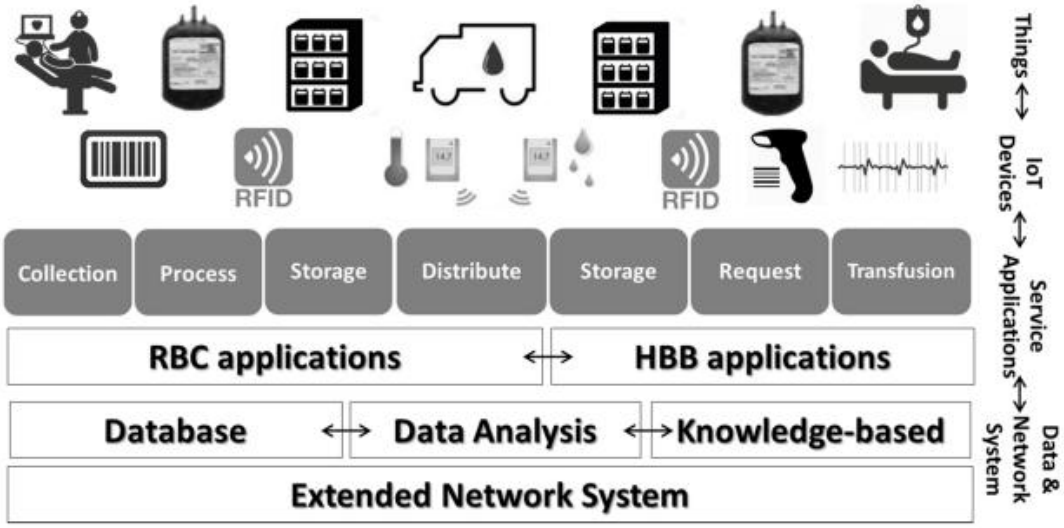

Fig.2.IoT-based framework for blood bank supply chain management

V. BIG DATA ANALYTICS IN BLOOD SUPPLY CHAIN

Big data is saving lives and it has been changing lives in many ways. Big data analytics is bringing a welcome shift in the healthcare sectors. Healthcare analytics cannot only help reduce the cost of healthcare facilities including treatments, medication, and diagnosis. Over the past decade, Electronic Health Records (EHR) have been widely adopted in hospitals and clinics worldwide. Important clinical knowledge and a deeper understanding of patient disease and symptoms patterns can be studied from such data. It will help to improve patient care and improve efficiency.

Using automatic data collection and transferring enables the blood management system to store a large amount of useful data in the blood service organizations. In developed countries, a blood-banking system which links between blood centers and hospitals can be performed automatically to communicate or make decisions on blood service operations. It is necessary to have information stored in the blood management system to use as a knowledge tool for supporting future decision-makings in any levels such as blood allocation policy, blood inventory management, and blood cross-matching policy.Hence, if healthcare is combined efficiently with big data techniques it results in effective storage, processing and analysis which can help to improve decision making process and finding better treatment solutions for present diseases.

Applications of Big Data and Machine Learning in Health Care

E- healthcare industry is being transformed by the advancements in machine learning and Big data analytics. Machine learning and big data are now being used in healthcare to provide superior patient care and has resulted in improved predicted outcomes. Nowadays, machine learning supports personalized health care through improved diagnostics and predictive & prescriptive healthcare analytics. Machine learning algorithms process huge structured and unstructured datasets (big data) and provide useful perceptions that allow effective health care services and it can make accurate decisions, significantly improve operating efficiencies, and reducing the unwanted cost.

Monitoring patient vitals: Sensors are being used in the patient beds to continuously monitor blood pressure, heartbeat and respiratory rate. Any deviations in pattern is immediately reported to doctors and healthcare administrators [7].

Healthcare Intelligence:Machine learning and Big Data are being used in healthcare Intelligence applications [7].

Fraud Prevention and Detection:Machine learning algorithms helps to avoid a wide range of human errors on the side of health care administrators in the form of dosage level, medicines, and other kinds of treatments. It will also be used to detect and prevent fraudulent claims of insurance from the insurance agencies [7].

Real-time Alerting: Wearable IoT enabled devices will collect patients' health data continuously and send this data to the cloud setup.This information will be accessed

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from the cloud databases on the state of health of the general public, which will allow doctors to compare this data along with existing patient record. For example, if patient's blood pressure increases, the system will immediately send an alert to the doctor who will then take care the immediate action [8].

Predictive Analytics in Healthcare: One of the key functionality of machine learning algorithm is Predictive Analytics. In health industry, it will save human lives.It will help doctors to make decisions within seconds and improve patients' treatment. This is particularly useful in case of patients with complex medical histories, suffering from multiple conditions [8].

Evidence-Based Medicine: It is one of the remarkable application of machine learning. Using evidence-based medicine, the doctor can compare symptoms of a patient to a larger patient database in order to come to an accurate diagnosis faster and more efficiently. Here big data role is assimilating information from different sources and normalizing the data in an accurate manner [9]

Analyzing Hospital Networks: With the help of the recent IoT enabled cloud based technologies we can easily tracking and monitoring the facility, availability of specialist doctors, nearby hospitals and locations of the hospitals [9].

VI. CHALLENGES

Blood supply chain is a challenging system to manage. Its overall operations are complex which are associated with human, blood centers, hospitals, and patients. Presently, there are advanced medical technologies that support various aspects of e-health services in order to improve the health outcomes of patients as well as enhance performances of care delivers, including Telemedicine, E-health, and IoT. Despite these benefits, Llewellyn et al. (2014) addressed barriers to the adoption and implementation of the advanced medical technologies. These barriers involve with the lack of encouragement from the Department of Health, change issues in new operational procedures, skills of practitioners, threats perception, leadership, infrastructure, project management, lack of knowledge towards new technologies, and costs. In order to overcome these obstacles, the development of the IoT application in the blood operations system is required to guarantee that such technologies are trustworthiness for investment in the real context.

VII. CONCLUSION

Nowadays, health care systems are rapidly adopting clinical data, which will rapidly enlarge the size of the health records that are accessible, electronically.A robust, sustainable blood system is a crucial component of every health care system. The availability of safe blood and blood products is a prerequisite for various health care services—including some surgeries, treatments for cancer and other acute and chronic medical conditions, trauma care, organ transplantation, and childbirths—that extend and improve life for millions of patients annuallyIoT-based healthcare applications paradigm consists of four main functions, tracking, identification and authentication, automatic data collection, and sensing. This study has incorporated the IoT paradigm to provide the guidelines to transform the blood supply chain management in order to improve blood service operations. Tracking is used to monitor blood inventory counting and storage location. Identification and authentication is the function aimed to ensure that the blood transfusion standard is followed. Automatic data collection is used as a mechanism to drive the information flows in blood logistics operations. The IoT-based framework of the blood supply chain management is proposed to conceptualize the interactions between blood products, donors, patients, practitioners, processes, and service operation applications through the network connection. The consolidation of the blood service organizations is a key success towards the implementation of IoT-based applications with big data analytics in the blood bank supply chain management.

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