

SUITABLE ENERGY ADVANCEMENT IN DIRECT AND MINIMUM TRANSMISSION APPROACHES

Saumya Dubey¹, Sonam Singh², Vandana Upadhyaya³,
Ram Krishna Sharma⁴

^{1,2,3,4} Department of Electronics & Communication Engineering, UIT, Allahabad (India)

ABSTRACT

Direct transmission energy approach explains that the nodes which are at the maximum distance from the sink died first. Unlike the previous, minimum transmission energy approach explain that the node nearest to the sink node died first. This theory concludes that there is no any strict requirement of energy advancement in the former since all nodes send data directly to the sink. In later, due to multi-hop propagation of data, one node depends on others state (on/off). Another important fact is that the nearest node to the sink dies first; therefore nodes near to the sink in this approach require more energy to run this protocol properly. If it does not happen, self configurable nodes are required to change their configuration as the distance between nearest node and sink changes.

Keywords: *Network Life Time, Energy Consumption, Advancement in Sensor Nodes*

I. INTRODUCTION

Wireless sensor network is the connection of a huge number of sensor nodes through a wireless medium is a self-organization (Ad-hoc) distributed network system. [1] This has large applications in military surveillance, environmental monitoring, seismic and weather forecasting, disaster relief, underground, deep water and outer space exploration and other areas as required. The network basically only monitors the event occurring at a place but it cannot be used in controlling the same. The information collected to the user results for the type of a control action. The deployed nodes collect the data and send it to the sink using any defined approach. The data is then transferred to the user through the satellite or internet and then broadcasted if it is required. Since nodes are battery powered devices and deployed at the place where battery cannot be either replaced or recharged, therefore energy efficient approaches are required to increase life time of the network. Hence the radio should be switched off as soon as there is no more data to send/receive, and should be resumed as soon as a new data packet becomes ready. In this way nodes alternate between active and sleep periods depending on network activity. This behavior is usually referred to as duty cycling. [2]

II. RELATED WORKS

The sensor nodes have RF transmitters and Receivers (Antennas), ADCs and DACs, processing unit (Microprocessors or microcontrollers), and external memory. Antennas receive RF data to convert it into analog electrical information which is then processed and converted to digital data using ADC. This data is used by the processing unit. The processed digital data is converted then to analog electrical information which is then sent through the transmitting antenna. For comparing the two different protocols in the same environment, we

neglect the energy consumption by the above components of the nodes. The energy consumption of these blocks is same for both the protocols. Hence we want to calculate energy consumption using only routing techniques. [4]

The radio module can be explained as follows:

The receiver and transmitter circuits consume energy in equal amount. The transmitter amplifier consumes excess energy to strengthened data so that the information is being capable of reaching at the receiver of another node successfully. [5, 6] The basic concept behind this theory is the concept of friss loss in wireless medium which explains that the strength of a signal in wireless medium decreases as the distance increases.

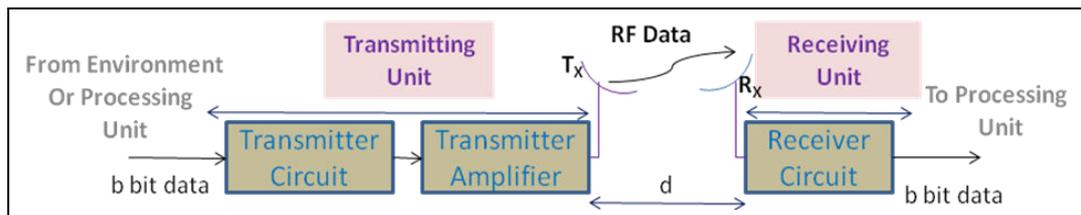


Fig. 1: Radio Module in A WSN

The radio module also explains that the energy consumption due to receiving circuit is not applicable if data is not received by the receiving antenna but it is gathered via sensors connected for suitable applications and requirements. The radio module (in Fig. 1) explains following energy consumption in a WSN:

$$\text{Energy consumed by the receiver section } E_{RX}(b, d) = bE_{elec} \dots\dots\dots (1)$$

$$\text{Energy consumed by the transmitter section } E_{TX}(b, d) = bE_{elec} + bE_{amp}d^2 \dots\dots\dots (2)$$

‘b’ is the data bits to be transmitted, ‘E_{elec}’ J/bits is the energy consumption by transmitting as well as receiving circuits, ‘E_{amp}’ J/bits-m² is the energy consumption per bit per meter square distance. ‘d’ is the distance between two consecutive nodes for which the radio module is explained.

Since friss loss is inversely proportional to d², therefore E_{amp} is directly proportional to d².

In Direct Transmission Energy Approach; [3] the sensor nodes directly send their data to the sink without any involvement of other sensor nodes. This approach is known as single-hop approach. Since all nodes sense environment and gather information accordingly therefore their receivers are switched off permanently. If distance between two consecutive nodes is r then nth node consumes energy equal to the transmission energy for distance equal to ‘nr’ as shown in Fig. 2 (at next page). Hence total energy consumption by nth node of the network,

$$E_{TX}(b, d) = 0 + bE_{amp}d^2 = bE_{amp}d^2 = bE_{amp}(nr)^2 \dots\dots\dots (3)$$

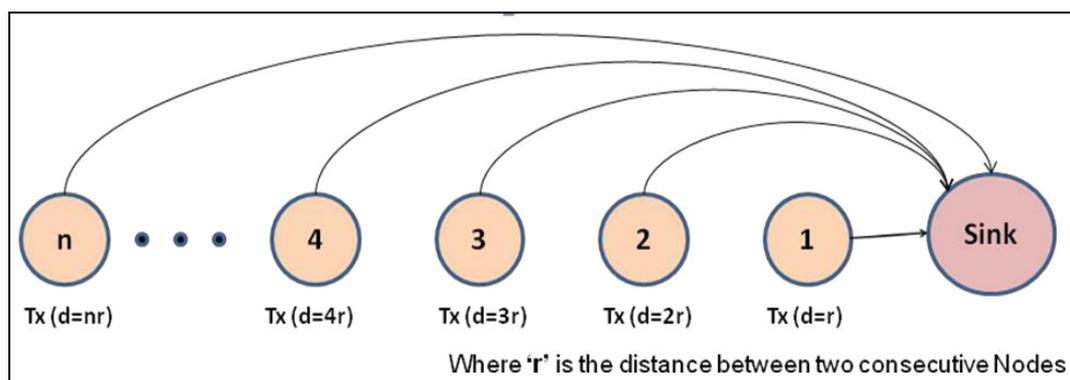


Fig. 2: Direct Transmission Energy Approach

As distance of the node from the sink increases in direct transmission energy approach, the energy consumption of that node also increases from equation (2). If initial energy of all the batteries is equal, nth node will die first. In minimum transmission energy approach; [3] information is sent node to node. This is also called multi-hop propagation. In this approach it is clear that the nth node does not consumes energy for receiving any data as it only collects data from environment through the sensor. The next node receives that data and sends it to next one addition with the data collected from the environment. Hence nth node consumes energy following equation (2).

For nth node; $E_n(b, d) = (0R_X + 1T_X) = bE_{elec} + bE_{amp}r^2$ (4)

For (n-1)th node; $E_n(b, d) = (1R_X + 2T_X) = 3bE_{elec} + 2bE_{amp}r^2$ (5)

Hence for first node; $E_n(b, d) = ((n-1)R_X + nT_X) = (2n-1)bE_{elec} + nbE_{amp}r^2$ (6)

From the above theory, it is clear that the nearest node will die first and the furthest node will die at last. This is shown in Fig. 3. This situation is slightly complex as the nearest node die, the second nearest node must be communicate directly to the sink otherwise no data will reach to the sink while (n-1) nodes are alive.

This complexity can be removed only by dynamic configuration of the nodes.

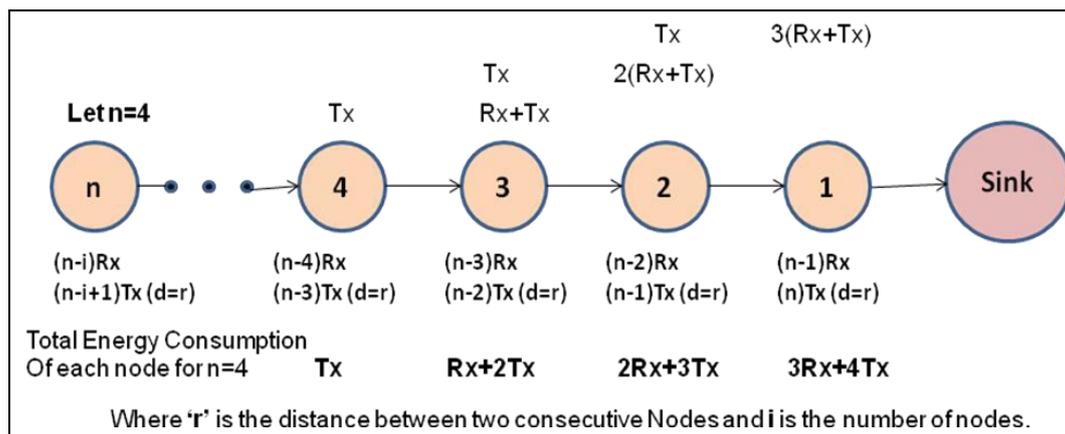


Fig. 3: Minimum Transmission Energy Approach

As the first node dies, the second node must communicate to the sink. As the second node die, third node must communicate to the sink and so on.

If nth node gets data from the environment and no other nodes get then the total energy consumption in WSN will be equal to the summation of (n-1) time's energy consumption by unit receiver and n time's energy consumption by unit transmitter. Hence energy consumption in this case will be equal to $(2n-1)bE_{elec} + nbE_{amp}r^2$. This energy is equal to the energy consumption by first node when all nodes get data from environment.

III. WORK DONE

The above two approaches show that the minimum energy transmission approach is slightly complex than that of direct transmission approach which is very simple in action and also in algorithm. In such cases advancement in the network is required. If we can increase the energy of those nodes that are going to die first then they will operate with all other nodes. Summary is the life time of those nodes will increase up to the mark. These nodes

can be 10%, 20%, 50% etc. This is very helpful in minimum transmission energy approach as this use multi-hop technique and nearest node dies first in this case.

IV. SIMULATION AND VERIFICATION OF RESULT

Let, $E_{amp}=100 \times 10^{-12}$ J/m²-bits, $E_{elec}=50 \times 10^{-9}$ J/bits, N=1000 nodes, $b=2000$ bits/sec, D=2000 meter.

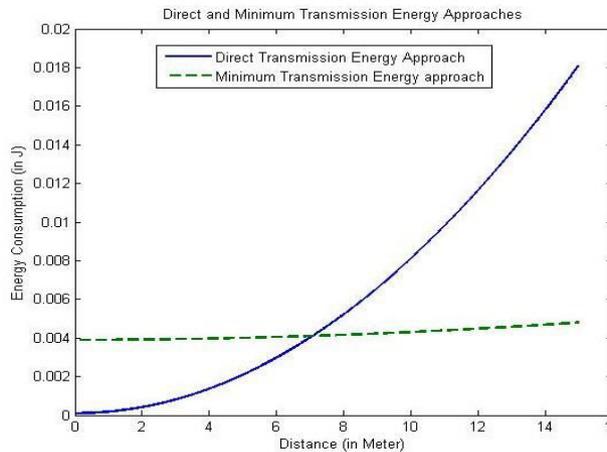


Fig. 3: Comparison for nth Node

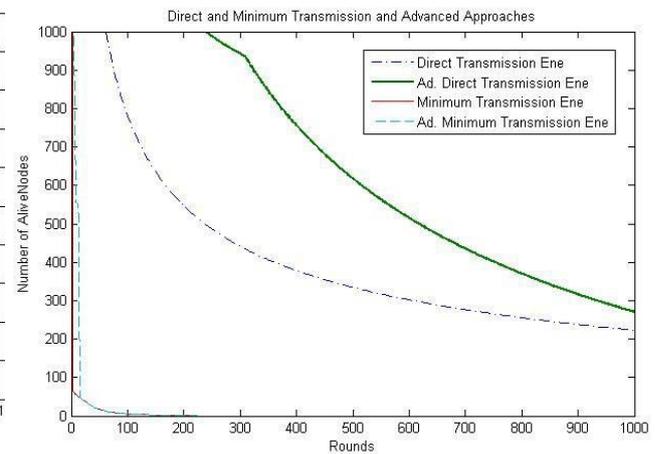


Fig. 4: Comparison for whole Network

Fig. 3 shows the plot comparison of Direct and minimum transmission energy protocols. This is done for the nth node (outermost node) and combines energy consumption by all the nodes when only nth node get data from environment and other nodes have their receiver switched off. There is always a distance where both the approaches consume equal energy. This distance can be described as

$$r_{equal} = \frac{r^2 n}{2} \dots\dots\dots (7)$$

Below this distance, direct transmission approach is better than minimum transmission approach as shown in plot.

Fig. 4 shows the energy advancement and it is clear that if advanced nodes are placed at suitable positions in the network then it is very useful. The diagram also shows that the energy advancement is always better than its normal approach.

The project is verified using simulation software (MATLAB 2011b).

V. CONCLUSION AND FUTURE SCOPE

This analysis shows that the energy advancement is always better than the normal of its approach. Direct transmission approach consumes less energy than that of minimum transmission energy approach below a certain distance. Future protocols will always simulate for the nodes deployments with very low distance between them. Therefore, direct transmission approach is useful in future protocols and analysis.

VI. ACKNOWLEDGEMENT

On the submission of our paper, we would like to extend my gratitude & sincere thanks to Mr. Ram Krishna Sharma (Department of Electronics and Communication Engineering, UIT, Allahabad) for his constant motivation and support during the course of our work during last one year. We would also like to thank to our

Head of Department Mr. Dipanjan De (Assistant Professor, Head of Department of Electronics and Communication Engineering, UIT, Allahabad), for encouraging us at the time when we did get demoralized. We are also thankful to our friends and family members who supported us directly and indirectly when we required it.

REFERENCES

- [1] Wendi B. Heinzelman, Anantha P. Chandrakasan, Hari Balakrishnan, "An Application-Specific Protocol Architecture for Wireless Microsensor Networks", IEEE transactions on wireless communication, Vol. 1, No. 4, October 2002
- [2] Giuseppe Anastasi, Marco Conti, Mario Di Francesco, Andrea Passarella, "Energy Conservation in Wireless Sensor Networks: a Survey", Department of Information Engineering, University of Pisa, Italy, Institute for Informatics and Telematics (IIT), National Research Council (CNR), Italy
- [3] Wendi Rabiner Heinzelman, Anantha Chandrakasan, and Hari Balakrishnan, "Energy-Efficient Communication Protocol for Wireless Microsensor Networks", 2000 IEEE, Hawaii International Conference on System Sciences, January 4-7, 2000, Maui, Hawaii.
- [4] I. Akyildiz, W. Su, Y. Sankarasubramaniam and E.Cayirci, "Wireless Sensor Networks: a Survey", Computer Networks, Volume 38, N. 4, March 2002.
- [5] Theodore S. Rappaport, "Wireless Communication: Principles and Practice", Book, 2nd Edition, Prantice Hall Communications Engineering and Emerging Technologies Series, 1996.
- [6] Xiangyang Li, "Wireless Ad Hoc and Sensor Networks: Theory and Applications" Book, 1st Edition, Cambridge University Press, New York, 2008.

A STUDY ON DELETERIOUS EFFECT OF COPPER ON BLOOD OF CLARIASBATRACHUS

Vikas Chandra Sharma¹, Ravnish Prasad², Raja Ram Singh²

^{1,2}Phd Scholar, Veer Kunwar Singh University, ARA, Bihar, (India)

³Associate Professor, Veer Kunwar Singh University, ARA, Bihar, (India)

ABSTRACT

This paper reports deleterious effect of copper on the blood of Clariasbatrachus by using CuSO₄.5H₂O as the test chemical. The average median lethal concentration of 96hr-LC₅₀ of CuSO₄.5H₂O was calculated to be 39.50 (≈ 40.00) mg/L. Two sub lethal doses i.e., 1/100th (=0.4 mg/L) and 1/200th (=0.2 mg/L) of CuSO₄.5H₂O were selected for acute and chronic toxicity on blood of Clariasbatrachus.

Acute exposure of 0.4 mg/L of CuSO₄.5H₂O for 24hrs, 48hrs and 96hrs duration showed a highly significant decrease from 2.33±0.10, 2.12±0.17 and 2.38±0.12×10⁶/mm³ respectively in comparison to control value 3.5875±0.15×10⁶/mm³ of erythrocyte in Clariasbatrachus. In the cases of haemoglobin, acute exposure of CuSO₄.5H₂O gave a significant decrease from 9.80±0.40, 9.67±0.22 and 10.21±0.28g/100ml respectively when compared to its corresponding control value 10.7625±0.47g/100ml. As far as, the variation in packed cell volume is concerned, the exposure of 0.4 mg/L of CuSO₄.5H₂O for 24hrs, 48hrs and 96hrs duration leads to a highly significant decrease from 25.33±0.56%, 24.17±1.00% and 24.75±1.26% respectively in comparison to its control value of 27.943±0.9956% in Clariasbatrachus.

Similarly, chronic exposure of 0.2 mg/L of CuSO₄.5H₂O for 15days, 30days and 45days duration showed a highly significant decrease from 2.13±0.04, 2.80±0.12 and 3.40±0.13×10⁶/mm³ respectively in comparison to control value 3.5875±0.15×10⁶/mm³ of erythrocyte in Clariasbatrachus. In the cases of haemoglobin, chronic exposure of CuSO₄.5H₂O gave a highly significant decrease from 10.40±0.032, 9.50±0.20 and 10.10±0.08g/100ml respectively when compared to its control value 10.7625±0.47g/100ml. As far as, the variation in packed cell volume is concerned, the chronic exposure of 0.2mg/L of CuSO₄.5H₂O for 15days, 30days and 45days duration leads to a highly significant decrease from 18.492±1.25%, 21.362±1.18% and 26.448±1.82% respectively in comparison to its control value of 27.943±0.9956% in Clariasbatrachus.

The observation of this study will help in establishment of suitable environmental condition of Clariasbatrachus.

Key Words: *Clariasbatrachus, Acute Exposure, Chronic Exposure, Copper, Erythrocyte, Haemoglobin, Packed Cell Volume.*

I. INTRODUCTION

Pollution of the aquatic environment with heavy metals has become a serious health concern in recent years (World Health organization, 1993; Ansari et al, 1994). These metals are introduced into aquatic ecosystem through various routes such as industrial effluents and wastes, agricultural pesticides, run off, domestic garbage dumps and mining activities (Merian, 1991). Increased discharge of heavy metals into natural aquatic ecosystems can expose aquatic organisms to unnaturally high levels of these metals (Van Dyk et al, 2007).

Among aquatic organisms, fish cannot escape from the detrimental effects of these pollutants, and are therefore generally considered to be the most relevant organisms for pollution monitoring in aquatic ecosystems (Van der Oost et al, 2003; Burger and Campbell, 2004).

The waste water from industries and also the sewage water from domestic sources containing heavy metals find their way into the nearby water bodies. Due to their persistence and accumulative nature, aquatic environment thus, absorb heavy metals from the surrounding contaminated water which ultimately affect their health. Among these animal species, fishes are the inhabitants that cannot escape from the detrimental effects of these pollutants (Olaifa et al, 2004) and are therefore very susceptible to physical and chemical change, which may be reflect in their blood components (Wilson and Taylor, 1993). There are five potential routes for a pollutants to enter a fish. These routes are through the food, non-food particles, gills, oral consumption of water and the skin. The metal once absorbed is transported by the blood to either a storage point, such as bone or to the liver for transportation. If transported by the liver, it may be stored there, excreted in bile, or passed back into the blood for possible excretion by kidney or gills or stored in extra hepatic tissues such as fat. This is how heavy metal gets accumulated in different tissues of the fish via blood. Once heavy metals are accumulated by an aquatic organism, they can be transferred through the upper classes of the food chain and cause biomagnifications Cumine,1975;Mance,1987).

1.1 Materials and Methods

In the present investigation, a fresh water air-breathing teleost, *Clariasbatrachus* (Linn.) was taken as the experimental animal. *Clariasbatrachus* is a carnivorous air-breathing fish belonging to the family-Claridae and order-Siluriformes.

The live fishes were collected from local fisherman of Arrah and adjacent localities during 2012-2013. The fishes were brought to the laboratory in polythene bags containing the pond water. The fishes were disinfected by washing properly with dilute $KMNO_4$ and then transferred to many large aquaria (90×60×45 cm). The fishes were left for acclimatization to the laboratory conditions for a fortnight. During this period water of each aquarium was changed on alternate days. The fishes were fed with pieces of goat's liver and fish food available in local market.

Fishes of each aquarium were thoroughly examined and unhealthy and injured specimens were rejected. To keep the aquaria free from fungal growth antifungal chemicals were used. The temperature of water of each aquaria was maintained at room temperature throughout the period of investigation.

1.2 Determination of 96-hr LC_{50} Dose

The toxicity tests of the heavy metals were conducted by employing the static bioassay method as designed by Doudoroff et al, (1951) and also recommended by APHA (1989) for the toxicity test experiments. As such, two sets of experiments, each were set up to determine the LC_{50} doses for 24hrs, 48hrs, 72hrs and 96hrs of exposure for copper.

In each set of experiment, five different concentrations of copper were taken in separate aquarium. In each concentration, ten fishes from the acclimatized fish stock were kept. The first set of experiment was conducted for 24hrs, second for 48 hrs, third for 72hrs and fourth for 96hrs respectively. The experiments were monitored round the clock and numbers of fishes died during the experiments in each concentration of each set of experiment was recorded.

The above sets of experiments were repeated with fishes formed in the present project to determine the LC_{50} dose of copper of the experimental fish. With the help of the records of dead fishes, LC_{50} doses for 24 hrs, 48hrs, and 72hrs and 96hrs exposures for copper were determined graphically by Probit Analysis (Finney, 1971). The behaviour of the fishes on exposure to various concentrations as well as to sub lethal dose of heavy metal was observed throughout the experiment.. The whole sets of experiment were repeated twice to get an average result and to minimize any error due to unavoidable reasons. Fishes were taken out for blood collection from the aquarium after the respective duration of treatment. Normal value of different blood parameters were collected before commencement of each toxicity test from the normal acclimatized fishes kept in separate aquaria and these fishes were called control groups. The values were considered as control values and were used for comparison with the experimental data's obtained from the treated fishes after conducting the toxicity test of each heavy metal. After determining the sub-lethal doses of copper selected for evaluation of their toxic effect on the haematology of *Cariasbatrachus* after treatment for different duration till 45 days. The median lethal concentration of 96hr - LC_{50} of $CuSO_4 \cdot 5H_2O$ was calculated to 39.50 (≈ 40.00) mg/L. Two sub lethal doses i.e., $1/100^{th}$ ($=0.4$ mg/L) and $1/200^{th}$ (0.2mg/L) of 96hr- LC_{50} of $CuSO_4 \cdot 5H_2O$ were selected for acute and chronic toxicity on blood of *Clariasbatrachus*.

II. HAEMATOLOGICAL PARAMETERS

various haematological parameters namely total erythrocyte (RBC) count, haemoglobin (Hb) content, haematocrit value (packed cell volume or PCV) of *Clariasbatrachus* when expose to the sub lethal concentration of 0.4mg/L $CuSO_4 \cdot 5H_2O$ for 24hrs, 48hrs and 96 hrs and 0.2mg/L of $CuSO_4 \cdot 5H_2O$ for 15 days, 30 days and 45 days exhibit distinct variations from the Control value of different haematological parameters. A detailed account of each parameter is given below:

III. TOTAL ERYTHROCYTE (RBC) COUNTS

The normal value of total erythrocyte count in the controlled *Clariasbatrachus* was $3.5875 \pm 0.15 \times 10^6 / mm^3$. The total erythrocyte count in fishes when exposed to the sub lethal concentration of copper showed following variations. The Acute exposure of 0.4 mg/L of $CuSO_4 \cdot 5H_2O$ for 24hrs, 48hrs and 96hrs duration leads to a highly significant decrease from 2.33 ± 0.10 , 2.12 ± 0.17 and $2.38 \pm 0.12 \times 10^6 / mm^3$ respectively in comparison to Control value $3.5875 \pm 0.15 \times 10^6 / mm^3$ of Erythrocyte in *Clariasbatrachus*.

When duration of exposure was increased, The Chronic exposure of 0.2 mg/L of $CuSO_4 \cdot 5H_2O$ for 15days, 30days and 45days duration leads to a highly significant decrease from 2.13 ± 0.04 , 2.80 ± 0.12 and $3.40 \pm 0.13 \times 10^6 / mm^3$ respectively in comparison to Control value $3.5875 \pm 0.15 \times 10^6 / mm^3$ of Erythrocyte in *Clariasbatrachus*.

IV. HAEMOGLOBIN CONTENT

The haemoglobin content was analysed in *Clariasbatrachus* exposed to the sub lethal doses of copper for 24 hrs, 48hrs, 96hrs, 15 days, 30days and 45 days of exposure, a marked reduction was observed. The Acute exposure of 0.4mg/L of $CuSO_4 \cdot 5H_2O$ for 24hrs, 48hrs and 96hrs duration leads to a significant decrease from 9.80 ± 0.40 , 9.67 ± 0.22 , 10.21 ± 0.28 g/100ml respectively in comparison to Control value 10.7625 ± 0.47 g/100ml of Haemoglobin in *Clariasbatrachus*

The Chronic exposure of 0.2mg/L of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ for 15days, 30days and 45days duration leads to a highly significant decrease from 10.40 ± 0.032 , 9.50 ± 0.20 and $10.10 \pm 0.08\text{g}/100\text{ml}$ respectively in comparison to Control value $10.7625 \pm 0.47\text{g}/100\text{ml}$ of Haemoglobin in *Clariasbatrachus*.

V. PACKED CELL VOLUME (PCV) OR HAEMATOCRIT VALUE (HV):

The packed cell volume in the treated *Clariasbatrachus* showed a decreasing trend when exposed to different duration of copper. The Acute exposure of 0.4 mg/L of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ for 24hrs, 48hrs and 96hrs duration leads to a highly significant decrease from $25.33 \pm 0.56\%$, $24.17 \pm 1.00\%$ and $24.75 \pm 1.26\%$ respectively in comparison to Control value of $27.943 \pm 0.9956\%$ in Packed cell volume in *Clariasbatrachus*.

Whereas after exposure of *clariasbatrachus* to The Chronic exposure of 0.2mg/L of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ for 15days, 30days and 45days duration leads to a highly significant decrease from $18.492 \pm 1.25\%$, $21.362 \pm 1.18\%$ and $26.448 \pm 1.82\%$ respectively in comparison to Control value $27.943 \pm 0.9956\%$ of Packed cell volume in *Clariasbatrachus*.

VI. RESULT

Acute Toxicity of Cupric Sulphate on Blood of *Clariasbatrachus*

Parameter	Normal Range	Control	Period of Exposure		
			24 hrs	48 hrs	96 hrs
1. Erythrocyte ($\times 10^6/\text{mm}^3$)	0.58-7.06	3.5875 ± 0.15	2.33 ± 0.10	2.12 ± 0.17	2.38 ± 0.12
2. Haemoglobin (g/100 ml)	6.40-21.20	10.7625 ± 0.47	9.80 ± 0.40	9.67 ± 0.22	10.21 ± 0.28
3. Packed cell Volume (%)	11.80-60.86	27.943 ± 0.9956	25.33 ± 0.56	24.17 ± 1.00	24.75 ± 1.26

Chronic toxicity of Cupric Sulphate on Blood of *Clariasbatrachus*

Parameter	Normal Range	Control	Period of Exposure		
			15 days	30 days	45 days
1. Erythrocyte ($\times 10^6/\text{mm}^3$)	0.58-7.06	3.5875 ± 0.15	2.13 ± 0.04	2.80 ± 0.12	3.40 ± 0.13
2. Haemoglobin (g/100 ml)	6.40-21.20	10.7625 ± 0.47	10.40 ± 0.032	9.50 ± 0.20	10.10 ± 0.08
3. Packed cell Volume (%)	11.80-60.86	27.943 ± 0.9956	18.492 ± 1.25	21.362 ± 1.18	26.448 ± 1.82

V. SUMMARY AND CONCLUSION

The average median lethal concentration of 96 hr-LC50 of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ calculated and its two sub lethal doses were selected for acute and chronic toxicity on blood of *Clariasbatrachus*.

The study showed that the effects of copper on blood of *Clariasbatrachus*. In erythrocyte it show significant decrease for both Acute and Chronic toxicity in comparison to their control value. In the cases of haemoglobin it show significant decrease for both Acute and Chronic toxicity in comparison to its control value. A significant decrease also studied in packed cell volume when compare to its control value.

Therefore it may be concluded that the changes in the haematological parameters indicate that, they can be used as indicators of copper stress in *Clariasbatrachus* on exposure to elevated copper level in water bodies. And contamination of water bodies by Heavy metals like copper is harmful for environment and their related organisms and it can create devastating situation in environment.

REFERENCES

- [1] Ansari AA, Singh LB and Tobschell HJ (1994): Status of anthropogenically induced metal pollution in the Kanpur Unnao industrial region of the Ganga Plain, India. *Environ Geol.* 38: 25-33.
- [2] APHA (1989): Standard Methods for the examinations of water and waste water. 17thed. American Public Health Association, Washington.
- [3] Burger J and Campbell RK (2004): Species differences in contaminants in fish on and adjacent to the Oak Ridge Reservation, Tennessee. *Environ. Res.* 96:55.
- [4] Cumine PM (1975): Mercury levels in Georgia Otter. Mink and fresh water Fish. *Bull Environ Contam Toxicol.* 14(2):193-196.
- [5] Doudoroff P, Anderson BG, Burdick GE, Galtsoff PS, Hart WB, Patrick R, Strong ER, Surban EW and Bon Horn WM (1951): Bioassay methods for the evaluation of acute toxicity of industrial wastes to fish. *Sewage Industrial wastes.* 23:1380-1397.
- [6] Finney DJ (1971): Probit analysis, III Ed. Cambridge University, Press. London, New York.
- [7] Krishnamurti CR and Viswanathan P (1991): Copper in the Indian environment and its human health implication. in: Toxic metals in Indian environment . Eds: CR KrishnaMurti and PushpaViswanathan). Tata McGraw, Hill Pub. Comp. Ltd. Pp. 188-198.
- [8] Mance G. (1987): Pollution Threat of Heavy Metals in Aquatic Environments. Elsevier Science Publishers Ltd. New York. pp. 146-151.
- [9] Merian E (1991): Metals and their Compounds in the Environment. Occurrence, *AnalBiolRelev.* VCH: Weinheim.
- [10] Olaifa FE, Olaifa AK, Adelaja AA, Owolavi AG (2004): Heavy metal Contamination of *Clariasgariepinus* from a lake and fish farm in Ibadan, Nigeria. *Afr. J. Biomed. Res.* 7:145-148.
- [11] Vander Oost R, Beyer J and Vermeulen NPE (2003): Fish bioaccumulation and biomarkers in environmental risk assessment: a review. *Environ ToxicolPharmacol.* 13:57-149.
- [12] Van Dyk JC, Pieterse M and Van Vuren JHJ (2007): Histological changes in the liver of *Oreochromismossambicus* (Cichlidae) after exposure to cadmium and Zinc. *Econtoxicol Environ safe.* 66:432-440.

- [13] Wilson RW and Taylor EW (1993): The physiological responses of freshwater rainbow trout, *Onchorynchusmykiss*, during acute exposure. *J Comp physiol.163B*: 38-47.
- [14] World health organization (1993): Environment Health Criteria, pp85, Lead environmental aspects, World Health Organization, Geneva.

HIGH SPEED LOW POWER ERROR TOLERANT ADDER FOR IMAGE COMPRESSION

Richa Chaturvedi¹, Dr. Rita Jain², Dr. M.K.Gupta³

¹Phd Scholar, AISECT University, Bhopal, Madhya Pradesh, (India)

² Professor, Dept of ECE, Lakshmi Narain College of Technology, Bhopal, Madhya Pradesh, (India)

³ Professor, Dept of ECE, Maulana Azad National Institute of Technology, Bhopal,
Madhya Pradesh, (India)

ABSTRACT

Low power is an imperative requirement for portable multimedia devices employing various signal processing algorithms and architectures. In most multimedia applications, human beings can gather useful information from slightly erroneous outputs. This paper contributes to better understanding of the behaviour of single-bit full adder cells when lowest power-delay products are essential. Four single-bit full adder cells have been implemented in Cadence tool suit and simulated using 180nm CMOS technology to obtain a comprehensive study of the performance of the cells with respect to time (time-delays) and power consumption (power dissipation). Simulation method used for performance measurements has been carefully devised to achieve as accurate measurements as possible with respect to time delay and power consumption. The method combines the simple measurement technique for obtaining accurate time-delays and power consumption of a cell, and the transistor resizing technique that allows systematically resizing of transistors to achieve minimal power-delay product.

Keywords: DSP application, High Speed, Low Power, Tolerant adder.

I. INTRODUCTION

In applications such as a communication system, the analog signal coming from outside world must first be sampled before we can convert it to digital data at the front end of the system. The digital data is then processed and transmitted in a noisy channel before being converted back to the analog signal at the back end. During this process, errors may occur everywhere. Furthermore, due to the advances in transistor size scaling, the previously insignificant factors such as noise and process variations are becoming important impacts in today's digital IC design [2]. Based on the characteristic of digital VLSI design, some novel concepts and design techniques have been proposed. The concept of error tolerance (ET) has proposed in [3]–[10]. According to the definition, a circuit is error tolerant if: 1) it contains defects that cause internal and external errors and 2) the system that includes this circuit produces acceptable results [3] not accurate but approximate. The “imperfect” result not appealing for the system attribute. However, the need for the error-tolerant circuit [3]–[10] was foretold in the 2003 International Technology Roadmap for Semiconductors (ITRS) [2].

To deal with error-tolerant problems, some truncated adders/multipliers have been reported [11], [12] but are not able to perform well in either its speed, power, area, or accuracy. The “flagged prefixed adder” [11] performs better than the non flagged version with a 1.3% speed enhancement but at the expense of 2% extra silicon area.

As for the “low-error area-efficient fixed-width multipliers” [12], it may have an area improvement of 46.67% but has average error reaching 12.4%. Of course, not all digital systems can engage the error-tolerant concept. In digital systems such as control systems, the correctness of the output signal is extremely important, and this denies the use of the error tolerant circuit. However, for many digital signal processing (DSP) systems that process signals relating to human senses such as hearing,

In this section, we discuss different methodologies for designing approximate adders. We use ripple carry adders (RCAs) and carry select adders CSAs throughout our subsequent discussions in all sections of this paper. Since the Mirror adder MA [13] is one of the widely used economical implementations of an full adder FA [14], we use it as our basis for proposing different approximations of an FA cell.

1.1 Approximation Strategies for the MA

In this section, we explain step-by-step procedures for coming up with various approximate MA cells with fewer transistors. Removal of some series connected transistors will facilitate faster charging/discharging of node capacitances. Moreover, complexity reduction by removal of transistors also aids in reducing the αC term (switched capacitance) in the dynamic power expression $P_{dynamic} = \alpha CV^2_{DD}f$, where activity or average number of switching transitions per unit time and C is the load capacitance being charged/discharged. This directly results in lower power dissipation. Area reduction α is the switching is also achieved by this process. Now, let us discuss the conventional MA implementation followed by the proposed approximations.

1) Conventional MA: Fig. 1 shows the transistor-level schematic of a conventional MA [13], which is a popular way of implementing a FA. It consists of a total of 24 transistors. Since this implementation is not based on complementary S logic, it provides a good opportunity to design an approximate version with removal of selected transistors.

2) Tolerant Adder 1: In order to get an approximate MA with fewer transistors, we start to remove transistors from the conventional schematic one by one. However, we cannot do this in an arbitrary fashion. We need to make sure that any input combination of A,B and C_{in} does not result in short circuits or open circuits in the simplified schematic. Another important criterion is that the resulting simplification should introduce minimal errors in the FA truth table. A judicious selection of transistors to be removed (ensuring no open or short circuits) results in a schematic shown in Fig. 2, which we call approximation 1. Clearly, this schematic as eight fewer transistors compared to the conventional MA schematic. In this case, there is one error in C_{out} and two errors in Sum. A tick mark denotes a match with the corresponding accurate output and a cross denotes an error.

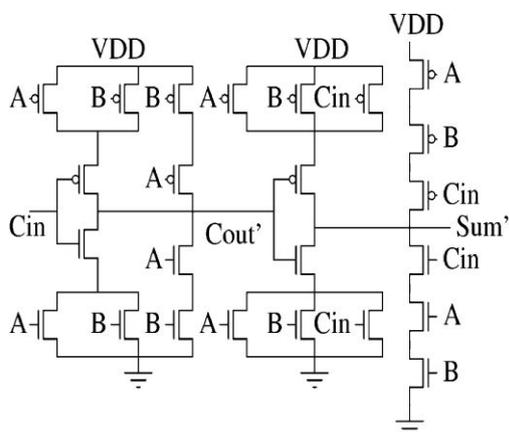


Fig. 1 Conventional Mirror Adder

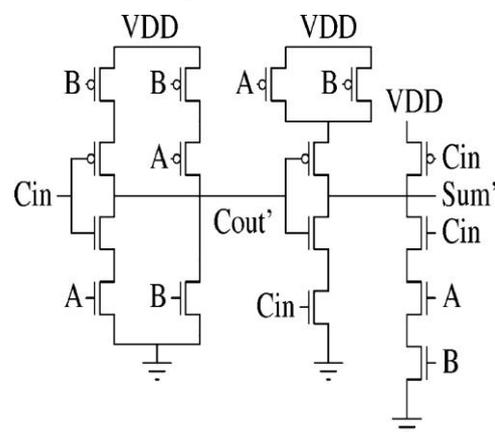


Fig. 2 Tolerant adder Adder 1

3) Tolerant Adder 2: The truth table of an FA shows that $Sum = C_{out} \oplus 1$ for six out of eight cases, except for the input combinations $A = 0, B = 0, C_{in} = 0$ and $A = 1, B = 1, C_{in} = 1$. Now, in the conventional MA, C_{out} is computed in the first stage. Thus, an easy way to get a simplified schematic is to set $Sum = C_{out}$. However, we introduce a buffer stage after C_{out} in Fig. 3 to implement the same functionality. The reason for this can be explained as follows. If we set $Sum = C_{out}$ as it is in the conventional MA, the total capacitance at the Sum node would be a combination of four source-drain diffusion and two gate capacitances. This is a considerable increase compared to the conventional case or approximation 1. Such a design would lead to a delay penalty in cases where two or more multi-bit approximate adders are connected in series, which is very common in DSP applications. Fig. 3 shows the schematic obtained using the above approach. We call this approximation 2. Here, Sum has only two errors, while C_{out} is correct for all cases.

4) Tolerant Adder 3: Further simplification can be obtained by combining approximations 1 and 2. Note that this introduces one error in C_{out} and three errors in Sum. The corresponding simplified schematic is shown in Fig. 4.

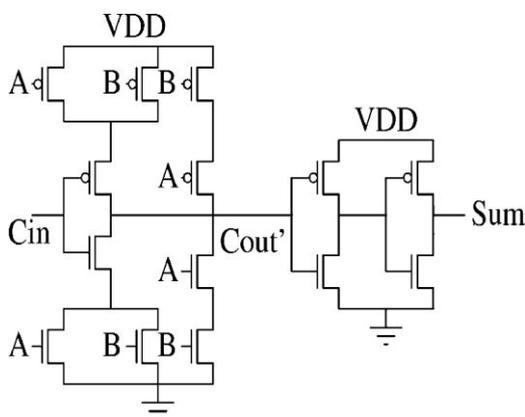


Fig. 3 Tolerant adder Adder 2

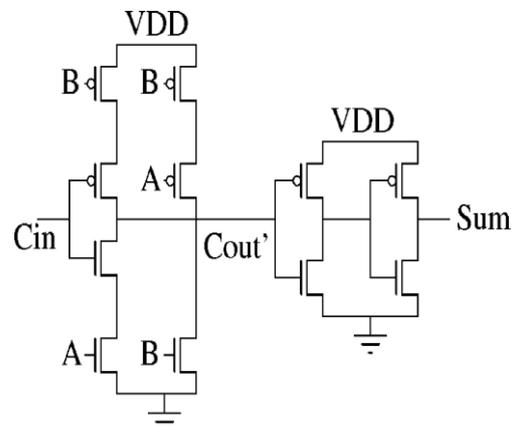


Fig.4 Tolerant adder Adder 3

5) Tolerant Adder 4: A close observation of the FA truth table shows that $C_{out} = A$ for six out of eight cases. Primarily, $C_{out} = B$ for six out of eight cases. Since A and B are interchangeable, we consider $C_{out} = A$, we propose a fourth approximation where we just use an inverter with input A to calculate C_{out} and Sum is calculated similar to approximation 1. This introduces two errors in C_{out} and three errors in Sum, as shown in Table I. The corresponding simplified schematic is shown in Fig. 5. In all these approximations C_{out} is calculated by using an inverter with C_{out} as input.

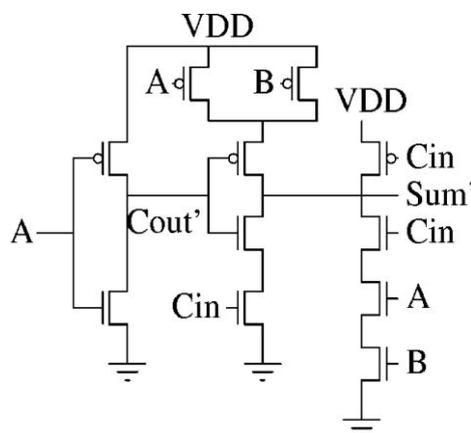


Fig. 5 Tolerant adder Adder 4

III. RESULTS

3.1 Power and Delay Comparison

Power and delay have been calculated in this work and found that power consumption of tolerant adder is very less as compared to the conventional adder. These tolerant adders are approximate but save at least 54% power it can be utilized when no accurate result is required. These tolerant adders are much faster than conventional, speed of such adder are 65% faster than conventional. Comparison of power and delay has been given in table I. The comparative result of power, delay and no. of transistors are shown in fig.6.

Table I Table for Power and Delay of Conventional FA and Tolerant Adder 1–4

	Conventional	Tolerant Adder 1	Tolerant Adder 2	Tolerant Adder 3	Tolerant Adder 4
Power	45.786 μ w	30.055 μ w	28.335 μ w	33.60 μ w	25 μ w
Delay	5.75 μ sec	7.8 μ sec	4.25 μ sec	4.98 μ sec	3.75 μ sec
No.of Transistor	24	16	14	11	11

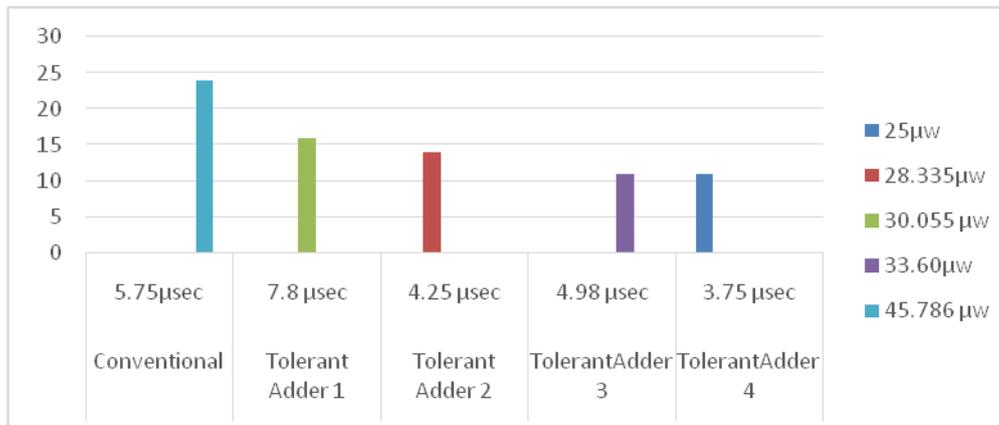


Fig.6 Comparison of Power, Delay and No of Transistors

3.2 Output Quality

The Low Power Digital Image Processing Using Approximate Adder is implemented in VHDL programming language, MATLAB and simulated. It has been synthesized and implemented by cedence 180nm tools. The results are shown in the table II. Power is reduced and image quality is maintained. The output quality of the decoded image after using discrete cosine transform has been evaluated in terms of the well-known metric of peak signal-to-noise ratio (PSNR). The output PSNR for the base case is 31.16 dB. Figure 7 shows the output images for the original and all approximate tolerant adders. It is observed that the blockiness in the second image using Tolerant adder 1. PSNR of the Tolerant adders are listed in table II.



ORIGINAL IMAGE



TOLERANT ADDER 1



TOLERANT ADDER 2



TOLERANT ADDER 3



TOLERANT ADDER 4

Fig.7 Compressed Images using Different Tolerant Adders

TABLE II PSNR and Power Comparison of Tolerant adder

	Mirror Adder	Tolerant adder1	Tolerant adder2	Tolerant adder3	Tolerant adder4
PSNR	32.2	30.12	24.56	34.44	35.56
POWER	160mW	163mW	159mW	156mW	154mW

Comparison of Lena image using different tolerant adders are shown in Figure 8 .

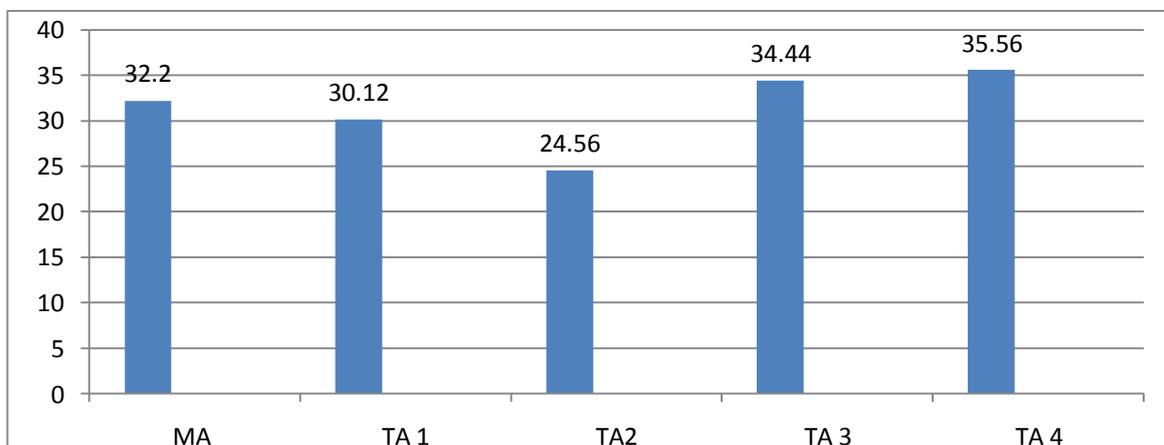


Fig.8 Comparison of PSNR of Lena Image using Different Tolerant adders

Comparison of power consumption and PSNR of different tolerant adder are shown in figure 9.

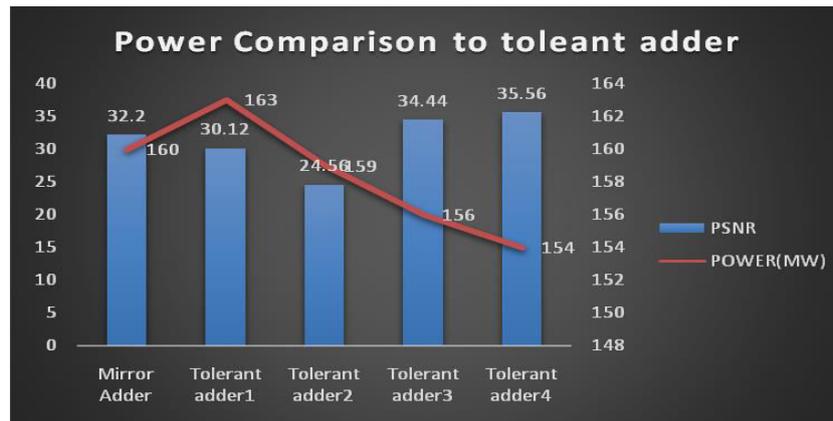


Fig.9 Comparison of PSNR and Power for Different Tolerant Adders

IV. CONCLUSION

In this paper, we proposed several imprecise or tolerant adders that can be effectively utilized to trade off power and quality for error-resilient DSP systems. Our approach aimed to simplify the complexity of a conventional MA cell by reducing the number of transistors and also the load capacitances. When the errors introduced by these approximations were reflected at a high level in a typical DSP algorithm, the impact on output quality was very little. Note that our approach differed from previous approaches where errors were introduced due to VOS [3]–[10]. A decrease in the number of series connected transistors helped in reducing the bits in each case are accurate. According to our experiments, using approximate FA cells beyond effective switched capacitance and achieving voltage scaling. We also derived simplified mathematical models for error and power consumption of an approximate RCA using the approximate FA cells. Using these models, we discussed how to apply these approximations to achieve maximum power savings subject to a given quality constraint. This procedure has been illustrated for two examples, DCT and FIR filter. We believe that the proposed tolerant adders can be used on top of already existing low-power techniques like SDC and ANT to extract multifold benefits with a very minimal loss in output quality.

REFERENCES

- [1] A. B. Melvin, "Let's think analog," in Proc. IEEE Comput. Soc. Annu.Symp. VLSI, 2005, pp. 2–5
- [2] International Technology Roadmap for Semiconductors, latest edition available online at <http://public.itrs.net/>.
- [3] A. B. Melvin and Z. Haiyang, "Error-tolerance and multi-media," in Proc. 2006 Int. Conf. Intell. Inf. Hiding and Multimedia Signal Process., 2006, pp. 521–524.
- [4] M. A. Breuer, S. K. Gupta, and T. M. Mak, "Design and error-tolerance in the presence of massive numbers of defects," IEEE Des. Test Comput., vol. 24, no. 3, pp. 216–227, May-Jun. 2004.
- [5] M. A. Breuer, "Intelligible test techniques to support error-tolerance," in Proc. Asian Test Symp., Nov. 2004, pp. 386–393.
- [6] K. J. Lee, T. Y. Hsieh, and M. A. Breuer, "A novel testing methodology based on error-rate to support error-tolerance," in Proc. Int. Test Conf., 2005, pp. 1136–1144.

- [7] I. S. Chong and A. Ortega, "Hardware testing for error tolerant multimedia compression based on linear transforms," in Proc. Defect and Fault Tolerance in VLSI Syst. Symp., 2005, pp. 523–531.
- [8] H. Chung and A. Ortega, "Analysis and testing for error tolerant motion estimation," in Proc. Defect and Fault Tolerance in VLSI Syst. Symp., 2005, pp. 514–522.
- [9] H. H. Kuok, "Audio recording apparatus using an imperfect memory circuit," U.S. Patent 5 414 758, May 9, 1995. (2002) The IEEE website. [Online]. Available: <http://www.ieee.org/>
- [10] T. Y. Hsieh, K. J. Lee, and M. A. Breuer, "Reduction of detected acceptable faults for yield improvement via error-tolerance," in Proc. Des., Automation and Test Eur. Conf. Exhib., 2007, pp. 1
- [11] D. Shin and S. K. Gupta, "Approximate logic synthesis for error tolerant applications," in Proc. Design, Automat. Test Eur., 2010, pp. 957–960.
- [12] B. J. Phillips, D. R. Kelly, and B. W. Ng, "Estimating adders for a low density parity check decoder," Proc. SPIE, vol. 6313, p. 631302, Aug.2006
- [13] J. M. Rabaey, Digital Integrated Circuits: A Design Perspective. Upper Saddle River, NJ: Prentice-Hall, 1996/
- [14] Lyons, V. Ganti, R. Goldman, V. Melikyan, and H. Mahmoodi, "Full-custom design project for digital VLSI and IC design courses using synopsys generic 90nm CMOS library," in Proc. IEEE Int. Conf. Microelectron. Syst. Edu., Jul. 2009, pp. 45–48.
- [15] "K. K. Parhi, VLSI Digital Signal Processing Systems: Design and Implementation. New York: Wiley,

A NOVEL STUDY FOR SUMMARY/ATTRIBUTE BASED BUG TRACKING CLASSIFICATION USING LATENT SEMANTIC INDEXING AND SVD IN DATA MINING

Ketki, Mr. Sanjay Kumar, Mr. RajKumar Singh Rathore

¹PG Scholar, Galgotias College Of Engineering & Technology, Greater Noida(up), (India)

²Assistant Professor, ³M.Tech Coordinator, Dept of CS/IT,

Galgotias College of Engineering & Technology, Greater Noida(up) , (India)

ABSTRACT

This paper presents a Latent Semantic Indexing (LSI) method for learning Bug tracking concepts in document data. Each attribute in a vector provides the mark of participation of the document in data or term in the parallel concept. The objective is to describe the concepts summary based, but to be capable to signify the documents and relations in a combined way for showing document-similarity, document-term, and term-term similarities or semantic relationship. Many techniques for implementing our research i.e. NLP, STEMMING, LUD, & SVD to the relevant similarity like bug report bug title, report summary etc., since every bug report, and mined developer's name who fixed the bug reports from the developers activity data. We processed the mined textual data, and got the term-to-document matrix. Our proposed model differs from different machine learning methods for on the basis of summary and attribute based classification of bug reports which produce the outlier bugs from large amount of data that improved accuracy and efficiency bug classification and relevant base bug indexing which is similar in meaning by using LSI and SVD Technique.

Keyword: BTS, LSI, SVD, LUD etc

I. INTRODUCTION

A bug tracking system is used for justification and sharing of bug reports to the maximum appropriate designers. An LSI based bug tracking scheme may decrease the software preservation time and advance its value by correct and timely task of new bug reports to the suitable reporters.

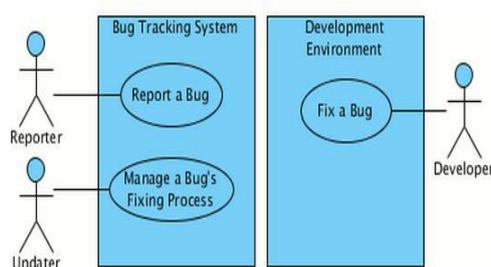


Figure 1: Diagram Shows Some use Cases Related to Bug Tracking and Fixing

In this paper, we present the current techniques over due an LSI bug tracking system, which is based on the labeling of summary bug reports. In order to get an attribute bug tracking system we used these techniques and performed comparative experiments.

Latent Semantic Analysis arose from the problem of how to find relevant documents from search words. The fundamental difficulty arises when we compare *words* to find relevant documents, because what we really want to do is compare the *meanings or concepts behind the words*. LSA attempts to solve this problem by mapping both words and documents into a "concept" space and doing the comparison in this space.

Most NLP applications such as information extraction, machine translation, sentiment analysis and question answering, require both syntactic and semantic analysis at various levels. The motivation for LU decomposition is based on the observation that systems of equations involving triangular coefficient matrices are easier to deal with.

1.1 Indexing for Documents

Indexing is an essential part of the IR systems for two reasons. First, it optimizes the query performance and improves the response times considerably by storing terms in an inverted file structure.

1.2 Searching

In this phase, the query terms are searched against the inverted index. All the documents that contain the occurrences of the query terms are retrieved. Depending on the application, the retrieval can be done even for the partially matched documents.

1.3 Ranking

The documents retrieved in the previous step are given scores according to the matching quality between the query terms and the documents. The documents are sorted according to this score, so that the most relevant documents are presented to the user on top of the retrieval list. Ranking process is highly dependent to the IR model. Semantic analysis at various levels. Traditionally, NLP research has focused on developing algorithms that are either language-specific and/or perform well only on closed-domain text.

II. LITERATURE REVIEW

Literature reviews are the maximum basic, yet very significant concept to set a theoretical basis. Their quality and usefulness greatly depends on the literature research process:-

Turney [2, 9] proposed the Latent Relational Analysis (LRA) by covering VSM-based methods in three ways: a) lexical patterns are mechanically extracted from a corpus, b) the Singular Value Decomposition (SVD) is used to smooth the frequency data, and c) synonyms are used to travel variants of the word-pairs.

Danushka Bollegala *et al.* [11] planned the method which accepted web text wastes to mechanically extract lexical patterns that describe the relation obscure by the two words in a word-pair and calculates the relational similarity between two word-pairs using a machine learning approach.

Shuji [10] shape a model to detect defect correction effort based on protracted association rule mining. They defined defect fixing effort as a variable and appropriate association rule mining to treat with such variables. Data used are supported from Japan's Ministry of Economy, Trade and Industry (METI).

Emad and Walid [13] have developed an approach for predicting re-opened defects through Eclipse projects, their study depend upon some factors such as work habits dimension like: day which issue is closed, the bug report features dimension like: components, the bug correction dimension like: time needed to fix bug.

Weiß et al. predict the “fixing effort” or person-hours spent addressing a defect [7]. They leverage existing bug databases and historical context information. To make their prediction, they use pre-recorded development cost data from the existing bug report databases.

III. PROBLEM STATEMENT

The Software development corporations have to face a lot of problems while preserving physically all the preservation of the projects, their bugs and their status. This type of problem kinds the whole system an incompetent one and thus making a poor and unorganized working. In order to remove this type of problem, So that the paper is deliberate to develop. The LSI mechanism that resolves the problem contains simply of helpful a very large number of local Data. It also permits the manager of the system to modify the tracking procedure so that unnecessary documentation on the part of the problem solvers does not develop a waste of time.

IV. SYSTEM MODEL

The system model in linear algebra that decomposes a matrix into three factor matrices. SVD is a much more complex approach than other; however, once the original matrix has been moldy, operations on the matrix are rather quick.

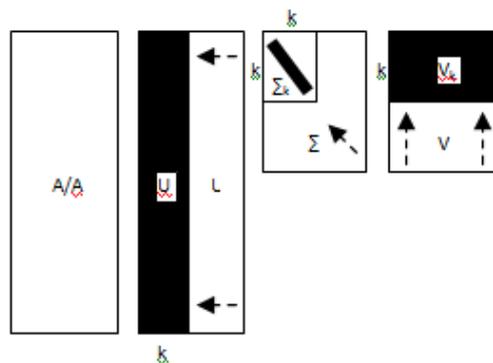


Fig 2: Singular Value Decomposition is a Mathematical

SVD is an extension of Latent Semantic indexing (LSI). LSI is a technique of investigating a group of terms and documents to find relationships between the two [7].

SVD taking as input a matrix of size $m \times n$. This matrix is spoiled into three different matrices: $U\Sigma V_T$. The output of these three matrices is a relationship to the original matrix.

S and V_T are both orthogonal matrices and Σ is a diagonal matrix. These three matrices are added identified as:

- S is the right singular vectors
 - Sized: $m \times r$
- V_T is the left singular vectors
 - Sized: $r \times r$
- Σ is the singular values
 - Sized: $n \times r$

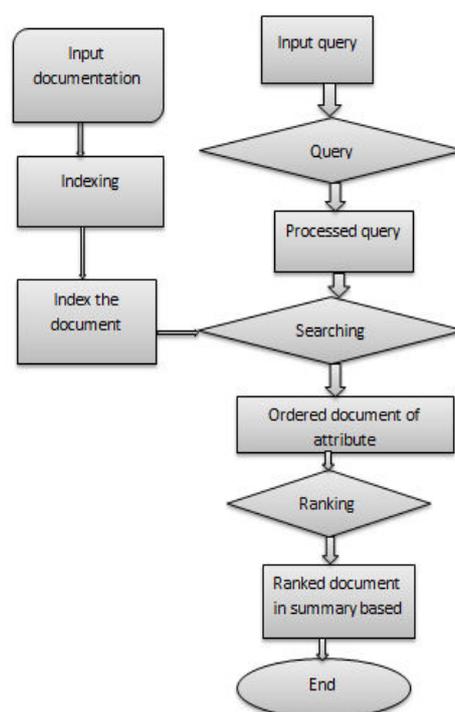
For SVD, “ r ” is measured to be the rank of the matrix, which is the minimum of the original matrix dimensions. In overall, all matrices necessityis full rank, meaning r is equal to either m or n . In this case, we can accuratelyrebuild the original matrix given the three decomposed matrices.

SVD has astimulating property that permits for less than full rank of the matrices to approximate the original matrix. For the purposes of this project and LSA, we don’t want the original data back (perfect reconstruction of the original matrix), but rather we want underlying relationships in the movie data.

V. PROPOSED IMPLEMENTATION

To complete Latent Semantic Indexing on a collection of documents, this paper performs the following steps:

- Main in first, change each document in your index into a vector of word occurrences. The number of dimensions your vector occurs in is equivalent to the number of exclusive words in the whole document set. Most document vectors will have great empty patches, some will be quite full. It is optional that common words (e.g., "this", "him", "that", "the") are removed.
- Next, scale each vector so that every term imitates the frequency of its occurrence in context. *I'll column the math for this step when I get home. Seems he didn't ever get home ;-)*
- Next, combine these column vectors into a large *term-document matrix*. Rows represent terms, columns represent documents.
- Execute SingularValueDecomposition on the term-document matrix. This will result in three matrices usually called U, S and V. S is of specific interest, it is a diagonal matrix of singular values for your document system.
- Recombine the terms to form the original matrix (i.e., $U * S' * V(t) = M'$ where (t) signifies transpose).
- Break this reduced rank term-document matrix back into column vectors. Assistant these with their corresponding documents.
- Currently you have a Latent Semantic Index.



5.1 Indexing Process

A stemming algorithm is a process of language standardization, in which the different procedures of a word are summary to a common form, for example,

- Connection
- Connections
- Connective --->connect
- Connected
- Connecting

It is important to grow that we use stemming with the meaning of improving the concert of LSI systems. It is not an exercise in etymology or grammar. In fact from an etymological or grammatical viewpoint, a stemming algorithm is accountable to make many mistakes. In adding, stemming algorithms - at least the ones obtainable here - are appropriate to the written, not the spoken, form of the language.

For some of the world's languages, Chinese for example, the concept of stemming is not applicable, but it is certainly meaningful for the many languages of the Indo-European group. In these languages words tend to be constant at the front, and to vary at the end:

- ion
- ions
- connect-ive
- ed
- ing

The adjustable part is the 'ending', or 'suffix'. Taking these endings off is called 'suffix stripping' or 'stemming', and the residual part is called the stem.

VI. RESULT

The performance evaluation in the thesis is being carried out by using standard Bug tracking of recall and precision for each word & sentence, interpolated average percentage is computed.

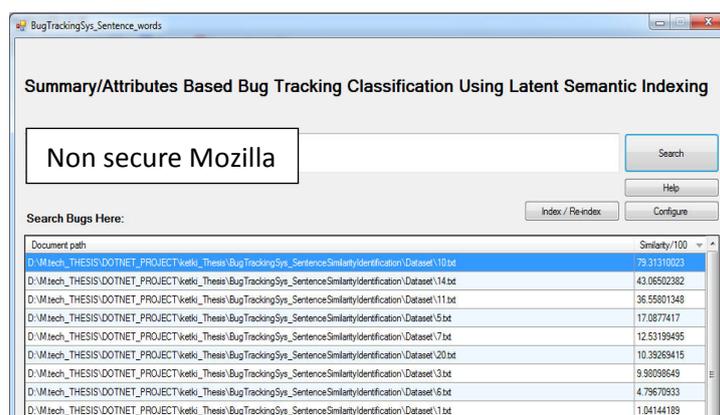


Figure 1: Semantic Search Sentence Based Similarity

In Figures 2 and 3, we have presented the results on evaluation of interpolated semantic search for each of the content queries in the database. Figure 3 represents the highlight of sentence for each query with respect to SVD and

LUD at, where we have recorded the maximum average percentage in Figure 3.

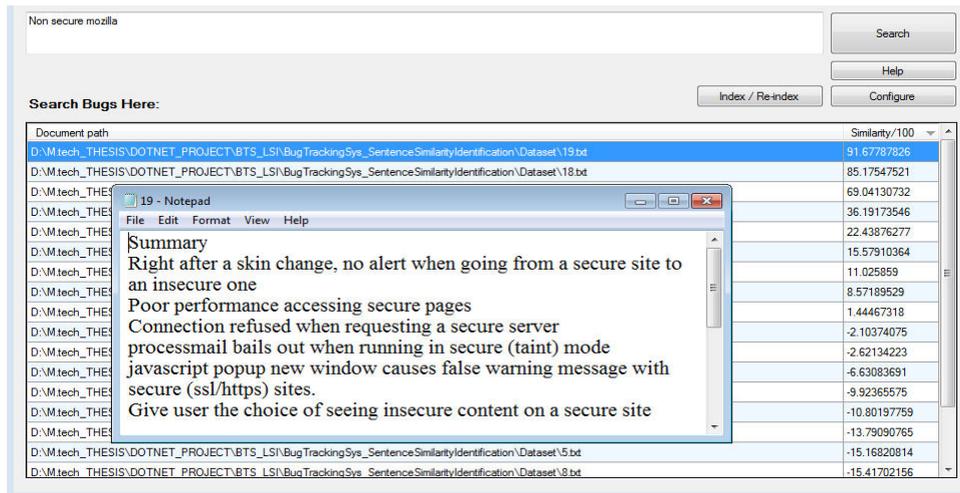


Figure2: Semantic Search Sentence Based Similarity with Document

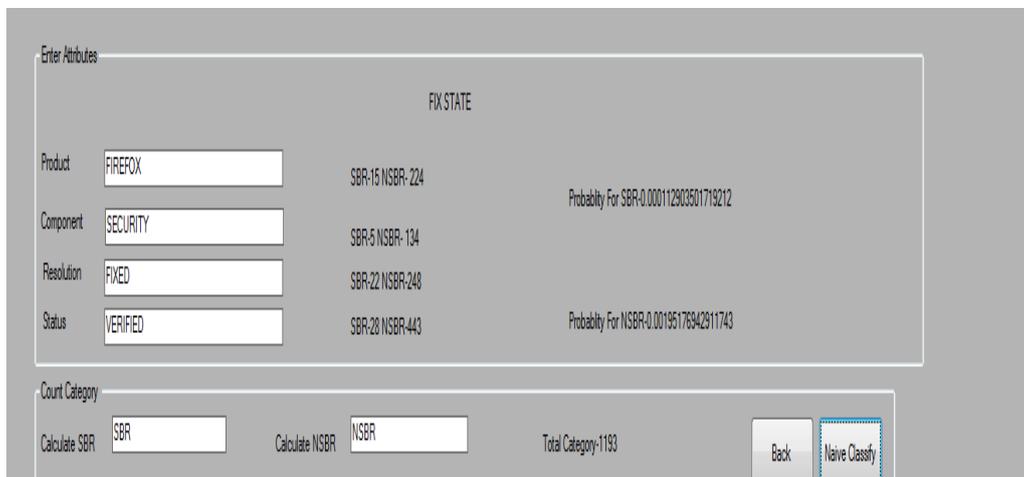


Figure 3: Bug Tracking with Random Attribute

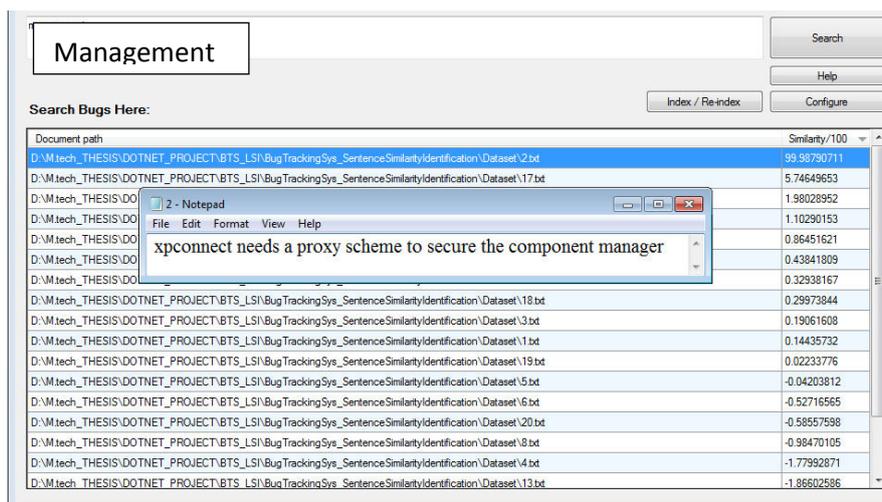


Figure 4: Semantic Search Word Based Similarity with Data

VII. CONCLUSION

Current bug tracking systems effectively elicit all of the information needed by user. Without this material developers cannot resolve bugs in a timely detect. We analyze the same bug summary attributes in different

ways. First we analyze the bug summary with the help of LSI Indexing & SVD classification which is simple to use and efficient to other classification algorithm. Natural language processing enables us to implements a more automated and more efficient bug training process. By analyzing same BUG summary with different methods it increase the efficiency of the system. While implementing a range of improvements from these areas may be ideal, bug tracking systems may instead prefer to specialize, thus providing a rich set of choices.

REFERANCES

- [1] J. Anvik, I. Hiew, and G. C. Murphy, Who should fix this bug? In ICSE'06: Proceedings of the 28th International Conference on Software engineering, pages 361-370, 2006.
- [2] P.D. Turney, Measuring semantic similarity by latent relational analysis, in Proc. Of IJCAT'05, pp-1136-1141, (2005).
- [3] S. Artzi, S. Kim and M. D. Emst, Research: Making software failures reproducible by preserving object states. In Ecoop'08: Proceedings of the 22nd European Object-Oriented Programming Conference, pages 542-565, 2008. [CrossRef]
- [4] N. Bettenburg, S. Just, A. Schroter, C. Weiss, R. Premraj, and T. Zimmermann. What makes a good bug report? In FSE'08: Proceedings of the 16th International Symposium on Foundations of Software Engineering, pages 308-318, November 2008.
- [5] N. Bettenburg, R. Premraj, T. Zimmermann, and S. Kim. Duplicate bug reports considered harmful...really? In ICSM'08: Proceedings of the 24th IEEE International Conference on Software Maintenance, pages 337-345, 2008.
- [6] S. Brey, J. Sillito, R. Premraj, and T. Zimmermann. Frequently asked question in bug reports. Technical Report, University of Calgary. March 2009.
- [7] C. Wei, B. R. Premraj, T. Zimmermann, and A Zeller. How Long will it take to fix this bug? In Workshop on Mining Software Repositories, May 2007.
- [8] S. Kim and J. E. James Whitehead. How long did it take to fix bugs? In International workshop on Mining Software Repositories, pages 173-174, 2006.
- [9] P.D. Turney, Similarity of semantic relations, Computational Linguistics, 32(3), 379-416, (2006).
- [10] SHUJI M.AKITO M AND TOMOKO M, Defect data analysis based on extended association rulerning, In Proceeding of International Workshop on Mining Software Repositories (MSR), 2007
- [11] D. Bollegala, Y. Matsuo, and M. Ishizuka. www site the sat: Measuring relational similarity on the web. In Proc. Of ECAI'08, pages 333-337, 2008.
- [12] J.Aranda and G. Venolia. The secret life of bugs: Going past the errors and omissions in software repositories. In ICSE'09: Proceedings of the 31st International Conference on Software Engineering(to appear), 2009.
- [13] EMAD S, AKINORI I, WALID I, AHMED H, Predicting reopened bugs: A case study on the eclipse Project. In Proceedings of the 17th Working Conference on Reverse Engineering WCRE 2010.

FINGERPRINT MATCHING TECHNIQUES: REVIEW

Renu Mourya¹, Ms.Sarita²

¹M.tech Scholar, ²Assistant Professor, DCRUST (Murthal)

ABSTRACT

Biometric systems operate on behavioral and physiological biometric parameters to identify an individual. Every fingerprint has unique features and its recognizing system mainly works on local ridge feature such as ridge endings, minutiae, core point, delta, etc. However, fingerprint images get degraded and corrupted due to variations in skin and impression conditions. The more critical step in fingerprint matching is to reliably extract minutiae from the input fingerprint images. This paper presents a review of a number of techniques present in the literature for matching fingerprints.

Keywords: *Fingerprint Images, Minutiae Extraction, Ridge Endings, Ridge Bifurcation, Fingerprint Recognition.*

I. INTRODUCTION

Biometrics is the science of recognizing uniqueness of humans based upon one or more intrinsic physical or behavioral traits [1]. Biometric systems operate on behavioral and physiological biometric parameters to identify an individual. The behavioral biometric parameter includes signature, gait, speech and keystroke, which are keep changing with age and environment. However physiological characteristics such as face, fingerprint, palm print and iris remain the same throughout the life time of an individual. The biometric system can be used as verification mode or identification mode depending on the requirement of an application. The verification mode validates the individual's feature by matching against an existing database and the identification mode recognizes individuals among number of fingerprints. The quality of the fingerprint image is of critical importance therefore a good quality fingerprint must contain at least 25 to 80 minutiae. It is quite difficult to extract reliably minutia from poor quality fingerprint impressions which are due to very dry fingers and fingers mutilated by scars, scratches due to accidents, injuries or non-uniform contact with the fingerprint capture device, etc.[15] Fingerprint identification is commonly employed in forensic science to aid criminal investigations etc. A fingerprint is a unique pattern of ridges and valleys on the surface of a finger of an individual. False accept rate (FAR) specifies the performance of a bio-metric system. There should be a decision boundary which minimizes the false reject rate (FRR) for the specified FAR [3].

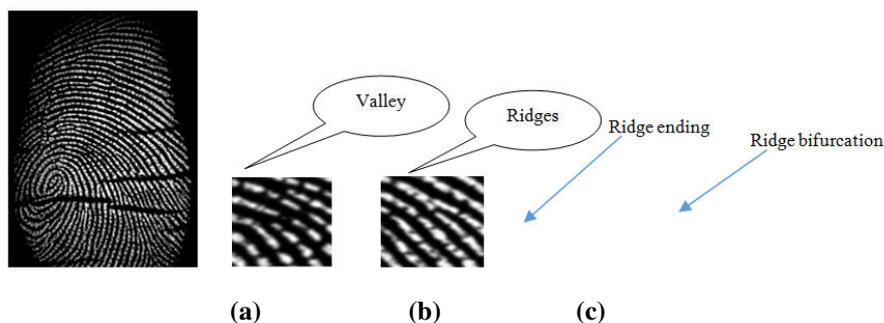


Figure 1 (A) Basic Fingerprint Image (B) Ridge Ending (C) Ridge Bifurcation

A ridge is defined as a single curved segment (white colored curve), and a valley is the region between two adjacent ridges (black color space between two adjacent ridges). Minutiae points (fig.1) are the local ridge discontinuities, which are of two types: ridge endings and bifurcations. These are the minutiae points which are used for determining uniqueness of a fingerprint of an individual. Recently, techniques like [4, 5, 6] have been proposed that use other features apart from minutiae for Fingerprint recognition. Chen et al [4] proposes a reconstruction technique due to which the fingerprint's orientation from minutiae and utilizes it in the matching stage for the improvement of the system's performance. Cao et al [5] had introduced two novel features like finger placement direction and the ridge compatibility to deal with non linear distortion in fingerprints. Choi et al [6] proposed many ridge features like ridge count, ridge length, ridge curvature direction and ridge type together with minutiae for the increment o the matching performance.

The accuracy of any techniques depends on the quality of the input image. Therefore, image enhancement techniques are often used for reducing the noise. Today, there are number of methods has been proposed for enhancement of fingerprint images which are based on image normalization and Gabor filtering (Hong's algorithm) [7], based on Directional Fourier filtering [8], using Binarization Method [9], based on directional median filter [10], fingerprint image enhancement using filtering techniques [11], image retrieval based on color histogram and textual features [12], based on fuzzy logic and neural networks [13-14] etc. For low quality fingerprint images, Choonwoo et al [1] has proposed novel approach to enhance feature extraction using stochastic resonance (SR). SR refers to a phenomenon where certain amount of noise is added to the original signal due to which signal-to- noise-ratio increases. Experimental results show that Gaussian noise added to low quality fingerprint images enables the extraction of useful features for biometric identification.

II. FINGERPRINT FEATURES

Fingerprint features can be classified into three classes [7, 29]. Level 1 feature gives macro level details of the ridge flow, Level 2 feature gives minutiae points which are discriminative enough for recognition, and Level 3 feature gives pores of the fingerprint which complement the uniqueness of Level 2 feature.

2.1 Global Ridge Pattern

There are two types of ridge flows: the pseudo-parallel ridge flows and high-curvature ridge flows which are located around the core point and/or delta point(s). This representation relies on the ridge structure, global landmarks and ridge pattern characteristics. The commonly used global fingerprint features are:

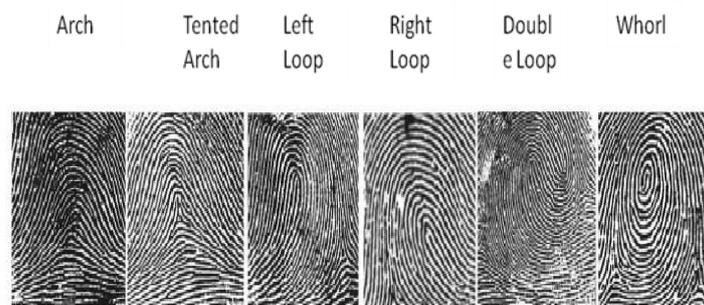


Figure 2 Global Fingerprint Ridge Patterns [29]

Ridge orientation map – It represents the local direction of the ridge-valley structure. It is commonly utilized for classification, image enhancement and minutia feature verification and filtering.

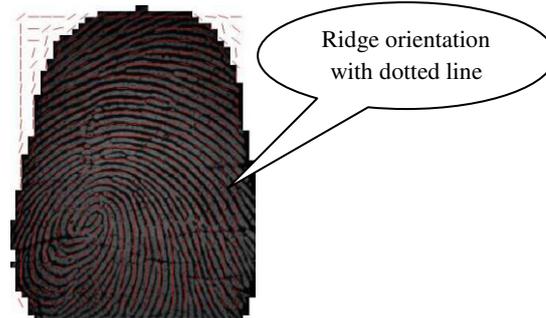


Figure 3 Ridge Orientation Map

Ridge frequency map – It is the reciprocal of the ridge distance in the direction perpendicular to local ridge orientation. It is extensively utilized for contextual filtering of fingerprint images.

2.2 Local Ridge Pattern

This is the most widely used and studied fingerprint representation. Local ridge details are the discontinuities of local ridge structure referred to as minutiae.

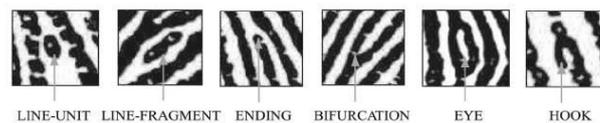


Figure 4: Some of the Common Minutiae Types [29]

Minutiae are also called “Galton details” because Galton (1822-1922) was the first person who observed the structures and permanence of minutiae. There are about 150 different types of minutiae [15] categorized based on their configuration. Mainly “ridge ending” and ridge bifurcation” are used because all the other types are combination of these two minutiae. Some minutiae are shown in fig. 4. Minutiae-based fingerprint representation method has been proposed by The American National Standards Institute-National Institute of Standard and Technology (ANSI-NIST) which includes minutiae location and orientation [16]. Minutia orientation gives the direction of the underlying ridge at the minutia location (fig. 5).

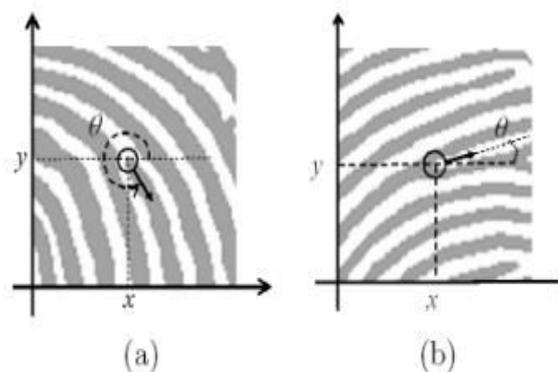


Figure 5: (A) A Ridge Ending Minutia: (X, Y) are The Minutia Coordinates; Θ Is The Minutia's Orientation; (B) A Ridge Bifurcation Minutia: (X, Y) Are The Minutia Coordinates; Θ Is The Minutia's Orientation.

2.3 Techniques for Fingerprint Matching

- Minutia based
- Pattern matching
- Correlation based
- Image based

Minutiae Based Matching: Techniques based on minutia represent the fingerprint by its local features, like terminations (ridge ending) and bifurcations [17, 18]. Two fingerprints match if and only if their minutiae points match with each other. This technique is treated as backbone of fingerprint recognition products. One of the example can be found in proposed algorithm of [19] in which minutiae are extracted and then an affine transformation model is applied between the points and solved it using Ransac algorithm. Philippe Parra [2], proposed algorithm based on Fingerprint Recognition using Minutia Score Matching method work well as compare to Fingerprint Recognition Fuzzy Neural Network (FRFNN). Anil Jain et.al[20], has proposed novel hybrid method which is combination of texture based and minutia based matching technique which leads to substantial improvement in performance in overall matching performance as shown in graph below(fig 6) which shows that performance of hybrid method is more than only minutiae based.

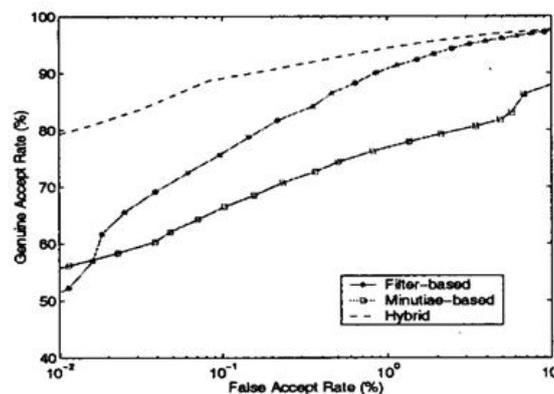


Figure 6: ROC Curve Comparing the Performance of Hybrid Technique [20] with Minutiae Based Approach

Pattern Based Matching: This technique also known as Ridge Feature Based Techniques. It is suffering from disadvantages such as being sensitive to proper placement of finger and the need of large storage for templates.

Correlation Based matching [21, 22, 23]: Result based on this principal is rarely accepted because of several reasons such as Non-linear distortion, Skin condition and finger pressure cause image brightness, contrast variation, and the technique is computationally very expensive.

Image Based matching: Image based matching techniques try to match based on the global features of a whole fingerprint image.

Asker M. Bazen et.al.[24]showed that reinforcement learning for minutia detection. Arivazhagan et.al [25] has proposed method based on Gabor wavelet and co-occurrence matrices to obtain fingerprint code for fingerprint verification. Mohammed S. Khalil[26] has proposed method based on the statistical descriptor for the characterization of co-occurrence matrices and for the result analysis Rate Estimation and statistical summaries program used. Koichi et. al.[25] has proposed a hybrid algorithm which combines phase-based image matching and feature-based matching technique for improvement of matching performance of both fingerprint images with poor image quality and with non linear shape distortions.

III. CONCLUSION

False matching ratio is more accurate in minutiae based technique as compare to fuzzy neural based technique [15] but performance of hybrid matching technique is better than opting single technique for matching. On the other hand Filter based matching technique is more amenable to hardware implementation than a string-based fingerprint matcher [10].

REFERENCE

- [1]. Roli Bansal et. al, "Minutiae Extraction From Fingerprint Images - A Review", IJCSI International Journal Of Computer Science Issues, Vol.8 Issue 5, No-3, September 2001.
- [2]. Philippe Parra, "Fingerprint Minutiae Extraction And Matching For Identification Procedure", CA 92093-0443.
- [3]. Anil K Jain, "Filterbank-Based Fingerprint Matching", IEEE Transactions On Image Processing, Vol. 9, No. 5, May 2000.
- [4]. F. Chen, J. Zhou And C. Yang, "Reconstructing Orientation Field From Fingerprint Minutiae To Improve Minutiae Matching Accuracy", Ieee Transactions On Image Processing, Vol. 18, No. 7, 2009, Pp. 1665-1670.
- [5]. K. Cao, X. Yang, X. Tao, P. Li, Y. Zang And J. Tian, "Combining Features For Distorted Fingerprint Matching", Journal Of Network And Computer Applications, Vol. 33, 2010, Pp. 258-267.
- [6]. H. Choi, K. Choi And J. Kim, "Fingerprint Matching Incorporating Ridge Features With Minutiae", IEEE Transactions On Information Forensics And Security, Vol. 6, No. 2, 2011, Pp. 338-345.
- [7]. L. Hong, Y. Wan and A. K. Jain, "Fingerprint Image Enhancement: Algorithms and Performance Evaluation", IEEE Transactions On Pattern Analysis And Machine Intelligence, Vol. 20(8), 1988, Pp. 777-789.
- [8]. B. G. Sherlock, D. M. Monro And K. Millard, "Fingerprint Enhancement By Directional Fourier Filtering, Vision", IEEE Proceedings On Image And Signal Processing, 141(2), 1994, Pp. 87-94.
- [9]. Trier, T. Taxt, "Evaluation Of Binarisation Methods For Document Images", IEEE Transactions On Pattern Analysis And Machine Intelligence, Vol. 17, No. 3, 1995, Pp.312- 315.
- [10]. C. Wu, Z. Shi, And V. Govindaraju, "Fingerprint Image Enhancement Method Using Directional Median Filter", Biometric Technology For Human Identification, Spie, Volume 5404, 2004, Pp. 66-75.
- [11]. S. Greenberg, M. Aladjem, D. Kogan And I. Dimitrov, "Fingerprint Image Enhancement Using Filtering Techniques", Real-Time Imaging Vol. 8, 2000, Pp. 227- 236.
- [12]. Chuen-Horng Lin, W. Lin, "Image Retrieval System Based On Adaptive Color Histogram and Texture Features", The Computer Journal, 2010.
- [13]. M. T. Leung, W. E. Engeler, And P. Frank, "Fingerprint Image Processing Using Neural Networks", In Tencon 90, Ieee Region 10 Conference On Computer And Communication Systems, Vol. 2, 1990, Pp. 582-586.
- [14]. C. Ryu, S. G. Kong And H. Kim, "Enhancement Of Feature Extraction For Low-Quality Fingerprint Images Using Stochastic Resonance", Pattern Recognition Letters, Vol. 32, 2011, Pp. 107-113.
- A. K. Jain, L. Hong, and R. Bolle, "On-Line Fingerprint Verification", IEEE Transactions On Pattern

Analysis And Machine Intelligence, 19(4), 1997, Pp. 302–314.

- [15]. Bazen And S. Gerez, “Segmentation Of Fingerprint Images”, In Proc. Workshop On Circuits Systems And Signal Processing (Prorisc 2001), Pp. 276–280.
- [16]. Zhixin Shi , Venu Govindaraju, “A Chaincode Based Scheme For Fingerprint Feature Extraction”, Pattern Recognition Letters, Vol. 27, 2006, Pp. 462–468.
- [17]. V. K. Sagar And K. J. Beng, “Hybrid Fuzzy Logic And Neural Network Model For Fingerprint Minutiae Extraction”, International Joint Conference On Neural Networks, Ijcnnc '99., Vol. 5, 1999, Pp. 3255–3259.
- [18]. Ravi.J. Et Al , “Fingerprint Recognition Using Minutia Score Matching”, International Journal Of Engineering Science And Technology Vol.1(2), 2009, 35-42
- [19]. Anil Jain. Et Al, “Fingerprint Matching Using Minutiae and Texture Features” 0-7803-6725-1, ©IEEE.
- [20]. K. Nandakumar and A.K. Jain, "Local Correlation-Based Fingerprint Matching", In Proc. Icvqip, 2004, Pp.503-508.
- A. Lindoso, L. Entrena, C. López-Ongil, And J. Liu-Jimenez, "Correlation-Based Fingerprint Matching Using Fpgas", In Proc. Fpt, 2005, Pp.87-94.
- [21]. D. K. Karna, S. Agarwal, And S. Nikam. “Normalized Cross-Correlation Based Fingerprint Matching”. In Proc. Fifth International Conference On Computer Graphics, Imaging And Visualisation (Cgiv '08), 2008, Pp. 229-232.
- [22]. Asker M. Bazen Et Al., “A Reinforcement Learning Agent For Minutia Extraction From Fingerprint” 2008
- [23]. S. Arivazhagan Et Al., “Fingerprint Verification Using Gabor Co-Occurrence Features “ In International Conference On Computational Intelligence And Multimedia Application, 2007 Pp 281-285.
- [24]. Mohammed S Khalil, et al., “Fingerprint Verification Based On Stastical Analysis”, IEEE, 2010.
- [25]. Ritu et al., “A Review On Fingerprint Based Identification System” International Journal Of Advanced Research In Computer And Communication Engineering Vol.3, Issues 3, March 2014.
- [26]. D. Maltoni, D. Maio, A. K. Jain, And S. Prabhakar. Handbook Of Fingerprint Recognition. Springer-Verlag New York, Inc., Secaucus, Nj, Usa, 2003. 2, 3
- [27]. Anil K. Jain, Yi Chen, Meltem Damirkus, “ Pores And Ridges:High Resolution Fingerprint Matching Using Level Three Features,” Ieee Transaction On Pattern Analysis And Machine Intelligence, Vol 29, No1, Jan 2007.

DIFFERENT FILTERING METHOD FOR SUPPRESSING ARTIFACT FROM COLOR AND CONTRAST MODIFICATION

Miss. Kulkarni Rohini Gopalrao¹, Prof. Gajare Yogita R.²

¹ PG student, E& TC Department (Signal Processing), Jai Hind College of Engineering,
Kuran Dist.-Pune, Maharashtra(India)

² Assistant Professor (E& TC Dept.), Jai Hind College of Engineering, Kuran Dist.Pune,
Maharashtra (India)

ABSTRACT

This work is concerned with the modification of the gray level or color distribution of digital images. A common draw-back of classical methods is that it allows large number of artifacts or the attenuation of details and textures. In this work, we propose a generic filtering method enabling, given the original image and the radio metrically corrected one, to suppress artifacts while preserving details. The approach relies on the key observation that artifacts correspond to spatial irregularity of the so called transportation map, defined as the difference between the original and the corrected image.

In this paper, Adaptive Histogram equalization are applied on digital image which leads to some visual artifacts. Then Transportation map which is the difference between original image and transformed image is calculated, then a generic filtering method also called TMR filter which draws on the nonlocal Yaroslavsky filter is used to regularize the transportation map so that artifacts are suppressed. The results are compared with related approaches such as mean, median and wiener filtering of transformed images.

Keywords: *Color and Contrast Modifications, Histogram Equalization, Adaptive Histogram Equalization, Transportation Map, TMR Filter, Color Transfer, Contrast Adjustment, Contrast Equalization,*

I. INTRODUCTION

Applying contrast changes to digital images is one of the most essential tools for image enhancement. Such changes may be obtained by applying a prescribed function to the gray values of images, as in contrast stretching or Gamma correction, or by prescribing the histogram of the resulting image, as in histogram equalization or specification from an example image [1]. Such operations are characterized by the way they affect the histogram of an image and may be seen as Modifications of their gray-level distribution. These techniques extend to color images by considering a luminance channel, as in Gamma correction, or by working on each color channel separately. The prescription of the 3-D color distribution is more satisfying because it avoids the creation of false colors, but is also more involved.

Applications of contrast or color changes are of course extremely numerous. With the popularization of digital photography, these techniques have become immensely popular through the use of various “curves” in image

editing software. Early uses of contrast equalization are the enhancement of medical images [2] and the normalization of texture for analysis purposes. In a related direction, the construction of *midway* histograms [3], [4] is useful for the comparison of two images of the same scene. More recently, extensive campaigns of old movies digitization have claimed for the development of contrast modification techniques to correct flicker [5], [6]. Similar techniques are commonly used in the postproduction industry [7], [8]. Another field of increasing industrial interest in which contrast changes play a central role is the one of imaging in bad climatic conditions, see, e.g., [9]. Color modification or transfer is also useful for a wide range of applications, such as aquatic robot inspection, space image colorization, and enhancement of painting images.

The drawback of color and contrast modification techniques and compression techniques is to create visual artifacts such as noise enhancement, detail loss, texture washing, color proportion inconsistencies and compression artifacts. Several methods have been proposed in last few years to remove artifacts from color and contrast modification. The simplest one is proposed in [10] in the context of local histogram modifications and amounts to limit the modification depending on gradient values. While improving the results in some cases, this approach let most artifacts untouched. In [11], it is proposed to correct color transfer artifacts by using a variation regularization after the transfer. Still in a variation framework, the authors of [12] propose a unified formulation containing both color transfer and regularity constraints in a single energy minimization. For the problem of color proportion, a possible approach is to transfer color after having identified some homogeneous regions, as proposed in [13] and [14]. A related class of works takes interest in the avoidance of compression artifacts, usually using the properties of the compression scheme [15].

In this paper TMR filter is proposed as a universal approach to remove all visual artefacts. TMR filter is a variant of yaroslavsky filter. In this paper, the original image is preprocessed and firstly, color and contrast modifications techniques applied over preprocessed image to convert into transformed image –I. Secondly, both color and contrast modification techniques and image compression and decompression techniques are applied over preprocessed image to convert in to transformed image-II. Then some visual artifacts are introduced into transformed image along with the actual requirement. Then mean, median, wiener filters are applied over transformed images one after another to remove those visual artifacts. Finally TMR filter is applied on transformed images to remove visual artifacts. TMR filter gives better results compared to mean, median and wiener filters.

II. LITERATURE REVIEW

Color alteration is an active research area in the communities of image processing and computer graphics. There searches much related with this work in the area of color alteration include color transfer, color correction, colorization of gray scale and reverse processing. Applications of this work range from post processing on images to improve their appearance to more dramatic alterations, such as converting a daylight image into a night scene.

First, they convert pixel values in RGB color space to Ruderman et al's perception-based color space $l \alpha \beta$ in 1998. Then, they calculate the mean and standard deviations along each of the three axes, and then scale and shift each pixel in the input image. Last, they transform pixel values to return to RGB space. While this method has produced some very believable results.

Their approach is qualitatively and quantitatively superior to the conventional color correction. Another color correction method has been developed by Schechner and Karpel for underwater imaging and great improvement of scene contrast and color correction are obtained in 2004. Jia et al. propose a color correction approach based on a Bayesian framework to cover a high quality image by exploiting the tradeoff between exposure time and motion blur in 2004.

Colorization is a term that is now used generically to describe any technique for adding color to monochrome still and footage. Welsh et al. introduce a general technique for colorizing grey scale images by transferring color between a source, color image and a destination, grey scale image in 2002. Their method transfers then the color mood of the source to the target image by matching luminance and texture information between the images and allows user interaction.

Levin presents a simple colorization method that requires neither precise image segmentation, nor accurate region tracking in 2004. This method is based on a simple premise: neighboring pixels in space-time that have similar intensities should have similar colors. In 2011 Julien Rabin, Julie Delon, and Yann Gousseau removes artifact from color and contrast modification in digital image by using TMR filter.

There are different approaches have been proposed to suppress artifacts due to contrast or color modification. The simplest one is proposed in [15] in the context of local histogram modifications and amounts to limit the modification depending on gradient values. While improving the results in some cases, this approach let most artifacts untouched. In [16], it is proposed to correct color transfer artifacts by using a variational regularization after the transfer. Still in a variational framework, the authors of [17] propose a unified formulation containing both color transfer and regularity constraints in a single energy minimization. For the problem of color proportion, a possible approach is to transfer color after having identified some homogeneous regions, as proposed in [18] and [19]. A related class of works takes interest in the avoidance of compression artifacts, usually using the properties of the compression scheme, see, e.g., [20].

III. PROBLEM STATEMENT & MOTIVATION

A common drawback of most method in modification of the contrast or color content in images is visual artifacts. When increasing the contrast, parasite structures that were barely visible become prominent. Most noticeable is the enhancement of noise and compression scheme patterns, such as “block effect” due to the JPEG standard. In the other direction, contrast reduction or color transfer may yield detail loss and texture washing. A last artifact is particularly noticeable in the case of color transfer and appear when the proportions of colors are very different between images.

In this paper TMR filter is proposed as a universal approach to remove all visual artefacts. TMR filter is a variant of Yaroslavsky filter. In this paper, the original image is preprocessed and firstly, color and contrast modifications techniques applied over preprocessed image to convert into transformed image –I. Secondly, both color and contrast modification techniques and image compression and decompression techniques are applied over preprocessed image to convert in to transformed image-II. Then some visual artifacts are introduced into transformed image along with the actual requirement.

IV. DESIGN METHODOLOGY

The input image is preprocessed that is color image is separated into three planes and size will be changed to 256x256 image. Adaptive histogram equalization method is used to change contrast of an input image. Adaptive Histogram Equalization method is an extension to traditional Histogram Equalization technique. It enhances the contrast of images by transforming the values in the intensity image.

The main steps of the methodology for removal of artifacts are shown in Fig I and include the following: read the input image, preprocessing of image, transformation of image, filtering of image by different methods, comparing performance measures for all filter outputs.

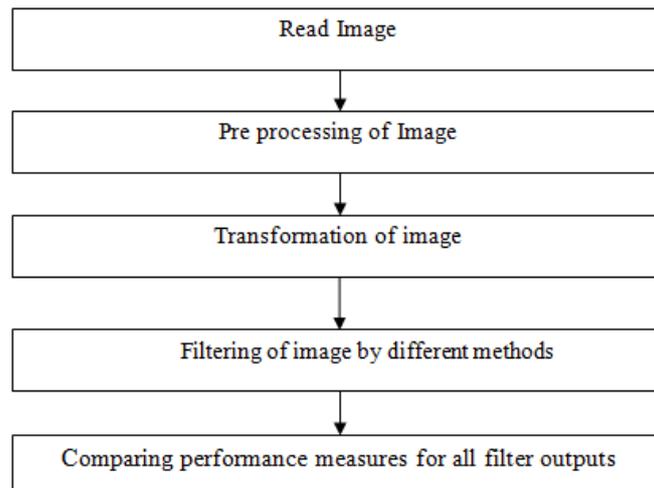


Figure1. Main Steps in Removal of Artifacts

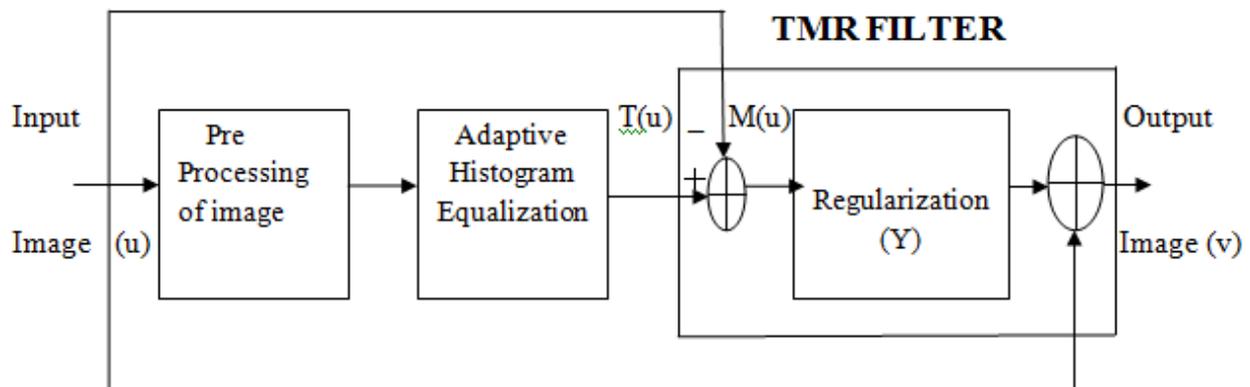


Figure 2. Block Diagram for Removing Artifacts from AHE Image Using TMR Filter

In Fig II, the input image is preprocessed that is color image divided into three planes, after that Adaptive Histogram Equalization method is applied to change the contrast. Visual artifacts such as Noise enhancement, detail loss, color proportion inconsistencies are introduced. TMR filtering is applied to remove those artifacts. The input image is preprocessed that is color image divided into three planes, then Adaptive Histogram Equalization method is applied to change the contrast and then JPEG Encoding& Decoding Technique is applied for compressing and decompressing. Visual artifacts such as Noise enhancement, detail loss, color proportion inconsistencies, compression artifacts are introduced.

V. TMR FILTER

The block diagram for TMR Filter is shown in Fig VI. The transportation map $M(u)$ which is the difference between transformed image and original image is applied to TMR Filter. In this, weighted factor is computed, Regularization term is evaluated, finally stopping criterion is found out regularization process convergence. Then enhanced image will be obtained by combining the regularized image with original image (u).

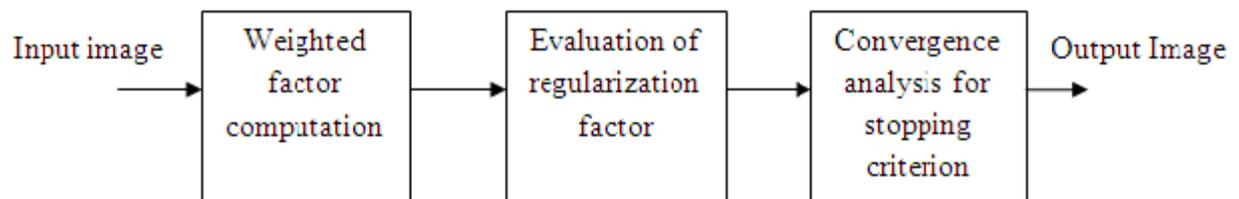


Figure 3: Block diagram of TMR Filter

All the artifacts mentioned above are removed by regularizing the *transportation map*, which is defined as the image of the differences between the original image and the one after contrast or color modification. All these artifacts may be interpreted as spatial irregularities of this transportation map. In order to regularize this map without introducing blur in the final image, inspiration is taken from nonlocal methods that have been proposed for image de-noising and more precisely from the Yaroslavsky filter.

The transportation map is filtered by averaging pixel values using weights that are computed on the original image, therefore adapting to the geometry of this initial image. It will be shown that artifacts are progressively suppressed by iterating this filtering stage.

We calculate the transportation map which gives the difference between original image and transformed one. Y_u is the operator, a weighted average with weights depending on the similarity of pixels in the original image u . We calculate the weights for each and every pixel leaving the first pixel; we start from second pixel. we take 8 neighbor hoods of each pixel. Where $\|.\|$ stands for the Euclidean distance in R^n , where, $N(x) = x + N(0) \subset \Omega$ with $N(0)$ a spatial neighborhood of 0, where σ is a tuning parameter $C(x)$ of the method and is the normalization constant.

We will add all the weights which are calculated for each and every pixels. Observe that if we apply to the image u , we obtain the Yaroslavsky filter. If the weights also decrease as a function of the distance to x , Y_u becomes similar to the cross bilateral filter introduced in [19] for flash photographic enhancement. The regularization of the image $T(u)$, referred to as transportation map regularization (TMR), is then defined as $TMR u(T(u)) := u + Y_u M(u)$. Now, observe that this formulation can be divided in two terms as of image TMR $u(T(u)) = Y_u(T(u)) + u - Y_u(u)$

First, the image $T(u)$ is filtered by a nonlocal operator Y_u , following the regularity of the image. This operation attenuates noise, compression, and color proportion artifacts but also the details of the image $T(u)$. The second operation performed by the TMR filter consists in adding the quantity details $=: u - Y_u(u)$.

VI. TRANSPORTATION MAP REGULARIZATION

Recall that $T(u)$ is the image after color or contrast modification. In what follows, we write $\mathcal{M}(u) = T(u) - u$ for the transportation map of image u . We propose to regularize it thanks to the operator Y_u , a weighted average

with weights depending on the similarity of pixels in the original image u . The effect of this operator on an image $v: \Omega \rightarrow \mathbb{R}^n$, with $n \geq 1$ is defined as

$$Y_u(v) : x \in \Omega \mapsto \frac{1}{C(x)} \int_{y \in \mathcal{N}(x)} v(y) \cdot w_u(x, y) dy$$

$$w_u(x, y) = \frac{1}{\|u(x) - u(y)\|^2}$$

The regularization of image $t(u)$ is defined as Transportation map. $TMR_u(T(u)) = u + Y_u \mathcal{M}(u)$. Now, observe that this formulation can be divided in two terms as

$$TMR_u(T(u)) = \underbrace{Y_u(T(u))}_{\text{image detail}} + \underbrace{u - Y_u(u)}_{\text{image detail}}.$$

First, the image $T(u)$ is filtered by a nonlocal operator Y_u , following the regularity of the image u . This operation attenuates noise, compression, and color proportion artifacts but also the details of the image $T(u)$. The second operation performed by the TMR filter consists in adding the quantity $u_{\text{detail}} = u - Y_u(u)$, which can be considered as details of the original image (e.g., texture and fine structures).

VII. RESULT

The images after applying various filters on transformed image-I are shown in Fig IV. The Fig IV(f) has less artifacts and much similar to original image as the mean square error for transformed image-I after applying TMR filter is less and the PSNR of transformed image-I after applying TMR filter is more compared to the same after applying another filters such as mean, median, wiener filters. We can say TMR filter is giving better results compared to mean, median and wiener filters for transformed image

VIII. CONCLUSION

In this paper, we have introduced a generic filtering procedure in order to remove the different kinds of artifacts created by radiometric or color modifications. The ability of the proposed TMR filter to deal these artifacts while restoring the fine details of images has been demonstrated on various examples.



(a) Original image.

(b) Target color distribution.

(c) Raw color transfer



(d) Filtering of image



(f) Regularization of image with iterated TMR filter.

REFERENCES

- [1] A. C. Bovik, Handbook of Image and Video Processing (Communications, Networking and Multimedia). Orlando, FL: Academic, 2005
- [2] R. H. Selzer, "The use of computers to improve biomedical image quality," in Proc. AFIPS, 1968, pp. 817–834.
- [3] J. Delon, "Midway image equalization," J. Math. Imaging Vis., vol. 21, no. 2, pp. 119–134, Sep. 2004.
- [4] N. Papadakis, E. Provenzi, and V. Caselles, "A variational model for histogram transfer of color images," IEEE Trans. Image Process., vol.19, no. 11, p. , Nov. 2010.
- [5] J. Delon, "Movie and video scale-time equalization application to flicker reduction," IEEE Trans. Image Process., vol. 15, no. 1, pp.241–248, Jan. 2006.
- [6] J. Delon and A. Desolneux, "Stabilization of flicker-like effects in image sequences through local contrast correction," SIAM J. Imaging Sci., vol. 3, no. 4, pp. 703–704, Oct. 2010.
- [7] G. Haro, M. Bertalmío, and V. Caselles, "Visual acuity in day for night," Int. J. Comput. Vis., vol. 69, no. 1, pp. 109–117, 2006.
- [8] M. Bertalmío, V. Caselles, E. Provenzi, and A. Rizzi, "Perceptual color correction through variational techniques," IEEE Trans. Image Process., vol. 16, no. 4, pp. 1058–1072, Apr. 2007.
- [9] S. G. Narasimhan and S. K. Nayar, "Vision and the atmosphere," Int. J. Comput. Vis., vol. 48, no. 3, pp. 233–254, 2002.
- [10] S. M. Pizer, E. P. Amburn, J. D. Austin, R. Cromartie, A. Geselowitz, T. Greer, B. T.H. Romeny, and J. B. Zimmerman, —Adaptive histogram equalization and its variations,| Comput. Vis. Graph. Image Process., vol. 39, no. 3, pp. 355–368, 1987.
- [11] N. Papadakis, E. Provenzi, and V. Caselles, —A variational model for histogram transfer of color images,| IEEE Trans. Image Process., vol.19, no. 11, p. , Nov. 2010.
- [12] Y.-W. Tai, J. Jia, and C.-K. Tang, —Local color transfer via probabilistic segmentation by expectation-maximization,| in Proc. IEEE Comput. Soc. Conf. Comput. Vis. Pattern Recognit., 2005, pp. 747–754.
- [13] A. Abadpour and S. Kasaei, —An efficient PCA-based color transfer method,| J. Vis. Commun. Image Represent., vol. 18, no. 1, pp. 15–34, 2007.
- [14] F. Alter, S. Durand, and J. Froment, —Adapted total variation for artifact free decompression of jpeg images,| J. Math. Imaging Vis., vol. 23, pp. 199–211, 2005.
- [15] S. M. Pizer, E. P. Amburn, J. D. Austin, R. Cromartie, A. Geselowitz, Greer, B. T. H. Romeny, and J. B. Zimmerman, "Adaptive histogram equalization and its variations," Comput. Vis. Graph. Image Process., vol. 39, no. 3, pp. 355–368, 1987.
- [16] F. Pitié, A. C. Kokaram, and R. Dahyot, "Automated colour grading using colour distribution transfer," Comput. Vis. Image Underst., vol. 107, pp. 123–137, Jul. 2007.
- [17] N. Papadakis, E. Provenzi, and V. Caselles, "A variational model for histogram transfer of color images," IEEE Trans. Image Process., vol. 19, no. 11, p. , Nov. 2010.
- [18] Y.-W. Tai, J. Jia, and C.-K. Tang, "Local color transfer via probabilistic segmentation by expectation-maximization," in Proc. IEEE Comput. Soc. Conf. Comput. Vis. Pattern Recognit., 2005, pp. 747–754
- [19] A. Abadpour and S. Kasaei, "An efficient PCA-based color transfer method," J. Vis. Commun. Image Represent., vol. 18, no. 1, pp. 15–34, 2007.

- [20] F. Alter, S. Durand, and J. Froment, "Adapted total variation for artifact free decompression of jpeg images," J. Math. Imaging Vis., vol. 23, pp. 199–211, 2005.

CONCEPTUAL FRAMEWORK TO INVESTIGATE THE ACCESSIBILITY AND IMPACT OF FINANCIAL INCLUSION

Minaxi Rani

¹ Assistant Professor (Extn.), Department of Commerce, N.M. Govt. P.G. College,
Hansi (Haryana), India

ABSTRACT

Financial inclusion refers to a process of providing the financial product or services to weaker section of the society at an economical price. Its main aims are to providing banking and financial services in a village to the poor people and low- income group at an inexpensive amount and disadvantage. In other words financial inclusion is introduction of safely, easily and inexpensive financial product or services to financially disadvantaged people.

The Rangarajan committee (2008) viewed financial inclusion as an important step for inclusive growth. A comprehensive financial system helps in efficient allocation of productive resources and thus can reduce cost of capital.

In making, economic growth more inclusive “Financial inclusion” of household belongs to poor and vulnerable section of the society is in very critical situations. Through the up to date knowledge and data about levels, trends and impact of access to financial service is a first step in this regard.

This paper focus on to suggest a “Conceptual framework” to measure the availability and impact of access to financial products & services by the household that’s belongs to vulnerable (weaker) section of the society. Weaker section faces greater challenges in accessing formal finance due to various reasons. Comparatively less use of financial product and services by vulnerable section reduces their ability to invest, save and plan for future. Vulnerable sections are still marginalized and in many instances excluded from institutional credit and money flows. The present paper is focus on the poorer people of the society to bringing that people under the umbrella of financial inclusion growth and sustainable development.

Keywords: *Financial Comprehensive, Financial Services, Sustainable Development, Impact Of Access To Finance, Socio- Economic Status And Inclusion Growth*

I. INTRODUCTION

Credit is one of the most important input for economic development of the society. Its timely availability in the right time, at the right quantity, at an affordable cost goes a long way in contributing to the well-being of the people especially in the lower-rungs of society. The main aim of the financial inclusion is to provide financial services and financial product to the exhausted section of the society at an affordable cost. In other words, financial inclusion is simpleness of access, availability and uses of the financial system by all the member of economic.

In India the main concept of financial inclusion is that household must have to save and a business man has a current account. In reality, in that we includes loans, advances, insurance services and many much more. Financial inclusion main aim to focus on the poor section of the society who don't have courtly financial institution support and who getting finance out of the local and nearest, money lender, neighbors, relatively who give them loan by paying high rate of interest. People may be financially included throw regional bank, commercial bank, post of saving bank, govt. of India and planning commission has target the faster inclusive growth in the 12th five year plan 2012-2017^[1].

The nationalizations of major banks in 1969, commercial bank have to meet the economical, socio economical objective for balanced and economic development. In India banking sector has shown fast moving average growth during the last few decades, but macros data shows that banking services are not made available to the entire population without discrimination.

In order to achieve the inclusive growth, govt. of India has time to time given announced several developmental and employment program such as national health mission save child mission etc.

1.1 Defination of the Financial Inclusion

Financial inclusion is based on principal of Stake and inclusive growth. It may be defined as the process of as creating access to financial services, time to time available and educate credit which is needed by vulnerable groups such as weaker section and low income group at an affordable cost in a fair and transparent manner by main stream institutional players.

II. FINANCIAL INCLUSION EQUATION

$$\begin{aligned} \text{NFA} + \text{BC} &= \text{FI} \\ \text{Where, BC} &= \text{BANKS} + \text{OFIs} + \text{IT} \\ \text{NFA} &= \text{No Frills Saving Bank Account} \\ \text{BC} &= \text{Banks} + \text{Other Financial Institutions} + \text{Micro Finance Institutions} + \\ &\text{Information Technology} \\ \text{OFI} &= \text{Insurance Companies, Mutual Funds, Pension Companies} \end{aligned}$$

2.1 Objective of the Paper

1. To know about the various strategies of RBI for enhance the financial inclusion.
2. To appraise the bank role for financial inclusion.
3. Discuss weighable annotation of Financial Inclusion.
4. To know about the various challenges faced by the country for the enhance the financial inclusion.
5. India position as compared to others countries.

2.2 Strategies of Financial Inclusion



- a. **No frill account:** RBI makes strategies for No frill account. No Frill account means a customer can open the bank account without any minimum monthly average balanced requirement. The no frill account is a very innovative strategy, that is used to begging the concept of banking to the under- privileged and reduced credit quota for this section of the people. In that zero or a very low balanced with limited transaction.
- b. **Simplify the KYC Norms** According to the KYC norms when a customer wants to open a account he must to fulfill the various requirement and he has to provide the various document for opening a bank account as per the RBI rules and regulation. People those who are lived in the rural areas face so much difficulty to fulfill the bank requirement. When the banks of open in the rural unbanked areas then RBI provides opportunities to the banks for opening of rural bank account through simply KYC norms.
- c. **Simplified Bank Saving Account Opening** form that is filled while opening the bank account has been very reduced by the RBI, so that the poor and less educated person can easily fill the form.
- d. **Usage of regional language** Regional language means local language. RBI makes strategies that bank should used regional local language and provide all the material related to account opening must be in the regional language.
- e. **Engaging business correspondence** In 2006 RBI has adopted a major strategic that is related to technology based agent bank model through business correspondence. It is alternate of the banking structure that model represent the bank.
- f. **Beef up the credit absorption** For the strengthen of financial inclusion services bank adopt the strategies for credit absorption.
- g. **Elaborate existing credit delivery system** Bank adopt the strategies for refining the existing credit delivery system through the various strategies such as provide ATM, Education Loan, Car Loan and insurance facility.
- h. **Opening the branches in unbanked area** Bank makes important strategies for opening the branches in unbanked rural centers. RBI promotes those strategies.
- i. **Plan for Financial Inclusion** RBI should draw a plan for financial inclusion and prepare target over the next twenty years.

- j. Adopt various models** Bank adopts various models for effective and efficient outreach. For example: Knowledge based model, Technology based model, product led model and regulator led model etc.
- k. Kisan Credit Card** Govt. of India has organized the scheme of Kisan Credit card in august 1998. The main of that is to providing adequate and timely support in a changeable way and price effective manner to the farmer by fulfilling their cultivation needs including the purpose of seeds pesticides and fertilizer etc.
- l. General Credit Card** General Credit is an important strategy for the rural and semi urban branches. General credit provides facility up to Rs. 25000. The interest rate on general credit is entirely be regulated.

2.3 Role of Banks for Financial Inclusion

In India Banks are most important part of the financial system. In the economic and socio-economic development of India banks plays a crucial role in our country India. There are various changes in the Banking regulations act in India. Firstly the banking system is nationalized in 1969 that made major changes in the banking system of India. The opening of the various new banks branches with innovative preferable, introduction of the new Banking polices and begging of the comfort facilities with plentiful zone of the Indian Banking system features of banking services of India. Today the RBI main plan is to provide the financial services to the every people of the country for this purpose the RBI adopt the financial inclusion plan. Through the Financial inclusion banks grasp into the areas where there no banking facilities. Beyond the help of the financial inclusion it is not possible for banks to go into the unbanked areas. Saving through the people and balanced growth is possible through the financial inclusion. Banks uses various strategies in the rural areas for accompany the rural peoples with banks. Receptiveness in the rural areas, is a problem, than banks used various strategies like micro finance network and business correspondents model and facilitators to bring more people under the boundary of banking facilities. In the large scale Financial Inclusion is not possible without the contributions of the banks. So that we can say that the banks are important role player in the financial products and services.

Various central banks have a common objective that is Financial inclusion. Financial Inclusion is mainly supported and sponsors by Reserve Bank of India and the policies of the Reserve Bank of India. After the nationalizations and introductions of financial inclusion in the banking makes the several superior formation from the last decades. Now the banks have reached far away from the country. From the year 1969 when the first nationalizations takes place to the 1980 when the second nationalizations takes place Indian banking industry makes growth in that period. Branches of commercial banks, regional rural banks are increased very much. They provide every kind of services such as loan facility, insurance facility, grantee facility, ATM facility, Online Banking transactions facilities etc.

Government of India and Reserve Bank of India makes various polices for the strength of the financial inclusion. Prime Minister Narendra Modi on 15th August ,India's independence day, disclosed a national mission policy. The name of the policy is Pradhan Mantri's Jan-Dhan-Yojana. That policy is related to the people's wealth plan. According to that policy bank account are opened for all the peoples of india. In the first stage of that policy the target is 75 million accounts. In that plan pradhan mantra says that "I hope to associate the weaker peoples of the country with the aptitude of opening bank accounts". For that plan RBI launched a debit card that is sponsored by National Payments Corporation of India- for that account holder accident insurance cover of Rs.100,000, life insurance coverage of Rs. 30,000 and an overdraft facility of Rs. 5,000.

After the announcement of the plan the progress is that on the begging of the next day, more than 15 million accounts were added with the banks branches. It is the new beginning of financial inclusion, freedom from poverty and it is the end of the financial unattainability.

III. WEIGHABLE ANNOTATION OF FINANCIAL INCLUSION

- 3.1** (Roy, 2012) studied the overview of financial inclusion in India. The study concluded that banks have set up their branches in the remote corner of the country. Rules and regulations have been simplified. The study also said that banking industry has shown tremendous growth in volume during last few decades.
- 3.2** (V.Ganeshkumar, 2013) noted that branch density in a state measures the opportunity for financial inclusion in India. Literacy is a prerequisite for creating investment awareness, and hence intuitively it seems to be a key tool for financial inclusion. But the above observations imply that literacy alone cannot guarantee high level financial inclusion in a state. Branch density has significant impact on financial inclusion. It is not possible to achieve financial inclusion only by creating investment awareness, without significantly improving the investment opportunities in an India.

IV. Challenges of the Financial Inclusion faced by Banks

4.1 Financial Illiteracy

The first and foremost challenge for the bank is financial illiteracy of the people. India's most of the people does not want to prepare the proper records of financial data in books of account. There is need for removing such thinking of these people by the financial by the financial services provider.

4.2 Lack of Awareness of Financial Product

People don't have complete knowledge about the financial product and services of the bank and people don't want any change in the procurement of funds.

4.3 Failure in Reaching the Poor Section of the Society

Banks are not successful for reaching the poor section and low income group of the society. There is so many reason of this such as most of the employee in the banking industry till the late nineteen and they want to work only and only for "Salary" and they want to contribute in accomplishing the target of the nation.

4.4 Various Rules are Barriers in the Way of Bank

bank has to follow certain rules and regulations which is given in the Reserve Bank of India schedules. That's rules and regulations create barrier in the way of the bank for achiving the target for reaching to the poor group of the society. For exp. A person has to be a minimum balance of rupees one thousand in account and then bank issues checkbook and debit card to that person. When a poor person opens a bank account he is out of coverage of the basic faculty.

4.5 Financial Literacy

Financial literacy is also a challenge for bank. As we know that illiterate person can't fill the bank form. Cheques, income tax return and that problem is also with the literate person, they need consulates to fill the bank form, cheques, drafts.. That is a major confrontation in the way of bank.

4.6 Irregular Income: the Income of the Low Income Group is Very Irregular

When they get work, they get money otherwise they do not get the so . They can only achieve their basic needs and then saving option is not derive. That is also a major challenge in the way of bank.

4.7 Lack of Trust Informal Banking Institution

Rural people is less trust on the banking system. They think that bank run by taking their money. They only believes on the money lenders, mahajans and they don't want to deposit the money into the bank.

4.8 None Availability of Branches in Rural Areas

Sometimes there is lack of bank branches in the rural areas and depositor is very more that is major challenge for the bank.

V. INDIA'S POSITION IN FINANCIAL INCLUSION AS COMPARED TO OTHERS COUNTRY.

Country	No. of Branches	Rank	No of ATMs	Rank	Bank Credit	Rank	Bank Deposit	Rank
	per 0.1 million adults				as percent of GDP			
India	10.91	8	5.44	9	43.62	5	60.11	3
Austria	11.81	7	48.16	7	35.26	6	32.57	8
Brazil	13.76	6	120.62	3	29.04	8	47.51	6
France	43.11	1	110.07	4	56.03	3	39.15	7
Mexico	15.22	5	47.28	6	16.19	9	20.91	9
UK	25.51	3	64.58	5	467.97	1	427.49	1
US	35.74	2	173.29	2	46.04	4	53.14	4
Korea	18.63	4	250.29	1	84.17	2	74.51	2
Philippines	7.69	9	14.88	8	27.57	7	53.02	5

Source: World Bank, Financial Access Survey(2011)

Interpretation: The above table shows the coverage of the Bank and number of ATM's per 0.1 million adults as well as of bank credit and Bank deposit as a percentage of GDP of the country. It can be seen from the above table that on the basis the number of branches, France is on Rank 1, whereas India's scored 7th rank, Korea scored 1st rank on the basis of ATM's where as India is on the 9th rank. UK is on 1st rank for providing bank credit as percentage of GDP and India scored 5th rank. According to the Bank Deposit UK is on 1st rank whereas India is on the 3rd rank for the same. It can be conclude that the growth of the Financial Inclusion is at moderate level as compare to others country.

Suggestions: RBI should make a policy to provide the bank form in all the languages for the customers. There must be awareness among the people about the Banking Services. That awareness must be created through the advertisement, Banners and financial inclusion, debit card and loan facility are the most important way for encompassing the rural weaker sections. Bank must have established new biometric tool for the customer who does not remind the PIN. The complains of the customers should be removed immediately and redressal should

be provide promptly. The bank should appoint BUSINESS CORRESPONDENT MODEL who reached into the areas where banking facilities are not provided to the person.

Conclusion:- From the above study we can conclude that the India's position is moderate as compared to other countries such as UK, U.S., Korea, France etc. in terms of ATMs, branch account, bank credit and bank deposit. Financial services such as insurance, savings, deposits and loans are very important for the poor section of society for economic development. Our over all Govt. has been taken various steps and initiates to include unbanked part of the population to the bank areas. Govt. of India has take various steps for the Financial Inclusion. Govt. is focused on quality rather than on quantity. RBI has also adopted various strategic such as No Frill account, Simple the Bank form, Regional Language and Simple the KYC norms etc. to strength the financial inclusion. Only opening the No Frill account is not the purpose or end of the financial inclusion while various formal financial inclusions must gain, the trust and goodwill of the poor through the financial inclusion. As per Dr. K.C. Chakrabarty Deputy Governor of RBI says that, "Financial Inclusion is the road that India needs to travel towards become a Global Player." At present financial inclusion is not performing well and there is needed of long road map for the success in the financial inclusion and there is no doubt that in India banking sector play an important role for the success in the Financial Inclusion. RBI has taken various majors steps for increasing the status of the poor section of society and upgrading the standard of living of weaker section of the society.

REFERENCES

- [1]. Planning commission 12th five year.
- [2]. Rangarajan Committee (2008), "Report of the committee on Financial Inclusion".
- [3]. Financial Inclusion article – SAP 2015.
- [4]. RBI plan for Financial Inclusion.
- [5]. Financial Inclusion/a road India needs to travel article by Dr. K.C. Chakrabarty Deputy Governor of RBI.
- [6]. Roy, S.K. (2012). Financial Inclusion in India: An overview. Asian Journal of Multidimensional Research.
- [7]. Ganesh kumar (2013). Overview of Financial Inclusion in India. International Journal of Management and studies.

THE ROLE OF RESPONSIBILITY ACCOUNTING IN ORGANIZATIONAL STRUCTURE

Ritika¹, Minaxi Rani²

^{1,2}Assistant Professor (Extn.), Department of Commerce, Govt. P.G. College,
Hisar (Haryana), (India)

ABSTRACT

Today the size of the business is very large and business operations is very complicated due to the large scale of business size. So there is a need of centralization and decentralization of Organizational Structure As the centralized activities in organizations become more elaborated in case of business development and growth, the need to delegate authorities and responsibilities will build upon the size of the business. When the business operations are decentralized then the directors and managers are responsible for planning and controlling the Business activities. If the authority to manage daily business operations is transferred from top-level managers to middle or lower department of the managers, the top-level manager will have more recreation time to focus on cardinal planning and decision making.

The responsibility accounting system is constructing to announcement and to collecting of costs by individual levels of responsibility. There are various supervisory areas in the organization and every supervisory area is given a fixed amount of cost for which that supervisory area is responsible and over which they have to be disciplined.

Responsibility centers are primarily divided into four main centre cost centre, revenue centre, profit centre and investment centre. When we compare the standard data with actual and result may be favorable and unfavorable. When actual data is greater than standard then the result is favorable and vice-versa. Responsibility accounting can be used to find the causes of such variations and hence tried to improve the performance. We can also determine each manager's responsibility to achieve his attainable goals in the organization.

Keywords: *Functional-Based Responsibility Accounting System, Responsibility Accounting System, , Organization Structure, Investment Inside, Cost Inside,, Revenue Inside, Profit Inside.*

I. INTRODUCTION

There are various branches of accounting like financial accounting, Cost Accounting, Management Accounting and social responsibility accounting. But the responsibility accounting is not branch of accounting. In this way we can say that responsibility accounting is a ancillary cost control technique. Responsibility accounting is only and only a controlling device that controls the various centres like profit centre, cost centre, Investment centre and revenue centre. Responsibility Accounting is a good engine for control in the large scale organizational structure. This is a system of responsibility, answerability and work measurement. Many controlling devices of Accountancy are used for controlled the whole organization and that are necessary to evaluations the performance of the organizational structure. Budgeting and standard costing is tool of controlling and also both are the part of the responsibility accounting system. Responsibility Accounting is used in large scale enterprises

in comparison to small scale because in the large scale enterprises the production is at large scale and there are the requirement of highly technology oriented workers. In that type of the enterprises various types of department like production department, purchase department, research and development and responsibility accounting department etc are established and huge amount is required for establishment of various types of departments.

Responsibility Accounting is also defined as, “that divide revenues and costs into areas of personal responsibility, in order to ascertain performance attained by persons to whom authority has been assigned.”

This paper mainly focuses on the various centre of responsibility accounting and organization structure.

II. OBJECTIVE OF THE STUDY

Following are objectives of Responsibility Accounting.

1. To gestate the various types of responsibility accounting system .
2. To determine the contribution that a division as a sub unit makes to the total organization.
3. To determine the organizational structure
4. To motivate the divisional manager to operate his division perfectly with the basic goals of the whole organization

2.1 Responsibility Centre

For the purpose of control, responsibility accounting Center is divided into mainly four types:-

1. Cost Centre.
2. Revenue Centre.
3. Profit Centre.
4. Investment Centre.

III. COST CENTRE OR EXPENSE CENTRE

A responsibility of cost centre is cost centre where the manager is answerable only for those costs which are under his control but not for its revenue. Only those costs are charged to cost centre which are controllable by the manager of the cost centre. A cost center is a responsibility center in which only inputs are measured in monetary terms and not output. The performance of a cost centre is measured in terms of quantity of inputs used in producing a given output. A comparison between the actual input used and the predetermined budgeted inputs is made to determine the variances which represent the efficiency of the cost centre.

3.1 Types of Cost Centres

- (a) Engineered expenses centre
- (b) Discretionary expenses centre

3.2 Cost Centre Can be Classified According to Functions

- Production cost centre
- Service cost centre
- Ancillary cost centre
- Research and development centre

- Marketing centre
- Administrative and support centre

IV. REVENUE CENTRE

A responsibility Revenue centre is a Revenue Centre in which manager controls only revenues not cost of production and service. Revenue centre may control on selling prices, promotional activities (Advertising, personal selling, publicity and sales promotion) salesman commission, salesman salary and product mix.

V. PROFIT CENTRE

Profits are the excess of revenue over the total expenses. Therefore, the manager of a profit center is held accountable for the revenues, costs, and profits of the center. A profit center is responsibility center in which inputs are measured in terms of expenses and outputs are measured in terms of revenues. "Under profit centre, manager determines the profit of the centre with the help of Revenue and the cost center." For example If a business a number of processing and the output of one process is transferred to the next process. When the transfer from one process to another is only on cost, then these processing will not profit processes. On the other hand if management decided to transfer the output from one process to other at a profit then the process will become profit center.

The performance of the manager of a profit center can be evaluated by the following major of profitability.

- Contribution margin
- Controllable profit
- Profit before tax
- Profit after tax.
- Direct Profit

VI. INVESTMENT CENTRE

The manager of a responsibility center is made by responsible for properly utilizing the assets used in the center. He is expected to earn a fair return on the amount employed in assets in centre; measurement of assets employed causes many problems. It become difficult to determine the amount of assets employed in pa particular responsibility center. Investment center may be used for big responsibility center where assets will be in exclusive possession of that centre.

The performance of an investment centre can be measured by relating profit to the investment base.

The two methods are generally used to evaluate the performance of an investment centre are:

- a. Return of Investment/Capital Employed (ROI):-Return on capital employed establishes the relationship between profits and the capital employed. The term capital employed refers to the total investment made in the investment centre. However, net capital employed comprises the total assests used less its current liabilities.

$$\text{RETURN ON CAPITAL EMPLOYED} = \frac{\text{NET PROFIT}}{\text{CAPITAL EMPLOYED}} * 100$$

- b. Economic Value added approach: Economic value is added a major of performance evaluation that was originally employed by STERN STEWART and company. It is also referred to as residual income approach of performance evaluation. EVA has been considered as a better measure of divisional performance as compared to the return on assets.
- i. $\text{EVA} = (\text{Net operating profit after tax}) - (\text{Cost of capital} * \text{Capital invested})$
- ii. $\text{EVA} = \text{Return on investment} - \text{cost of capital}$

6.1 Steps Involved in Responsibility Accounting

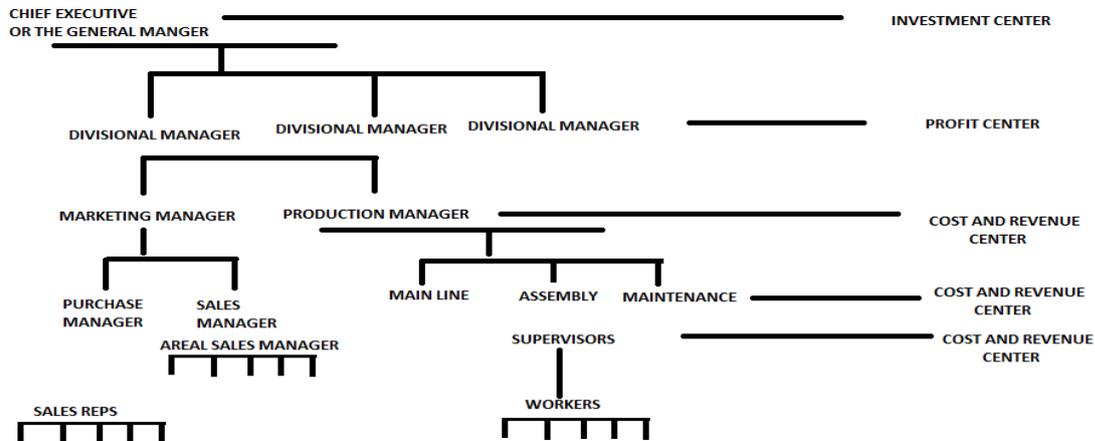
Responsibility accounting is used as a control device. The aim of responsibility accounting is to help management in achieving organizational goals. The following steps are involved in responsibility accounting:

- (i) **Divide the organization in to various centers** The organization is divided into various responsibility centre .Each responsibility centre is put under the charge of a responsibility manager. The managers are responsible for the performance of their departments.
- (ii) **Set the targets** The target of each responsibility centre is set in. The targets or goals are set in consultation with the manager of the responsibility centre so that he may be able to give full information about his department. The goals of the responsibility centre are properly communicated to them.
- (iii) **Recording of Actual performance and comparison** The actual performance of each responsibility centre is recorded and communicated to the executive concerned and actual performance is compared with goals set and it helps in assessing the work of these centre.
- (iv) **Know the Variances** If actual performance of a department is less than the standard set, then the variances are conveyed to the top management.
- (v) **Timely action is taken** Timely action is taken to take necessary corrective measures so that the work does not suffer in future. The directions of the top level management are communicated to the concerned responsibility centre so that corrective measures are taken.

6.2 Relationship between Organizational Structure and Responsibility Accounting System

A sound organizational structure with clear cut lines of authority and responsibility relationships is a prerequisite for establishing a successful responsibility accounting system. Responsibility accounting system must be so designed as to suit the organization structure of the organization. It must be founded upon the existing authority-responsibility relationships in the organization. In fact, responsibility accounting system should parallel the organization structure and provide financial information to evaluate actual results of each individual responsible for a function.

6.3 Organization Chart



6.4 Advantages of Responsibility Accounting

- 1. Assigning of Responsibility** Each and every individual in the organization is assigned some responsibility and they are accountable for their work. Everybody knows what is expected of him. The responsibility can easily be identified and satisfactory and unsatisfactory performances of various persons are known. Nobody can shift responsibility to anybody else if something goes wrong. So, under this system responsibility is assigned individually.
- 2. Improve Performance** The assigning of tasks to specific persons acts as a motivational factor too. The person incharge for different activites know that their performance will be reported to the top management. They will try to improve their performance.
- 3. Helpful in Cost Planning** Under the system of responsibility accounting, full information is collected about costs and revenues. This data is helpful in planning of future costs and revenues, fixing of standards and preparing of budgets.
- 4. Delegation and Control** This system enables management to delegate authority while retaining overall control. The authority is delegated according to the requirements of task assigned.
- 5. Helpful in Decision Making** Responsibility accounting is not only a control device but also helpful in decision-making. The information collected under this system is helpful to management in planning its future actions.

VII. CONCLUSION

Responsibility accounting is one of the best tools of cost management which is used in large organization in case of decentralization or divisionalization to reduce the difficulty of managing the organization. It means organizations follow responsibility accounting in integrated system, not any unique responsibility accounting system. As responsibility accounting is a method different from piling up costs and puts more emphasis on evaluating operations than costing production, it can cover an overall scheme consisting of all aspects of production, marketing, administrative and financial affairs within an organization by taking advantage of “planning” and “controlling” techniques. In fact, it can identify each manager with a responsibility to achieve his attainable objectives.

REFERENCES

- [1]. Antle, R. and J. Demski. 1998. The controllability Principle in Responsibility Accounting.
- [2]. The Accounting Review 63: 700-718.
- [3]. Demski, J. 1994. Managerial used of Accounting Information. Norwell, MA: Kluwer.
- [4]. Broberg M.P. (1996) Corporate Social Responsibility in the European communities.
- [5]. Itoh, Hideshi, 1992, "Cooperation in Hierarchical Organization: An Incentive Perspective," Journal of Law, Economics and organization, Vol. 8.
- [6]. Milgrom, P and J. Roberts, 1992, "Economics, Organization & Management, " Prentice Hall.

ASSESSING THE SCOPE OF UTILIZING WASTE FROM BRICK PRODUCTION FOR BUILDING MATERIALS

Salman Siddique¹, Mohd. Shadab Siddiqui², Shariq Masood Khan³

¹Research Scholar, Civil Engineering Department, Malviya National Institute of Technology
Jaipur,(India)

^{2,3}PG Scholar, Civil Engineering Department, Integral University, Lucknow,(India)

ABSTRACT

The recent increase in infrastructure sector is resulting in increased production of bricks. The brick industry of India is managed by unskilled labour resulting in high amount of waste generation, the waste generated is a cause of environmental concern.

Published research reports have indicated it as a viable material to be utilised in concrete industry. This paper presents an overview of the work done in earlier studies depicting the effect of brick dust on the properties of concrete

Keywords: *Brick Dust, Compressive Strength, Durability*

I. INTRODUCTION

In developing countries bricks are still one of the most popular construction materials. India is the second largest producer of fired clay bricks after china. India is estimated to have more than 100,000 brick kilns, producing about 150-200 billion bricks annually, employing about 10 million workers and consuming about 25 million tons of coal annually [8]. For brick making availability of good soil is crucial. Recently number of additives are added or are replaced with clay to increase the performance of bricks including fly ash, bagasse ash, rice husk ash etc. The utilisation of waste from different industrial sector is appreciable for the environment and for the economy of the state also. The waste from the brick production facilities is also a cause of concern as the brick sector of India is unmanaged and have poor worker skill which causes high waste generation. The waste generated from the brick production can be broadly classified as

- Brick dust or Surkhi
- Deformed bricks
- Over burnt bricks
- Broken bricks
- Fly ash

The fly ash generated is being utilised by various other industries and have sufficient recycling values. The rest of the waste is being dumped on the roadside or in land filling causing environmental concerns. The presence of water bodies near the brick kilns also adds the high risk of water contamination and poses a threat to water ecology.

With increasing restrictions on the landfills and increased concerns about environmental quality, effective waste management is being desired. The current study is aimed to review the published literature on building materials with brick dust waste as raw material.

II. CHARACTERISTICS OF BRICK POWDER

Table 1 presents the chemical composition of brick powder waste from different studies. Table 2 presents the physical properties of brick powder waste.

Table 1: Chemical Composition of Brick Powder Waste

Author	SiO ₂ (%)	CaO(%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	MgO(%)	Na ₂ O(%)	Loi
Kamal uddin (2004) [1]	67.43	2.12	1.99	7.99	2.46	0.08	1.10
Aliabdo et al. (2013) [6]	54.2	6.8	15.4	7.6	2.5	-	6.2
Demir and Orhan (2003) [9]	55.91	7.20	16.68	8.29	2.32	1.09	2.28

Table 2: Physical Properties of Brick Powder Waste

Authors	Specific gravity	Fineness Modulus	Water absorption (%)
Aliabdo et al. (2013) [6]	2.43	2.44	20.00
Sharma et al. (2014) [3]	2.35	3.73	-
Kamal uddin (2004) [1]	2.6	2.11	-

III. PROPERTIES of HARDENED CONCRETE

3.1 Compressive Strength

Kamal Uddin (2004)[1] investigated the use of brick dust as mineral admixture replacing cement. The cement was replaced till 60%, the compressive strength values till 20 to 30% replacement were slightly higher than

control concrete at curing ages of 45 days. Singh et al. (2013) [2] examine the use of brick dust as fine aggregate in production of self-compacting concrete. The brick dust substituted natural aggregates by 25 and 50%. The cube compressive strength achieved at 7 days was 23% lower and at 28 days it was lower by 19% when 25% brick dust was utilised as fine aggregate. The strength kept on decreasing at higher substitution levels. Sharma et al. (2014) [3] demonstrated the use of brick dust as partial substitute of cement in manufacture of concrete paver blocks. The replacement levels were kept from 5 to 30%. It was observed that compressive strength improved when brick dust was utilised till 15% at all curing ages of 7, 14 and 28 days. Sharif et al. (2013) [4] utilised brick powder as mineral admixture replacing cement by 5, 10 and 15%. The binder content used was of three different series having different water cement ratios. They concluded that 5% brick dust powder can achieve higher strength than traditional concrete. At higher replacement levels a decrease in compressive strength was observed. Khan et al. (2013) [5] studied the brick dust as 10, 20 and 30% fine aggregate replacement in concrete. At the ages of 28 days and 56 days the concrete containing 20% brick dust achieved 12.2% and 25% higher strength than conventional concrete. Aliabdo et al. (2014) [6] studied the effect of 25 to 100% replacement of fine sand by brick dust on properties of cellular concrete. They observed that the compressive strength increased by 12.92 and 20.22% till 50% replacement of natural sand and at higher percentages a decrease of 24.16 and 25.84% was observed. Bharti and Patel et al. (2014) [7] utilised brick dust as fine aggregate replacement till 15% replacement. They observed that highest compressive strength of concrete was achieved at 15% presence of brick dust.

3.2 Split tensile strength

Bharti and Patel et al. (2014) [7] utilised brick dust as fine aggregate replacement till 15% replacement. They observed that highest split tensile strength of concrete was achieved at 10% presence of brick dust. Aliabdo et al. (2014) [6] studied the effect of 25 to 100% replacement of fine sand by brick dust on properties of cellular concrete. They observed that the split tensile strength increased at all levels of replacements. The increase in split tensile strength after 90 days was 10, 1, 22 and 33% at 25, 50, 75 and 100% replacement levels compared to control mix respectively.

IV. DURABILITY PROPERTIES OF CONCRETE

4.1 Water Absorption

Sharma et al. (2014) [3] demonstrated the use of brick dust as partial substitute of cement in manufacture of concrete paver blocks. The replacement levels were kept from 5 to 30%. It was observed that water absorption increased when brick dust was utilised till 15% at all curing ages of 7, 14 and 28 days. One of the major reason is the water absorption of brick powder in itself is very high which in turns causes an increase in water absorption of concrete.

4.2 Sulfate Attack

Sharif et al. (2013) [4] utilised brick powder as mineral admixture replacing cement by 5, 10 and 15%. The binder content used was of three different series having different water cement ratios. They concluded that brick dust powder causes higher expansion than traditional concrete. Although at lower replacement levels expansion was within permissible limits.

V. OBSERVATIONS AND CONCLUSIONS

The review of different published literature results that brick dust or powder has potential to be utilised as lower aggregate replacement in concrete. The strength development pattern of brick dust concrete is similar to that of conventional concrete but there is increase in strength at all the curing ages. The utilisation of mineral admixtures can be used to increase compressive strength at higher substitution levels. From the published research work it is concluded that:-

1. Brick dust is the potential viable material to be used as fine aggregate to produce durable concrete.
2. Its use as fine aggregate in concrete will help in alleviating the potential problem of dwindling natural resources.
3. Its use will also help in protecting the environment surroundings.

Till date a very limited research work on brick dust as aggregate in concrete has been carried out. Therefore further investigations to study the ways in which brick dust as aggregate replacement in concrete affects the rheological properties of fresh concrete, mechanical and durability properties of hardened mass are needed.

REFERENCES

- [1] M. Kamal Uddin, "Use of brick dust in concrete as mineral admixture and partial replacement of cement," *Journal of Civil Engineering (IEB)*, Vol. 32(1), pp. 69-78, December 2004.
- [2] E. R.Singh, E. R.Kaushik, and E. G. Singh, "Study of Self Compacting Concrete Using Brick Dust and Marble Powder," *International Journal of Engineering Research and Applications*, Vol.3.3,pp. 1283-1286, June 2013.
- [3] S. Sharma, R. Mall and K. Raza, "Effect of waste brick kiln dust with partial replacement of cement with adding superplasticizer in construction of Paver Blocks," *International Journal of Science, Engineering and Technology Research*, Vol. 3(9),pp. 2261-2266, September 2014.
- [4] M. B.Sharif, A. Anjum, M.A. Tahir, andM. Yousaf, "Performance of Pozzolanic Concrete Using Different Mineral Admixtures," *Pak. J. Engg. & Appl. Sci*, Vol. 12, pp. 73-81, January 2013.
- [5] A. Khan, S. Ramzan, S. Arif, S. Danish, and M. Mushtaq, "Development of Green Concrete (GC) with Brick Dust Waste (BDW) and Natural Fertilizer of Municipal Solid Waste (NFMSW)," *Journal of the Pakistan Institute of Chemical Engineers*, Vol. 41(1), pp. 39-44, August 2013.
- [6] A. A. Aliabdo, A. E. M. Abd-Elmoaty, andH. H. Hassan, "Utilization of crushed clay brick in cellular concrete production," *Alexandria Engineering Journal*, Vol. 53(1), pp. 119-130, March (2014).
- [7] R. K. Bharti, and R. D. Patel, "A Study on Low Performance Concrete using Mineral Admixtures (Brick Kiln Dust and Silica Fume)," *International Journal for Scientific Research & Development*| Vol. 2(10), pp. 217-221, 2014.
- [8] S. Maithel, D. Lalchandani, G. Malhotra, P. Bhanware, R. Uma, andS. Ragavan, "Brick Kilns Performance Assessment; A Roadmap for Cleaner Brick Production in India." *Shakti Sustainable Energy Foundation and Climate Works Foundation*, New Delhi, 2012.
- [9] I. Demir, andM. Orhan, "Reuse of waste bricks in the production line," *Building and Environment*, Vol. 38(12), pp. 1451-1455, May 2003.

AN ANALYTICAL STUDY FOR THE REAL ESTATE MARKET IN THE YEAR 2014- 2020 WITH SPECIAL REFERENCE TO DUBAI

Dr. Anand Bajpai¹, Mr. Prakash Bhalchandra²

*¹Lecturer, Al Sharq Studies Institute, UAE, Adjunct Faculty, Akamai University, USA
Member of Reviewer Board for the Consortium 2015(Academy of Management),
Southern Management Association, Florida, United States*

*²Director, Nakheel, Real Estate Group, Dubai, UAE
Research Scholar, Banasthali, University, India*

ABSTRACT

Real estate investing involves the purchase, ownership, management, rental and/or sale of real estate for profit. Improvement of realty property as part of a real estate investment strategy is generally considered to be a sub-specialty of real estate investing called real estate development. Real estate is an asset form with limited liquidity relative to other investments and is highly cash flow dependent. If these factors are not well understood and managed by the investor, real estate becomes a risky investment. The primary cause of investment failure for real estate is that the investor goes into negative cash flow for a period of time that is not sustainable, often forcing them to resell the property at a loss or go into insolvency. Dubai was the only Middle East city on the list and ranked higher than traditionally popular real estate markets amongst London, New York, Tokyo, Hong Kong, Moscow, Monaco and Singapore. Investors and common property buyers, though made a little cautious by the distorted market perceptions, don't seem to have lost interest in Dubai real estate in any way. The demand for Dubai real estate, both residential and commercial, has not only remained afloat but also retained its upward trend. The Government's assurance of the market stability and the continuing boom in Dubai's real estate that have helped retain investor confidence.

This study facilitates developers in Dubai to emphasis on preferences of consumers related to their decisions pertaining to home buying that is apartments or villas as these consumers are coming from different parts of the world.

I. INTRODUCTION

A study conducted by Dubai's Foreign Investment Office⁵ in late 2012 found that 81% of investors who had investments in Dubai planned to either maintain or increase their presence in the following three years. In contrast, globally 37% of investors indicated plans to decrease their investments.

Although Dubai rose to regional prominence thanks to the discovery of oil, leaders have led the economy away from the non-renewable resource towards other sectors. Today, oil and gas account for less than 6% of revenues, while tourism, real estate and construction top the list of earners.

The demographic survey shows that emirate's population swells on the back on an improving economy, so does the demand for housing, and with it the sale and rental prices. According to data from the Dubai Statistics Centre, the emirate's population stands at 2.17 million, up from 1.97m a couple of years ago.

Dubai is cementing its status as a safe haven in a region of political and economic turmoil, attracting people from unstable countries around the Middle East/North Africa region.

1.1 Reasons to Buy Home in Dubai

- High Rents

Due to scarcity of accommodation the rents in Dubai are very high and recently the 5% cap has been removed by the government. The landlord can increase rents as per RERA calculator. On an average by paying 12 to 15 years of rent the consumer can own his house. Yes it depends on location, quality, payment terms etc After 2008 great recession, now the Dubai market start appreciating. Further the 20-20 expo has motivated government to start many stalled projects again and which has again boomed the real estate market.

- Investment due to easy loan facility

The market is good for investment as the per year appreciation is in the range of 5% to 7% in addition to getting rent. The bank load can easily obtain for 15 years.

- Compulsory savings

Buying a home or investing in real estate makes UAE residence to do compulsory savings as it is very difficult in Dubai as there are many entertaining facilities, easy fast food outlets, malls and branded outlets etc are available for spending money.

II. RESEARCH AIM

To find the real estate market for the year 2014 to 2020.

III. RESEARCH OBJECTIVES

1. To study main factors that influence consumer to buy real estates in Dubai.
2. To Study main features that influence consumer while buying real estates in Dubai
3. To find out the market size for the horizontal and vertical developments.
4. To find out the buying preferences of population types for various property types.

IV. LITERATURE REVIEW

The current research aim is to consider factors influencing the purchase of real estate. A literature review has been carried out on the publications in related to studies previously carried out by various research scholars in this regard.

The Public expenditure, tax, crime rate commercial activities are factors influencing buying decisions, (Nechyba and Strauss, 1997)¹⁵. The factors are important as Dubai is tax free country and has very low crime rate.

Apart from this, the material usage in construction which has environmental impact on newly constructed buildings is also one of the factors influence buying decision. (Morel et al, 2000)¹³. The quality of housing services that the prospect gets either through public services or through the developer plays the major role. (Hua

Kiefer, 2007)⁶. In most of new construction, importance is given for sustainability which not only reduces services charges but has less impact on environmental pollution.

The buyer behavior influenced by aesthetic, economic, marketing, geographic and social constructs. (Mwfeq Haddad, 2011)¹⁴. The customer behavior also affects by residential mobility, choice and satisfaction (Brandstetter, M.C.G. de O, 2011)². These factors are considered taking into consideration the infrastructure links in Dubai such as metro services, public transport, schooling and leisure facilities. Price, availability of easier loans has revolted the preferences and choices of consumer related to home buying decisions pertaining to buy a flat or residential villa (Jomon Lonappan, 2011)⁹. The lending rates in Dubai are very low and mortgage amount is in proportion to property value and also depends on age. These factors are important as consumer gets a loan based on income and also depends on disposable income.

Factors like high demand, low supply and limited income especially for salary class consumers affects the buying in real estate. Therefore it is important for real estate marketer to understand the behavior of prospect and to identify the factors influencing the customer choices beginning of new development. (N. Kathrvel, P. Vimalagracy, 2014)¹¹.

As per the above literature review for the customers it is of prime importance to pay attention to cultural background, income and spending capacity, local laws and regulations while investing into real estate. (Knight, Frank article, Spring 2014)¹⁸.

To conclude above review in brief the new developments should give high importance to customer behavior while launching new developments as the customer will be happy only if the real estate he purchased has no big financial impact on him, educational institute are near by, neighborhood is of similar income group, family size and commitments, public services, developers services and services charges etc.

V. RESEARCH DESIGN

The research design is almost Quantitative in nature and wherein the research is tried to find out the factors affecting the consumer buying behavior in real estate market. The below Research design is given in five steps

1. Analyze the factors to buy the real estates in Dubai
2. To identify the behavior of the customer of UAE residents while buying the real estates.
3. Consumer behavior towards the horizontal development
4. Consumer behavior toward the vertical development
5. Demographic behavior towards the real estate
6. Presenting the data & its Analysis
7. Interpretation & Implications as well as Results

VI. RESEARCH POPULATION

6.1 General Definitions

Population Type 1 – The population for the study consisted of various nationalities including locals (UAE Nationals) in the age group 30 to 60 and having disposal income AED 13,450=00 only⁶

Population Type 2: Expatriates (non-UAE Nationals) staying in United Arab Emirates in the age group 30 to 60 and having disposal income AED 5,355=00 only.⁶

These are further categorized into three groups due to cultural behavior which will have great impact on investments choices in vertical and horizontal developments.

Sub types of Population 2 :

Group 1: Arab speaking expatriates (Gulf Cooperation Council and neighboring Arab countries)

Group 2: Europeans Expatriates includes European continent Nationals and Australians

Group 3: Asian Expatriates including nationals from Asian Continent excluding Arab speaking countries.

Strata of the population is made and the quota for each strata is allocated based on the Stratified Proportional Sampling Technique. The sample size will be three hundred. Samples within a group will be picked for interview using Simple Random Techniques from a list of individuals comprising of entire population, available with DLD and is accessible upon request only.

6.2 Horizontal Property and property types

The Horizontal property is considered as villas of ground + first floor. The various types of villas considered are from three (3) bed room, hall, kitchen, maid rooms, a separate garage and constructed on individual plot to five (5) bed room with said amenities.

6.3 Vertical Development

The Vertical property is considered as vertical buildings having apartment/ flats from ground plus two floors and above.

The various types of apartments considered are from one bed room, hall, kitchen apartments to 3 bed room apartments with said amenities.

VII. DATA COLLECTION

7.1 Primary Data

The Population data is obtained from Dubai Land Department (DLD). The quota for each stratum is allocated based on the Stratified Proportional Sampling Technique. The final individuals were picked for interview using Simple Random Techniques with 100 individual prospects which is possible as the list of individual comprising population is available. The number of prospects interviewed from the 100 individuals for the each group as per number noted in Table 1:

Table 1

Population	% (Rounded to next whole number) (From DLD)	Number of Prospects to be Interviewed from Target Populations (Total sample 100)
Population 1 (Locals)	21 %	21
Population 2- Group 1 (Arabs)	23 %	23
Population 2 Group 2 (Europeans)	18 %	18

Population 2 Group 3 (Asians)	38 %	38
-------------------------------	------	----

The Primary data was obtained through personal interview with prospects. Questionnaires were used for collecting the information. The questionnaire contains two sections. The first section consists of Demographic closed ended questions. The second section combines the open ended and closed ended questions which are based on consumer behavior as per the research objectives.

7.2 Secondary Data

The secondary data is obtained from various journals, news papers, web sites, & government documents.

7.3 Limitations

The study is conducted during 60 days time from November 2014 to January 2015.

The study is based on the survey data collected from the primary data.

The study was confined to Dubai & Sharjah limits only.

VIII. DATA ANALYSIS AND RESULTS

8.1 Brief: Prospect Behavior

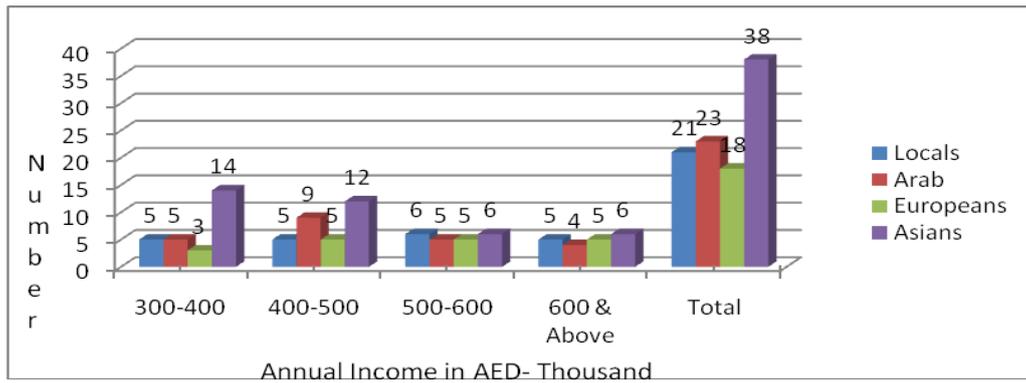
Various nationalities staying in Dubai were interviewed face to face on the understanding that they represent prospects of the current population in Dubai.

8.2 Prospect Behavior

Number of prospects they are willing to invest but they were more cautious as they have learned a lesson through from boom in Dubai through recession. The property market had suffered the most. The prices went to rock bottom and reached to less than half of its original purchase price.

Most of the prospects before used to take a bank loan and do the investment as the profit margin or the price appreciation of the property was about 30% in a span of year. Second reason was the job market. Supply was less and Opportunities were more. The highly paid jobs were available in the market. The general salary range which was about AED 100,000 per year became 300 to 400 thousand year. Hence prospects were having surplus money and thinking of purchasing real estate in Dubai which was giving very attractive returns.

Salary Range	Annual Income (AED -Thousands)				Total
	300-400	400-500	500-600	600 & Above	
Locals	5	5	6	5	21
Arab	5	9	5	4	23
Europeans	3	5	5	5	18
Asians	14	12	6	6	38



Due to recession, many projects in Dubai were either scrapped or stopped due to financial crunch. Lots of people were made redundant and have to leave the country which had an impact on banks and the projects which were suspended due to lack of funds.

However, again the situation has been improved and new projects were launched. As still real estate is giving good returns, the prospects are ready to invest, but now they are enquiring in details about the financial health of the developer and then investing. Even though, not taking too much financial risk and not to collapse their regular budget but wants to continue the investment.

8.3 Consumer Behavior

The Consumer behavior has been studied in two aspects. Investment Behavior and preference behavior and their percentages.

8.4 Locals

8.4.1 Investment Behavior

The locals have their own residential arrangement hence few of them are worried about high rent.

However, there are about 19% are purchasing property as investment appreciation, 67% are investing as it will be other source of income and 14% each are buying property as 2nd home.

Further, we understood that the locals are taking bank loans and to purchase a property and paying the installments through rents so that they can become full owner in few years of time.

Whatever is salary range, the locals prefer to have second and permanent income hence purchasing property.

Only few are interested to buy and sell it after appreciation.

Locals	Total surveyed 21 Numbers				
Annual Income		Due to High rent	Appreciation	Other Source of income	2nd Home
AED	21				
300-400	5		1	3	
400-500	5		0	4	1
500-600	6		0	6	
600 & above	5		3	1	1
Total			4	14	3

	%	0	19.05%	66.67%	14.29%
--	---	---	--------	--------	--------

8.4.2 Real Estate Behavior

Locals with different salary range prefer to invest in buying Villa than apartment. When enquired in details, it is the culture and second reason is easily available low interest bank loan. Hence they prefer to have bigger house or villa. 52% prefer to investment in 3 BHK villas while 24% prefer to invest in 4 BHK & above villa. Around 14 % prefer to buy apartment with 3BHK and 10 % prefer to by apartment with rooms more than 3 BHK.

Locals		Total Number of Surveyed = 21 no					
		Apartment				Villa	
Total		1 BHK	2BHK	3BHK	3BHK & ABOVE	3BHK	4BHK
21							
5	300-400			2		2	1
5	400-500			1	2	2	
6	500-600					4	2
5	600 & above					3	2
Total			0	3	2	11	5
%		0%	0%	14%	10%	52%	24%

8.5 Consumer Behavior: Europeans

8.5.1 Investment Behavior

Most of the Europeans are buying the property for investment. The first reason we understood is that it is good investment which will be good income for future or retirement life. The second reason is the investment is tax free and affordable.

However, there are about 11% are purchasing property due to high rent. About 61% are finding it is good opportunity in UAE to purchase property and do the investment for future life. Only 22% are buying this as second source of income and 6 % are buying property as second home. They want to sell it off, when the property prices will go up in near future.

Further, we understood that the Europeans are paid high and they have surplus income for investment which is most important is tax free. Hence they want to do the investment which will fetch them good returns in future.

Europeans		Total surveyed 18 Numbers			
Annual Income		Due to High rent	Appreciation	Other Source of income	2nd Home
AED	18				
300-400	3		3		
400-500	5	1	3	1	

500-600	5		3	2	
600 & above	5	1	2	1	1
	Total	2	11	4	1
		11%	61%	22%	6%

The ultimate aim of the Europeans is to do investment only and save for future life.

8.5.2 Real Estate Behavior

Europeans with different salary range prefer to invest in buying Villa than apartment. When enquired in details, it is the culture and they have surplus money through which they can able to pay the installments. Third thing is that both husband & wife they work which generate good money hence they prefer to have bigger house or villa. 56% prefer to investment in 3 BHK villas while 28% prefer to invest in 4 BHK & above villa. Only 16 % prefer to buy apartment with 3 BHK..

Europeans		Total Number of Surveyed = 18 no					
	Annual Income	Apartment				Villa	
		1 BHK	2BHK	3BHK	3BHK & ABOVE	3BHK	4BHK
18	AED						
3	300-400			1		2	
5	400-500			1		2	2
5	500-600			1		3	1
5	600 & above					3	2
Total		0	0	3	0	10	5
%		0%	0%	16%	0%	56%	28%

8.6 Consumer Behavior: Arabs

8.6.1 Investment Behavior

Most of the Arabs are buying the property for investment to cover up the high rent. Further recent unrest in neighboring countries and devaluation in their currency force them to do the investment.

There are about 61% are purchasing property due to high rent. About 22% are finding it is good opportunity in UAE to purchase property and do the investment for future life. Only 17% are buying this as second source of income. They want to sell it off, when the property prices will go up in near future.

The ultimate aim of the Arabs to do investment current unrest in their country and own home than paying high rents in Dubai.

Arabs		Total surveyed 23 Numbers			
Annual Income		Due to High rent	Appreciation	Other Source of Income	2nd Home
AED	23				
300-400	5	5			
400-500	9	6	2	1	
500-600	5	2	2	1	
600 & above	4	1	1	2	

	Total	14	5	4	0
		61%	22%	17%	0%

8.6.2 Real Estate Behavior

Arabs with different salary range prefer to invest in buying either bigger apartment or Villa. When enquired in details, their family size is bigger and second thing is their culture to stay in spacious apartment or villa. 35% prefer to investment in 3 BHK Apartment and 13 % prefer to buy apartment with more than 3 BHK. Further, 43% prefer to invest in 3 BHK villas and about 9% prefer to buy 4 BHK villas.

Thus the requirement whether it is apartment or Villas it need to be spacious.

Arab National	Annual Income	Total Number of Surveyed = 23 no					
		Apartment				Villa	
		1 BHK	2BHK	3BHK	3BHK & ABOVE	3BHK	4BHK
23	AED			3		2	
5	300-400			3	3	2	1
9	400-500			2		3	
5	500-600					3	1
4	600 & above					3	1
Total		0	0	8	3	10	2
%		0%	0%	35%	13%	43%	9%

8.7. Consumer Behavior: Asians

8.7.1 Investment Behavior

As seen from the population survey, around 40 % population is from Asian country. The Asians are more doing low income and low profile jobs however; there are 5% to 7% amongst this 40 % who really contribute to UAE economy by owning big business houses.

Most of the Asians are buying the property to cover up the high rent. They do investment as ther is no surely in case they loose their job. Hence they always think that they will sell the property which will be one of the source to fulfill their old age needs.

There are about 42% are purchasing property due to high rent. About 29% are finding it is good opportunity in UAE to purchase property and do the investment for future life. Only 24% are buying this as second source of income and 5 % are buying property as second home. They want to sell it off, when the property prices will go up in near future.

The ultimate aim of the Asians to do investment in Dubai is own a home than paying high rents in Dubai.

Asians	Total surveyed 38 Numbers			
	Due to High rent	Appreciation	Other Source of income	2nd Home
Annual Income				

AED	38				
300-400	14	8	4	2	
400-500	12	7	2	3	
500-600	6	1	3	2	
600 & above	6	0	2	2	2
	Total	16	11	9	2
		42%	29%	24%	5%

8.7.2 Real Estate Behavior

Arabs with different salary range prefer to invest in buying smaller apartment or affordable villa which they are able to maintain. When enquired in details, their family size is not big so they can comfortably stay in small apartment. Second thing is most Asians first buy or built house in their own country so they have their initial commitments which when completes they will think of another investment. . 35% prefer to investment in 1 BHK apartment, 40% prefer to invest in 2 BHK apartment and around 12,5 % prefer to invest in 3 BHK apartment. Only 12.5% prefer to invest in 3 or 4 BHK & above villa.

For Asians investment in Dubai is second investment other than in their own country hence they prefer it should be small and affordable without much of financial burden.

Asians		Total surveyed 38 Numbers					
	Annual Income	Apartment				Villa	
38	AED	1 BHK	2BHK	3BHK	3BHK & ABOVE	3BHK	4BHK
14	300-400	6	8				
12	400-500	5	6	1			
6	500-600	1	2	3			
6	600 & above			1		4	1
Total		12	16	5	0	4	1
%		32%	42%	13%	0%	11%	3%

8.7.3 Analysis Conclusion & Recommendation

Most of the locals and Europeans prefer to have independent Villas which have privacy and security.

Arab nationals prefer to have bigger apartment or small villa which can be maintained,

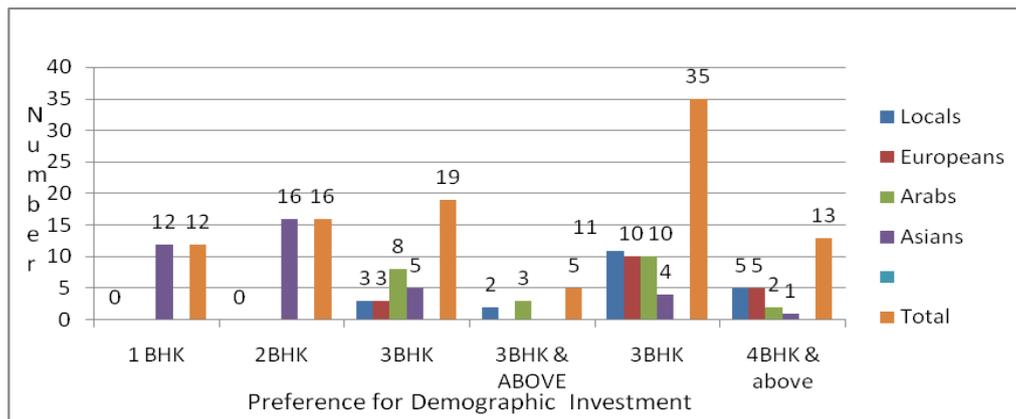
While Asians as this is second investment for them, they prefer to be a Apartment which will fetch them good rent and will recover a their investment cost within a span of 8 or 9 years from the year of investment.

8.7.4 Recommendation

The below recommendation is based on Population 1. (UAE Residents) & Population 2

Locals		Nationality Preference Investment					
		Apartment				Villa	
Total		1 BHK	2BHK	3BHK	3BHK & ABOVE	3BHK	4BHK & above
21	Locals	0	0	3	2	11	5

18	Europeans			3		10	5
23	Arabs			8	3	10	2
38	Asians	12	16	5		4	1
100	Total	12	16	19	5	35	13
%		12%	16%	19%	5%	35%	13%



From above table it can be concluded that the current market is for 3 BHK Villas and it is around 35% of the market share and for 4 BHK and above Villas is 13%.

The market for 1 BHK is 12%, 2 BHK is 16% and 3 BHK is 19 % share. Then the market share for 3 BHK apartments and above is only 4 %.

Hence, the developer has been advised to prefer to use above combination while launching new project.

IX. PROPOSALS AND SUGGESTIONS

UAE Real Estate after a significant slowdown, soaring property prices and rents, and rental yields higher than most global markets have brought investors back to UAE real estate markets in 2012. Accelerated investment activity has also echoed the risk of speculative behavior, which overheated and eventually collapsed the market in 2008.

X. DEVELOPER & PROSPECT TO BE AWARE OF NEW MORTGAGE RULES BY UAE CENTRAL BANK

To ensure sustainable long-term sector recovery, in December 2012, the UAE Central Bank announced plans to restrict Loan-To-Value (LTV) ratios for mortgage lending to expatriates and UAE nationals (50% and 70% respectively)

While the details, or the exact capping levels, of the proposed regulation are currently the focus of negotiations with UAE banks, discussions have overlooked a larger, more systemic issue – the economic impact of mortgage restriction.

10.1 Suggestions to Developer

Dubai's battered property market is on the cusp of a rebound as real estate prices in the city's prime locations show their first increases since the recession. Several developers are again preparing to launch new projects again. However, if they carry out following feasibility studies it will be helpful for them to study various options and work out their business plan accordingly.

10.2 Feasibility Study

The Developer is investing a huge money in business. Feasibility studies can be used in many ways but primarily focus on proposed business projects.

Developer need to monitor the UAE economic conditions well and estimate the market conditions quite accurately. This enables him to provide a comprehensive picture of the proposed investment and accordingly opportunities available.

If properly conducted, it may be the best investment you ever made. Below are other reasons to conduct a feasibility study.

- Gives focus to the project and outline alternatives
- Narrows business alternatives
- Surfaces new opportunities
- Identifies reasons not to proceed
- Improves the probability of success
- Provides quality information for decision making
- Helps in securing funding from lending institutions

10.3 Financial Feasibility Study

This gives you a complete knowledge of financial requirements and gain. The financial feasibility study outlines and analyzes several alternatives or methods of achieving business success. A feasible business enterprise is one where the business will generate adequate cash-flow and profits, withstand the risks it will run into and will have achievable targets in the long-term for investors.

- Proposed total investments
- Cost of investments
- Working capital requirement
- Borrowings/Lenders
- Operational and Organizational details
- Risk factors
- Conclusion and recommendations

XI. MARKET FEASIBILITY STUDY

Developer should gather the latest information on market trends, competitions, products, prices, customer needs and lot more.

Brief market analysis

- Competition
- Products (Apartments or Villa or mixed used development)
- Pricing
- Place of New Project
- identifying the requirements,
- exploring extensive knowledge of the local Real Estate market to suit the needs of the Prospects.

XII. ORGANIZING SEMINARS AND PROMOTIONS

Organize seminars, participations on the local fairs and exhibitions. As well we organize promotions on the local market for our overseas clients.

Due to recession shock, Prospects is always in dual mind as to go ahead of investment or not hence it is necessary to boost his confidence by answering all his queries and doubts to make him comfortable and invest with clean mind.

XIII. CONCLUSION

The aim of the above mentioned points is to establish a strong message to all the developers to update their market study in line with Consumer Behavior and propose new developments to suit needs, wants and culture of their targeted prospects.

REFERENCES

- [1]. Amadeo Kimberly, 05 September 2014: What is Economic Recession? , [http// USEconomy.about.com /od/grossdomesticproduct/f/recession.html](http://USEconomy.about.com/od/grossdomesticproduct/f/recession.html)
- [2]. Brandstetter, M.C.G. de O 2011: Consumer behavior analysis of real estate market with emphasis in residential mobility, choice and satisfaction- Brazilian cases: the Built and Human Environment Review, Volume 4, Special issues 1.
- [3]. Bundahun Rebecca, Tuesday, 3 February 2009, UAE Monthly household income revealed, [arabianbusiness.com,http://www.arabianbusiness.com/uae.monthly.household_income_revealed.80418.html](http://www.arabianbusiness.com/uae.monthly.household_income_revealed.80418.html)
- [4]. <http://www.DubaiBeat.com>, Directory of venture capital and private equity in Middle East, Accessed on 03 September 2014.
- [5]. Department of Economic Development, Foreign Investment Office, Dubai , vae.ahk.de/fileadmin/ahk_vae/.../Foreign_Direct_Investment_-_Dubai.pdf Page 6-7
- [6]. Hua Kiefer, M.A. 2007. Essays on applied spatial econometrics and housing economics. Ph.D. Thesis, Ohio State University, USA.
- [7]. Issac John 03 February 2009, Average Monthly Household Income of UAE Resident Rises to Dh18,248.60 Khaleej Times
- [8]. Jones Lang Lasalleip, Q2014: Encouraging signals from corporate occupiers- Global Market Perspective, Page 2-8

- [9]. JomonLanappan, Nov 2013: An Evaluation of factors influencing customer's home buying decision: Paripex- Indian Journal Research, volume 2, Issue 11
- [10]. Nader Hassan Sabry, AkilMukeshMirchandani, Nisrine Salam 2011: Dubai- FDI destination of choice. Page 3-10
- [11]. Dr. N. Kathirvel, P .Vimalagracy 2014: Factors affecting the buying behavior and buying preferences of individual house ownes:, Indian Journal of Applied Research, Volume 4, Issue 5
- [12]. Miller Samuel, Douglas Elliman, 2013: Kim Corporation. Prime global cities Index: Knight frank Residential Research
- [13]. Morel, J.C., A.Mesbah, M.Oggero and P. Walker, 2001. Building houses with raw materials: Means to drastically reduce the environmental impact of constructions. Build, Environ., 36: 1119-1126
- [14]. MwfeqHassad, MahfuzJudeh and Shafiq Haddad 2011. Factors affecting buying behavior of an Apartment and Empirical Investigation and Amman, Jordan. Research Journal of Applied Science, Engineering and Technology 3(3): 234-239
- [15]. Nechyba, T and R. Stratus, 1997, Community choice and local public services: A discrete choice approach. Region.Sci Urban Econ.,28: 51-73
- [16]. Shah Yash, Tuesday, 26 August 014; Investing in residential properties in Dubai; Residential, Gulf News Page 2
- [17]. United Arab Emirates, National Bureau of Statistics; Table (2-1)- Employees by Economic Activity Group and Major Occupation Group (October 2008).
- [18]. Victoria Garrett, 2014: Spring Article, Dubai prime residential report: Knight rank, Page 2