USE OF DIVERSE FISHING TECHNIQUES IN MID-HIMALAYAN LANDSCAPE OF CENTRAL HIMALAYA, UTTARAKHAND

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ABSTRACT

Fishes are protein providing main exploitable resources of the aquatic ecosystems. Fishing nets and gears are refers to those devices having different shape and sizes and used in the water body to capture different sizes of fishs. Present study deals with fishing techniques in Uttarakhand where fishing has its good scope. Fishing methods was observed and collected through intensive field survey, structured questionnaire, direct observation, interview methods and direct conversation to the fishermen. Various fishing nets, fish poison and use of explosives were main part of this state fishing methods. Fishing techniques adopted in Uttarakhand were simple, mostly old-fashioned, indigenous and locally manufactured. Paper also focuses on various techniques as well as their independent contribution in state fishing. Gill net, Cast net, Dragged net, Dip net, Hand net, Hanging rope, Trap, Hook, Line and Explosives were mainly used other than that six chemical poisons and thirteen Icthyo-toxic plants were observe which was used by the local fishermen. Explosives and Icthyo-poisons were polluting and damaging aquatic ecosystem by various ways and was one of the main causes of aquatic biodiversity loss.

Keywords: Central Himalaya, Fishing Techniques, Fishing Gears, Fishing Nets, Fish Poison, Hill Stream Fishing

I. INTRODUCTION

The fishes are one of the main exploitable resources of the aquatic ecosystems that provide a major source of protein. Fishing technology is the discipline dealing with the natural sciences and technology for optimizing fish capture and fishing operations the leading to a productive and sustainable capture fishery. The state of Uttarakhand situated between 77^{o} 34'- 81^{o} 02' E longitudes and 23^{o} 53'- 31^{o} 27' N latitudes in the north of the India, is a region of great physical diversities. The Uttarakhand is blessed with splendor, varied natural water resources which serve as potential fishery resources [1]. The Central Himalaya is a region of an exceedingly diversified climate and natural aqua-resources [2]. The panorama depicts that the fishery is having a vast scope in the state. Variety of fish species especially Indian major carps, Minor carps, Catfishes, Murrels, Snakeheads, Exotic fishes and many more variety of species and contributes over a great extent upon the state inland fish production. Several researchers work on fishing methods, fishing techniques, fishing craft and gears used over freshwaters of India and abroad [3-8].

Fishing was providing direct and indirect jobs along with economic benefits in relation to population. Hence, forth no more literature has been found that are cited the available used in fishing operation. So, the present

study was concentrated to find out the different fishing techniques with their detailed description. The present paper is an attempt to document the fishing techniques used in Uttarakhand state.

II. MATERIAL AND METHODS

Information on traditional knowledge on fishing methods was observed and collected through intensive field survey and interaction with the local boys or fisherman of the region. During the field work all the data and information regarding the various fishing techniques and their working procedure were collected through a structured questionnaire, direct observation, interview methods and direct conversation to the fishermen. Focus group and personal interview with the fish farmers and local fish contractor were one of the tools which were effectively used in this study. The materials used during the survey includes, measuring taps, measuring scales, one still camera, fish identification handbook, drawing paper, pencils for the spot sketch etc. by the survey staff. Data are collected from the field directly by the various Ph.D. research scholars during his research.

III. RESULTS AND DISCUSSION

Any instruments or device to catch the fish is called gear, while the crafts are used to carry the fishermen and gears to fishing grounds. Various methods and means are employed to catch the fish. Fishing techniques adopted in Uttarakhand were simple, mostly old-fashioned, indigenous and locally manufactured so used by local fishermen for commercial catches of fishes. In India, fishing crafts and gears used to catch fish are mostly primitive and non-mechanized [9]. Fishing nets and gears are refers to those device having different shape and sizes and used in the water body to capture different sizes of fish [10]. Various techniques were studied, observe and classified according to Dr. Andres Von Brandt and details of all technique given in Table-1.

Even in this region various gears were use but few of them were major among them. They were various fishing nets such as Gill net, Cast net, Dragged net, Dip net and Hand net. Other than that Trap, Hook and line, Hanging rope and Explosives were main part of this state fishing methods. Table-2 shows detail description of some of main fishing technique and gears of the region. This findings supported by other similar kind of research [9-12]

Use of fish poisons is the easiest and cheap way of overfishing in hill streams. Chemical poison and Icthyo-toxic plants are two types of fish poison used for fishing. The chemical poison includes the Bleaching powder, Thiodon, Novan, Pesticides, Cyanide and Endrin etc. Icthyo toxic plants were widely used in the hill stream fisheries of Uttarakhand because a multitude of plant species were known to possess Icthyo-toxin (Table 3). It is used in stagnant water, partially blocked river and slow flowing water in the morning and evening hours. Fish-poisons were particularly interesting because they were used for an area effect rather than against an individual target so as it polluting and damage aquatic ecosystem as killing of aquatic biota like neuston, nekton, periphyton, benthos, fry and fingerlings. Our these research findings were strongly supported by the various other cited literature [13-15]

IV. FIGURES AND TABLES

Table 1- Various Fishing Gears and Their Use Ratio in The Region

	Fishing Technique			Used in Uttarakhand		
				Rare	Common	Main
1.	**Fishing without gears**	Grasping by hand		+		
		By diving		+		
		With hunting animals		+		
2.	**Grappling and wounding gear**	Hand instruments	Clamps	+		
			Tongs	+		
			Raking devices	+		
		Sharp projectiles	Spears	+		
			Fish plumonets	+		
			Fish combs	+		
			Bows and arrows	+		
			Harpoons	+		
			Cross bow	+		
			Blowpipes	+		
			Rifles	+		
3.	**Stupefying devices**	Mechanical Stupefying	Striking gear	+	+	
			Explosives	+	+	+
		Chemical Stupefying	Toxic plants	+	+	+
			Chemical poisons	+	+	
		De-oxygenation		+	+	
		Electrical Stupefying		+	+	
4.	**Lines**	Without hook		+		
		With gorges	hand line	+	+	
			set line	+	+	
			drift lines	+	+	
			trawl lines	+	+	
		With rip hooks	Pole hooks	+		
			Fish narrows	+		
			Squid jigs	+		
			Rip lines	+		
5.	**Traps**	Handling places	Bust traps and tubes	+	+	
			Octopus pots	+		

			other hiding places	+		
		Barriers		+		
		Mechanical traps		+	+	
		Tubular traps		+		
		Baskets		+	+	
		Trap nets		+	+	+
6.	**Arial Traps**	Box raft		+		
		Canoe traps		+		
		Varandah nets		+		
7.	**Bag nets**	Scoop net		+	+	
		Scraps nets		+	+	
		Gap nets		+		
		Gap nets with wings		+		
8.	**Dragged gear**	Dredger		+	+	
		Deep net		+	+	+
		Bottom trawls		+	+	
		Mid-water trawls		+	+	
9.	**Seine net**	Double stick net		+	+	+
		Beach Seine		+	+	+
		Canoe seines		+	+	
10.	**Surrounding nets**	Lampara nets		+	+	+
		Purse seines		+	+	+
		Ring net		+	+	+
11.	**Drive-in nets**			+	+	
12.	**Lift nets**	Hand lift nets		+	+	+
		Mechanical lift nets		+	+	
		Blanket nets		+	+	
		Fish wheels		+	+	
13.	**Falling gear**	Cover pots		+	+	
		Cast nets		+	+	+
14.	**Gill nets**	Set gill nets		+	+	+
		Drift gill nets		+	+	+
		Encircling gill nets		+	+	+
15.	**Tangle nets**	Single walled entangling nets		+		
		Double walled entangling nets		+		
		Trammel nets		+		

16.	**Harvesting machines**	Fish pumps		+	+	
		Conveyer belts		+	+	

Table 2 – Detail Description of Some of Main Fishing Technique and Gears Used in The Region

Hook and line	**Cast net**
➢ This might be the one of the oldest and famous fishing method all over the world. ➢ The principle of line fishing was to offer bait to attract the fish to bite it. ➢ A metal hook various in shapes and sizes and tied with one end of nylon tread and the other end of nylon tread was tied with a bamboo stick. ➢ A fishhook was a metallic piece with following parts, eye, shank, bend and the spear. The spear end has an inclined barb with two points, outer and inner. ➢ Earthworm, grasshopper, fingerlings were placed into the hook as bait. ➢ Generally, the fishermen placed the nylon rope along with metal hook in water for whole night and collect the fish in another morning. ➢ This was not a commercial fishing method and mostly the fish caught is consumed by the fishermen itself. ➢ It was observed that the most of the catch in hook and line comprise of carnivorous fishes ➢ It was a very popular method for sport fishery in state. ➢ The efficiency of the fishing with hook and line depends upon several other factors such as (i) changes in feeding behavior of fish (diurnal or seasonal), (ii) abundance of natural food in the water, (iii) density of fish in the water, (iv) setting pattern of the long line.	➢ Cast net was conical in shape and commonly known as Ghaghra jaal. ➢ The diameter of the cast net used ranges from 1 to 1.5 meter and the mesh size is from 1 to 3.5cm. ➢ On the periphery metallic sinkers were attached to make the net sink and to withstand the flow of streams. ➢ It was operated in shallow water near the shore line to catch small fish. ➢ It was circular in shape looking like umbrella, with a strong rope attached to the apex. ➢ The fishermen throws the net skillfully over the water in such way that the rope was held in one hand and the net falls on the water surface fully expanded. The net gradually sinks to the bottom due to weights attached to the margin. The net was hauled with the help of rope. ➢ While using, after a number of attempts the fishermen became successful to catch the fishes. ➢ Mostly use for *Tor species, Barilius species, Schizothorax* species, minnows, small carps minor carps and small catfishes
Dragged net	**Gill net**
➢ It was also known as Mahajal or Chata jal	➢ Most commonly use by local fishermen.

➢ This group contains all nets, begs which were towed through the water on or near the bottom. ➢ The manner of capturing was filtering the passive prey by the active moving gear. ➢ According to the size of the fish expected to be caught the mesh size of the net was selected. ➢ The smallest mesh size net no. zero is used to collect fish and fingerling in harvesting pond. ➢ Its mesh size 25-50 mm generally used for removing wild indigenous fishes, and also to catch small fresh water fish species.	➢ Can used in fast flowing as well as slow flowing waters. ➢ The gill net was made up of Polyamide or Nylon only. ➢ Mesh size of net ranges from 20 mm to 120 mm. ➢ Net size ranges ten different combination of (60 to 90 meters X 4 to10 feet) ➢ Normally, two gill nets of different mesh sizes are used at a time at the same fishing spot. ➢ Gill nets were generally not operated during the monsoon season. ➢ The gill net was set in the evening time and hauled in the morning hours. ➢ Mostly use for Indian major carps and catfishes
Trap ➢ Commonly known as funnel. ➢ These were implements in which the fish enters voluntarily but it hampered from coming out. ➢ Rectangular in shape all the six sides of the structure was surrounded by bamboo netting. ➢ An entrance was provided at the middle of one side ➢ Fish prevent to escape by fixing a comb like bamboo strips fitted at a rubber string. ➢ In general use for small scale of fishing.	**Hand net** ➢ It was used for catching the small fishes. ➢ This gear was commonly known as fatela jal. ➢ The net is X- shape with two sticks attached to it. ➢ The mesh size of nets ranges from 1.5 to 2.0 cm with net diameter 1.0 to 1.2 meter. ➢ Local boys mostly use it in morning and evening time. ➢ This method was applied in shallow pools and riffles. ➢ These nets were actively used in the summer, winter and spring seasons.
Hanging rope ➢ This gear was locally known as Suraka. ➢ This gear consists of a nylon rope with several knots at regular interval. ➢ The diameters of knot ranges from 10 to 20cm, while the length of the rope ranges from 10 to 25 meters. ➢ When the fishes moving upwards or	**Dip net** ➢ Here the net was rectangular in shape. ➢ The net was dip after an interval and again lift, as it is lift category net. ➢ The fishes come voluntarily sometimes some bait such as rice bran was broadcast over the net to attract the fish. ➢ Two bamboo frames were tied at the middle

downwards in the river get trapped in these knots. ➢ Hanging rope was put during night time and fishes are collected the next early morning. ➢ Hanging rope was often put in riffle and glide habitat type with shallow depth and high water velocity.	by a rope thus divided into 4 tips. The nets are fixed at these 4 tips forming the structure as cross mark "X". ➢ A bamboo pole was fixed at the middle of the cross; this will act as lever to lift the net.

Explosives

- Fishes were killed by damaging their inner ear by the explosion or by making them semi-conscious.
- It was main reason for the decline in the number of fish species.
- The uses of explosives were quite common in the hill stream fishing due to fishing ground were uneven rocky bottom and not suitable for the operation of any types of nets.
- Explosives were use by the part time fishermen.
- Explosives were purchase from the market or can acquired dynamite from road constructions originations.
- Fishermen can modify the explosives so can use as a purposes like hunting.
- Only few experts were operating the explosives other were collect the fishes after the explosion.

Table 3- Long List of Plants that Used as Fish Toxicants in The Region (Adopted and Modified From Negi and Kanwal, 2009) [15]

S.No.	Botanical Name	Local Name	Family	Plant parts in use
1.	Acacia pennata	Rigadi	Mimosaceae	Leafs
2.	Aesculus indica	Pangar	Hippocastanceae	Bark
3.	Agave americana	Rambans	Agavaceae	Bark
4.	Casearia elliptica	Chilla	Flacourtiaceae	Powder
5.	Catunaregam spinosa	Maindul	Rubiaceae	Buds and leafs
6.	Euphorbia royleana	Sulla	Euphorbiaceae	Plant past
7.	Juglans regia	Akhrot	Juglandaceae	Leafs and bark
8.	Lyonia ovalifolia	Aiyaar	Ericaceae	Buds and leafs
9	Madhuca longifolia	Mahua	Spotaceae	Leafs, bark and seed powder
10	Sapindus mukorossi	Reetha	Sapindaceae	Fruit powder
11	Sapium insigne	Khinna	Euphorbiaceae	Buds and leafs
12	Syzgium cumini	Kala Jamun	Myrtaceae	Bark and leafs juice
13	Zanthoxylum armatum	Timbur	Rutaceae	Bark,leafs juice and Fruit powder

V. CONCLUSIONS

Various fishing methods were used in the region and fishermen have good knowledge about it. Various fishing nets, fish poison and use of explosives were the main methods. Most of methods were old-fashioned, indigenous

and locally manufactured. Explosives and Icthyo-poisons were polluting and damaging aquatic ecosystem and causing aquatic biodiversity loss.

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THE DISTRIBUTION OF THE PRODUCT, QUOTIENT AND VARIATE OF A POWER OF RANDOM VARIABLES PERTAINING TO H-FUNCTION

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ABSTRACT

The aim of this paper is to obtain the distribution of product,quotient and variate of a power of random variables(H-function variables) with probability density functions in the form of H-function. The method used is based on Mellin transform. The result obtained here is quite general in nature and is capable of yielding a large number of corresponding new and known results merely by specializing the parameters involved therein. To illustrate, some special cases of our main result are also given.

Keywords: ***Probability Density Function, Mellin Transform, H-Function.***

I. INTRODUCTION

We obtained transformation of random variable on distribution of product, distribution of quotient and distribution of variate to a power.

II. DISTRIBUTION OF PRODUCTS

We know that if $X_1 \ldots X_N$ are independent continuous random variables with Probability Density Function $f(X_1) \ldots f(X_N)$, where p(X_i <0) for i=1…N, then probability density function of a random variable $Y = \prod_{i=1}^{N} X_i$ i=1…N,is given by

$$f_Y(y) = M_y^{-1}\left\{\prod_{i=1}^{N} M_s\left[f_i(X_i)\right]\right\} = \frac{1}{2\pi i}\int_{\omega-i\infty}^{\omega+i\infty} y^{-s} M_s f_1(x_1).M_s f_2(x_2)\ldots M_s f_N(x_N).ds \quad [1]$$

We also know that

$$M_s\{H(cx)\} = \frac{1}{c^s}\frac{\prod_{j=1}^{m}\Gamma(b_j + B_j s)\prod_{j=1}^{n}\Gamma(1-a_j - A_j s)}{\prod_{j=m+1}^{q}\Gamma(1-b_j - B_j s)\prod_{j=n+1}^{p}\Gamma(a_j + A_j s)}$$

i. **Theorem:** If X_1 *and* X_2 are independent H-function variates with Probability Density Function $f_1(X_1)$ *and* $f_2(X_2)$, where

(1.1) $f_1(x_1) = k_1 H_{p_1 q_1}^{m_1 n_1}\left[c_1 x_1 : \underset{j=1\ldots p_1}{\{(a_{1j} A_{1j})\}}; \underset{j=1\ldots q_1}{\{(b_{1j} B_{1j})\}} \right] , x_1 > 0$

(1.2) $f_2(x_2) = k_2 H_{p_2 q_2}^{m_2 n_2}\left[c_2 x_2 : \underset{j=1\ldots p_2}{\{(a_{2j} A_{2j})\}}; \underset{j=1\ldots q_2}{\{(b_{2j} B_{2j})\}} \right] , x_2 > 0$

Then find the distribution Y= $X_1 X_2$.[2]

Proof:

Using Mellin transform formula for H[cx] ,the distribution of Y= $X_1 X_2$ is given by

f(y)= $\frac{1}{2\pi i}\int_{\omega-i\infty}^{\omega+i\infty} y^{-s} M_s f_1(x_1).M_s f_2(x_2).ds$

or f(y) = $\frac{1}{2\pi i}.k_1 k_2 \int_{\omega-i\infty}^{\omega+i\infty} \frac{\prod_{j=1}^{m_1}\Gamma(b_{1j}+B_{1j}s)\prod_{j=1}^{m_2}\Gamma(b_{2j}+B_{2j}s)\prod_{j=1}^{n_1}\Gamma(1-a_{1j}-A_{1j}s)\prod_{j=1}^{n_2}\Gamma(1-a_{2j}-A_{2j}s)}{\prod_{j=m_1+1}^{q_1}\Gamma(1-b_{1j}-B_{1j}s)\prod_{j=m_2+1}^{q_2}\Gamma(1-b_{2j}-B_{2j}s)\prod_{j=n_1+1}^{p_1}\Gamma(a_{1j}+A_{1j}s)\prod_{j=n_2+1}^{p_2}\Gamma(a_{2j}+A_{2j}s)}(c_1c_2y)^{-s}$ where

$y = x_1 x_2 =$

$$k_1 k_2 H_{p_1+p_2\ q_1+q_2}^{m_1+m_2\ n_1+n_2}\left[c_1 c_2 y \left| \begin{matrix} (a_{11},A_{11})\ldots(a_{1n_1},A_{1n_1}),(a_{21},A_{21})\ldots(a_{2n_2},A_{2n_2});(a_{1n_1+1},A_{1n_1+1})\ldots(a_{1p_1},A_{1p_1}), \\ (a_{2n_2+1},A_{2n_2+1})\ldots(a_{2p_2},A_{2p_2}) \\ (b_{11},B_{11})\ldots(b_{1m_1},B_{1m_1}),(b_{21},B_{21})\ldots(b_{2m_2},B_{2m_2});(b_{1m_1+1},B_{1m_1+1})\ldots(b_{1q_1},B_{1q_1}), \\ (b_{2m_2+1},B_{2m_2+1})\ldots(b_{2q_2},B_{2q_2}) \end{matrix} \right. \right]$$

$$= k_1 k_2 H_{p_1+p_2\ q_1+q_2}^{m_1+m_2\ n_1+n_2}\left[c_1 c_2 y \left| \begin{matrix} \underset{j=1\ldots n_1}{\{(a_{1j} A_{1j})\}}, \underset{j=1\ldots n_2}{\{(a_{2j} A_{2j})\}}, \underset{j=n_1+1\ldots p_1}{\{(a_{1j} A_{1j})\}}, \underset{j=n_2+1\ldots p_2}{\{(a_{2j} A_{2j})\}} \\ \underset{j=1\ldots m_1}{\{(b_{1j} B_{1j})\}}, \underset{j=1\ldots m_2}{\{(b_{2j} B_{2j})\}}, \underset{j=m_1+1\ldots q_1}{\{(b_{1j} B_{1j})\}}, \underset{j=m_2+1\ldots q_2}{\{(b_{2j} B_{2j})\}} \end{matrix} \right. \right]$$

Hence ,for N variables (H-function variates) ,the theorem is follows.[3]

ii. **Theorem:** If $X_1, X_2 \ldots X_N$ are mutually independent H-function variates with densities $f_1(X_1), f_2(X_2) \ldots f_N(X_N)$ respectively, where

(1.3) $f_i(x_i) = k_i H_{p_i q_i}^{m_i n_i}\left[c_1 x_i : \underset{j=1\ldots p_i}{\{(a_{ij} A_{ij})\}}; \underset{j=1\ldots q_i}{\{(b_{ij} B_{ij})\}} \right] , x_i > 0$ for i=1…N,then

Probability Density Function of the random variable $Y = \prod_{i=1}^{N} X_i$ is given by

(1.4) $f_Y(y) = \prod_{i=1}^{N} k_i \ H_{\sum_{i=1}^{N} p_i \ \sum_{i=1}^{N} q_i}^{\sum_{i=1}^{N} m_i \ \sum_{i=1}^{N} n_i}\left[\prod_{i=1}^{N} c_i : \{(a_{ij} A_{ij})\}; \{(b_{ij} B_{ij})\} \right] , \ y > 0$

where the sequence of parameters $\{(a_{ij} A_{ij})\}$ is $j = 1,2 \ldots n_i$ for i=1,2…N

followed by

$\{(a_{ij} A_{ij})\}$ $j = n_i + 1, n_i + 2 \ldots p_i$ for i=1,2…N.

the sequence of parameters $\{(b_{ij}\ B_{ij})\}$ is $j=1,2...m_i$ for i=1,2…N

followed by

$\{(b_{ij}\ B_{ij})\}$ $j=m_i+1,m_i+2...q_i$ for i=1,2…N.

Verification: Product of two half-normal variates

$$f_1(x_1)=\frac{1}{\sqrt{2\pi}\sigma_1}H_{01}^{10}\left[\frac{x}{\sqrt{2}\sigma_1}:...;\left(0,\frac{1}{2}\right)\right]$$

and $f_2(x_2)=\frac{1}{\sqrt{2\pi}\sigma_2}H_{01}^{10}\left[\frac{x}{\sqrt{2}\sigma_2}:...;\left(0,\frac{1}{2}\right)\right]$

is given by

$$(1.5)\left(2\pi\sigma_1\sigma_2\right)^{-1}H_{02}^{20}\left[\frac{z}{2\sigma_1\sigma_2}:...;\left(0,\frac{1}{2}\right),\left(0,\frac{1}{2}\right)\right],z=x_1x_2$$

Now we know that Bessel's function

$$K_\nu(z)=\frac{1}{4}H_{02}^{20}\left[\frac{z}{2}:\ ;\left(\frac{\nu}{2},\frac{1}{2}\right),\left(\frac{-\nu}{2},\frac{1}{2}\right)\right]$$

$$\Rightarrow K_0\left(\frac{z}{\sigma_1\sigma_2}\right)=\frac{1}{4}H_{02}^{20}\left[\frac{z}{2\sigma_1\sigma_2}:...;\left(0,\frac{1}{2}\right),\left(0,\frac{1}{2}\right)\right].$$

Hence, (1.5) represents Bessel's distribution $\frac{2}{\pi\sigma_1\sigma_2}\cdot K_0\left(\frac{z}{\sigma_1\sigma_2}\right)$ and agrees with known results without H-function

III. DISTRIBUTION OF QUOTIENT

We know that If X_1 and X_2 are independent H-function variates with Probability Density Function $f_1(X_1)$ and $f_2(X_2)$,then Probability Density Function of $Y=\frac{X_1}{X}$ is

$$(2.1)\ f_Y(y)=\frac{1}{2\pi i}\int_{\omega-i\infty}^{\omega+i\infty}y^{-s}M_s f_1(x_1).M_{2-s}\{f_2(x_2)\}.ds\ .\ [4]$$

iii. **Theorem:** If X_1 and X_2 are independent H-function variates with densities $f_1(x_1)$ and $f_2(x_2)$ respectively ,where

$$(2.2)\ f_i(x_i)=k_i\ H_{p_i\ q_i}^{m_i\ n_i}\left[c_1\ x_i:\underset{i=1,2}{\underset{j=1...p_i}{\{(a_{ij}\ A_{ij})\}}};\underset{i=1,2}{\underset{j=1...q_i}{\{(b_{ij}\ B_{ij})\}}}\right]$$

Then find the distribution of $Y=\frac{X_1}{X_2}$.

Proof:

$$\text{f(y)}=\frac{1}{2\pi i}\int_{\omega-i\infty}^{\omega+i\infty} y^{-s} M_s f_1(x_1).M_{2-s}\{f_2(x_2)\}.ds \text{ or}$$

$$\text{f(y)}=\frac{1}{2\pi i}.k_1k_2\int_{\omega-i\infty}^{\omega+i\infty}\frac{\prod_{j=1}^{m_1}\Gamma(b_{1j}+B_{1j}s)\prod_{j=1}^{n_1}\Gamma(1-a_{1j}-A_{1j}s)}{\prod_{j=m_1+1}^{q_1}\Gamma(1-b_{1j}-B_{1j}s)\prod_{j=n_1+1}^{p_1}\Gamma(a_{1j}+A_{1j}s)}.$$

$$\left(\frac{1}{c_2^{2-s}}\right).\frac{\prod_{j=1}^{m_2}\Gamma(b_{2j}+2B_{2j}-B_{2j}s)\prod_{j=1}^{n_2}\Gamma(1-a_{2j}-2A_{2j}+A_{2j}s)}{\prod_{j=m_2+1}^{q_2}\Gamma(1-b_{2j}-2B_{2j}+B_{2j}s)\prod_{j=n_2+1}^{p_2}\Gamma(a_{2j}+2A_{2j}-A_{2j}s)}$$

$$=\left(\frac{k_1k_2}{c_2^2}\right)\frac{1}{2\pi i}\quad .$$

$$\int_{\omega-i\infty}^{\omega+i\infty}\frac{\prod_{j=1}^{m_1}\Gamma(b_{1j}+B_{1j}s)\prod_{j=1}^{n_2}\{\Gamma(1-a_{2j}-2A_{2j})+A_{2j}s\}\prod_{j=1}^{n_1}\{\Gamma(1-a_{1j}-A_{1j}s)\}\prod_{j=1}^{m_2}\{1-(1-b_{2j}-2B_{2j})-B_{2j}s)\}}{\prod_{j=n_1+1}^{p_1}\Gamma(a_{1j}+A_{1j}s)\prod_{j=m_2+1}^{q_2}\{\Gamma(1-b_{2j}-2B_{2j})+B_{2j}s\}\prod_{j=m_1+1}^{q_1}\Gamma(1-b_{1j}-B_{1j}s)\prod_{j=n_2+1}^{p_2}\{1-(1-a_{2j}-2A_{2j})-A_{2j}s)\}}\left(\frac{c_1}{c_2}y\right)^{-s}ds$$

$$=\frac{k_1k_2}{c_2^2}H_{p_1+q_2\ q_1+p_2}^{m_1+n_2\ n_1+m_2}\left[\frac{c_1}{c_2}y:\{(d,D)\};\{(e,E)\}\right]\ ,\ y>0$$

where the sequence of parameters $\{(d,D)\}$ is

$$\{(a_{11},A_{11})...(a_{1n_1},A_{1n_1}),(1-b_{21}-2B_{21},B_{21})...(1-b_{2m_2}-2B_{2m_2},B_{2m_2})$$
$$(a_{1n_1+1},A_{1n_1+1})...(a_{1p_1},A_{1p_1})$$
$$(1-b_{2m_2+1}-2B_{2m_2+1},B_{2m_2+1})...(1-b_{2q_2}-2B_{2q_2},B_{2q_2})\}$$

the sequence of parameters $\{(e,E)\}$ is

$$\{(b_{11},B_{11})...(b_{1m_1},B_{1m_1}),(1-a_{21}-2A_{21},A_{21})...(1-A_{2n_2}-2A_{2n_2},A_{2n_2})$$
$$(b_{1m_1+1},B_{1m_1+1})...(b_{1q_1},B_{1q_1}),$$
$$(1-a_{2n_2+1}-2A_{2n_2+1},A_{2n_2+1})...(1-a_{2p_2}-2A_{2p_2},A_{2p_2})\}$$

In short notation, distribution of $Y=\frac{X_1}{X_2}$ is

$$\text{f(y)}=f(x)=[\phi\Gamma(\theta)]^{-1}H_{01}^{10}\left[\frac{x}{\phi}:...(\theta-1,1)\right].$$

Verification:

(i) We know that Probability Density Function of Gamma distributionis

$$f(x)=[\phi\Gamma(\theta)]^{-1}H_{01}^{10}\left[\frac{x}{\phi}:...(\theta-1,1)\right]\quad \text{x>0, } \theta,\phi>0$$

Suppose two Gamma variates are

$$f_1(x_1)=[\phi_1\Gamma(\theta_1)]^{-1}H_{01}^{10}\left[\frac{x_1}{\phi_1}:...(\theta_1-1,1)\right]$$

$$f_2(x_2) = [\phi_2\,\Gamma(\theta_2)]^{-1} H_{01}^{10}\left[\frac{x_2}{\phi_2} : \ldots(\theta_2 - 1,1)\right]$$

Then 'quotient' of two gamma variates is

$$\left\{\frac{\phi_2}{\phi_1\,\Gamma(\theta_1)\Gamma(\theta_2)}\right\} H_{11}^{11}\left[\frac{\phi_2}{\phi_1} z : (-\theta_2,1);(\theta_1 - 1,1)\right],$$

by previous theorem,

$$= \left\{\left(\frac{\phi_2}{\phi_1}\right)^{\theta_1} \frac{\Gamma(\theta_1+\theta_2)}{\Gamma(\theta_1)\Gamma(\theta_2)}\right\} z^{\theta_1 - 1}\left(1+\frac{\phi_2}{\phi_1}\right)^{-\theta_1-\theta_2},$$

By using the relation

$$\left\{z^b (1+z)^{-a} = H_{11}^{11}[z : (b-a+1,1);(b,1)]\right/\Gamma(a)$$

which is "Beta distribution of second kind" and agrees with the known result obtained without H-function.

(ii) Similarly for quotient of two exponential variates (Gamma distribution with θ =1) is given by

$$\left\{\frac{\phi_2}{\phi_1}\right\} H_{11}^{11}\left[\frac{\phi_2}{\phi_1} z : (-1,1);(0,1)\right] = \frac{\left(\frac{\phi_2}{\phi_1}\right)}{\left(1+\frac{\phi_2}{\phi_1} z\right)^2}.$$

IV. DISTRIBUTION OF VARIATE TO A POWER

We know that if X is a random variable with density f(x),non-zero for positive values of , the variable ,then the density of Y= X^p is given by

$$f_Y(y) = \frac{1}{2\pi i}\int_{\omega-i\infty}^{\omega+i\infty} y^{-s} M_{ps-p+1}\{f(x)\}\,ds \quad ,0<y<\infty$$

In Mellin transform of H(cx) that is $M_s\{H(cx)\}$,replacing s by (ps-p+1) [5],we get the following theorem

iv. **Theorem:** If X is an H-function variate with density f(x), where

$$f(x) = k\,H_{p\,q}^{m\,n}\left[c\,x : \underset{j=1\ldots p}{\{(a_j\ A_j)\}}; \underset{j=1\ldots q}{\{(b_j\ B_j)\}}\right] \quad x>0$$

Then Probability Density Function of the random variable Y= X^p is given by

$$f_Y(y) = kc^{p-1} H_{p\,q}^{m\,n}\left[c^p\ y : \begin{matrix}\{(a_j - A_j p + A_j,\ A_j p)\}_{j=1\ldots p} \\ \{(b_j - B_j p + B_j,\ B_j p)\}_{j=1\ldots q}\end{matrix}\right] \quad y>0, \text{ when } p>0 \text{ and}$$

$$f_Y(y) = kc^{p-1} H_{p\,q}^{m\,n}\left[c^p\ y : \begin{matrix}\{(1-b_j + B_j p - B_j,\ -B_j p)\}_{j=1\ldots q} \\ \{(1-a_j + A_j p - A_j,\ -A_j p)\}_{j=1\ldots p}\end{matrix}\right] \quad y>0, \text{ when } p<0$$

Verification:

(i) If X has Rayleigh distribution with parameter λ, then Y= X^2 has exponential distribution with parameter λ.

(ii) If X has Weibull distribution with parameter β *and* λ, then Y= X^p has exponential distribution with parameters $\frac{\beta}{p}$ *and* λ.

(iii) If X has a half normal distribution with parameter σ, then Y= X^2 has Gamma distribution with parameters $r = \frac{1}{2}$ *and* $\lambda = \frac{1}{2\sigma^2}$

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ICT AND E-AGRICULTURE

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ABSTRACT

Agriculture is considered to be a main occupation for a most segment of population. The agricultural field plays a major role in the India's development. There is a large gap between rural areas and information residing in agricultural knowledge center. The agriculture sector has been on under development for past few years due to lack of environment changes and Agriculture knowledge. E-agriculture is a rising field focusing on the improvement of agriculture and rural development through communication processes and advanced information and Technology. In this paper, some important issues discussed with ICT and E-agriculture. This review paper presents a some review of the rural ICT and the issues associated with the use of ICT for rural e-Agriculture application.

Keywords: ICT, e-Governance, e-Agriculture, Agriculture websites

I. INTRODUCTION

ICTs or Information and Communication Technologies are important tool for the development of rural and agriculture sector. Agriculture is a main sector with the majority of the rural population in developing countries depending on it. This sector faces large major challenges of enhancing production in a situation of dwindling natural resources necessary for production. The large increasing demand for agricultural products, however, also offers some opportunities for producers to sustain and uplifting their living style. Information and communication technologies (ICT) play an important role in solving these challenges and improve the livelihoods of the rural poor people. This review paper explores the potential contribution of ICT to the livelihoods of small-scale farmers and the efficiency of the agricultural sector in developing countries. The agricultural sector plays an important role in the India's development.

II. ICT

The full form of ICT is "Information and Communication Technologies."Information and Communication Technology(ICT)means technologies that provide access to information through broadcast media and telecommunication. It is similar and equal to Information Technology (IT), but primarily focuses on communication technologies. This includes the telephone, cell phones, wireless networks, Internet and other communication mediums.In the past few years, information and communication technologies have provided society with a very large number of new communication abilities. People can communicate with each other in different countries using technologies such as voice over IP (VoIP), video-conferencing and instant messaging. Social networking website likes LinkedIn, Facebook, Twitter allow own all users from all over the world to remain in contact and communicate on a regular basis.Modern information and communication technologies (ICT) have created a "Global small city," in which people can communicate with each other across

the world as if they were living next door. For this basis, ICT is often studied in the context of how modern communication technologies affect agriculture sector and society.

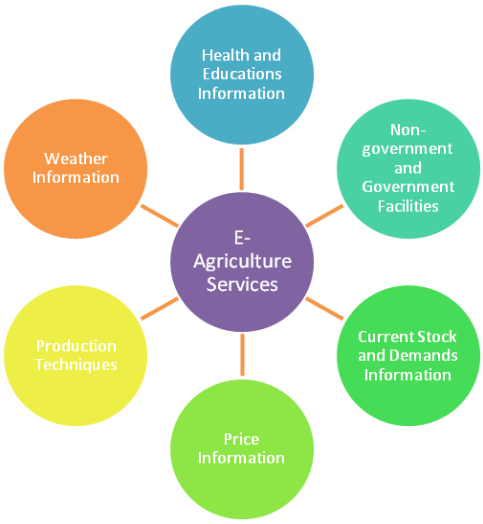
III. E-AGRICULTURE

E-agriculture is improving agriculture development opportunities, and aiding the practice of agri-business. Theincreased use of E-Agriculture and e-agriculture technologies has empowered farmers and translated into a higher standard of living for farming communitiesworldwide. E-agriculture is a rapidly emerging field which involves increasing access to internet-based farming and crop growing information related to local natural resources, market information, businessopportunities, emerging farming technologies, and new farming techniques, credit and financial services, monitoring of resources, accounting, weather forecasts, and pest alerts. Agriculture has really changed. People are using satellite photos to determine needs for water, fertilizer and pesticides, then connecting wirelessly to the application equipment so that as the equipment moves through a field its application rates change. A variety of sensing equipment can feed into the network. The idea is to apply exactly the right material to exactly the right spot at exactly the right time using networked equipment.E-Agriculture Community is made up offarmers,policy makers, development practitioners, individual stakeholders such as information and communication specialists, students, researchers, business people and others.Farmers can get the desired information at any time from any part of world and they can also get the help from experts viewing their problem immediately by without moving anywhere. E-agriculture is a relatively new term in the area of agriculture and rural development.In short e-Agriculture will connect all related persons starting from farmers to researchers together.E-agriculture conveys the information related agricultural details to farmers in SMS via SMS gateway. The details such asseasonal alert, daily alert, and other additional details can be sent to farmers. The seasonal or daily alert can be sent to all farmers in the database.

IV. NEED OF ICT IN AGRICULTURE

E-agriculture helps in dissemination of gathered information to the farmers, mostly lived in rural areas, to use in their routine work. These services are provided through the Internet and related technologies. This ensures the effective and efficient use of information and communication technologies for designing, implementing, and analyzing innovative and existing applications to help the agricultural sector. The information disseminated by e-Agriculture can be divided into several major fields or areas, which is called as services of e-Agriculture. These are:

- Weather Information
- Price Information
- Health andEducations Information
- Production Techniques
- Non-government andGovernment Facilities
- Current Stock andDemands Information



There are several models of ICTs may be used in agriculture of India, which have made a significant many difference operation. The main technologies involved in Farmer's call centers are:

• Desktop and Laptop computer system with Internet connectivity

• Teleconferencing and telephones with headphones

• High bandwidth telephone line

The main purpose is to deliver the extension services to the farming community in the local languages. The farmer dials the help line, a toll free number, 1551 (symbolic), and the agricultural graduates provide the initial important enquiry. The information cost to the farmers is almost zero, and they also get the response in their own local languages. If needed extra knowledge and information then some time, the agricultural scientists also visit the field to resolve any further queries.

V. ROLE OF ICT IN E –AGRICULTURE

Information and Communication Technology is a term that includes any communication device or application, television, radio, mobile andcomputer, network hardware, fixed phones andsatellite systems and softwareso on, necessary for the delivery of information in the form ofdata, image, audio, video, etc. from Point P to Point Q. ICT exist of all technical means used to handle information and aid communication.The spread of information to farmers has become increasingly integrated into ICTs. Many of the organizations likeprivate, cooperatives, government and public have also attempted to facilitate technology transfer in the agricultural sector. A new concept about Agricultural informatics that has proceededquick development in information and communication technologies and of the internet. Rural telecentres provide information onagricultural,education andhealthissues and equip rural citizens with skills on how to use computers and provide basic literacy. Information and Communication Technologies are crucial in facilitating communication and access to information forrural development and agricultural. Also TV programand Radio provided agricultural information. Information and communication technologies are making big impact on the rural economy due to its appeal andwide application. It may seem paradoxical that modem lets associated with developed country markets and capital intensive methods of production, has any relevance for country like India where many millions of people lack in basic needs. Nevertheless, there are many efforts in India and other developing countries to demonstrate the concrete benefits of ICT for rural population and to carry out the same in a manner that makes economic sense.

Some Application of ICT is following.

Some Application of ICT

VI. ADVANTAGES OF ICT IN E-AGRICULTURE

Advantages of ICT in E-agriculture are following.

1) Improved productivity and profitability of farmers through ICT and E-Agricultural facility.

2) Efficient utilization and management of resources

3) Rain and other important information timely available in to the farmer.

4)It can support policy and decision-making information and evaluation on optimal farm production, agro-environmental resource management etc. using tools such as GIS.

5) It can also provide new agricultural and rural business such as,rural tourism, real estate business for satellite offices, e-commerce and virtual corporation of small-scale farms.

6) It canprovide more comfortable andsafe rural life with equivalent services to those in the urban location, such as provision oftelemedicine, distance education, remote public services,remote entertainment, etc.

7) Development of Decision Support, Knowledge Management, and Advisory Systems to strengthen Extension services and also used for Farmers Redressed system

8).It can improve farm management and farming technologies by efficient farm management, risk management,knowledge transfer or effective information etc., realizing competitive and supportable farmingwith safe products. In this help farmer has to make critical decisions such as what to plant? When to plant? how to manage blighter?, while considering off-farm factors such asmarket access, environmental impacts, and industry standards. Information Technology-based decision support system can surely help their decisions.

9). It can provide systems and tools to secure foodreliability and traceability that has been an emerging issue concerning farm products since serious contamination such as chicken flu was detected.

VII. ICT AND ITS CHALLENGE IN AGRICULTURE

It is very important that the application of ICT in agriculture is increasing. E-Agriculture helps in dissemination of gathered information to the farmers, mostly lived in rural place, to use in their routine work.Any system applied for getting knowledge and information for making decisions in any industry should delivercomplete, accurate, concise information in time or on time. These services are provided and enhanced through the Internet and related technologies. The information provided by the system must be in easy to access,cost-effective,user-

friendly form and well protected from unauthorized accesses.This ensures the effective and efficient use of information and communication technologies for analyzing,implementing existing and designing and innovative applications to help the agricultural sector. Those who are involved with agricultural industry also need information and knowledge to manage their occupation efficiently. An important role could be played by ICT in maintaining the above mentioned properties of information. An authentic agricultural database based onclimate condition and soil, crop cultivation history, demand of raw material,farmers interest, pest and disease management technologies,marketing system, storage facilities, etc. have to be developed with the help of ICT and Geographic Information System.

The major challenges to "Agriculture Sector in India" are following:

1) Insufficient use of ICT for agricultural purposes, etc.,

2) Lack of "Common Platforms" for the farmers in India,

3) Agricultural content up-gradations and its development.

4)Insufficient agriculturalsupport facilities and infrastructure.

5) Ownership issues of the public and government generated data,

6) Inadequate use of Public-Private Partnerships in India,

7)Shortage of awareness regarding suitable agricultural methods among the farmers

8) Absence of an "Agricultural Think-Tank" in India,

9).Insufficient institutional capacity to deliver farmers specific services,

VIII. FUTURE OUTLOOK IN ICT FOR AGRICULTURAL

For sustainable development of agriculture and national economy to emphasis on ICT and its use in agriculture very important. T

he following issues are very important for ICT management in sustainable agriculture.

1.Farmer information system

2. Marketinginformation system

3.Research management information system

4.Water andIrrigation management information system

5.Production forecasting system

6. Climate change scenarios

7. Stock information systems

8.Agricultural technology database

9. Agricultural product Price Information system

10.Availability of updated bio-physical database

11. Crop zoning map

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WORKERS PARTICIPATION MANAGEMENT IN INDIA

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ABSTRACT

For the growth and development of organization, the role of wpm is very important. Many countries like England, USA, SWEDEN, and GERMANY etc. have researched a lot in this field and support the significance of wpm. In India also the concept is growing wide. This paper shows the steps of direction of growth of wpm in India.The stages are presented in two parts before independence and after independence. In my paper I am considering three researches and conclude the positive approach towards wpm. The research shows that the wpm is necessary for increasing productivity in organization.

Keywords: Participation, Democracy, TISCO, JMC

I. INTRODUCTION

Workers participation in management means sharing the decision making power by lower level workers of the organization. The concept is originated from the word "democracy". It is the process of management of the people, for the people and by the people. It gives a sense of belongings among the workers towards the organization.

"Coming together is a beginning",
"Keeping together is a progress" and
"Working together is a success."

1.1 Definition of WPM

"Workers participation may, broadly be taken to cover all terms of association of workers and their representatives with the decision making process , ranging from exchange of information , consultations, decisions and negotiations to more institutionalized forms such as the presence of workers' members on management or supervisory boards or even management by workers themselves as practiced in Yugoslavia[1]. "

By International Labour organization (ILO)

1.2 Research Methodology

Te present paper is descriptive in nature. The data used is secondary in nature and collected from two research paper through website and from some of the books.

II. REVIEW OF LITERATURE

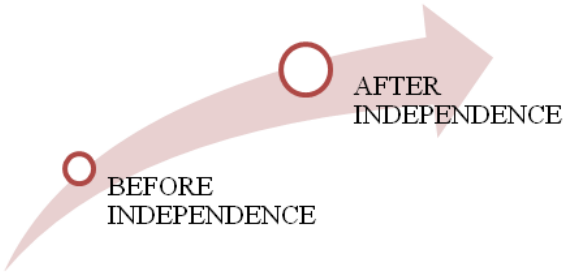
Dr. Kuldeep Singh And Mrs. Meera Siwach- "Workers Participation In Management As Ambivalence Approach: A study of Sugar Industry of Haryana"-their research shows to what extent the workers in sugar industry of Haryana participate with management. With the expansion of participation of workers in management a positive attitude develops.

III. OBJECTIVE OF STUDY

- To know the history of WPM in India.
- Results of WPM implementation in business.
- Stating the reasons of failure of WPM in schemes.
- How to improve the effectiveness of WPM in India.
- To propose the suggestions to improve it.

IV. ORIGIN OF WPM IN INDIA

The stages are divided in two parts:-



4.1 Before Independence

1920-The concept was originated by Mahatma Gandhi first when he said that workers shares property of company by using their brain and labour.Influence of this thought on organization -workers of Ahmedabad Textile Industry agreed to settle their disputes through joint discussions and consultations.Work committee-after this many work committee was set up in government printing press and Railways also in TISCO (Tata iron and steel company), Jamshedpur[2].

4.1.1 India's experience at TISCO

Tata Iron AND Steel Company was first who introduced WPM. It consists three levels of WPM:-

- Joint Departmental Councils(JDC):-
  It was formed to study organization working problems .since then there are 40 JDC in organization. It also considered the problem of welfare and safety.
- Joint Works Councils(JWC):-
  JWC is apex body on all other committee of organisations.it monitor the functioning of other committee in organization.
- Joint consultative council of management(JCCM):-
  It also reviews the performance of other committee and give suggestions to improve the productivity of organization.

4.2 After Independence

- The setup of INDUSTRIAL DISPUTES ACT, 1947 also gained the scope of WPM.
- The industrial policy resolution of 1948 also supported the participation of labour in all matters.

- GOVERNMENT OF INDIA set up a "STUDY GROUP ON WPM" in 1956 and examined a study on wpm in other countries and submitted a report with following recommendations-the implementation of wpm on voluntary basis and a subcommittee should be developed for implementation WPM in India.
- The subcommittee recommendations were drafted in a model agreement between labour and management which resulted for the set-up of JMC (joint management council)[2].
- On the basis of recommendation administrative reforms committee, govt. of India accepted the participation of workers in BOD (BOARD OD DIRECTORS) OF PSU'S FROM 1970'S
- 1976-Govt. of India makes amendment in constitution of India to include WPM as a directive principle of State Policy.
- 1977-Govt of India formed MRTP Act to improving the WPM in share capital of companies.
- 1983-a new non-legislative scheme was formed for all central public enterprises except those who have exempted.
- All the schemes discussed above failed the meaningful participation in management. Thus Govt. introduced a bill in Parliament on25th may 1990[3].
- The bill proposes the participation at all levels
- An attempt to bring statutory force.
- Rules for monitor all schemes.
- Imprisonment up to 2 years or a fine up to 20000 rupees.

V. REASONS OF FAILURE OF WPM IN INDIA

- Not cooperative attitude of workers.
- Concept of WPM is not clear.
- Legal Definition, scope and functions of WPM not clear.
- Implementation of bill is unsuccessful.
- Doubtful in the minds in trade unions.
- No strong trade unions.
- Failure of past reference mainly in public sector undertakings.

VI. IS WPM WORKS?

The working of WPM can be seen by their increasing importance and positive result in the different organisations. I have taken data of three secondary researches and concluded that the presence of WPM is very necessary.

6.1 First Research

The WPM working can be concluded from the research made by COCH AND FRENCH'S. The research was conducted in Harwood Company producing pajamas. The factory was facing problems of reduced production after transfer of its employees.

An experiment was conducted in which it was divided three levels of participation-

- No participation

- Representative workers
- Total participation.

The changes has been seen for the production of 5 days in factory as under-

Total participation	64	65	75	71	71
Representative participation	50	53	60	68	64
No participation	45	53	55	51	49

Conclusion:-the research shows the positive relations between participation and productivity of workers.The productions is increasing as participation increasing.

6.2 Second Reaearch

Importance of WPM can also be concluded from a research done in Haryana Sugar Mills:-Total 2088 of workers are selected in 3 mills from PANIPAT, GOHANA AND MEHAM. The result of findings was:-

Ares of WPM IN Mill

Aspect of workers	Percentage
Attend meeting	80
Want to be a member of committee	71
Are consulted before taking in to decisions at workplace	56

Workers Viewpoint

Full awareness	92
Consent for implementation	93
Believe that it improves productivity	87
Knowledge of mill standing orders	83

Conclusion of the finding:-the sugar mills employees are actively supporting the decision of management and oppose to strikes.it improves the relation between workers and management.

6.3 Third Research

There is another research conducted in BHEL RC. Puram, Hyderabad by Dr. G .RATHNAKAR:

The samples were taken of 100 employees and the result was drawn on their respond. Workers concluded that: - They all are feeling satisfied with ihe present level of WPM. They all have positive attitude towards management. Improving cooperation between management and workers by set up of joint councils. But some of them felt that the dispute between them and management can fails the WPM[4].

VII. SUGGESTIONS TO IMPROVE THE EFFECTIVENESS OF SCHEMES

- The objective of WPM should be clear in organizations.
- Worker union should be actively participating in it.
- Participation should be at all levels.

- Continuous communication between workers and management.
- Management should develop a positive attitude towards workers.
- Workers should be given knowledge of the importance of WPM in organization.
- Proper implementation of all schemes.
- Conducting training to all participants to form a good environment.
- Disputes should be resolved immediately.
- Communication should also be informal.

VIII. CONCLUSION AND RECOMMENDATIONS

As we concluded from various research that the WPM has a key role for increasing the productivity of oraganisations. Moreover it leads to a sense of belongings among employees. This is one of the step to get success in future and facing competition. Despite all the efforts taken by Govt. and evolution of WPM in India does not leading success. The performance is not satisfactory till now.so we should do more as we can and we did. We want to increase our GDP of an economy which can be increased by increasing the production of business and that can be done by increasing the WPM levels.

WHEN GDP increased our economy grows and leads to more industry and employment. More employees can be satisfied by WPM .SO WE should improve the extent level of wpm more. This can be done by:-

- By more democratic environment.
- Clearly defined organization objective.
- Participation should be at all levels.
- Philosophy should be trusted.
- More legislative measures should be adopted.
- Education and training is a very important step.
- Decision given by workers should be implemented immediately if good.

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CORPORATE RESTRUCTURING: A CASE STUDY OF MICROSOFT ACQUIRES NOKIA

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ABSTRACT

Growth is the substance that every enterprise strives for as 'excellence' applies as much to entrepreneurs as to others in life. For achieving this substance the existing organization go for the restructuring by exploiting the advantages and overcoming the disadvantages. Today, the corporate world witnesses the wave of mergers and acquisitions (M & As) across all the industries which have totally restructured the market place. Corporate restructuring says, changing in the existing model of business, its management team or the organization of finances to face challenges and enhance shareholders values. The recent big ticket of restructuring includes Microsoft acquiring a part of Nokia for US$7.2bn. This buyout is analyzed and commented by experts of the industry. This research paper provides the views of various experts in the context of Microsoft and Nokia deal.

Keywords: Corporate Restructuring, Mergers and acquisitions, Microsoft, Nokia

I. INTRODUCTION

Restructuring as per Oxford dictionary means "to give a new structure to, rebuild or rearrange".

As per Collins English dictionary, meaning of corporate restructuring is a change in the business strategy of an organization resulting in diversification, closing parts of the business, etc., to increase its long-term profitability.

Growth of business organization can be done primarily on two bases, i.e. organic and inorganic growth.

Organic growth is one that can be achieved through internal strategies, which includes business or financial restructuring i.e. within the organization which derives in enhanced customer base, increase in sales, increased revenue, without affecting the corporate entity.

Inorganic growth provides a path to the organization for achieving accelerated growth enabling it to skip few steps on the growth ladder. Restructuring through mergers, amalgamationsetc. constitute one of the most important methods for securing inorganic growth.

Before the introduction of new economic Policy 1991, India was a highly regulated economy. At that time the government participation and intervention bounds the corporate world. In other words, the economy was closed as economic forces such as demand and supply were under the control of government, which not allowed having a liberty to rule the market. By this, there was no space for realignments and everything was under the control of the government. In such a scenario, the scope and mode of corporate restructuring were not existed at all because of the restrictive government policies and stiffed regulatory framework.

These restrictions been continued for over two decades. These, however proved incompatible with the economic system for achieving the objective of faster economic growth. By removing the irrelevant sections and provisions, government had to review its entire policy.

The real growth of the economy started with the introduction of industrial policy, 1991 whereby government provides relaxations in industrial licensing, foreign investment with 100% equity participation & imports regarding foreign technology etc. with the new industrial policy which defines liberalization, privatization, and globalization and opening up of economies, the Indian corporate sector started restructuring to grab the opportunities and overcome the challenges of competition that are to be presented in external environment.

The economic and liberalization reforms, have transformed the business scenario all over the world. The most significant development has been the integration of national economy with 'market-oriented globalized economies. The multilateral trade agenda and the World Trade Organization (WTO) have been facilitating easy and free flow of technology, capital and expertise across the globe. A restructuring wave is sweeping the corporate sector the world over, taking within its fold both big and small entities, comprising old economybusinesses, conglomerates and new economy companies and even the infrastructure and service sector. From banking to oil exploration and telecommunication to power generation, petrochemicals to aviation, companies are coming together as never before. Not only this new industries like e-commerce and biotechnology have been exploding and old industries are being transformed.

With the increasing competition and the economy, heading towards globalization, the corporate restructuring activities are expected to occur at a much larger scale than at any time in the past. Corporate Restructuring play a major role in enabling enterprises to achieve economies of scale, global competitiveness, right size, and a host of other benefits including reduction of cost of operations and administration.

Corporate restructuring is defined as the process involved in changing the organization of a business. Corporate restructuring can involve making dramatic changes to a business by cutting out or merging departments. It implies rearranging the business for increased efficiency and profitability. In other words, it is a comprehensive process, by which a company can consolidate its business operations and strengthen its position for achieving corporate objectives-synergies and continuing as competitive and successful entity.

“Corporate restructuring is the process of significantly changing a company's business model, management team or financial structure to address challenges and increase shareholder value corporate restructuring is an inorganic growth strategy.”

Corporate restructuring is the method of changing a company's business model, management team or financial structure to overcome challenges and enhance shareholders value. Restructuring may involve major layoffs or bankruptcy, though restructuring is usually designed to minimize the impact on employees, if possible in a significant manner. Restructuring may involve the company's sale or a merger with another company. Companies use business strategy in the form of restructuring to ensure their long-term existence. The parties who owned or invest their funds in the company’s i.e. Shareholders or creditors might go for a restructuring if they observe the company's present business position as insufficient to cure a loss on their investments. The nature of these dangers can vary, but common causes for restructuring involve a loss of market share, the fall of profit margins or declines in the strength of their corporate brand. Other motivators of restructuring include the inability to retain talented professionals and major changes to the marketplace that directly impact the corporation's business model.

1.1 Need and Objectives of Corporate Restructuring

Corporate restructuring states the arrangement of the whole business activities so as to achieve predetermined objectives at corporate level. Such objectives include the following:

Redirection of firm's whole objectives;

cut the investment from loss generating business to finance growth in another;

exploiting inter-dependence among present or prospective businesses within the corporate portfolio;

risk reduction; and

Development of core competencies

II. REVIEW OF LITERATURE

DeepikaDhingra and Nishi Aggarwal(2014) has examined that growth is the substance for which everyone is survives for it applies as much as to entrepreneurs as to others in life. A competitor needs to be an overachiever in every sense of the word. Hence, unprecedented growth has become unavoidable in the wide range of industrial operations.

Netra Pal Singh(2014) has examined (i) reasons behinddownfall in the market share of Nokia, (ii) general views of the experts, (iii) similarities / dissimilarities in the models of smartphone business, (iv) the buyout reasons for Nokia by Microsoft, (v) effects of buyout on Microsoft, Nokia, consumers and markets. In addition to this, paper focused the existing cases of merger & acquisition in telecom sector in the past.

Alejandra López Salazar, Universidad de Guanajuato, Ricardo Contreras Soto, Universidad de Guanajuato and Rafael Espinosa Mosqueda, Universidad de Guanajuato(2012) has examined the financial decisions made by companies, the strategies that organizations follow, the alignment between these two variables, and the relationship of financial decisions to the level of competitiveness. Two hundred two businesses' testimonies in the region of Celaya were analyzed. The results show that most micro and small enterprises make funding decisions in a certain way, apply an intensive strategy, also that their market longevity is low and their level of sales is regular, implying that Mexican companies lack competitiveness, which hampers their development and expansion. The emphasis that companies place on certain financial decisions is not always appropriate for the type of business strategy being implemented. Likewise, companies that efficiently manage their short-term assets and liabilities are more competitive, as evaluated by their longevity on the market.

Anil K. LalandRonald W. Clement (2005) have examinedhow the change in the government policies & regulations affect the individual as a corporate identity. Study suggests that recent market reforms that encouraged individual enterprise have ledto higher economic growth in that country. India can generate economic growth by fostering entrepreneurial activity within its borders. To pursue further the entrepreneurial approach to economic growth, India must now provide opportunities for (1) education directed specifically at entrepreneurial skills, (2) financing of entrepreneurial efforts, and (3) networking among potential entrepreneurs and their experienced counterparts. Further, although the Indian government should establish policies supportive of entrepreneurial efforts, its role overall should be minimized so that the influence of the free market and individual self-interest can be fullyrealized.

III. OBJECTIVES OF THE STUDY

- To understand the general framework of Corporate Restructuring.
- To defining Corporate Restructuring as a tool of Competitive advantage.
- To analyze the case study of Corporate Restructuring as Nokia's acquisition.
- Understand the role of acquisition as a growth strategy.

- To study the acquisition as a competitive strategy.
- Examine the reason behind the acquisition.

IV. RESEARCH METHODOLOGY

The study has made use of secondary source of data. The records are to be summed up by the analysis of various forms of data which is collected from the news reports, official websites, articles and the press releases published on web before or after the acquisition of Nokia's phone business by Microsoft. These sources of information are very recent. The analysis is similar to content analysis.

V. ANALYSIS

Nokia Corporation (Nokia) headquartered in Finland which operates business in four groups i.e., Mobile phones, Enterprise Solutions, Networks and Multimedia. Nokia is a Global manufacturer of telecom equipment. Microsoft buys out devices and services part of Nokia's business which is now to be known as Microsoft Mobile OY (OY being a Finnish word for a company, like Ltd. or Inc.).

Microsoft also noted that "any further decisions regarding specific branding will bemade"

As the Microsoft is buying nokia's handset division increasing evidence of what actually drove the decision. And remarkably it's all best described in the terms invented by the recently deceased Nobel Laureate in economics, Ronald Coase. It's all about transaction costs, you see?

Here something from one of the Microsoft managers:

"Nokia & Microsoft worked closely together on company's Lumia1020, and Microsoft made core changes to its window phone operation system as a result. Sources familiar with Microsoft windows phone work have revealed to the verge that nokia was left frustrated by some windows phone restrictions its Lumia1020 camera software. Specifically the restrictions made it difficult to store the large image files and make them easily accessible to phone owners.

These secrets and frustrations will no longer occur and collaboration appears to have helped Microsoft realize its priorities elsewhere. A Bluetooth file sharing feature is particular popular in developing countries, but Microsoft wasn't aware as US consumers don't typically use it. "We didn't even have that feature, and we did not even understand and appreciate the degree to which it was critical," says Belfiore

And here's a piece discussing Coase and those transaction costs:

"I found the answer," Coase recalled in his 1991 Nobel lecture, "by the summer of 1932. It was torealize that there were costs of using the price mechanism. There are negotiations to be undertaken, contracts have to be drawn up, inspections have to be made, and arrangements have to be made to settle disputes and so on. These costs have come to be known as transaction costs. Their existence implies that methods of coordination alternative to the market, which are themselves costly and in various ways imperfect, may nonetheless be preferable to relying on the pricing mechanism, the only method of coordination normally analyzed by economists."

It sounds simple, but it was a groundbreaking insight because it explained why, for example, companies often became vertically integrated as they grew. Transaction costs are why a manufacturer of car tyres would come to own and operate rubber plantations in some fetid tropical country; not because its executives want to farm

rubber, but because the transaction costs of not owing the supplier are higher than the costs of operating it themselves.

While Microsoft was working with Nokia on the hardware and software for their phones they weren't working together closely enough. Pesky transaction costs come in the way there. Thus the bet was that by being owned by the same company than the better phones will be made by reducing the cost.

Well, it could work but I do wonder myself. For as other Nobel Laureate, Haynek pointed out, all knowledge is local. So if the combined firm is managed from Redmond then there's going to be a certain loss of that knowledge as it does or does not get transmitted up the managerial pecking order. Those Coasean reasons for a merger could indeed work out but only if the management and the design work stays sufficiently local to the knowledge base.

VI. CONCLUSION

Nokia's mobile devices manufacturing unit has changed its name to Nokia Solutions and Networks and it also focused a lots of changes in the last few weeks. All this happened just because of restructuring programme that is undertaken by the equipment maker, to cut down the loss making business unit and focus on the wireless broadband.

It's being provided positive results to Nokia Solutions and Networks and also to their shareholders as well. This is actually pretty good deal momentum justbecause the devices unit of business has been so strong here by cut down the loss making business. It also aims at exploiting strategically through the business strengths i.e., monopolistic strengths, goodwill, exclusive licensing etc. to increase the advantage of competition.

Thus restructuring would help bringing an edge over competition. Competition drives technological advancement. Competition faces are different from within a country or from crosscountry competition. For getting survived in that competitive world it becomes necessary for existing firms to adopt two mantras i.e. cost cutting and value addition. Activity of Corporate Restructuring aims at different objectives at different times for different firms and the single common objective in every restructuring exercise is to exploit the disadvantages and grab the advantages. The various needs for undertaking a Corporate Restructuring actions are to focus on core strengths, operational synergy and efficient allocation of managerial capabilities and infrastructure, consolidation and economies of scale by expansion and diversion of existing business to exploit extended domestic and global markets, revival and rehabilitation of a sick unit by adjusting losses of the sick unit with profits of a healthy Company, acquiring constant supply of raw materials and free access to scientific research and technological advancements, capital restructuring by proper proportion of loan and equity funds to reduce the cost of servicing and improve the turnover on the capital employed, Improve corporate performance to bring it at par with competitors by adopting the basic changes brought out by information technology.

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EXPERIMENTAL STUDY OF KALINA CYCLEAND ITS EFFECT ON EXHAUST EMISSION FROM MULTI-CYLINDER 1196 CC PETROL ENGINE

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ABSTRACT

The increasingly worldwide problem regarding rapid economy development and a relative shortage of energy, the internal combustion engine exhaust waste heat and environmental pollution has been more emphasized heavily recently. The total amount of energy supplied to engine, out of which only 30% to 40% is convert into useful work while rest of energy is expelled to the environment which causes serious environment damage. Therefore it is required to utilize this waste energy to improve thermal efficiency of engine and also to reduce greenhouse effect. This paper focuses on waste heat recovery of 1196cc multi-cylinder petrol engine with the help of Kalina cycle. In order to investigate the effect of Kalina cycle, an experimental set-up has been developed. For the experimental purpose, Kalina cycle is connected to exhaust ofengine have been tested for different mass flow rate and rpms. This paper also covers the analysis of exhaust emissionwith and without Kalinacycle. The waste heat of small car engine doesn't find use due to its minimum quantity of heat availability. Due tohigh thermal efficiencyofKalina cycle, it is suitable for waste heat recovery from small car engines. In the present work, optimum mass flow rate ofKalina Cycle and turbine pressure ratio effect is experimentally studied for waste heat recovery from 1196cc multi-cylinder petrol engine.For maximum turbine power of 41.98 W, the optimum mass flow rate is found to be 0.29LPM. From comparative analysis of exhaust gas emission from engine, CO2, NOx and HCemissions reduces due to use of Kalina cycle.

Keywords: Ammonia-Water Mixture, Exhaust Heat Recovery, Separator, Waste Heat

I. INTRODUCTION

With the increasingly prominent problem regarding rapid economy development and the graduallyserious environmental pollution, the waste heat recovery and waste gas pollution processing have receivedsignificant attention. Waste heat recovery is the system in which waste heat of different application such as internal combustion engines, turbines, industries, small power plants etc. are converted into useful mechanical or electrical energy. There are various direct and indirect technologies by using which heat can be recovered.Out of which, the organic Rankine cycle and Kalinacycle is the good choices for electricity generation, as they operates at low-temperature heat sources.

With automobile industrial revolution, the manufacturing and sales of small vehicle increases drastically. Each small vehicle engine loses a large part of the fuel energy to the environment, most importantly with the exhaust gasses which can contain about 25% of the input energy [1].Hence it is required to reduce this wastage in small vehicle. Main problem in heat recovery from such system is its small amount of heat availability.

Dr. Alexander Kalian proposed waste heat recovery cycle which give high thermal efficiency than Organic Rankine Cycle. This cycle is known as Kalina Cycle or Ammonia-Water bottoming cycle. The mixture of Ammonia-water of different concentrations are used as working fluid. Because of non-isothermal phase change behaver of Ammonia-Water mixture, Kalina Cycle can extract low temperature heat effectively. Thus Kalina Cycle is suitable for waste heat recovery from light duty engine.

Fromexisting literatureview reveals that,very little research has been done on waste heat recovery on multi-cylinder petrol engine with the help of Kalina cycle.Experimental studies have done for ORC and Kalina cycle on heavy duty engines like truck, marine, small power generation plant, industrial waste heat etc.Most of experimental studies focused on how effectively power produce by ORC or Kalina cycle with low exhaust emission.It is found that the Kalina cycle can produce minimum power at 53 ºC temperature. Inadequate implementation of Kalina cycle on four cylinder light motor vehicle engine. Hence, it is clear that with the help of Kalina, Rankine and Breton cycle, waste heat from exhaust gas can be recovered to produce power. Up till now, Kalina cycle is studied on heavy duty engines, turbines, geothermal sources etc. Hence it is required to study and investigate the performance of Kalina cycle on multi-cylinder petrol engine.

This experimental study is carried out on 1196 CC multi-cylinder petrol engine of Maruti Suzuki Eeco and the Kalina cycle is used with 0.6% ammonia-water mixture. The objective of the study is to find the mass flow rate of ammonia-water mixture in Kalina cycle to produce maximum turbine power and study the behaviour of turbine pressure, with comparative analysis of exhaust emission from engine with and without Kalinacycle.Theresultsobtained from this experimental study will help to decide the feasibility of Kalina cycle on small cars.

II. THEORETICAL HEAT LOSS THROUGH THE EXHAUST EMISSION

Engine specification is given in Table I.

Table 1 Engine Specification

Manufacture	Maruti Suzuki (Eeco)
Engine	4 Cylinder, 4-Stroke, S.I. Engine
Bore	0.071m
Stroke	0.075m
Sp. Fuel Combustion	270gm/kw.hr
Capacity	1196CC
Maximum Power	73BHP @ 6000rpm
Maximum Torque	101Nm @ 3000rpm
RPM	6000rpm
Cooling System	Water Cooled

Heat loss through the exhaust gas from multi-cylinder petrol engine is calculated as follows. Assuming,

Volumetric efficiency is 0.8 to 0.9

Specific gravity of fuel is 0.85 kg/lit

Calorific value of petrol is 44 MJ/kg

Density of air fuel is 1.167 kg/m3

Specific heat of exhaust gas is 1.1-1.25 KJ/kg°K

Exhaust heat loss through multi-cylinder petrol engine Mass flow rate of air in suction,

$m_a = \eta_v \times \rho_a \times n \times V1$

$m_a = 0.9 \times 1.16 \times \frac{3000}{2} \times 1196 \times 10^{-6}$

$m_a = 31.2$ gm/sec

Mass flow rate of petrol fuel,

$m_f = (SFC \times POWER)2$

$m_f = 270 \times 36$

$m_f = 2.7$ gm/sec

Heat avalable at exhaust gas

$Q = (m_a + m_f) \times C_p \times \Delta T$ 3

$Q = 33.9 \times 1.2 \times (400 - 40)$

$Q = 14.6$ KW

Therefore the total energy loss by Multi-Cylinder SI-Engine is 27.12%. Hence the loss of heat energy through the exhaust gas exhausted from I.C. engine into the environment 27.12% energy.

III. EXPERIMENTAL TEST FACILITY

3.1 Experimental Set Up

In this experimental setup of given dissertation work, Kalina cycle performance will be tested on multi-cylinder petrol engine. In this setup, all essential measuring instruments will be calibrated and connected as per recommended standards. The schematic view of experimental set up to study the performance of Kalina cycle on multi-cylinder petrol engine is shown in figure 2.

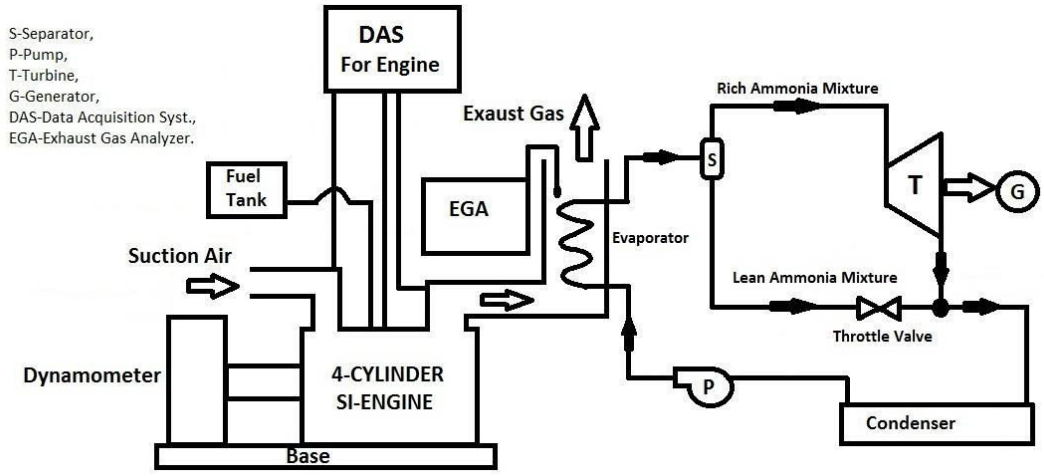

Figure 2 Experimental setup

Experimental set up consist of multi-cylinder SI-Engine with Kalina cycle as shown in figure 2. The dynamometer, exhaust gas analyzer and data acquisition system are connected to multi-cylinder engine. The dynamometer is used to provide different load to engine. Data acquisition system is provided to analysis the change in different parameter of engine during experimentation such as suction temperature, exhaust temperature, brake power of engine, rpm etc. At the exhaust of engine as shown in fig. exhaust gas analyzer is fixed to study the variation in exhaust emission coming from engine during experimentation.

Figure 3 Photographic Image of the experimental setup

Heat required for driving the Kalina cycle is taken from exhaust heat of engine by using evaporator. The high pressure ammonia-water mixture is collected in separator out of which high pressure vapour rich mixture is used to drive turbine and liquid lean mixture is used to increase the condensation temperature by using throttle valve as shown in fig. The rich and lean mixture are mixed before condenser and cooled in condenser by using water. The condensed ammonia-water mixture is supplied to evaporator by recirculation, using pump as shown in fig. the photographical view of experimental setup is shown in figure 3.

Present experimental setup consists of four main components which are necessary for performance analysis of kalian cycle. Specifications of each components of present experimental set-up are given as following

The experimental setup used Maruti-Suzuki Eecomulty-cylinder petrol engine. It is small 1196 CC engine with MPFI system. This engine is inline type four cylinder four stroke petrol engine which produce 73bhp at 6000rpm.The detail specification is given as follows

The water cooled eddy current dynamometer is used to change the load on engine to study the engine performance. Eddy-Current Brake Dynamometers are ideal for applications requiring high speeds and also when operating in the middle to high power range. Eddy-Current Brakes provide increasing torque as the speed increases, reaching peak torque at rated speed. The dynamometers have low inertia as a result of small rotor diameter. Brake cooling is provided by a water circulation system, which passes inside the stator to dissipate heat generated by the braking power. The dynamometers have accuracy ratings of ± 0.3% to 0.5%. The detail specification is given as follows

Table 2 Dynamometer Specifications

Weight	560 kg
Inertia	0.093 kg.m^2
Maximum Power	150 kW (200 bhp)
Maximum Torque	500 Nm
Maximum Speed	12000 rpm
Operating Temperature	10ºC to 60ºC
Minimum water mass Flow rate	20 LPM
Accuracy	± 0.3% to 0.5%

Use of a five Gas Exhaust Analyser can be helpful in troubleshooting both emissions and driveability concerns. The five gasses measured by the latest technology exhaust analysersfor petrol emissions are HC, CO, CO2, O2 and NOx.We can use clues and patterns of exhaust readings to figure out if we have a problem in Combustion, Ignition and exhaust emission etc.

Figure 4 Photographic Image of Kalina Cycle System

The photographical view of system is shown in fig 4.6. Kalina cycle have two heat exchangers, pump, Turbine, separator and mixing-chamber. The spiral tube heat exchangers have 10mm Aluminium spiral tube diameter and 140mm shell diameter. The diaphragm pump used in this system which gives 5.5 bar pressure and 4LPM mass flow rate at 30 W. The turbine used is centrifugal type with 55mm impeller diameter. The separator is cylinder of diameter 30mm and length 40mm with one inlet and two outlets. The mixing-chamber is cylinder of diameter 30mm and length 50mm with two inlets and one outlet.

Table 3 shows variation in turbine power for different mass flow rate of ammonia water mixture and for different turbine pressure ratio at respective RPMs.

N(rpm)	MFR (LPM)	TPR	TP (W)
1400	0.15	1.55	22.32
1400	0.22	1.94	27.94
1400	0.29	2.54	36.58
1400	0.36	1.73	24.91
1400	0.43	1.46	21.02
1600	0.15	1.62	23.00
1600	0.22	2.02	29.90
1600	0.29	2.56	37.89
1600	0.36	1.78	26.34
1600	0.43	1.46	21.61
1800	0.15	1.59	24.17
1800	0.22	2.02	30.70
1800	0.29	2.55	38.76
1800	0.36	1.82	27.66
1800	0.43	1.47	22.34

N(rpm)	MFR (LPM)	PR	TP (W)
2000	0.15	1.67	25.38
2000	0.22	2.06	31.38
2000	0.29	2.58	39.91
2000	0.36	1.88	29.04
2000	0.43	1.52	23.49
2200	0.15	1.65	26.05
2200	0.22	2.04	32.14
2200	0.29	2.62	40.81
2200	0.36	1.92	29.89
2200	0.43	1.54	23.99
2400	0.15	1.76	27.86
2400	0.22	2.10	34.44
2400	0.29	2.56	41.98
2400	0.36	1.88	30.83
2400	0.43	1.52	24.93

3.2 Experimental Results

All the measured parameter for different mass flow rate and speeds are listed in table3. First the engine rpm is made constant like 1400rpm then change the mass flow rate of ammonia-water mixture from 0.12lpm to 0.42lpm and note down the turbine pressure ratio and turbine power. Repeat same process for different rpms from 1400rpm to 2400rpm. From experimental values find mass flow rate which give maximum turbine power. For comparative exhaust gas analysis first engine is run without Kalina cycle at different rpm from 1200rpm to 2400rpm and second time engine is run with Kalina cycle. Five gas analyser is used to note down the CO, CO2, NOx, HC and O2 emission for respective rpms.The results obtained from experimentation is shown in table 4.

Table 4 Shows Exhaust Emission from Engine at Constant Load one Kg For Different Speeds

RPM	O2 with KC	O2 with KC	CO2 with KC	CO2 with KC	CO with KC	CO with KC	Nox with KC	NoxwithKC	HC with KC	HC with KC
1200	19	19.17	7.225	6.658	141	143	149.1	139.9	133.0	118.4
1400	18.94	19.08	7.326	6.744	159	162	166.9	158.7	154.8	137.6
1600	18.99	19.1	7.583	6.983	180	186	165.3	160.7	149.3	133.1
1800	18.86	18.99	8.29	7.595	243	245	171	163.1	156.2	143.7
2000	18.83	19	8.486	8.186	261	263	176.4	169.1	190.8	179.5
2200	18.81	18.88	8.682	8.478	327	328	201.7	193.3	257.4	249.3
2400	18.77	18.86	8.902	8.779	391	392	222.2	217.5	293.6	285.9

V. REASULT AND ANALYSIS

After the extensive experimentation at different speeds and loads of engine, results obtained are broadly discussed hear. The optimum mass flow rate of ammonia-water solution and optimum turbine pressure ratio results are discussed. Then comparative experimental results of exhaust emission with and without Kalina cycle is describe in table 3.

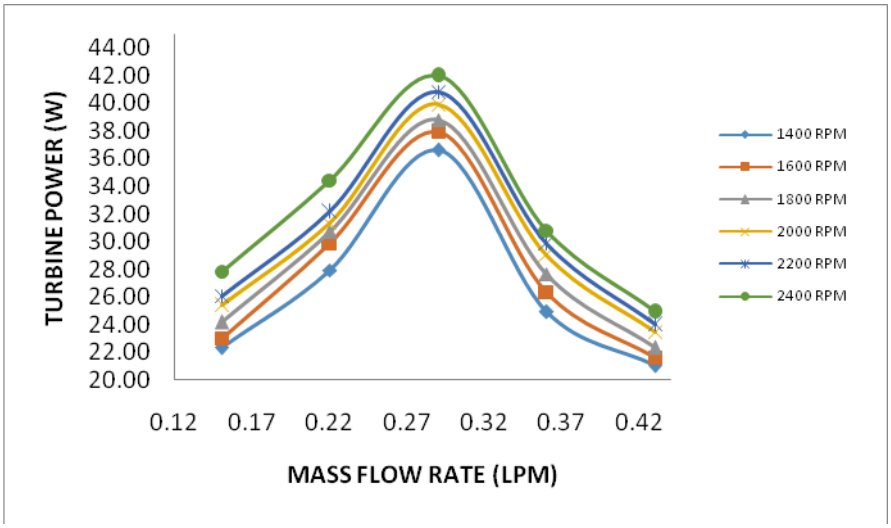

Figure 5 Turbine Power Variations with Mass Flow Rate

It is required to find the mass flow rate for which Kalian cycle shows maximum output power to fix the optimum mass flow rate in Kalina cycle for maximum efficiency. The figure 5 shows turbine power variations with mass flow rate.The load on engine is kept constant at 10kg and at different engine speeds from 1400RPM to 2600RPM and for respective different mass flow rate of ammonia-water mixture solution from 0.12LPM to 0.42LPM the variation in turbine power is experimentally studied.A results show continues increase in turbine power then it riches to its maximum power and start decreasing with increase in mass flow rate at constant load and respective RPM. The maximum turbine power shows 36.58W, 37.89W, 38.76W, 39.91W, 40.81W and 41.98W at 1400RPM, 1600RPM, 1800RPM, 2000RPM, 2200RPM and 2400RPM with optimum mass flow rate of 0.29LPM. At the begging mass flow rate is minimum and enthalpy difference is maximum but its product give minimum value until it riches to that point where both achieve such a value that their product should be optimum as we continue to increase mass flow rate then enthalpy difference start decreasing and again their product start decreasing.

To study the behaviour of turbine in Kalina cycle, the outlet and inlet pressure ratio of turbine is experimentally studied with respect to turbine power at different mass flow rate from 0.12LPM to 0.42LPM at different RPM from 1400RPM to 2400RPM as shown in figure 6.A results show continues increase in turbine power as pressure ratio increases up to optimum pressure ratio which is achieve at optimum mass flow rate. At the same time turbine power also increases with RPM too. The maximum turbine value is 36.58W, 37.89W, 38.76W, 39.91W, 40.81W and 41.98W for pressure ratio 2.54, 2.56, 2.55, 2.58, 2.62 and 2.56. The pressure at inlet of turbine is going to increase as mass flow rate of ammonia water mixture increase up to its optimum value and the pressure at outlet almost remains constant. Hence the pressure ratio increases with mass flow rate and the turbine power too.

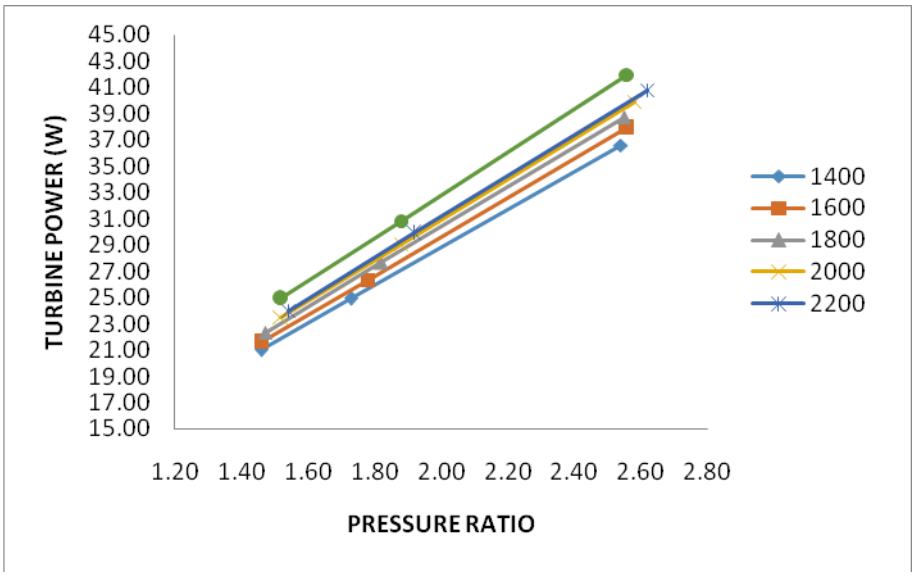

Figure 6 Turbine Power Variations with Pressure Ratio

In IC-Engine the intake is taken as HC, N_2 and O_2 and after combustion at outlet there is CO, CO_2, NO_x, HC, O_2 and H_2O. It is required to study behaviour of exhaust emission with and without Kalina cycle.

Following figure 7 shows the effect of Kalina cycle on the amount of oxygen emitted from the engine. It shows that the highest amount of oxygen 19.2% is emitted from the engine when the speed is between 1200-2400 RPM while the exhaust system is attached with Kalina cycle system. Again from this figure the amount of oxygen emitted from the engine without Kalina cycle has been reduced significantly while the best possible amount of

oxygen is 18.1% which occurred around 1400RPM of engine speed. The amount of oxygen emitted from engine stabilizes while the engine speed increases with the absence of catalytic converter but the amount is still lower than the condition while the exhaust system. The amount of oxygen increases in exhaust with Kalina cycle because the extra amount of oxygen present at exhaust not chemically react with nitrogen, carbon monoxide to produce NO_X and CO_2, because for this reaction high temperature is required.

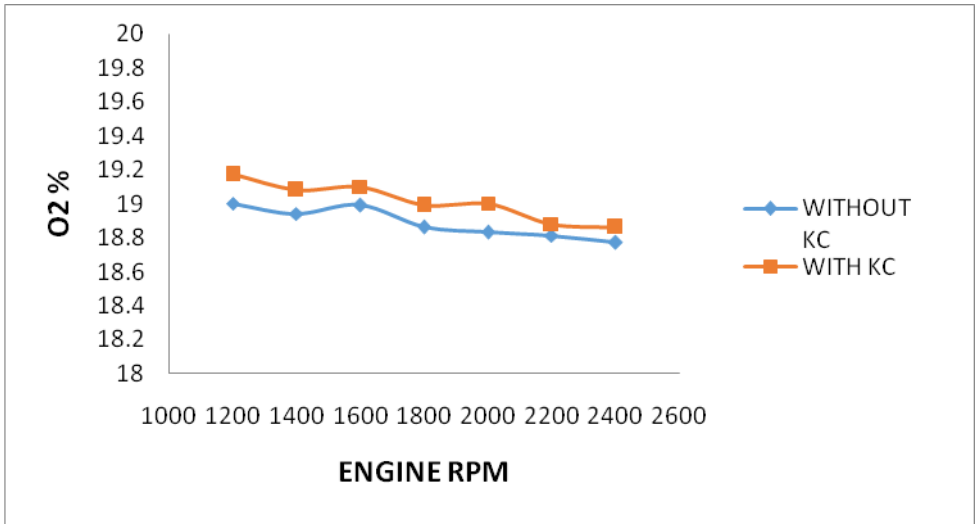

Figure 7 Oxygen Emission Variations with Engine RPM

From figure 8 CO2 emitted from the engine is always less than 7ppm while the minimum amount of CO2 emission from engine without Kalina cycle is greater than 7ppm. This implies a quite good improvement in reduction of CO2 presented in the exhaust gas. In both the cases the amount of CO2 increases constantly with increase in speed. Highest speed causes to emit the highest amount of CO2 from the engine exhaust. After 1600 RPM the CO_2 emission is above 7ppm for exhaust with Kalina cycle. The amount of CO_2 emission reduces in engine with Kalina cycle because at low temperature CO to CO_2 conversion rate is reduced.

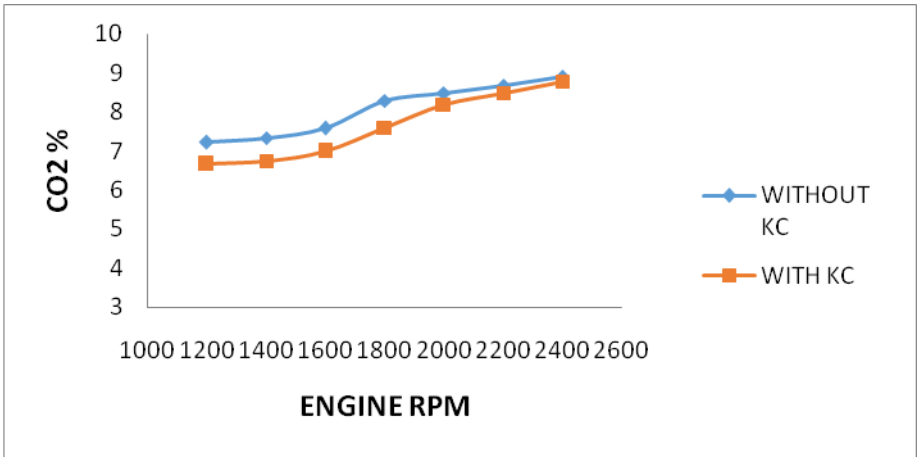

Figure 8 Carbon Dioxide Emission Variations with Engine RPM

The figure 9 shows the linear characteristic of CO emission with the change of engine speed. In both the cases the amount of CO increases with the engine speed. But with the use of Kalina cycle the CO emission increases as compare to CO emission without Kalina cycle. At 1200RPM to 2400RPM CO emission for without are 141ppm, 159ppm, 180ppm, 243ppm, 261ppm, 327ppm and 391ppm and with Kalina cycle are 143ppm, 162ppm, 186ppm, 245ppm, 263ppm, 328ppm and 392ppm. The CO emissions which produce during

combustion react with excess oxygen and produce CO_2. CO to CO_2 conversion rate is minimum with use of Kalina cycle because of low temperature.

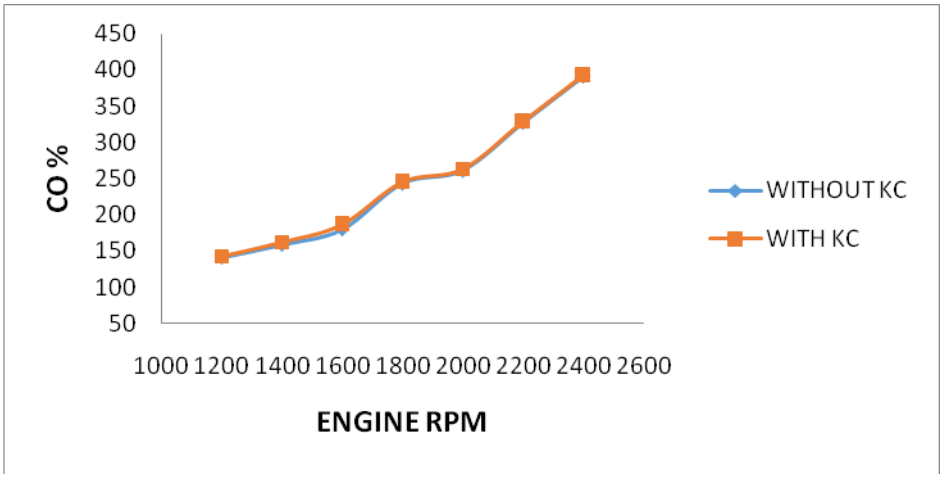

Figure 9 Carbon Monoxide Emission Variations with Engine RPM

Oxide of nitrogen are NO and NO_2 which produce by chemical reaction between nitrogen and excess oxygen present at exhaust gas at high temperature. From following figure 10 it is found that as engine speed increase from1200 RPM to 2400 RPM then NO_x emission increase drastically for both with and without Kalina cycle. The NO_x emission for engine without Kalina cycle is 149.1ppm, 166.9ppm, 165.3ppm, 171ppm, 176.4ppm, 201.7ppm and 222.2ppm and with Kalina cycle is 139.9ppm, 158.7ppm, 160.7pp, 163.1ppm, 169.1ppm, 193.3ppm and 217.5ppm. The NO_x emission of engine exhaust with Kalina cycle shows minimum emission than engine without Kalina cycle because lower temperature exhausts produce due to evaporator of Kalina cycle. In pure combustion process engine exhaust contains CO_2 and H_2O. Hydro-carbon present in exhaust explains the incomplete combustion process. Kalina cycle system not going to reduce the HC contain by any reaction. So to reduce the HC in exhaust the baffles and winded tubes act as filter and some of hydro-carbon get deposited on that which reduces HC contain at exhaust during draining to atmosphere.

With increase in speed of engine from 1200 RPM to 2400 RPM then amount of HC emission at exhaust also get increase for both with and without Kalian cycle. At 1200 RPM HC emission for with and without Kalina Cycle is 118.4ppm and 133ppm. As we move to maximum 2400 RPM the HC emission for with and without Kalina Cycle shows small variation as 285.9ppm and 293.6ppm.

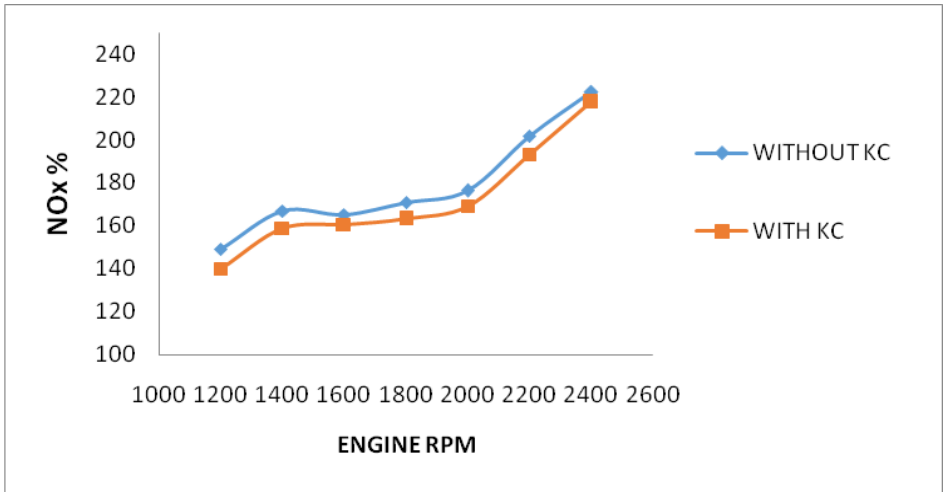

Figure 10 Oxides of Nitrogen Emission Variation with Engine RPM

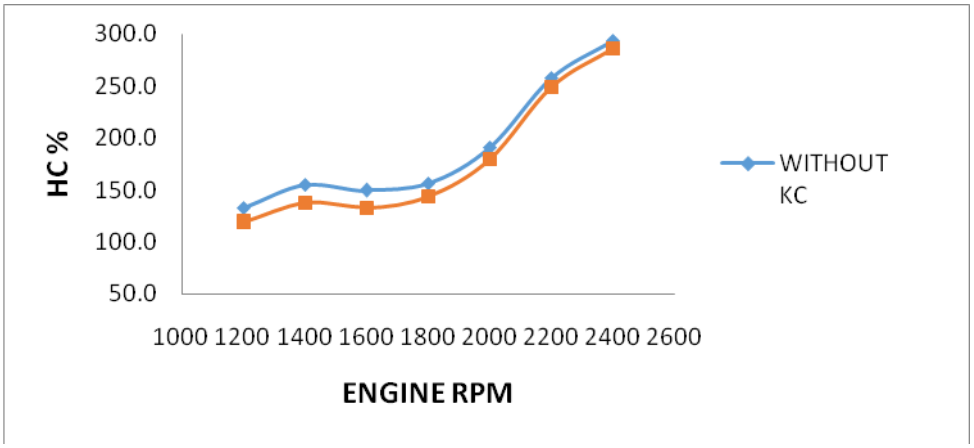

Figure 11 Hydro Carbon Emission Variations with Engine RPM

V. CONCLUSION

Power cycles with ammonia-water mixtures as the working fluid are well suited for utilization of waste heat from multi-cylinder petrol engines. The 1196CC multi-cylinder petrol engine losses 27% of its energy in exhaust gas. This waste energy not only increases entropy but also causes other environmental damages. This waste energy can be utilize with the help of Kalina cycle. From given experimental study it is found that at different speeds optimum mass flow rate of ammonia-water mixture is found to be 0.29LPM. At different speeds, as turbine pressure ratio increase then the turbine power also increases. From exhaust analysis it is found that, Oxygen emission at exhaust of engine enhanced due to use of Kalina cycle with engine exhaust. Carbon dioxide emission at exhaust of engine reduces due to use of Kalina cycle with engine exhaust. There is very small decrease in carbon monoxide with the help of engine with Kalinacycle. Oxides of nitrogen emission decreases due to use of Kalina cycle with engine exhaust. Hydro carbon emission at exhaust reduces with the help of engine with Kalina cycle.

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FPGA BASED DESIGN OF MEDIAN FILTER TO REDUCE NOISE IN IMAGING

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ABSTRACT

In this paper it is necessary to perform high degree of noise reduction in an image as well as preserving the edges from corrupted image as presented here. In the signal transmission the image signal can be corrupted by noise and the blurred image occurs. The Median filter is a nonlinear digital filtering technique often used to reduce speckle noise and salt and pepper noise from images without damaging the edges. The simulation design gives better image and it is simple to implement.

Key Words: FPGA, Impulsive noise, Logic devices, Median filter, VHDL

I. INTRODUCTION

Digital image processing refers to processing digital images on digital computer. As a subfield of digital signal processing, digital image processing has many advantages over analog image processing; it allows a much wider range of algorithms to be applied to the input data, and can avoid problems such as the build-up of noise and signal distortion during processing. Most images involve two dimensional functions and applying standard signal-processing techniques to it. Image Processing is a signal processing in which inputs and outputs are images such as photographs or frames of video. Also some methods whose inputs may be images but output are extracted from those images. There are various methodologies that can applied to images for different purposes such as image acquisition, image enhancement, image restoration, etc. Images are always preferred to texts in multimedia transmission but all these communications face a common problem: "Noise". One of the most common forms of noise is the impulse noise, also known as salt and pepper noise which is caused because of noisy pixel value is either minimum or maximum value. There have been many methods for removing salt-and-pepper noise, and some of them perform very well. Our main goal is to remove the fixed-valued impulse noise from the corrupted images. Recently, many image de-noising methods have been proposed for impulse noise suppression.The median filter was once the most popular nonlinear filter for removing impulse noise, because of its good denoising power and computational efficiency. However, when the noise level is over 50%, some details and edges of the original image are smeared by the filter. Filters are chosen according to their noise pattern in the field of image processing. Hardware implementation can result better speed with the help of pipelining and parallelism technique than the software implementation. Reconfigurable nature of FPGAs consisting with pipeline and parallelism technique makes it efficient to reduce the complexity of algorithms and

simplify the debugging and verification. In this paper, the algorithms of median are proposed in the means of hardware implementation for removal of impulse noise considering salt and pepper noise from images.

II.MEDIAN FILTER

Median Filter is a spatial filtering operation, so it uses a 2-D mask that is applied to each pixel in the input image Its strength lies in its ability to filter out impulsive noise without destroying the properties of the underlying signal. It is used to remove defects and noise from pictures. Median filter is much less sensitive than the mean to extreme values (called outliers), therefore it is better without reducing the sharpness of the image and edge preserving nature. Edge detection typically is followed by linking algorithms designed to assemble edge pixels into meaningful edges or region boundaries. The FPGA and PLD's are rising applications in all fields of engineering because of their high speed parallel operations. This paper presents a fast and efficient processing architecture based on FPGA for the filtration of the impulsive noise. In noise filtering, the essential plan is a manner to preserve some desired signal selections whereas attenuating the noise. A block diagram of median filter is depicted in Figure 2.1.

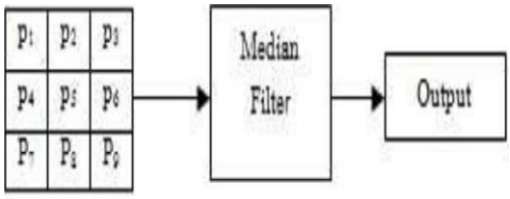

Figure 2.1 Block Diagram of Median Filter

Traditionally, the impulse noise is removed by a median filter which is the most popular nonlinear filter. To apply the mask means to center it in a pixel, evaluating the covered pixel brightness and determining which brightness value is the median value. The algorithm is: every pixel from the picture to be filtered is replaced by the median value of the neighbouring pixels. The picture is thus transformed by the median filter by another picture that has exactly the same size. For every pixel P of the input picture we first create a list of the 9 (3x3) pixels surrounding P. The 9 pixels are then sorted. The median value is the value located at the center of the sorted list. The pixel P in the filtered picture takes this median value. In our example the pictures are grayscale pictures, 8 bits per pixel. The pixel values are between 0 (black) and 255(white).

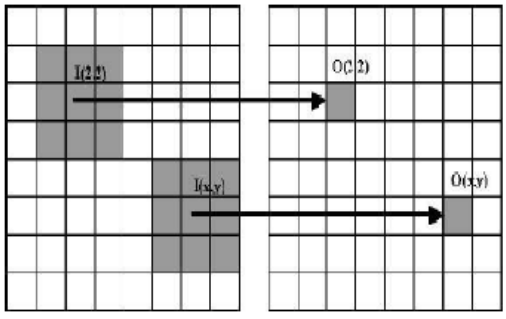

Figure 2.2 The Concept of Spatial Filtering Based on A 3x3 Mask, where i is The Input Image and O is The Output Image.

The median value is determined by placing the brightness in ascending order and selecting the centre value. The obtained median value will be the value for that pixel in the output image. The oldest sample is discarded, a new sample acquired, and the calculation repeats.

III. IMPULSIVE NOISE

Noise is any undesirable signal. Noise is everywhere and thus we have to learn to live with it. Noise gets introduced into the data via any electrical system used for storage, transmission, and/or processing. In addition, nature will always plays a "noisy" trick or two with the data under observation. When encountering an image corrupted with noise you will want to improve its appearance for a specific application. The techniques applied are application-oriented. Also, the different procedures are related to the types of noise introduced to the image. Impulse noise is caused by malfunctioning pixels in camera sensors, faulty memory locations in hardware, or transmission in a noisy channel. Two common types of impulse noise are the salt-and-pepper noise and the random-valued noise. For images corrupted by salt-and-pepper noise (respectively random-valued noise), the noisy pixels can take only the maximum and the minimum values (respectively any random value) in the dynamic range. There are many works on the restoration of images corrupted by impulse noise. The impulse noise produces fixed values in the pixels which are 0 (pepper noise) and 255 (salt noise). The aim of noise detection module is to detect the noise pixel with the help of threshold value. Each central pixel should be compared with predefined threshold values (Tl & T2) shown in Figure 3 .

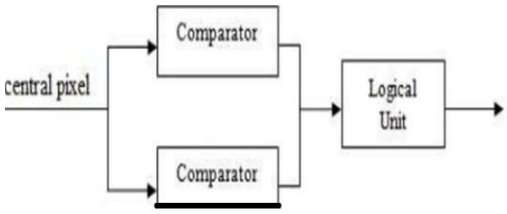

Figure 3.1 Noise Detection Module

The central pixel is considered to be noise free when its value between Tl & T2, Otherwise it is considered as noisy pixel. Another block diagram of impulse noise removal by using FPGA embedded development kit Spartan 3 as shown in figure 3.2

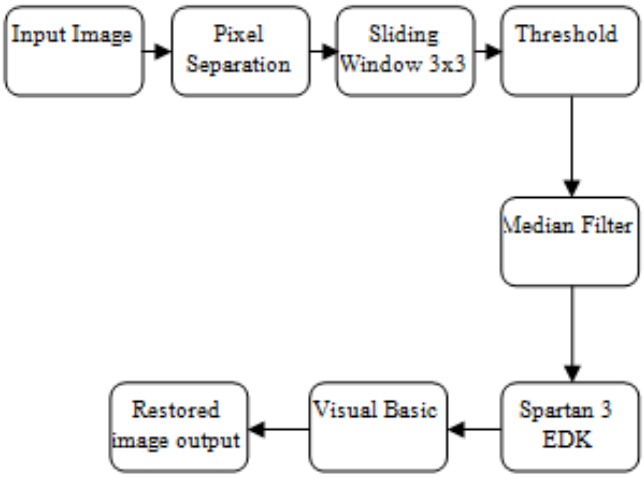

Figure 3.2 Block Diagram of Impulse Noise Removal

IV. HARDWARE IMPLEMENTATION

The VHDL coding of Median Filter and its FPGA implementation is done by Xilinx Synthesis Tool. The Xilinx Platform Studio (XPS) is that the event setting or interface used for developing with the hardware portion of your Altera DE2 board system. DE2 board is part of the DE2 package in the Altera DE2 Development and education board. The DE2 board has many features that allow the user to implement a wide range of designed circuits, from simple circuits to various multimedia projects. The following hardware is provided on the DE2 board:

• Altera Cyclone II 2C35 FPGA device

• Altera Serial Configuration device - EPCS16

• USB Blaster (on board) for programming and user API control; both JTAG and Active Serial etc.

In addition to these hardware features, the DE2 board has software support for standard I/O interfaces and a control panel facility for accessing various components. In order to use the DE2 board in this project, the user has to be familiar with the Xilinx software. To provide maximum flexibility for the user, all connections are made through the Cyclone II FPGA device. FPGA behaves like processor enforced there on throughout a Xilinx Field Programmable Gate Array (FPGA) device. Thus, the user can configure the FPGA to implement any system design.

V. SIMULATION RESULTS

The VHDL coding of median filtering and its FPGA implementation is done by Xilinx Synthesis Tool. Simulation result for median filter is shown below.

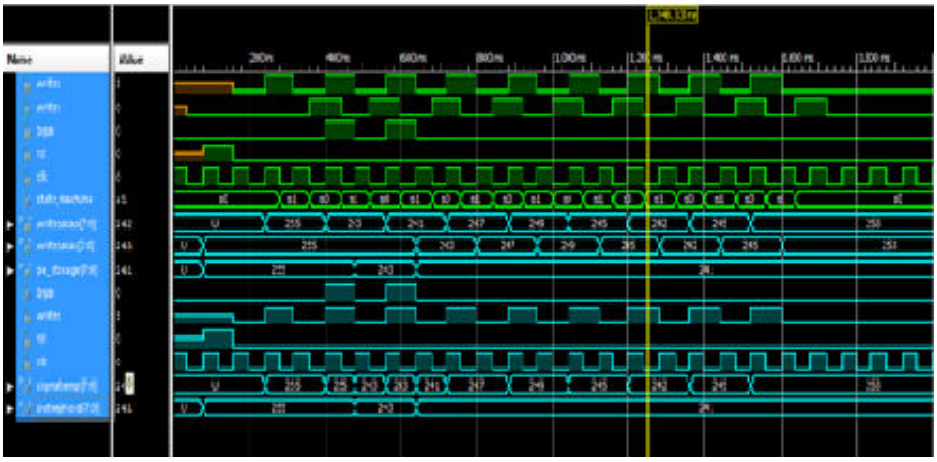

Figure 4.1: Simulation result for Data unit of Median Filter

VI. CONCLUSION

We have presented a novel method for median filtering using FPGA. When the median filter is carried out in real time, the software implementation in general-purpose processors does not usually give good results due to their high computational cost (for sorting N pixels, the temporal complexity is O(N·log N), so the FPGAs are a good alternative (**F**ield **P**rogrammable **G**ate **A**rray -hardware) for median filtering.This paper gives a good description of median filtering FPGA implementation of median filter using VHDL and the sort hardware accelerator made the computation easy, fast and efficient.

V. ACKNOWLEDGEMENT

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MOBILE ANCHOR BASED LOCALIZATION SCHEME IN WIRELESS SENSOR NETWORK

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ABSTRACT

Wireless Sensor Network technology is the fast growing field so the challenges are also quit much, the main and important parameter in any network is the location of the nodes. The performance of any system is decided on the basis that how much it is clever to find the exact location with the minimum error in minimum time, also can it be able to find obstacle and identify them.in this paper we proposed the Mobıle Anchor Based Localızatıon Scheme In Wıreless Sensor Network. With two mobile anchor node to find the location of other sensor node in obstacloe based envornment. And finaly simulate the result in NS-2.

Keywords: Anchor , Beacon, Chords, Gps

I. INTRODUCTION

Accurate and low-cost sensor localization is a critical requirement for the deployment of wireless sensor networks in a wide variety of applications. Many applications require the sensor nodes to know their locations with a high degree of precision. Various localization methods based on mobile anchor nodes have been proposed for assisting the sensor nodes to determine their locations. However, none of these methods attempt to optimize the trajectory of the mobile anchor node. Accordingly, this project presents a path planning scheme, which ensures that the trajectory of the mobile anchor node minimizes the localization error and guarantees that all of the sensor nodes can determine their locations. The obstacle-resistant trajectory is also proposed to handle the obstacles in the sensing field. Later this path planning algorithm is adjusted so that it suits most of the effective localization algorithms. The performance of the proposed scheme is to be evaluated through a series of simulations with the ns-2 network simulator.

II. EXISTING SYSTEM

There are many schemes available for determining the location of sensor nodes. These can be classified into range based or range free, anchor based or anchor free, stationary or mobile sensor nodes, fine grained or coarse grained, and centralized or distributed as shown in figure 1, other than these schemes GPS based is also one of the technology which can be used for location identification. However, it consumes large amount of energy and is expensive because GPS receiver is required for every node. As compare to other technology GPS provides very high accuracy of localization. But because of limited amount of energy in sensor nodes and very high cost of GPS, it is not suitable for most of the WSN based applications. These methods are follws.

Fig.1. Localization Schemes

III.PRAPOSED SYSTEM

3.1. Localızatıon Implementatıon

The localization scheme was inspired by the perpendicular bisector of a chord conjecture. The conjecture describes that the perpendicular bisector of any chord passes through the center of the circle. As shown in Fig., the chord of a circle (AB) is a segment whose endpoints are on the circle. With two chords of the same circle, the intersection point of two perpendicular bisectors of the chords will be the center of the circle. The localization problem can be transformed based on the conjecture. The center of the circle is the location of the sensor node; the radius of the circle is the largest distance where the sensor node can communicate with the mobile anchors. The endpoint of the chord is the position where the mobile anchor point passes through the circle.

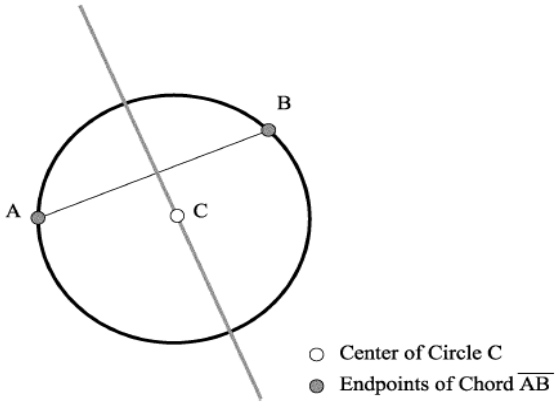

Fig 1.Perpendicular Bisector of A Chord Conjecture

3.2 Beacon Poınt Selectıon

In the mechanism, at least three end points on the circle should be collected for establishing two chords. Each mobile anchor point periodically broadcasts beacon messages when it moves in the sensor network. The beacon message contains the anchor node's id, location, and timestamp.

Every sensor node maintains a set of beacon points and a visitor list. The beacon point is considered as an approximate endpoint on the sensor node's communication circle. The visitor list stores both the mobile anchors

whose messages have been received by the sensor node and their associated lifetime. The th beacon point in the sensor is represented as (id , location , timestamp) and the th entry in the visitor list can be recorded as (id , lifetime).

When a sensor node receives a beacon message from a mobile anchor point, the node will check whether the anchor point is in its visitor list. If not, a beacon point will be added and the anchor point with a predefined lifetime will be inserted in the visitor list. Otherwise, the beacon message will be ignored and the lifetime of the mobile anchor point will be extended. When the lifetime of the anchor point is expired, the corresponding entry in visitor list will be removed and the last beacon message of the anchor point will be recorded as a beacon point.

3.3 Locatıon Calculatıon

After three beacon points are obtained, two different chords can be generated. As shown in Fig. the set of selected beacon points is$\{B_I, B_J, B_K\}$and their locations are(x_i, y_i), (x_j, y_j), (x_k, y_k), and . Two chords randomly chosen B_iB_j, B_iB_k, and , are formed based on the beacon points. Consider that lines L_{ij} and L_{jk} are the corresponding perpendicular bisectors of the chords B_iB_j, B_iB_k and , respectively. Therefore, by simple algebraic calculation, the equations of two lines L_{ij} and L_{jk} can be presented as follows:

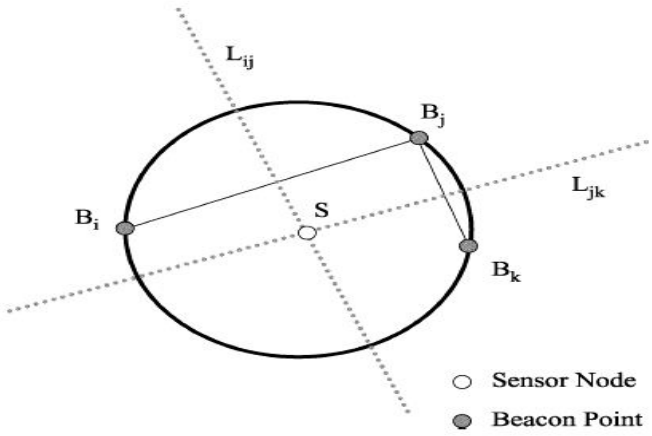

Fig 2.Anchor Path Planning Scheme

$$\begin{cases} L_{ij} : a_{ij}x + b_{ij}y = c_{ij} \\ L_{jk} : a_{jk}x + b_{jk}y = c_{jk} \end{cases}$$

If three beacon points are obtained on the communication circle of a sensor node, it follows that the mobile anchor node must pass through the circle on at least two occasions.

In the path planning scheme proposed in this study, the distance between two successive vertical segments of the anchor trajectory (i.e. the resolution of the anchor trajectory)is specified as $R-X$, where R is the communication radius of the mobile anchor node and X is set in the range $0 < X \leq R/3$This is because if X is bigger than $R/3$,$R - X$ will be smaller than $2R/3$. Hence, the distance between four successive verticalsegments is less than the diameter of the communication circle(i.e. $2R$). As a result, the mobile anchor node will pass throughthe circle more than three times. In other words, increasing thevalue of X may incur redundant beacon points.

Conversely, decreasing the value of *X* may cause the chord length tofall below the minimum threshold value. Thus, in practice, acareful choice of *X* is required. To determine the positions of the sensor nodes close to the boundary of the sensing field, the dimensions of the field are virtually extended by a distance of *R* on each side, as shown in Fig. By extending the sensing field, and choosing an appropriate value of *X*, the proposed path planning scheme ensures that the mobile anchor node passes through the circle of each sensor node either two or three times.

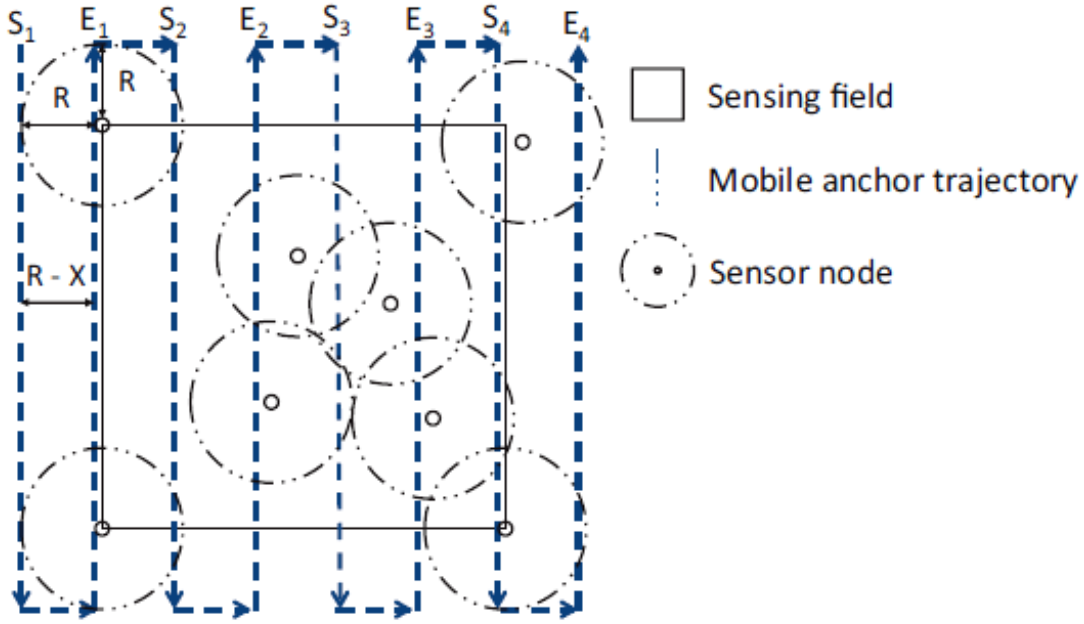

Fig 3 .Proposed Mobile Anchor Trajectory.

As shown in Fig 3, the total path length *D* is given as

$$D = (L+2R)\times\left(\left\lceil\frac{L+2R}{R-X}\right\rceil+1\right)+(R-X)\times\left\lceil\frac{L+2R}{R-X}\right\rceil$$

IV. PERORMANCE EVALUATION

We simulated the energy efficient localization technique on Network Simulator (version 2) widely known as NS2 [11], a scalable discrete-event driven simulation tool.

Building high performance WSN network systems requires an understanding of the behavior of sensor network and what makes them fast or slow. In addition to the performance analysis, we have also evaluated the proposed technique in measuring, evaluating, and understanding system performance. The final but most important step in our experiment is to analyze the output from the simulation. After the simulation we obtain the trace file which contains the packet dump from the simulation.

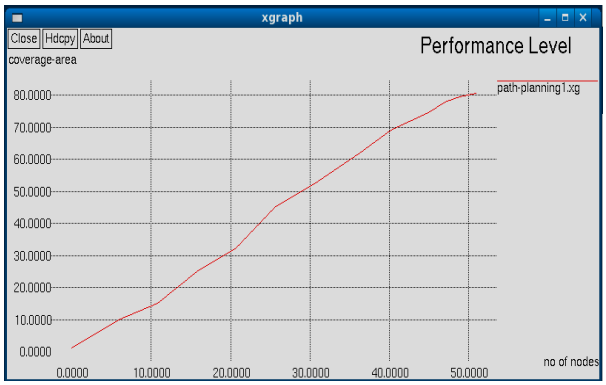

Figure 1 Coverage area Vs number of nodes

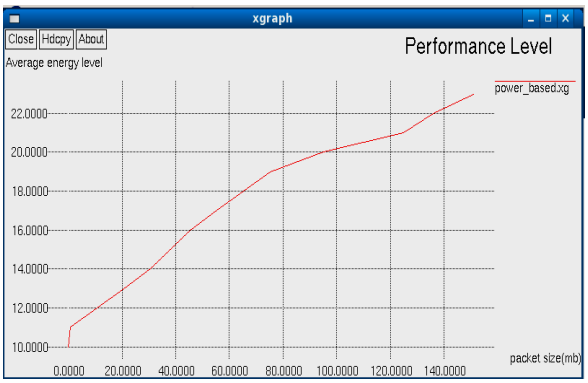

Figure 2. Coverage area Vs number of nodes

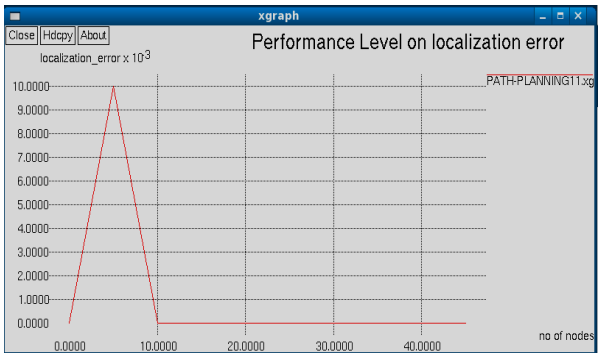

Figure 3. Coverage Area Vs Number Of Nodes

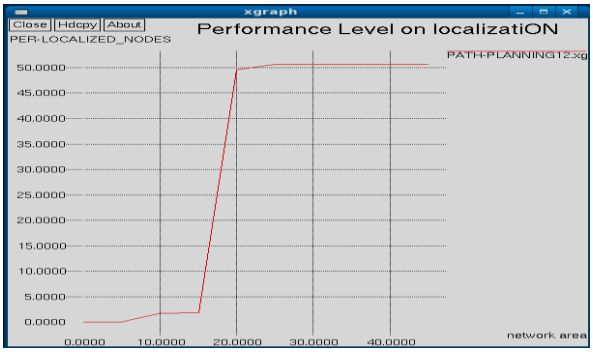

Figure 4. Coverage Area Vs Number Of Nodes

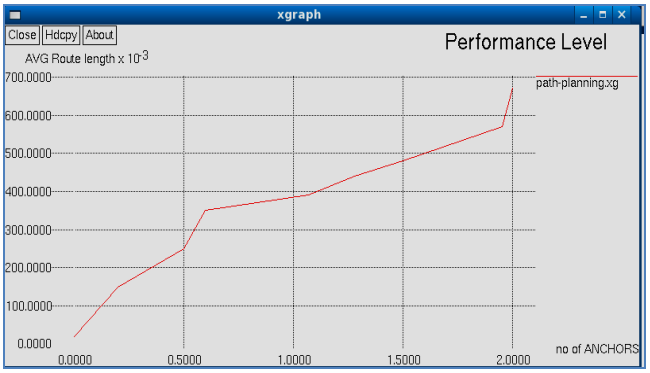

Figure 5. Coverage Area Vs Number Of Nodes

V. CONCLUSION

In this paper, we have proposed a path planning scheme for the mobile anchor node in the localization method. The modified movement trajectory and the virtual beacon point generation scheme are implemented to tolerate the obstacles in the sensing field. The performance of the proposed scheme is improved as compared to the original random movement strategy. Overall, the simulation results have shown that the proposed path planning strategy outperforms existing methods in terms of both a smaller localization error and a higher percentage of successfully localized sensor nodes. Furthermore, it has been shown that all sensor nodes can determine their locations in the presence of obstacles in the sensing field. The future work will investigate the path planning method for all kinds of mobile anchor-based localization schemes

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EVALUATION OF ANTICANCER PROPERTY OF GOSSYPOL USING HeLa CELL LINE

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ABSTRACT

Cervical cancer is the fifth most common cancer in humans, the second most common cancer in women worldwide and the most common cancer causing death of women in the developing countries. Gossypol, a polyphenolic compound extracted from cotton plants, has been found to be an anticarcinogenic agent. The aims and objectives of our study were to evaluate the anticancer property of Gossypol, to find the IC_{50} value for Gossypol & to find the cell viability using MTT assay. The cells were incubated with different concentrations 1%, 0.75%, 0.5%, 0.25%, 0.125%, 0.062% and 0.031% for 24 and 48 hours. After gossypol treatment, the cytotoxic effects were measured with MTT tests. Finally, the IC_{50} lies on 0.125%.

Keywords - Anticarcinogenic, cell line ,Cervical cancer, Gossypol, HPV, IC_{50}, MTT, Trypsinization.

I. INTRODUCTİON

1.1 Tissue Culture

Culturing of tissues in a favorable artificial environment is called tissue culture. Tissue culture is divided into two types: (i) primary cultures and (ii) secondary cultures. Primary cell culture is the maintenance of growth of cells dissociated from the parental tissue. The (I) Primary cell culture could be of two types depending upon the kind of cells in culture (Jacoby *et al.,* 1979). They are Adherent cells and Suspension cells. Adherent Cells require attachment for growth are said to be anchorage dependent cells and Suspension Cells which do not require attachment for growth are anchorage independent cells/suspension cells. For example is lymphocyte. (ii) Secondary cell cultures: When a primary culture is subcultured, it is known as secondary culture or cell line. A cell line or cell strain may be finite or continuous depending upon whether it has limited culture life span or it is immortal in culture. On the basis of the life span of culture, the cell lines are categorized into two types. One is Finite cell lines and another one is infinite cell line. The Cell lines which have a limited life span and go through a limited number of cell generations (usually 20-80 population doublings) are known as finite cell lines. The Cell lines which are transformed under laboratory conditions or *in vitro* culture conditions give rise to continuous cell lines. They grow either in a monolayer or in suspension. The growth rate is rapid and doubling time can be 12-24 hours (Capes et al, 1993).

1.2 HeLa Cells

A HeLa cell is a cell type in an immortal cell line used in scientific research. It is one of the oldest and most commonly used human cell lines. The line was derived from cervical cancer cells taken on February 8, 1951, from Henrietta Lacks, a patient who eventually died of her cancer on October 4, 1951 (Walboomers 1999). The cell line was found to be remarkably durable and prolific as illustrated by its contamination of many other cell

lines used in research (Rahbari et al., 2009). HeLa cells have been reported to contain human papilloma virus 18 (HPV-18) sequences (Singh 2005). Culture conditions for HeLa cells are air is 95%, carbon dioxide (CO_2) is 5% and temperature is 37°C (Batts 2010). The Advantage of HeLa Cells is developed standardized methods for culturing cells. It is used to develope methods for accurately determining the number of chromosomes in cells beneficial for cancer research. Used to study effects of radiation and used to test safety of cosmetics and pharmaceuticals replacing lab animals.

1.3 Gossypol

Gossypol is a natural phenol derived from the cotton plant (genus Gossypium). Gossypol is a phenolic aldehyde that permeates cells and acts as an inhibitor for several dehydrogenase enzymes. It is a yellow pigment. Gossypol is a non-volatile yellow pigment first isolated in 1889 from the seeds, roots, and stems of cotton plants of the genus *Gossypium (family:* Malvaceae) the Scientific Name(s): *Gossypium* spp. Family: Malvaceae (mallow), Common Name(s): Gossypol, AT-101, ApoG2. Gossypium are shrubs that grow to a height of 3 m, have broad lobed leaves, and contain seeds in a capsule or "boll" of fibers. These fibers are harvested and woven in the textile industry. The seeds of Gossypium species vary widely in gossypol content, with levels ranging from 0.13% to 6.6%. Gossypol was first identified as an antifertility agent as a result of epidemiologic studies conducted in China during the 1950s. Investigators had been puzzled by the extremely low birth rates in a particular geographic region. Further investigation revealed that the antifertility component was gossypol. Gossypol can have various chemical structures Shown in Fig(1). Gossypol's main function in the cotton plant is to act as an enzyme inhibitor (Wang *et al.,* 2009).

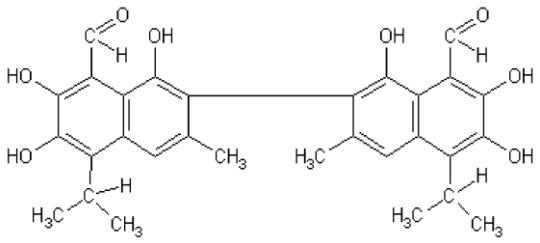

Figure 1: Chemical Structure of Gossypol

Gossypol reduces mitotic index and decreases the rate of DNA synthesis to some extent in all types of cell tested, including tumor cells. Many studies reported that protein synthesis can also be reduced in various cell lines, while others have identified various ways in which gossypol can arrest cell growth by inhibiting enzymes involved in DNA replication. Several studies showed that gossypol promotes apoptosis in tumor cells (Adams *et al.,* 1960). Gossypol also uncouples mitochondrial oxidative phosphorylation; chelates iron, copper, aluminum and zinc; manifests both pro-oxidant and antioxidant characteristics; alters membrane potential, fluidity and permeability; binds to tubulin and inhibits microtubule assembly; and disrupts gap junctions and cell-cell communication before causing appreciable cytotoxicity (Berardi 1969). Oncology testing is a Gossypol is also under investigation as a possible chemotherapy drug. It is currently believed that gossypol in itself will not kill cancerous cells; however, it changes the chemistry within the cancer cell and makes it more susceptible to traditional chemotherapy drugs. Phased trials have been done on resistant prostate and lung cancer.

II. REVIEW OF LITERATURE

Esra *et al.,* 2006 [1] Gossypol, a polyphenolic compound extracted from cotton plants, has been found to be an anticarcinogenic agent. The aim of our study was to investigate whether gossypol induced cell death on ME-180 cervix cancer cells, and whether it was a potent inhibitor of some antioxidant enzymes, like catalase, glutathione reductase and glutathione-S-transferase. The cells were incubated with four different doses (5, 10, 15 and 20 μM) for 24, 48 and 72 hours. After gossypol treatment, the cytotoxic effects were measured with MTT tests. Using DNA agarose gel electrophoresis, cellular internucleosomal DNA fragmentation of the cells treated with gossypol and untreated was examined. Consequently, gossypol caused different fragmentation on tumour cells due to apoptosis. Gossypol was found to be a potent inhibitor of catalase, glutathione reductase and glutathione-S-transferase.

Yi Wen *et al.,* 2006 [2] Gossypol, a natural compound present in cottonseeds, displays antiproliferative and pro-apoptotic effects against various cancer cells. The (-)-gossypol enantiomer is a more potent inhibitor of cancer cell growth. Here, the molecular mechanisms of apoptosis induced by (-)-gossypol were studied in human prostate cancer cells. The effects of (-)-gossypol on the expression of apoptotic-regulated gene markers in both death receptor- and mitochondria-mediated apoptotic pathways, such as the Bcl-2 family and caspase, etc., were detected by RT-PCR and Western blot analysis. (-)-gossypol also activated caspases-3, -8 and -9 and increased PARP [poly (ADP-ribose) polymerase] cleavage. By using caspase inhibitors, (-)-gossypol caused apoptosis via the caspase-dependent pathways.

Jiahua *et al.,* 2004 [3] Racemic gossypol, a naturally occurring polyphenolic yellow pigment present in cottonseed products, inhibits in vitro proliferation of Dunning prostate cancer cells (human prostate cancer cells derived from a bone marrow metastasis (PC3)), MCF-7 and primary cultured human prostate cells. The results show that (±)-GP caused reductions in DNA synthesis and prolonged the DTs in PC3 cells. RT-PCR and ELISA results show that (±)-GP elevate the mRNA expression and protein secretion of transforming growth factor beta1 in PC3 cells. Consistent with these findings, (±)-GP has been shown to decrease the cyclin D1 mRNA expression and protein expression in PC3 cells. These results indicated that the inhibitory effects of (±)-GP on the proliferation of human prostate cancer PC3 cells are associated with induction of TGF,1, which in turn influences the expression of the cell cycle-regulatory protein, cyclin D1, in prostate cancer cells.

Shawky 2007[4] The anti-proliferative activity and mitochondrial toxicity of gossypol in endometrioma cells was maintained in short-term cultures. Three endometrioma cell lines from patients were treated with 25 or 50 nmol/L gossypol for up to 12 days. The effect of gossypol on the cell growth was recorded. A phosphorescence oxygen analyzer was used to determine the effects of gossypol on mitochondrial oxygen consumption of six endometrioma cell lines from patients. Cellular gossypol accumulations in three endometrioma cell lines from patients were measured by high-pressure liquid chromatography. Proliferation of the endometrioma cells was inhibited by 25 and 50 nmol/L gossypol. Respiration of the endometrioma cells was inhibited by 10 μmol/L gossypol. Cellular gossypol was detected in the endometrioma cell lines that were treated for 24hrs with 10 and 0.3 μmol/L gossypol.

Maryam Mehrpour1 *et al.,* 2009 [5] Gossypol is the Bcl-2 family proteins regulate commitment to apoptosis primarily through their capacity to control the permeability of the mitochondrial outer membrane permeabilization (MOMP) which triggers the release of multiple apoptogenic factors into the cytosol and thereby apoptosis. Various Bcl-2 family members affected this key event of the apoptotic cascade in different

ways, determining their pro- or anti-apoptotic status. The Bcl-2-type proteins inhibit MOMP, thereby preserving cell viability. In contrast, Bax-type proteins and the diverse group of BH3-only proteins facilitate MOMP and thus promoted cell death. Recently, several drugs that act as BH3 mimetics have been identified, including Gossypol. Their review revisits the properties of the gossypol family, their use as anticancer agents for cancer therapy.

Suresh *et al.,* 2010 [6] Prostate cancer (PCa) continues to represent a burgeoning medical problem in the United States. Recent studies suggested that gossypol, a bioactive phytochemical produced by cotton plants, is a promising agent against prostate cancer. Their current studies were undertaken to examine the chemotherapeutic efficacy of gossypol on human prostate cancer cell lines and prostate tumor initiating cells. Gossypol reduced viability of three prostate cancer cell lines with an IC_{50} between 3–5 μM. These studies demonstrate for the first time that gossypol treatment induces DNA damage and activates p53. Collectively, this data supports the use of gossypol as a novel agent for PCa.

Foong Ying Wong *et al.,* 2012 [7] Over expression of Bcl-2 has been associated with gemcitabine resistance. The aim of this study is to determine whether Gossypol can overcome gemcitabine resistance in cell lines with high level of Bcl-2 expression in combination drug therapy. Their study demonstrated that in 10 cell lines derived from different cancers, high Bcl-2 baseline expression was observed in cell lines that were resistant to gemcitabine. Furthermore, synergistic effect of combination therapy was observed in gemcitabine-resistant cell lines with high Bcl-2 expression, but not in gemcitabine-sensitive cell lines regardless of Bcl-2 expression. Gossypol treatment resulted in the decrease of anti-apoptotic genes such as Bcl-2 and Bcl-xl and an upregulation of the pro-apoptotic gene.

III. METHODOLOGY

3.1 Thawing of Cryopreserved Cells

Thawing of cells is defined as the transfer of cryo cells to room temperature. Thawing of cells is of two types depending on the cryoprotectant. They are rapid thawing and slow thawing. In most of the cases, rapid thawing is used.

3.1.1 Procedure

The cryovial containing the frozen cells from liquid nitrogen is taken and immediately placed into a 37°C water bath. The cells were thawed out quickly (1 minute) by gently swirling the vial in the 37°C water bath until there is just a small bit of ice left in the vial. The vial was transferred into a laminar flow hood. Before opening, the outside of the vial was wiped with 70% ethanol. The desired amount of pre-warmed saline appropriate for the cell line is transferred drop wise into the centrifuge tube containing the thawed cells. Cell suspension is centrifuged for 5–10 minutes. After the centrifugation, pellets were collected. Then the cell pellet was re-suspended in complete growth medium, and transferred into the appropriate culture vessel and into the recommended culture environment.

3.2 Cell Counting Using a Haemocytometer

It is often necessary to count cells, for example, when plating cells for transfection experiments. One method for counting cells is to use a haemocytometer shown in fig 2. A haemocytometer contains 2 chambers. Cell concentration is determined by counting the number of cells within a defined area of known depth (volume).

3.2.1 Procedure

The cell suspension was mixed with tryphan blue in the ratio 1:1. Cell suspension was loaded in the hemocytometer and the cells were counted under a microscope. The total number of cells presented in the suspension was calculated using the formula below:

Average cell count × dilution factor × 10^4 × final volume

The average cell count was calculated by taking an average of cells in the four corner chambers or the opposite corner chambers. 10^4 is the total volume of all the four chambers.

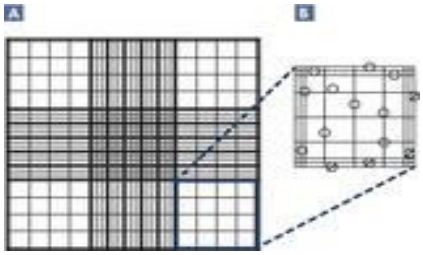

Figure 2: Cell Count Using Haemocytometer

3.3 Viability Staining

Trypan blue staining provides a method for distinguishing between viable (i.e., capable of growth) and nonviable cells in a culture. This staining method is based on "dye exclusion": cells with intact membranes exclude the dye and are considered viable.

3.3.1 Procedure

Harvest the cells by trypsinization (adherent cell cultures) and resuspend the cells in an appropriate volume of medium to give a cell density of at least 10^6 cells/ml. Add 10 µl of trypan blue to 10 µl the cell suspension. Mix thoroughly, and allow standing for 1–2 min.

% viability of cells = (No. of viable cells / Total No. of cells) × 100

Then, count the stained and unstained cells using a hemocytometer. Blue-stained cells are nonviable and unstained cells are viable.

3.4 Trypsinization

Trypsinization shown in Fig 3 and 4 before and after is a technique that uses the proteolytic enzyme trypsin to detach adherent cells from the surface of a cell culture vessel. This procedure is performed whenever the cells need to be harvested (e.g., for passaging, counting, or for nucleic acid isolation).

3.4.1 Procedure

Medium was discarded from the dish and washed with saline. 3mL of trypsin/EDTA solution was added. 2-3 minutes were allowed for trypsin to work.

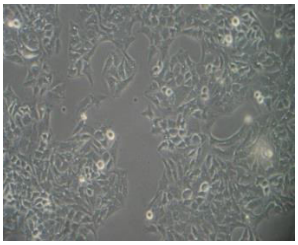

Figure 3: Before Trypsinization

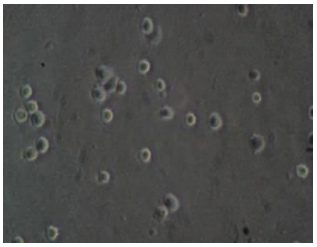

Figure 4: After Trypsinization

Reaction of trypsin was terminated with DMEM medium containing FBS, when ~ 50% of cells were floating, the suspension was collected in a centrifuge tube. Centrifuged at 1500rpm for 10-15 minutes. Supernatant was discarded and the pellet was re-suspended in the medium.

3.5 MTT Assay

Day 1: Dish was taken from the incubator and the medium was discarded. Wash with saline to remove the trace amount of globular protein and other compounds in the dish. The saline was discarded and trypsin was added for 2 to 3 mins. Media was added to inhibit the activity of trypsin and centrifuged for 10 to 15 mins at 1500 rpm and pellet was formed. The pellet should be dissolved with media. From this, we took 10 µl of sample and 10 µl of dye (trypan blue) and counted the cells using haemocytometer. The cells were prepared in 96 well microtiter plates containing a final volume of 100 µl / well. They were incubated for 24 hrs.

Day 2: The cells were observed using an inverted microscope. The test compounds and controls were prepared, added in 96-well micro titer plates containing a final volume of 100 µl/well. The drug concentrations were 0.031%, 0.062%, 0.125%, 0.25%, 0.5%, 0.75%, 1% by serial dilution method. 96 well plates were taken from the incubator and the medium was discarded. The controls and concentration of drugs were also added in the 96 well micro titer plates. It was incubated for 24 and 48 hrs.

Day 3: 50 µl MTT Solution was added per well. It was incubated 3 to 4 hours at 37°C in a CO_2 incubator and formazan crystals were formed. 100 µl of DMSO solution was added to each well to dissolve formazan crystals. It was mixed to ensure complete solubilization. It was incubated for 1 hour. Absorbance was recorded at 545 nm using ELISA reader.

$$\% \text{ Vehicle Control} = \{\text{Vehicle control / Media control}\} \times 100$$

$$\% \text{ CellViability} = \{\text{Concentration / Media control}\} \times 100$$

IV. RESULTS & DISSCUSION

4.1 Observations of Crystal Formation

The cells were observed using a microscope. Cell death increases when the concentration decreases. Then, the crystals were formed based on the concentration of drug (Gossypol). Shown in figure 5.

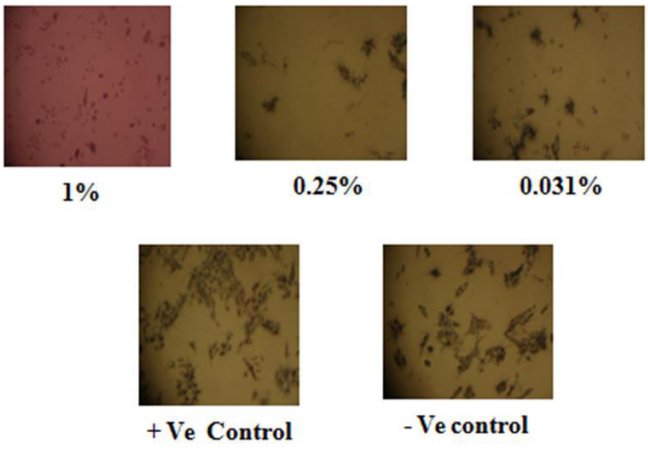

Figure 5: Crystal Formation at Different Concentration

Since 1970, though studies have concentrated on the contraceptive effects of gossypol, recently more interest has been emphasized on its antitumoral effects. It has been known that Gossypol has antiproliferative effects on different cancer cells. Gossypol generally exhibits many biological activities by disturbing cellular energy metabolism. Gossypol was shown to be the most potent inhibitor of tumor cells using MTT assay. Gossypols have been found to be active against a wide variety of types cancer, and have been shown to suppress multidrug-resistant cells and metastatic tumors. In several clinical trials, gossypols have been shown to meet toxicity criteria and are well tolerated in patients with metastatic adrenal cancer, malignant gliomas, and refractory metastatic breast cancer. Gossypol was reported to arrest cell cycle at the G_0/G_1 phase (Van poznak 2001).Gossypol has also been demonstrated to inhibit the proliferation of cancer cells by inhibiting nuclear enzymes, such as DNA polymerase α and topoisomerase II, suppressing DNA synthesis, reducing protein kinase *C* activity (Hu *et al.,* 1993).

Concentration in %	Cell viability
0.031	100% ± 0%
0.062	94.39% ± 0%
0.125	71.54% ± 0%
0.25	46.26% ± 0%
0.5	43.1% ± 0%
0.75	24.3% ± 0%
1	24.27% ± 0%

Figure 6: Action of Gossypol at 24 hrs

In this study, Gossypol has been assessed in different concentrations and its effect on HeLa cell line for 24 and 48 hours. Shown in Fig.7. In this context, the death of cells increased when concentration is decreased. The cytotoxic effect of gossypol and fragmentation of nucleus has exhibited parallelization. The most cytotoxic effect of gossypol on the cells has been detected at the end of 72 hours after treating with gossypol. The fragment of the DNA indicates that gossypol induces apoptosis and some of these cells were in necrotic pathway.

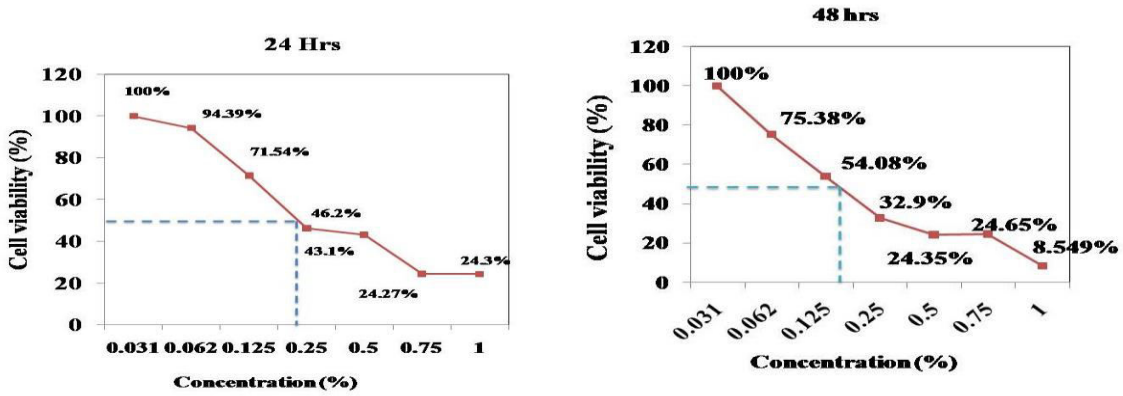

Figure 7: Different Concentrations of Gosspol and its Effect on HeLa Cell Line for 24 and 48 Hours

In the present study, it has shown that gossypol inhibits the activity of these enzymes in dose and this activity was increased till 48 hours of post treatment. As the HeLa cell line is originated from human cervix cancer cells, the results of the present study will provide this valuable information for oncology and clinicians for the treatment of cervical cancer. It has been concluded that the evaluation of anticancer property of gossypol using HeLa cell line was determined using MTT assay in our present study. The results of MTT assay has demonstrated that gossypol can be efficiently used in anticancer therapy (Benz *et al.,* 1987). So, the results of present study and Benz *et al.,* 1987 study are in accordance.

Concentration in %	Cell viability
0.031	100% ± 0%
0.062	75.38% ± 0%
0.125	54.08% ± 0%
0.25	32.9% ± 0%
0.5	24.35% ± 0%
0.75	24.65% ± 0%
1	8.549% ± 0%

Figure 8: Action of Gossypol at 48 hrs

V. CONCLUSION

Cervical cancer occurs when abnormal cells on the cervix grow out of control. The cervix is the lower part of the uterus that opens into the vagina. Cervical cancer can often be successfully treated when it is found early. It is usually found at a very early stage through a Pap test. Gossypol is a polyphenolic compound which is extracted from cotton seed. Gossypol has many biological properties to inhibit the activity of tumor cells. In this experiment, the evaluation of anticancer property of gossypol using HeLa cell line was determined.

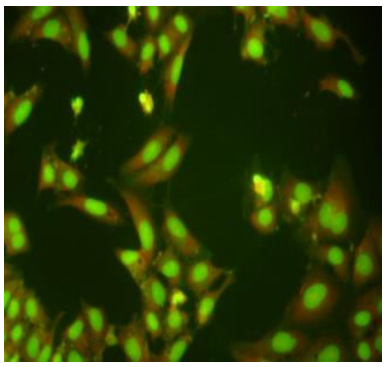

Figure 9: IC_{50}

Now a days, plant products are very efficient to cure many diseases and this work also showed similar results. Gossypol has been assessed in different concentrations and its effect on HeLa cell line for 24 and 48 hours was measured. The IC_{50} lies between 0.25% to 0.125%. Shown in Fig.9 . Acridine orange staining was performed to confirm the apoptosis of the cells. Gossypol had not undergone apoptosis or there was no apoptotic pathway.

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CLOUD COMPUTING TECHNOLOGY SUPPORT E-GOVERNANCE IN INDIA

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ABSTRACT

Cloud Computing is an emerging technology in computing. It is style of advance computing in which the aggregation and development of technology such as parallel computing, Distributed computing process and service-oriented architecture. The combination of sharing and integration of software, resources, hardware and network environment is known as a cloud. Cloud provides service of computing, communication and storage facility in a safe and secure environment, as soon as possible, virtually provided by Internet technology. Considering the provided services in e-governance are accessible with the help of internet, thus cloud service can also use for implementation of e-governance architecture and establish a strong relationship between government organization, citizens and industrial organization. In this paper, we examine cloud computing and analyze its services in the e-governance architecture. The cloud computing is a vibrant application which provide solution for all e-governance infrastructure at lower cost and less time requirements. An E-governance model framework which utilize the potential of cloud computing is presented. The various aspects and infrastructure for typical governance has been discussed in this paper. The power of cloud computing to offer some urgently required e-governance services with in short time span as described in this paper. A detail investigation about the merits and demerits on the basis of SWOT analysis has been presented in this paper.

Keywords: ***Cloud Computing, E-Governance, Information Technology***

I. INTRODUCTION

ICT is playing a key role for the development of our present economy. E-Governance is one of the results of ICT that brings a revolutionary change in our developing country. E-Governance is a democratic tool of our democratic country. The sole aim of E-Governance is to establish strong and transparent relationship between government organization, citizens and business organization so that a faith could be developed among them. But the technology is very costly and having security and some reliable issues.so we should focus on the development of E-Governance infrastructure at less cost. For this many researches have been made to reduce it cost[1]. This paper explores two parts: First one is E-governance concept, its requirements and implementations and second is significance of cloud computing in E-governance. Due to rapid increase in the demand of wed-based model ,the cost of data based model is alarmingly increasing and an efficient system is required which helps the government to regulate the cost on one hand and also give positive response for the work without any

breakdown and with full security. High-volume problem can be solved easily [2]. And the solutions of these problems are:-

- Cloud computing should be developed, such as grid computing and several order architecture. This made large data handling at less time and cost by using cluster if computers together.
- A system model should be developed for E-Governance which includes system efficiency and user satisfaction [3].

With the help of cloud computing government can developed a better system and also able to increase the benefits by overcoming its weaknesses.

II. CLOUD COMPUTING

Cloud computing have different types of definitions. According to National institute of standard and technology of America, "Cloud computing is a model for convenient services, demand based network access to shared resources, that can fastly liberate with minimal management efforts or service provider interaction." The another definition of Wikipedia is as follows "Cloud computing includesdeploying groups of multiple remote servers and software networks that permit different kinds of data sourceswhich can be uploaded for real time processing for the generation of results without the need to store(processed) data on the cloud[4]."

III. THREE DEPLOYMENT MODEL OF CLOUD COMPUTING

It is most primary to decide which type of cloud model is selected for secure cloud services. There are basicallythree types of deployment model in cloud computing.

3.1 Public Cloud

A network that is open and uses onlyfor publiclypurpose is called Public cloud. This model is based on pay-per-use method, same as prepaid electric meter technology. It isideal for businesses seeking less complex Information technology hosting. Public cloud allows user's access tothe cloud via interfaces using mainstream web browser. Applications run on it have either seasoned demand orunforeseeable traffic[4]. It is less secure cloud models

3.2 Private Cloud

Private cloud model is designed with organization's internal enterprise data center. Here scalable resources andvirtual services are provided by the cloud vendors are combine together and available for cloud users to shareand use Only the organization people and designated stakeholders may have use to operate on a specific privatecloud. Thus, private cloud model is much more secure than public cloud model. Just like Intranet, all theresources and applications are managed by organization itself.

3.3 Hybrid Cloud

Hybrid cloud is a combination of both public cloud model and private cloud model which is centrallycircumscribed and managed by a secure network. It gives more secure control of the data and applications and provides various parties to access data and information over the Internet[4].

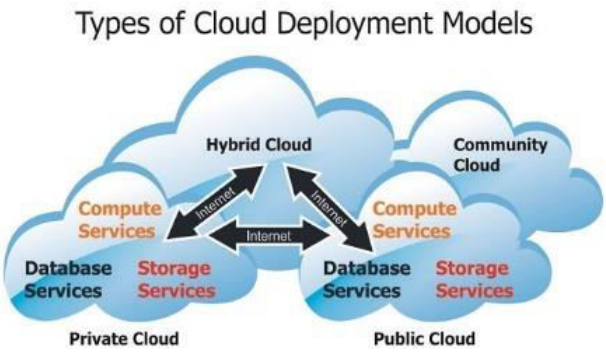

Fig.1. Cloud Computing Deployment Models

IV. DELIVERY MODEL OF CLOUD COMPUTING

Cloud computing normally works on service-oriented architecture in nature. It can be easily integrated with other systems. Cloud computing architecture is based on three types of abstraction layer and each layer has its own services and responsibility of work.

4.1 Infrastructure as a Service (IaaS)

It gives infrastructure as a service including hardware and networks/storage resources needs for data servers. 24x7 availability is needed for e-governance applications. In this infrastructure we needed uninterrupted power supply to database centers, proper bandwidth allocation. In the model the main focus of application designer should be on usability and functionalities of E-Governance system[4].

4.2 Platform as a Service (PaaS)

Cloud gives various platforms as a service like as Operation System provisioning, database support/control services, workflow management and middleware support services. In e-governance with cloud advantages departments can get hardware and network resources whenever they need them as compared to traditional methods.

4.3 Software as a Service (SaaS)

SaaS provides all applications are necessary for success full implementation of E-Governance .For example , Suppose an E-Governance plan decides to extend their area at district or state level Than no software is required to purchase at district level but cloud provider will gives required software along with additional services such as employee management system, district management system, call center service etc. in this manner cloud computing can give best solution as per requirement, Hence cloud reduces cost of E-Governance[5].

In this delivery model, Cloud gives different types of service from its plurality. On this basis of clouds three layers. These are three abstracted and virtualized layers and gives services uniquely to each other. E-governance architecture can use single layer or combination of two or more layers to give all types of services to each and every customer. In the following figure,the level of abstraction and the application of each layer are related to various initiatives (Acc. to Infosys Analysis)[6].

Model	Characteristics	Services offered	Applicability to e-Governance	Relevance
Software as a Service (SaaS)	• Software application is offered as a service • Pre-built applications that can be deployed on demand • Service virtualization	• e-Governance services (G2B, G2C, G2G) • Value added services • Gateway services (e.g., payment gateway)	• Actual G2X services as offered to end customers, accessible through internet • Easy to deploy and rollout • Similar applications for different departments can be provisioned faster • Reduces TCO as the application is available off the shelf	HIGH
Platform as a Service (PaaS)	• Provides required platform to develop and customize applications • Exposes service components & APIs • Integration platform • Choice of different platforms	• Plain or pre-configured application stack • Workflow and message queue services • Application instances (e.g., middleware containers) • Application clustering	• Pre-configured stack and middleware elements available, facilitating faster application development and rollout • Consistency and repeatability– helps re-deploy multiple instances quicker • End customer does not have to buy the software licenses • Reduces maintenance and management overheads	LOW
Infrastructure as a Service (IaaS)	• Provides hardware infrastructure (servers, OS, storage, network) on demand • Virtualized environments and hence are highly scalable • High availability • Choice of different platforms	• Slices of hardware (server, storage instances) • Data backup and restore services • Clustering solutions • Disaster recovery • Virtualized containers	• Pre-configured hardware instances that can be provisioned faster • Resource augmentation easier to support burst of demand • Uniformity of the environment configuration thereby ensuring consistency • End customer does not have to buy hardware and OS licenses thereby reducing the TCO	MEDIUM

Fig. 2. Cloud Computing Delivery Model with E-Governance Activities

V. E-GOVERNANCE

An automation of all government functionalities is provided by e-governance and it also enhances the organizational efficiency and participation of citizens. E-governance components and its requirements are including under effective e-governance. The terms are explained below:-

5.1 Requirement of E-Governance

To improve government work and to make easy sharing of information with is citizen, this way is provided by e-governance. For knowing about the practical implementation of e-governance,we have to play key role during the deployment of e-governance which is identified as one of the factor[5]. The requirements of e-governance divided into three parts:-

5.1.1 Government to Government

It is fully related with the inter government control, administration and monitoring on the government. Main focus of this requirement is an:-

i. Communication between two governments.

ii. And other aspects of the government to government.

5.1.2 Government to Business

For the development of the any country business organization are the important to be known which contribute substantial to a country.

For enforcing new policies, standards and various accountabilities, Government also keep eye on these type of organizations. So, it is requirement to make interaction between the business and government for:-

iii. Contract Management

iv. Tender Management

v. Tax Payments etc.

5.1.3 Government to Citizen

To provide the various types of services to its citizen is the primary role of any government. Government should provide to its citizen

vi. Better education

vii. Proper environment

viii. Basic emanates

ix. Health care

x. Most important quality life

Requirement of e-governance is a single window solution which is helpful in achieving citizen satisfaction.

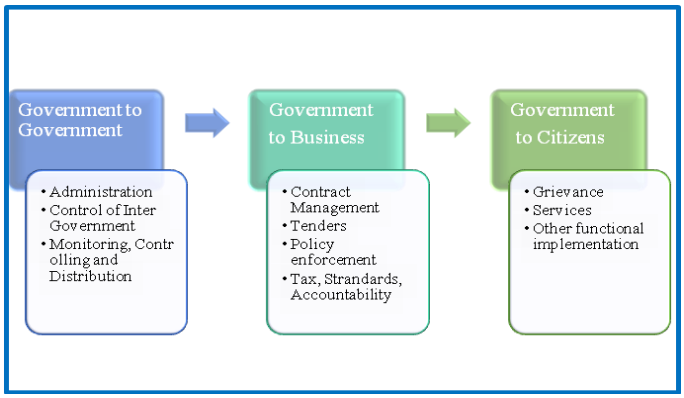

Fig. 3. E-Governance Models

VI. COMPONENTS OF TYPICAL E-GOVERNANCE APPLICATION

E-Governance consists of three tier architecture system.

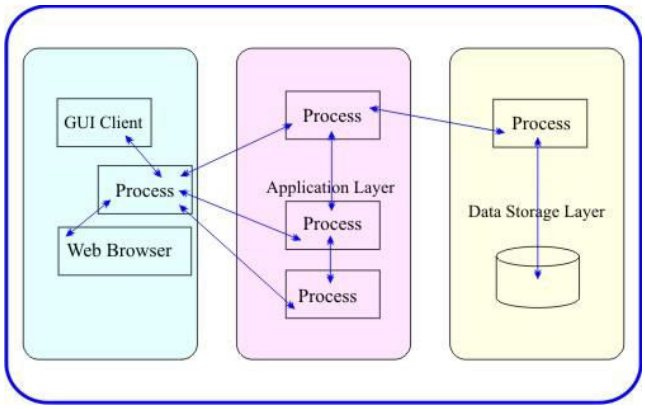

Fig.4.Typical Architecture for an E-Governance Application

In data storage layer, E-Governance has defined a proper scheme for data storage foundation for the storage of data which is coming from different process and which serves the request of the process which demands the data is provided by data storage layer.

The layer which works between the data layer and user layer is known as Application layer. For the user interaction with the system, user layer/upper has GUI. To get information from the system under E-Governance system GUI's upper layer helps. And with the help of the upper layer, the government legislatives and official can update the information[5][6]. There are following advantages of architectural in content of E-Governance:-

- **Heterogeneous System:** Different platforms, different hardware and different working software are supported by E-Governance application. All the heterogeneous system requirement of the integrated E-Governance.
- **Modifiability:** Each tier is fixed in three tier architecture responsibility. Due to segregation of responsibility, it easy to code and modify in any tier.
- **Scalability to handle many clients:** By using application layer, clients communicate with the system and with the help of this application database connection is to be provided to the clients. Deployment of several servers on application layer is the strength of a client.
- **Integrated Data Access:** Different sources of applications are used by the most of the application for managing the connection to database, Application layer is provided and to connect the different data source this application is used.

VII. WHY E-GOVERNANCE THROUGH CLOUD COMPUTING?

Significant Cost Reduction:- It is available at the cost of which is fractional to the cost of traditional ICT services, dramatically reduced ICT administrative burden by eliminating upfront capital expenditure as infrastructure can be hired by the clouds.

Increased Flexibility: - To run specific applications on demand as per need different technologies helps across on demand computing. For example, E-Governance based applications are used by users to interact with any ERP required in E-procurement type of services which can be shared easily and available with the large group of services provider which results in reduction on the implementation time for the new solutions[7].

Access Anywhere:- Offering government services from a single computer or networking is not same as in the current scenario and in today's scenario different networks are shared by different computer or may use portable devices like:-

- Notepad
- Mobile Phones
- Laptops

It helps to run applications and documents anywhere.

7.1 Elastic Scalability and Pay-as-you-go

According to our need we can make addition and subtraction in the infrastructure or services. The concept of pay for only services and pay per use is applied. It is easy to implement as there is no need to purchase a hardware or software license or any implementation services with in mean time or less time you can able to start new services.

7.2 Service Quality

- 24 x 7 user services will get with the facility of
- Large Storage
- Reliable Services
- Computing capacity

7.3 Delegate Non-Critical Applications

We may focus on more critical business applications or may outsource the non-critical business applicayion to the service provider. Without paying any new purchase cost to the vendor, automatically we can get a latest software.

7.4 Sharing Documents and Group Collaboration

Documents and Application can be accessed from anywhere in the world and helpful in facilitating group collaboration on projects and documents.

7.5 Data Recovery

Regular internal disturbance and natural disaster like, earthquakes, wars and floods cause not only loose of the data of e-governance application but also make services unavailable. We may fall in this huge problem by multiple installation system in different geographical area/location with complete back up. To switch from one data center to another, data and application should be available on short notice and must be redundant. Restoring and back up is allowed by cloud virtualization technologies and it offers comparison from traditional data center in term of migration of application[8].

7.6 Distributed Data Centers

Many risks are faced by IT-Base e-governance such as:-

- Fear of hackers
- Attacks of Viruses
- Terrorist attacks
- Fire

Mass destructibility is possessed by some disasters and some intentioned activities done after disasters. Facilities provided by these centers which helps in e-governance applications to use and manage are:-

- Self Supervision capability
- Robust communication
- Real time visible platform

VIII. INDIAN E-GOVERNANCE CLOUD STRATEGY

A complete infrastructure for implementation of government service is provided by cloud e-governance. Government services include:-

- Social Welfare
- Administration
- Regulation

Each cloud model has its level of assurance and importance as well for implementing e-governance strategy of cloud is based on specific designed services[9]. Figure5 is indicating the presence of cloud in specific task.

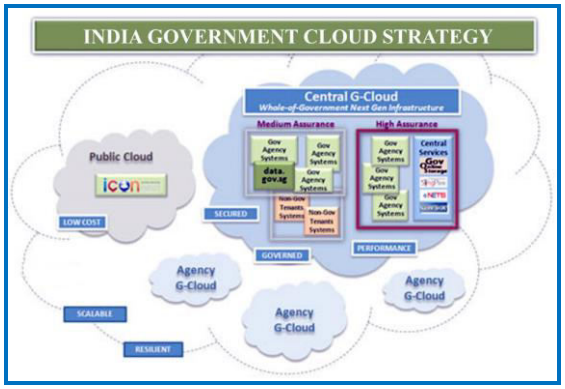

Fig 5: Cloud Computing Model for E-Governance with High, Medium and Low Assurance

The above mention model is suitable for implementation of e-governance at the low cost. In the above figure e-governance is divided into two half's:-

High assurance

Medium assurance

Different types of categories are required for different security as same security system is not enough for all requirements of clouds.

The three categories are introduced under:-

- High assurance
- Medium assurance
- Basic assurance

IX. SWOT- ANALYSIS PROPOSED MODEL OF E-GOVERNANCE

Four main points are focused by SWOT study i.e.

- S-Strength
- W-Weakness
- O-Opportunity
- T-threats

For making public confidence for government, it applies these methods for the communication and handles operation of it.A cost effective manner to implement e-governance application is provided by cloud computing by any developing country. Model is described below:-

9.1 Strength

Advanced internet technologies are utilized by the e-government projects. A way is providing by telephony, which provide services to the mobile phone. To scale up the services at any instances gives strength to e-governance application is able through cloud computing. For example homogeneous loads throughout the year are handled by the organization and in specific month, it requires more resources so in this situation solution is provided by cloud computing. Cloud reduces the infrastructure cost, maintenance cost and energy consumption as well. It provide full control over in accessing the mechanism, maintain cost of technological up gradation,

time to time up gradation and proper security management as well as data management. It also provides different mechanism for accessing to the different type of users[11].

9.2 Weakness

Low level of literacy and shortage of skilled employment for the development of the project of e-governance is a great problem faced in the implementation made by e-governance administration. Due to shortage of bandwidth storage, there is no usefulness of e-governance application in each low level areas, which are of daily use and fear of losing physical control over the data and information is a great weakness of the organization provides of cloud services are also unable to give information about of data and data server to the client. Situation of confused clients continuous efforts are made by cloud providers to resolve the problem but due to its weakness it is not suitable for large organization which is based on system of critical applications.

9.3 Opportunities

Main part of e-governance services is that it provides the facility to setup hardware at low cost. By providing cheap mobile phones, availability of e-governance is achieved in rural areas as well. Spreading awareness about the e-governance services, media plays a very important role. In e-governance application partnership of public-private is very fruitful. The use of information and communication technologies are made by developing countries with cloud computing and it allow to provide different benefits to the citizens and business organization from these technologies[12].

9.4 Threats

With increasing manpower cost, broad band cost increment and no reachability of internet or lack of internet coverage are a cause threats in implementation of e-governance. Cloud e-governance cannot implement there is support from legislature. Different regional languages are also great draw back in the success of the cloud e-governance. Data may be hacked due to lack of proper security system. Entrenched incumbents are a big threat of it. Basically, proper support is required from legislature to support the e-governance based on cloud computing.

X. CONCLUSIONS

Cloud computinggives a better way to offer services to clients and users related to different sectors. Cloud follow service oriented architecture and provide low cost hardware/software resources. E-governance could use both service oriented architecture and cloud architecture and can provide services to citizens and governments at low operating cost. The use of cloud computing continues, and different success stories arise, the Cloud based consumption of Information Technology, can help the Public Sector, private sector and Enterprises at large, unravel and deliver next generation citizen services, and further accelerate the economic growth of a country. In this paper, a cloud computing based E-Governance model has been presented .A SWOT analysis is also performed to highlight the strength and challenges of the E-Governance technology.

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