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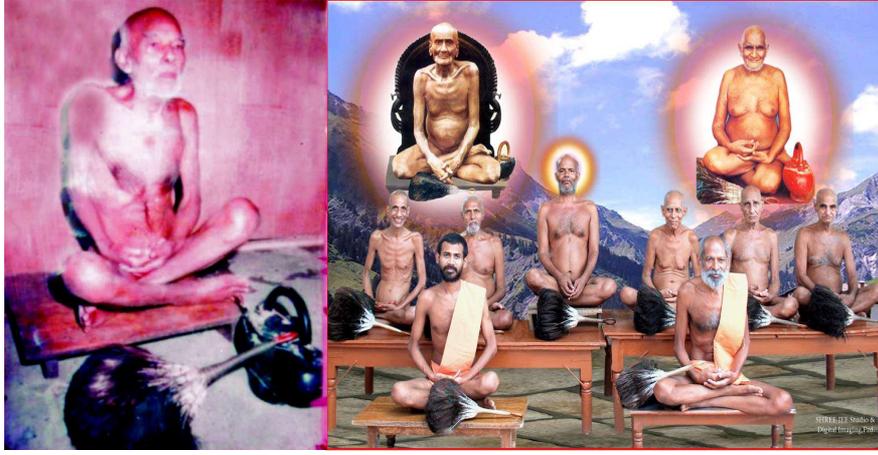


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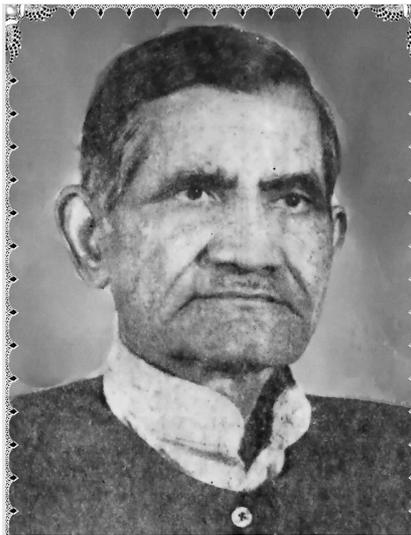
**This Edition,  
Dedicated to,**

**Gurudev,**

**108 Shri Jitendra Sagar Ji Maharaj,  
108 Shri Amit Sagar Ji Maharaj Sasangh**



**& My Revered Freedom Fighter  
Late Vaidya Panna Lal Jain Saral\* and  
Principal Late Narendra Prakash Jain\*\***



## Special Thanks



**Professor Ph.D  
Adriana Burlea-Schiopoiu  
University of Craiova, Romania**

Dear Professor,

We the member of organization – Amit International Impact Factor Journals welcome you in our journal ‘Deliberative Research’ and extend our heartiest thanks of gratitude to **Prof. Ph.D Adriana Burlea-Schiopoiu** for her help and able guidance that she has so benevolently in extended and circulation of the journal all over world and especially in Romania. Without help of such a celebrity and towering persona, it could never have been possible. She has always been so kind and considerate to us that whenever we needed her help advice and guidance. She never disappointed us. We are quite fortunate and highly privileged that we continue to enjoy her benevolence, blessing and inspirational company. We hope that in future too, She will keep on showering this compassion and magnanimity on us and show us the right way through thin and thick of life. We wish **Prof. Ph.D Adriana Burlea-Schiopoiu** a long, happy, prosperous and successful life. With warm Regards.



Yours Sincerely

**Dr. Amit Jain**

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# Editorial

**Dear Researchers of the world,**

My experience and research says that knowledge, education and love are neither the object of boasting nor hiding. Because by doing this, all three will be reduced to one place. It can also happen that they are either destroyed, or lost. Therefore, expansion of these three is necessary, So that it spread from one person to another across the world. Only those people can spread these three in the whole world, those who are well aware of their results. Proper knowledge and results about these three is possible only in sufficient form with the teacher. Therefore, only teacher in the whole world is the person who can be given the responsibility of expansion of education, knowledge and love. But according to my research a narrow thinking teacher is not ready to take this responsibility at all. Therefore, to pursue this great work, a teacher with detailed thinking has to be selected. A teacher who knows well that it is neither his own personal property nor the personal property of a nation. Then he will definitely be ready to act in the interest of each person and the world.

In the present times when the world is plagued by epidemics and facing devastating war. As a result, the world economy, education system, medical system and all other services have gone awry. Therefore, the atmosphere of fear has spread in humanity and the youth and students are facing the most difficulty.

In such a situation, feeling of being is paramount. We have chosen some great teachers from the world who have a beautiful idea of social service. All of these will represent their respective countries in the editing of the Deliberative Research international journal as members of Editorial Board. All these teachers will try to bring their logical, important and healthy research among students and everyone. This joint effort of all these will definitely infuse new sensations in the society. The students, full of new sensations, will be able to take the country towards a happy future with the same hope and belief.

I, Dr. Amit Jain, congratulate all your editors and wish you a beautiful future. Journal Deliberative Research is established as an open platform for all researchers and editors of the world. If you want to share your contribution in the society or world then write or E-mail to us.



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## An Ayurvedic Formula for Human Immunity System Development and Vaccine of Covid-19



**Dr. Amit Jain\* and Reenu Jain\*\***  
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**“The Formula should be tested in the interest of the Country or World”**

### **Abstract-**

While Covid-19 (Corona Virus) has created panic in all the countries of the world, on the other hand no vaccine has been produced so far. No medicine has yet been directed to protect against Covid-19 (Corona Virus). But all the Scientist of the world are engaged in this work. But this is not very necessary that every invention should have the name of a great Scientist written on it. Some times even an ordinary person does such tasks. I also belong to an Ayurvedic family. Therefore my research for the vaccine of Covid-19 (Corona Virus) and development of Human immunity system is based on Ayurveda.

**Keywords- Covid-19 (Corona Virus), Antidote, Vaccine, Immunity System, Infection, Ayurveda**

### **Introduction-**

Some such stones are found in India. Which can be used to make an Ayurvedic antidote of scary infection, In the research of the last Six months, I learned this. The medicine made from this, can cure a person who has become infected from own country and abroad. Apart from this, if people use this medicine during the transition and pandemic, then their risk of infection will be negligible because this medicine will prevent infection as well as strengthen its immune system. The above stones have been used to make many types of Ayurvedic medicine in India for centuries. Some other ingredients made together with them maybe antidote of Corona virus. The sign of my formula is-

**JM + KP + AB + MP + JM + SB + KGB = AKJ<sup>sm7</sup> or COVID CURE**

[[1]]

May this formula eliminate the Corona pandemic from its roots ? So I pray to Government of India to permit testing of this formula in the Nation interest. **Baba Ramdev's lab is a great place to test this formula.** And I also pray to all the countries of the world for testing this formula.

#### **Objectives of the Study-**

The objective of the study presented is to state that we have prepared an Ayurvedic medicine to increase the immunity of human beings, to avoid the infection of Covid-19 (Corona Virus). This medicine can also be taken to prevent infection. This medicine has the ability to cure diseases like smallpox. It is ready for testing. Therefore, it should be tested in the Nation interest.

#### **Hypothesis of the Study-**

The following important research hypotheses were created for the direct studies which are as follows –

- 1- We have prepared an Ayurvedic Vaccine to prevent and eliminate Covid-19 (Corona Virus) infection. If a healthy person is given precautionary, then increase his immunity and do not let him get infected, if given to the infected, then eliminate his infection.
- 2- We have prepared such an Ayurvedic Medicine. Which is best for increasing immunity, it can be a great formula to avoid and eliminate the infection of Covid-19 (Corona Virus). It should be tested in the interest of the country.
- 3- As per our research, Covid-19 does not have the full potential to infect the human brain. Therefore it is losing from the human brain. Perhaps the human brain is full of immense potential. That is why human brain has succeeded in controlling Covid-19. The well- being of infected people is a sign of this. This indicates good future prospects. Hence this Ayurvedic Antidote with give strength to all those cells and thoughts of human brains, which directly and indirectly control infection. So scientists should pay attention to this and find that cells and thoughts in the human brain, which is capable of doing so.
- 4- Considering each cause of infection in human body from Covid-19, All qualified medicines are included in this formula. Which along with being a symbol of faith for years are also the center point of Ayurveda.
- 5- This formula will give new life to infected cells and will be helpful in creating new cells in the human body and brain.
- 6- This formula will regulate the balance of **VATA**, **PITTA** and **KAPHA** in the human body. With the regularization of these three, The human body will be healthy.
- 7- Contaminated blood particles and bile will be cured and the creation of new life juice will be possible in the human body.
- 8- This formula will free the vital organs of the human body from the effects of infection. These organs are brain, lungs, intestines, dysfunction, heart, kidneys, stomach, limbs etc.
- 9- This will be the safeguard for nervous system and immune system. This formula will provide coolness by relieving people from nervousness.
- 10- This is our final research hypothesis that this formula will increase the immunity of human body so much that humans can remain completely safe during the transition and pandemic period.

#### **Problem of the Study-**

For the research presented, Covid-19 (Corona Virus) has been selected as the problem topic. Which at this time spread all over the world, in the form of pandemic?

### Symptoms of Covid-19-

From the research done all over the world so far. The following symptoms of Covid-19 have appeared. Which are as follows?

**1. Most Common Symptoms-**

Fever, Dry cough, Tiredness,

**2. Less Common Symptoms-**

Aches, Pains, Sore throat, Diarrhoea, Conjunctivitis, Headache, Loss of taste or Smell, A rash on skin, Discolouration of fingers or toes.

**3. Serious Symptoms-**

Difficulty Breathing or Shortness of breath, Chest pain, Blood pressure, Loss of Speech or movement.

### Attacking System of Covid-19 (Corona Virus) on Human Body-

The research so far on Covid-19 (Corona Virus) makes it clear that on reaching the human body. It first attacks the human immune system.

### Covid-19 Effects on Human Body-

Human's immune system is based on VATA, PITTA and KAPHA. Covid-19 (Corona Virus) infects both blood and bile (PITTA) in the human body. This causes a lack of blood particles in the human body. The reason for this that digestive PITTA stops its work by becoming infected. Due to which the digestive items are not properly digested, they do not produce good juice and due to lack of good juice, good blood is also not formed. Therefore, the formation of blood particles stops. Due to less blood particles, PITTA also becomes less because these two support each other. Contamination of one of these also contaminates the other. Its natural.

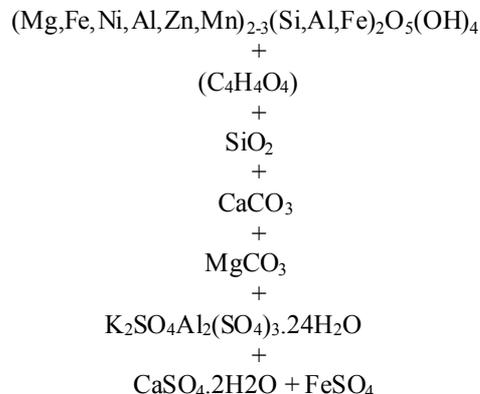
### Introduction of the Ayurvedic formula for Vaccine-

The presented formula is expanded under several points. Which are as follows:-

### Ayurvedic Medicine Formula-

**Jahar Mohra Khatai Pishti + Kahrava Pishti + Akik Bhasma + Moti Pishti + Jawahar Mohra (With gold) + Sphatika (Shubhra) Bhasma + Kasis Godanti Bhasma**

### Guesswork of Chemical composition of my formula-



### Our Ayurvedic formula is to protect against these diseases-

Fever, High fever, Odd Fever, Malaria, Bleeding, Cough, Cold, Excessive sweating, Pulse irregularity, Confusion, Vomiting, Diarrhea, Excessive thirst, Swelling, Weakness, Head Heaviness, Reddening of eyes, Nervousness, Restlessness, Liver disorder, Sleeplessness, Calcium Deficiency, Headache, Growth of bile, Brain Weakness, Decreased Thought power, Become irritable by nature, Do not like anything, Toughness in speech, Extreme rage, Wound in the body out side or inside, Excess nose bleeding, Plague disease,

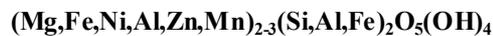
Chicken Pox, Head Spinning and dizziness, Skin and nerve disease, Weak heart and increased heartbeat, Loss of body radiance, Loss of appetite, Memory Loss, Suffering when walking a little and others.

**The formula will work like this-**

1. As precautionary medicine.
2. As an immunity development medicine.
3. As Antidote of Covid-19 after testing.

**Brief Description of each ingredient included in the Ayurvedic formula-**

**1. Jahar Mohra (Serpentine) - Magnesium Silicates-**



Jahar Mohra (Serpentine) is a stone. It is white in color, some are yellow and green. One which is light and smooth in weight is considered good.

**Ingredients (Composition)-**

The main ingredient of Jahar Mohra Pishti and Jahar Mohra Bhasma is Shuddha Jahar Mohra (Purified Serpentine).

**Chemical Composition of Jahar Mohra (Serpentine)-**

The mainly Jahar Mohra (Serpentine) is composed of magnesium silicates. In addition to magnesium silicates, it may also contain silicates of iron, aluminum, zinc and manganese.



Some elements may be missing in above general formula according to the type of serpentine.

**Jahar Mohra (Serpentine) has two mainly types:**

| <b>Main Types</b> | <b>Chemical Formula</b>   |
|-------------------|---------------------------|
| ANTIGORITE        | $(Mg, Fe)_3Si_2O_5(OH)_4$ |
| CHRYBOTILE        | $Mg_3Si_2O_5(OH)_4$       |

**Medicinal Properties-**

Jahar Mohra Pishti and Jahar Mohra Bhasma, both have similar medicinal properties.

- Antidote of scorpion stings
- Antidote of snake bites
- Anti-hypertensive
- Antibacterial
- Antimicrobial
- Digestive Stimulant
- Febrifuge
- Ant diarrheal
- Antiemetic
- Antacid

**Therapeutic Indications-**

Jahar Mohra Pishti and Jahar Mohra Bhasma, both are indicated in following diseases and symptoms:

- Diarrhea in children
- Nausea & Vomiting
- Burning sensation in abdomen and heartburn
- Liver disorders (rarely used)
- Restlessness
- Chronic Fever
- Cholera
- High Blood Pressure

**Benefits & Medicinal Uses-**

Jahar Mohra Pishti and Bhasma, both have similar benefits. Jahar Mohra is beneficial in diseases of digestive system and cardiovascular system.

**2. Kaharva Pishti (Amber)- Succinic Acid  $C_4H_6O_4$**

Amber is a type of gum. It is clean, very shiny and yellow in color. Rubbing produces magnetic force in it. It is found in Varma's mines as well as many other mines. Amber contains three to eight percent succinic acid. Amber is made through the fermentation process of adding saluolose. Which is stimulated by microorganisms? This is the identity of the best Amber that it should be stiff, clean, bright and yellow like gold. It becomes hot when rubbed by hand it smells like lemon.

**Ingredients-**

1. Kaharva (Trinkant mani) – Amber of succinite
2. Gulab Ark (Rose water) – Rosa centifolia

Amber of succinite is processed and ground with rose water and a micro fine powder is prepared. Amber (Kaharva) is a fossilized tree resin.

**Chemical Composition-**

Amber of succinite contains **3 to 8% succinic acid**. The formation of succinic acid in the amber resin is yet unknown, but some believe it is formed through the process of fermentation of cellulose resin of amber, which is induced by microorganisms.

**Medicinal Properties-**

Kaharva Pishti has following healing properties.

- Haemostatic (Antihemorrhagic) agents
- Anthelmintic or anti-parasitic
- Astringent
- Antacid
- Anti-arrhythmic

**Therapeutic Indications-**

Kaharva Pishti is helpful in following health conditions.

**Brain & Nerves-**

- Worm infestation in the brain
- Cysticercosis (pork tapeworm infestation)
- Headache due to worm infestation in the brain

**Heart & Blood-**

- Heart Palpitation
- Tachycardia

**Digestive Health-**

- Gastrointestinal bleeding
- Bleeding piles
- Blood in stools
- Bleeding due to Ulcerative colitis or any inflammatory diseases

**Women Health-**

- Excessive uterine bleeding
- Heavy menstruation

**Benefits & Medicinal Uses-**

From the above indications, we can understand that Kaharva Pishti (amber) mainly works on bleeding disorders. Therefore, we can use it in any type of internal as well as external bleeding. It is one of the rare medicines in Ayurveda, which helps in brain worm or pork-tapeworm tissue infection. Now, we will learn how to use it in various diseases.

**Worm infestation in the brain (Cysticercosis) & Headache due to it-**

The common cause of brain worm is pork tapeworm infestation. It causes headache, vertigo, low-grade fever, nosebleed, foul smell from the mouth and nose and burning sensation and anorexia. Kaharva Pishti (amber) acts as potent anthelmintic and eradicates pork tapeworms. After taking this remedy, many patients with brain worm reported the expelling of worms from the nose. All symptoms subside thereafter.

**3. Akik Bhasma- (Silicon dioxide SiO<sub>2</sub>) (Cryptocrystalline silica)**

Akik Bhasma (Pishti) is a mineral-based Ayurvedic medicine used for the treatment of general debility, heart weakness, and feeling of excessive heat in the body, mental diseases, eye diseases and excessive uterine bleeding in women. Akik Mainly is prepared from agate gemstone powder by grinding it with herbal juices and there after heating it to make Bhasma. It mainly works on heart, brain, liver and spleen, so it is beneficial in diseases of these body organs.

**Ingredients-**

| Common Name                 | Scientific Names   |
|-----------------------------|--|
| Akik Stone (Agate Gemstone) | Silicon dioxide (SiO <sub>2</sub> ) (Cryptocrystalline silica) |
| Aloe Vera Juice             | Aloe Vera (For processing)                                     |
| Rose water                  | Rosa Varieties (For processing)                                |
| Cow's Milk                  | —  |

**Chemical Composition-**

Akik Bhasma contains Silicon Dioxide and some herbal extracts derived into in during processing with Aloe Vera and Rose Water.

**Chemical Formula:** SiO<sub>2</sub>

**Medicinal Properties-**

Akik Bhasma and Akik Pishti has following healing properties.

- Antacid
- Heart & Brain Tonic
- Akik bhasma promotes bone formation.
- Cardio protective
- Anti-depressant
- Anti-anxiety
- Anti-hypertensive

**Therapeutic Indications-**

Akik Bhasma and Akik Pishti are help ful in following health conditions.

- General debility

- Heart weakness
- Feeling of excessive heat in the body
- Mental fatigue
- Restlessness
- Burning sensation in eyes
- Conjunctivitis
- Excessive uterine bleeding in women
- Depression with agitation, irritation and anger
- Emotional trauma in which patient create violence
- Gastritis
- GERD
- Heartburn
- Ulcer
- Duodenal ulcer
- Ulcerative colitis
- Osteoporosis
- Alzheimer's disease
- Hair loss

#### **Medicinal Uses & Health Benefits-**

Akik Bhasma mainly affects on heart, brain, liver and spleen, so it is used in diseases of these organ. In addition, it also has beneficial effects in bleeding disorders such as excessive uterine bleeding in women and epistaxis.

#### **High blood pressure-**

However, Akik has a little effect on reducing blood pressure, so it cannot work alone. Akik Pishti is added in antihypertensive herbal formulations due to its effects in alleviating hypertensive symptoms such as difficulty sleeping, nervousness, restlessness, facial flushing and sweating.

#### **Tachycardia with restlessness-**

Akik Bhasma helps in tachycardia. It reduces associated symptoms such as restlessness, dizziness and confusion. It also normalizes the heart rate, but for this purpose, it is used along with Abhrak Bhasma.

#### **Heart Tonic-**

Akik bhasma is also used as a heart tonic. Ayurvedic physicians believe it strengthens heart muscles and reduces symptoms of heart diseases. for heart weakness.

#### **Melancholic depression-**

Akik Bhasma works on neurons and believes to correct and restore their natural functions. It works well in people with symptoms such as loss of pleasure, sadness, and loss of appetite, weight loss, agitation and guilt feeling. It is a good medicine for melancholic depression. For better results, it is generally used with Mukta Pishti.

#### **Excessive uterine bleeding-**

Akik Bhasma stops bleeding, so it is beneficial in excessive uterine bleeding.

#### **Caution & Side Effects of Akik Bhasma-**

Akik Bhasma contains very rich amount of Silicon Dioxide, which is **safe** when ingested through oral route. It naturally occurs in the crust of earth. It also present in water and plants in form of silicates. The natural human diet also contains Silicates. According to modern science, Silicon Dioxide is a biologically inert and inactive substance, so FDA has recognized Silicon Dioxide as Safe substance. Therefore, **Indigestion of Akik bhasma is likely safe.**

However, Akik Dust when inhaled can lead to silicosis. Silicosis only occurs when a person inhales the particles of Akik, silica, quartz or slate.

The long-term use of Akik Bhasma or Silicon can result in kidney stones, but it rarely occurs.

#### **Pregnancy & Breastfeeding-**

During pregnancy and breastfeeding, Akik Bhasma is **likely safe** when it is taken under supervision of Ayurvedic doctor and recommended dosage only. However, the effects of larger dosage are yet unknown. No research data is available for this.

You can stay on **safer side** and **avoid** using Akik Bhasma in **larger amount** in Pregnancy and Breastfeeding.

#### **Contraindications-**

Patients with tuberculosis, asthma, productive cough and wheezing should not take Akik Bhasma.

#### **Drug Interactions-**

Akik Bhasma contains Silicon Dioxide, which is an inert material, so there are lesser chances that it can interact with other drugs. However, there are no evidences known for supporting this statement.

#### **4. Moti Pishti (Pearl)- Calcium Carbonate $C_aCO_3$**

pearl is a hard, glistening object produced within the soft tissue (specifically the mantle) of a living shelled mollusk or another animal, such as fossil conulariids. Just like the shell of a mollusk, a pearl is composed of calcium carbonate. Mainly aragonite or a mixture of aragonite and calcite. in minute crystalline form, which has deposited in concentric layers. The ideal pearl is perfectly round and smooth, but many other shapes, known as baroque pearls, can occur. The finest qualities of natural pearls have been highly valued as gemstones and objects of beauty for many centuries. Because of this, pearl has become a metaphor for something rare, fine, admirable and valuable.

#### **Ingredients (Composition)-**

1. Moti (Mukta) Pearl
2. Rose Water

#### **Chemical Composition-**

|                          |        |
|--------------------------|--------|
| Calcium Carbonate        | 82-86% |
| Conchiolin               | 10-14% |
| Water (H <sub>2</sub> O) | 2 – 4% |

#### **Medicinal Properties-**

Mukta Pishti has following healing properties.

- Antacid
- Anti-inflammatory
- Anti-arthritis
- Anti-pyretic
- Anti-hypertensive
- Demulcent
- Anti-mutagenic
- Febrifuge
- Hypo-glycemic
- Fat Burner
- Anti-gout

- Muscle relaxant
- Antioxidant
- Adaptogenic
- Anticancer
- Anti-stress
- Antidepressant
- Anticonvulsant

**Ayurvedic Properties-**

|                           |  |
|---------------------------|--|
| <b>Taste</b>              | Sweet  |
| <b>Main Quality</b>       | Light  |
| <b>Potency</b>            | Cold   |
| <b>Resultant</b>          | Sweet  |
| <b>Therapeutic Effect</b> | Improves eyesight, digestion, and provides strength  |
| <b>Effect on Humors</b>   | Pacifies <u>PITTA</u> & <u>KAPHA</u>   |
| <b>Effects on Organs</b>  | Stomach, Intestines, Brain, Heart, Nerves, Kidneys, Bladder, Reproductive organs, Endocrine Glands |

**Therapeutic Indications-**

Mukta Pishti is helpful in following health conditions.

- Stress disorders
- Depression
- Anxiety
- Somatic Symptom Disorder (SSD)
- Unmanageable emotional excesses (Hysteria)
- Anger
- Intermittent explosive disorder
- Insomnia (Sleeplessness)
- Cardiomyopathy
- High blood pressure
- Non-productive cough
- Cough due to irritation in the throat
- Acidity or Heartburn
- Acute and chronic Gastritis
- Duodenal ulcer and Peptic ulcer
- Mouth ulcer
- Ulcerative colitis
- Gingivitis
- Tooth decay
- Osteoporosis
- Osteomalacia
- Low bone mineral density
- Joint pains or osteoporosis
- Gout with symptoms like tenderness and heat sensation in feet

- Membranous dysmenorrhea
- Premenstrual syndrome (PMS)
- Excessive uterine bleeding
- Hypoparathyroidism (decreased activity of the parathyroid gland)

#### **Health Benefits & Medicinal Uses-**

Therapeutically, Mukta Pishti helps in bleeding disorders, heartburn, acidity, gastritis, GERD, nosebleed, mental weakness, anxiety, depression, burning sensation in eyes, headache, frequent urination, Cardiomyopathy, insomnia etc.

Mukta Pishti is also practicable as natural calcium supplement. Its calcium is highly micro fine and absorbable in the gut. It provides strength to bones, joints and muscles. Calcium plays a vital role for optimum functioning of cells, muscle cells, nerves and bones. Therefore, Mukta Pishti provides support in important vital functions in the human body. Let us discuss about the important health benefits and medicinal uses of Mukta Pishti (Pearl Calcium).

#### **Stress disorders, Depression, Anxiety & Anger-**

According to Ayurveda, three humors play a role in every disease. It is same for mental disorders. Mukta Pishti works when there is PITTA aggravation. The symptoms of PITTA aggravation are as follows.

- Angry outbursts
- Becomes irritable even for small matters
- Frustration
- Sleep disturbances
- Insomnia (sleeplessness)
- Agitation
- Restlessness
- Palpitations
- Aggressive behavior
- Anger
- Cannot endure noise
- Sweating
- Fear with sweating
- Suicidal thoughts
- Premature graying of hair
- Hair Fall
- Feeling heat in head
- Feeling burning sensation in head

#### **5. Jawahar Mohra (with gold)- Magnesium Carbonate- $MgCO_3$**

Colic in the heart arises when there is a restriction in the hemolysis of the aorta or arterial heart and the patient becomes very distraught. Hence the first to suppress the colic, after that, the heart becomes strong and prevents future attacks on heart.

Jawahar Mohra No. 1 has special qualities. It is made from precious and excellent quality grains like, gold, silver, amber, musk etc. This great medicine is uniquely effective in strengthening the heart and brain. The use of this great medicine provides excellent benefit in diseases with these types symptoms like heartbeat.

Jawahar Mohra is potent cardio protective Ayurvedic Medicine used in Ayurveda. It provides nourishment to the heart, brain nerves, and blood vessels. It is an excellent remedy for people with heart diseases like tachycardia, heart palpitation, heart failure, heart enlargement Cardiomegaly and angina pectoris angina pain. It is also very helpful for people with neurological and psychological disorders including depression, anxiety, insomnia, schizophrenia, emotional trauma, restlessness etc.

**Ingredients (composition)-**

| <b>Ingredients</b>                          | <b>Quantity (%)</b> |
|---|---------------------|
| Manikya Pishti                              | 6.4 %               |
| Panna Pishti                                | 6.4 %               |
| <u>Moti Pishti</u>                          | 6.4 %               |
| Praval Pishti                               | 12.8 %              |
| Shringa Bhasma                              | 12.8 %              |
| Sangeyashab Pishti                          | 12.8 %              |
| Kaharva Pishti                              | 6.4 %               |
| Swarna Bhasma                               | 2.0 %               |
| Rajat Bhasma                                | 2.0 %               |
| Daryai Nariyal                              | 12.8 %              |
| Abresham                                    | 6.4 %               |
| Jadbar (Nirvisha) – Delphinium<br>Denudatum | 6.4 %               |
| Kasthuri (Musk)                             | 3.2 %               |
| Amber                                       | 3.2 %               |
| Rose Water (Gulab Ark)                      | Q.S.                |

**Medicinal properties-**

Jawahar Mohra has following healing properties.

- Cardioprotective – Potential Action
- Antianginal
- Antacid
- Antibacterial
- Anticancer
- Anticonvulsant
- Antidepressant
- Anti-hypertensive
- Anti-inflammatory
- Antimicrobial
- Antioxidant
- Anti-stress
- Antiulcerogenic
- Digestive Stimulant
- Febrifuge
- Muscle relaxant
- General Tonic

**Ayurvedic properties-**

|                              |                              |
|------------------------------|------------------------------|
| <b>Potency</b>               | Cold                         |
| <b>Therapeutic effect</b>    | Nourish Heart & Brain        |
| <b>Effect on Humors</b>      | Pacifies                     |
| <b>Beneficial for Organs</b> | Blood, Heart, Brain & Nerves |

**Therapeutic indications-**

Jawahar Mohra is beneficial in following diseases and symptoms:

- Cardiomyopathy
- Heart Failure
- Heart Palpitation
- Tachycardia
- Heart Enlargement (Cardiomegaly)
- Angina Pectoris (Angina Pain)
- Depression
- Anxiety
- Dementia
- Memory Loss
- Mental Fatigue due to over thinking or worrying
- Insomnia
- Schizophrenia
- Emotional Trauma
- Restlessness
- Menorrhagia

**Benefits & medicinal uses-**

Jawahar Mohra is an excellent remedy for heart and brain disorders. It provides strength to the heart muscles, nerves, mind, and brain. Hence, it reduces restlessness due to heart or mental ailment. It reduces stress, aggression, irritability, anger etc. It calms the mind and reduces mental fatigue that occurs due to over thinking or worrying.

**6. Sphatika (Shubhra) Bhasma- (Alum- Fitkari)- $K_2SO_4Al_2(SO_4)_3 \cdot 24H_2O$** 

It is blood purifier. Blood vessel gets compressed due to its use. The speed of breathing due to its intake slow down. When chest hurts due to phlegm freezing and the lungs get worse. The alum expels this phlegm from the lungs. It destroys poison it is a good medicine for plague and malaria.

Sphatika Bhasma (Shubhra Bhasma) is prepared from Alum (*FITKARI*). It is used for the treatment of bleeding disorders, respiratory diseases, and skin diseases.

In Ayurvedic medicine, it is used for chest pain due to pneumonia, chronic cough, bronchitis, vomiting in tuberculosis, hematemesis (blood in vomiting), menorrhagia, metrorrhagia & menometrorrhagia, chronic diarrhea, and abdominal pain due to lead toxicity. Its external application is also beneficial for skin problems such as herpes, leucoderma, and vitiligo.

**Ingredients (Composition)-**

Sphatika Bhasma (Shubhra Bhasma) contains a calcined form of Alum (*FITKARI*).

**Chemical Composition-**

Sphatika Bhasma contains:

1. Aluminium Sulphate
2. Potassium Sulphate

It is also called Potash Alum, which is colorless and water-soluble compound. It is commonly used in medicine for its astringent and styptic actions.

**Pharmacological Actions-**

Sphatika Bhasma (Shubhra Bhasma) has astringent and styptic properties for which it is commonly used.

**Ayurvedic Properties-**

It has Kasaya (Astringent), Madhura (Sweet) and Amal (Sour) taste (Rasa).

**Medicinal Properties-**

- Astringent
- Hemostatic (styptic) – Check bleeding
- Anthelmintic
- Mild antipyretic
- Antidiarrheal
- Antipruritic (as an external application)
- Mucolytic
- Antibacterial

**Therapeutic Indications-**

Sphatika Bhasma (Shubhra Bhasma) is helpful in following health conditions.

**Internal (Oral) Use-**

- Whooping cough (pertussis)
- Chest pain due to pneumonia
- Bronchitis
- Vomiting in tuberculosis
- Abdominal pain due to lead toxicity
- Diarrhea
- Hematochezia (rectal bleeding)
- Bleeding piles
- Hematemesis (blood in vomiting)
- Menorrhagia
- Metrorrhagia
- Menometrorrhagia
- Intestinal parasite infestation
- Malaria

**External Use-**

- Bleeding
- Wounds
- Eczema
- Pruritus
- Leucorrhea
- Otorrhea – Ear discharge

**Sphatika Bhasma Benefits & Medicinal Uses-**

Sphatika Bhasma (Shubhra Bhasma) has following health benefits and medicinal uses:

**Whooping Cough (Pertussis)-**

The internal use of Sphatika Bhasma helps to pacify recurrent cough attacks in Pertussis. It has antibacterial activities, which also appear against *Bordetella pertussis* (or *B. pertussis*). In some patients, vomiting may also occur. It also helps to stop vomiting. A few days course with this medicine helps to get rid of whooping cough.

**Pneumonia-**

Pneumonia has four stages.

- Consolidation

- Red Hepatization
- Grey Hepatization
- Resolution

Sphatika Bhasma is helpful during first two stages: Consolidation and Red Hepatization. In the first stage, pleurisy occurs and the alveolar air is replaced by cellular exudates. In the second stage, alveoli are filled with fibrinous exudates and lungs become hard like liver. In these both stages, Sphatika Bhasma helps to absorb mucus, and exudates and pacifies the disease.

#### **Abdominal Pain due to Lead Toxicity-**

Lead Toxicity causes a severe abdominal pain and cramping. In ayurveda, Sphatika Bhasma is a drug of choice for abdominal pain occurring due to lead toxicity. Generally, it is used along with Karpur (camphor) and Ahiphena. Ayurvedic purgative medicine is also given for encouraging elimination of lead through defecation.

#### **Menorrhagia, Metrorrhagia & Menometrorrhagia-**

The astringent and hemostatic actions help to check bleeding occurring during Menorrhagia, Metrorrhagia, and Menometrorrhagia. It is commonly used along with Bolbaddha Ras. However, this type of treatment is not an ideal treatment and it only provides a temporary relief.

#### **7. Kasis Godanti Bhasma - (calcium sulphate dihydrate + ferrous sulphate)**



Kasis Godanti Bhasma is an ayurvedic mineral-based medicine used for malaria, acute fever, chronic fever, Splenomegaly, leucorrhoea and loss of appetite.

The main use of Kasis Godanti Bhasma is in Malaria fever. It significantly reduces fever and chills. It is also beneficial for Oligomenorrhoea and dysmenorrhoea.

#### **Ingredients-**

It contains mainly two major compounds.

1. Kasis (green vitriol)
2. Godanti (Gypsum)

It is processed with leaves of calotropis procera and aloe vera.

#### **Medicinal Properties-**

Kasis Godanti Bhasma has following healing properties.

- Antipyretic
- Hematogenic
- Digestive stimulant
- Emmenagogue
- Anti-spasmodic
- Anti-malarial

#### **Therapeutic Indications-**

Kasis Godanti Bhasma is therapeutically used in following health conditions.

- Fever
- Malaria fever
- Leucorrhoea
- Loss of appetite
- Splenomegaly
- Oligomenorrhoea
- Dysmenorrhoea

#### **Medicinal Uses & Benefits-**

Kasis Godanti Bhasma is used in fevers, especially fever in seasonal flu or malaria fever with chills. It also has mild antibacterial or anti-viral properties. It may work on thermo-regulatory center of the brain and stimulate reduction of fever. For fighting against

infection, patient also requires other medications. It is a safe ayurvedic alternative to Acetaminophen for antipyretic effects.

**Antipyretic – reduces fever-**

Kasis Godanti Bhasma has antipyretic characteristic, so it is used in all types of fevers for reduction of body temperature. Ayurvedic physicians use it in children, pregnant women, and old and fragile people for this purpose. It is not a strong medicine and may not cause side effects if taken under supervision of ayurvedic doctor. In malaria, it reduces chills and fever. It may also have anti-malarial property due to which it also reduces malarial parasitic infection. It is given at 4 hours interval in malaria to stop rise in fever.

**Splenomegaly (Enlarged spleen after malaria)-**

Kasis Godanti Bhasma is helpful in reducing the size of enlarged spleen. It is given in this case with Amritarishta.

**Caution & Side Effects-**

Kasis Godanti Bhasma is well tolerated and LIKELY SAFE for most people. However, some people may have following side effects.

1. Nausea (rare)
2. Vomiting (very rare)
3. Vertigo (very rare)

**Pregnancy & Breastfeeding-**

Kasis Godanti Bhasma is Possibly Safe in pregnancy and breastfeeding. Ayurvedic doctors regularly use it in fever in pregnancy.

**Contraindications-**

However, there are no contraindication known with Kasis Godanti Bhasma, but you should not take it in larger dosage (more than 1500 mg per day) in liver disorders.

**Solution of the Study-**

An Ayurvedic Vaccine of Covid-19 (Corona Virus) and development of Human immunity system- Ayurvedic antidote is ready for testing. It should be tested in the interest of the country.

**Recommendation-**

Succinic acid may have a good effect on Covid 19 infection. Which is found in 3 to 8 percent in Amber ? But is the subject area of scientist.

**Conclusion-**

Presenting my research on medication related to infection of Covid-19. We hope and believe that this Ayurvedic medicine will increase immunity for weak people. And this medicine will not allow healthy people to get infected and free the infected people from Covid-19 infection. With this I also want to say that ever in this formula as required the possibility of reducing and increasing various Ayurvedic medicines has been kept open. Thanks, Jai Hind.

**Note-**

1. I will suggest only Ayurvedic composition in our formula not chemical composition.
2. Information on the proportion of mixture of drugs used in the formula is also subject to approval.
3. Under this formula. What dose will be given to a person ? This will be stated after approval

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## Education in Pandemic Times : Covid-19



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### **Abstract**

The educational scenario had to be reinvented, using technology to make it pedagogical in the school context. In times of social isolation, education used digital technological tools to reinvent itself. Therefore, the objective of this article is: to map the light of the integrative review of education in the time of Covid-19. To this end, an integrative review was carried out based on a systematic search of the Scopus database. As a result, it was identified that the research appears in the multidisciplinary field, crossing the discussions with the areas of Social Sciences, Psychology, Informatics, Energy, Engineering and Medicine.

**Keyword:** Covid-19, Education, remote teaching.

### **Introduction**

Throughout history, education has undergone several modifications and many of them intersect the advancement of technologies. Along this path, the educator went from being a holder to a mediator of knowledge and, from there, to a professor of navigation. Knowledge is in the cloud. They are boats moved by the wind that take us where we want to know.

In this advance beyond the conceptual, there is the expansion of different educational methodologies as new ways of teaching and learning. In this scenario, we are reinventing ourselves in the midst of innovative technologies linked to the media. The human being lives in a world interconnected by networks of dynamic and fluid relationships - which requires the need for changes in educational institutions (Machado; Silva; Spanhol, 2017).

In the training of professionals for the various fields of knowledge, discussions regarding the teaching-learning process arise, through the pandemic of the new learning process, aiming at training professionals with skills and abilities to reorganize their planning in times of pandemic.

To legitimize concerns like these, the National Education Guidelines and Bases Law (LDB) emerges with actions aimed at knowledge and praxis in the student's context, requiring a school focused on a specialized service to the population, establishing a reciprocal relationship with it (Brasil, 2009). Thus, educational institutions had to undergo changes in their pedagogical practices in an attempt to approximate the demands of social reality and also motivating teachers and students to articulate new knowledge networks. These knowledge networks are linked to the teaching modality developed in different times and spaces. It is important to resume this in contexts such as the current one, in a pandemic situation, but using new practices and didactics at a time when classroom teaching is not possible.

In this context, an attempt was made to opt for the non-face-to-face modality, according to the guidelines of the National Education Council (CNE), which approved, on April 28, 2020, guidelines for basic education schools and higher education institutions during the new pandemic. coronavirus (Brasil, 2020). At that time, tools and methodologies were adopted to be used during the social isolation necessary to face the pandemic (an infectious disease, highly contagious and affecting the whole world). It was essential to adopt the new guidelines, as they are based on the Law of Directives and Bases of National Education, which says that “elementary education will be on-site, with distance learning being used as a complement to learning or in emergency situations” (Brazil, 2009).

Therefore, when comparing distance education to non-classroom teaching, we realize that we are dealing with two situations, different times and modalities. The adoption of non-face-to-face teaching was necessary so that education in Brazil did not stop, it was a necessary, momentary and emergency re-planning, in which the teachers, from their homes, redo lessons, re-plan and reinvent their pedagogical work to keep the progress of the school year. Since classes and activities, which were previously carried out in person, in this pandemic moment are sent through virtual platforms and digital media.

In this scenario in which teaching flexibility is necessary, it was opted for the non-face-to-face modality with regard to the moment of learning in the context of students' homes, where they are mediated by information and communication technologies and thus access knowledge, which allows teaching and learning on different digital platforms.

The non-face-to-face modality is very similar to distance education (DE), but the difference between them is that in DE, interactions occur in different geographical interactions, that is, in places very distant from each other. While in the non-face-to-face modality, geographic locations are in different neighborhoods in the same city.

Based on this context, objective of this article is: to map the light of the integrative review of education in the time of Covid-19. For that, the article is organized in three sections: in the first one explained here, entitled introduction, the research context is presented; in the second, the development of the research is described, in which the type of non-classroom teaching adopted at the time of the pandemic in Brazil was addressed, as well as the methodological paths for the state of the art of education in pandemic times, as well as the data, results and a bibliometric analysis of this research; in the third section, final considerations are made.

### **Development**

In the teaching-learning process, communication starts to transport knowledge and also to share knowledge. In this context, in times of pandemic in Brazil, there are guidelines to guide basic education schools and higher education institutions during social isolation, adhering to the offer of activities that you are not present in all stages of education, since or elementary up to or comply with the mandatory non-classroom teaching hours. In addition, it is essential to develop guidelines for the sessions of non-classroom educational activities to guide families and students, under the supervision of teachers and the management team of educational institutions (Brazil, 2020).

In this scenario, a remote teaching modality, different remote teaching (not in person), follows the aspects listed below:

**Table 1 - Differences remote teaching (not in person) teaching and distance education**

| <b>Characteristics</b> | <b>Distance education</b>     | <b>remote teaching (not in person)</b> |
|------------------------|-------------------------------|--|
| Legislation            | Decree 9,057, of May 25, 2017 | Guidelines established by the CNE.     |

|   |  |   |
|---|--|---|
| Methodology                             | Extraordinary measure guided by manuals made by the educational institution foreseeing a meeting on digital platforms.                   | Has its own methodology established by a multidisciplinary team   |
| Lessons                                 | Live classes on the day and time in the classroom, which will be recorded and made available to students who are not present on that day | Video classes.  |
| Materials                               | Materials adapted and re-planned by the class teacher  | Materials prepared, standardized and designed by a multidisciplinary team in accordance with the target audience of the course that will be offered |
| Relations between teaching and learning | Interaction between teacher, knowledge and student.  | Interaction between teacher, knowledge, student, multidisciplinary team and tutor.  |
| Content                                 | Use of different digital tools and technologies to work with the content.  | Use of different digital tools and technologies to work with the content.   |
| Interactions                            | Predominantly synchronous activities.  | Synchronous and asynchronous activities.  |
| Calendar                                | Flexible timetable, as rescheduled by the educational institution.   | Standardized timetable, as elaborated in the construction of the course offer plan.   |
| Assessments                             | Adapted and focused assessments of classes made available on digital platforms   | Standardized assessments.   |

**Source: prepared by the author (2020).**

In Brazil, to meet the demand for education in Covid-19 times, the non-face-to-face teaching modality was adopted. And in the world, what were the actions implemented? To answer this question, we worked from an exploratory-descriptive view, with the inductive method in which the objective is to outline the theme and expand the researchers' familiarity with the fact from sufficient data, allowing the researcher to infer a truth (Marconi; Lakatos, 2010).

As a literature search method, a systematic search of an online database was used, followed by a bibliometric analysis of the results. Bibliometrics enables the organization and quantitative analysis of relevant data such as: production by region; temporality of publications; research by area of knowledge; count of study citation; impact factor of a scientific publication among others. This analysis allows the systematization of the results of a research and the minimization of the occurrence of possible biases when looking at a specific theme.

For bibliometric analysis, the study was organized into three distinct stages: planning, collection and result. The planning started in May 2020, when the research was carried out. In the scope of planning, the Scopus database was defined as relevant, due to its contribution to the academic environment, its interdisciplinary character, its constant updating and also because it is one of the largest bases of abstracts and bibliographic references of peer-reviewed scientific literature.

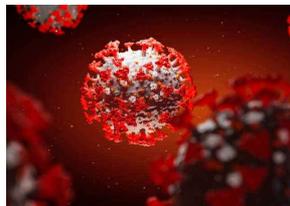
Considering that the research problem, the search terms were defined in the planning phase. Namely: “Learning in schools”, “Education” and “Covid-19”. As a basic principle for the search, it was decided to use the terms in the “title”, “abstract” and “keyword” fields, without time, language or any other restriction that may limit the result.

In the data collection phase, a total of 18 indexed studies were recovered, with a record dated 2020, when the pandemic is present in all countries of the world.

As a result of this data collection, it was identified that the 18 works were written by 70 authors, linked to 56 institutions. 108 keywords were used to identify and index the publications, which are distributed in six areas of knowledge. It was identified that, of the universe of 18 scientific works, all are peer-reviewed articles composing the sample for a bibliometric analysis in the area of Social Sciences, Psychology, Computer Science, Energy, Engineering and Medicine. Which allows to weave the state of the art of the theme from the consulted database.

For the bibliometric assessment of the results, the relevant information was selected and classified according to: temporal distribution; main authors, institutions and countries in evidence; type of publication in the area; main keywords and most referenced works.

Initially, the temporal distribution of the works was analyzed and five articles of the year from the Covid-19 pandemic were identified. From a systemic and directed view of these works, we can observe a varied list of countries that stand out in research with regard to learning in schools, education and Covid-19. With a significant emphasis on the United States, with six publications; secondly, Australia, with three works; and, thirdly, Vietnam, with two published articles. The other countries that publish on this subject are: Belgium, Canada, China, France, Indonesia, Italy, Malaysia, New Zealand, Oman, Peru and the United Kingdom. However, each of these has a publication with this theme.



**Covid-19 Image**

**Table 2 - Schematic table**

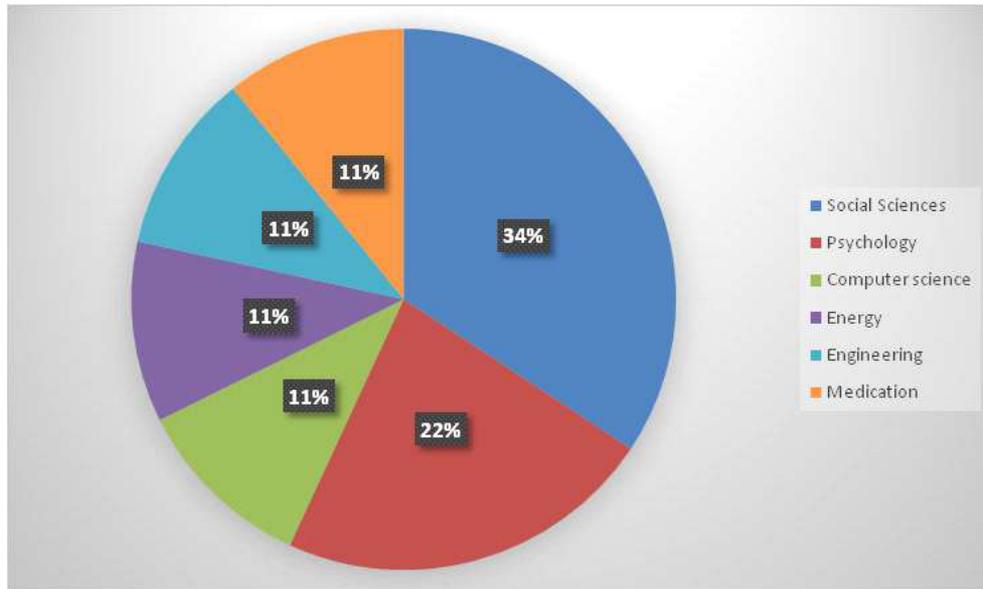
| <b>Author</b>   | <b>Title</b>   | <b>Abstract</b>  |
|---|--|--|
| Mulla, Osland-Paton,<br>Rodriguez,<br>Vazquez E<br>Plavsic. | New coronaviruses, new faculty development programs: rapid transition to eLearning during the pandemic | The article presents models for the transition from classroom teaching to online teaching in times of social isolation caused by Covid-19. |

|   |   |  |
|---|---|--|
| Pather, Blyth, Chapman, Dayal, Flack, Fogg, Green, Hulme, Johnson E Meyer | Forced disruption of the anatomy of education in Australia and New Zealand: an acute response to the Covid-19 pandemic  | The article demonstrates some models for Education in times of Covid-19, explaining synchronous teaching tools presented on remote sites, expanding the offerings for the remote.                        |
| Mailizar, Almanthari, Maulina E Bruce                                     | Secondary schools and mathematics teachers' views on implementation barriers during the Covid-19 pandemic: the case of Indonesia  | The article examines the views of secondary education at four barrier levels, school, curriculum and student in mathematics schools with implementation of online learning during the Covid-19 pandemic. |
| Salleh, Ghazali, Ismail, Alias E Rahim.                                   | The impacts of Covid-19 through the Internet: learning the use for Tertiary Education in Malaysia.  | The article presents the advantages and disadvantages of using the Internet in classes taught on digital platforms in higher education.  |
| Gomez, Azadi E Magid.   | Innovation born in isolation: rapid transformation of face-to-face radiology in an elective medical student for a remote learning experience during the Covid-19 pandemic | The article studies tools, materials and software used for medical student engagement and collaboration in times of social isolation caused by Covid-19.   |
| Zhao  | Covid-19 as a catalyst for educational change   | The article explains reflections on digital tools adopted in education in the time of Covid-19.  |
| Daniel.   | Education and the Covid-19 pandemic   | The article discusses the challenges of online education in the Covid-19 pandemic times.   |
| Tran, Ho, Pham, Nguyen, Nguyen, Vuong, Nguyen, Nguyen, Nguyen e Khuc.     | How digital natives learn and thrive in the digital age: evidence for an emerging economy   | The article addresses new formats of education, promoting quality according to Sustainable Development Goal 4, defined by the UN to meet the demands of online education in Covid-19 times.              |

**Source: prepared by the author (2020).**

Another quantitative analysis carried out from a bibliometric perspective is in the content of each article on this topic. Of the 18 articles surveyed, 10 explain health actions in the midst of a pandemic and eight discuss education in Covid-19 times. These eight works, all from the year 2020, were analyzed and summarized, drawing a schematic table 2 on the discussions of each of the articles.

Based on the general survey, it was also possible to analyze the areas of concentration of articles that are in the following fields of knowledge: Social Sciences, Psychology, Computer Science, Energy, Engineering and Medicine. It appears that the highest rate of publication is in the area of Social Sciences, with 34% of publications, followed by Psychology with 22%, as shown in the graph below:



**Graph 1 - Analysis of the percentage of the publication's knowledge areas**

**Source: prepared by the author (2020).**

Another analysis performed, based on the bibliometric analysis based on the group of works retrieved from the Scopus database, was the keywords used that are synthesized in 108 different words. The highlight was the keyword “Covid-19”, with three occurrences; followed by “learning”, “online learning” and “pandemic”, with two occurrences each. The other occurrences were not considered in this article, as they appear with a frequency considered low (only once).

In the analysis of the keywords, it can be seen that the discussion on education and Covid-19 emphasizes rethinking an active proposal to teach and learn in times of pandemic, using innovative methodologies available on online platforms.

Finally, looking for a qualitative analysis, it was noticed that this debate still involves the concern with innovative proposals, by rethinking pedagogical practices aimed at interactions in online learning.

#### **Final Considerations**

The Covid-19 pandemic is a huge challenge for education systems. This theme caused educational institutions to rethink their practices in a short period of time to meet the needs of students who, at the time of the pandemic, had to rely on the learning carried out directly inside their homes.

Thus, educational institutions had to adapt to asynchronous and synchronous resources in order to have a new space for teaching and learning, outside the context of concrete classrooms, for a digital context. Teaching, in addition to the themes composed in the curricula, was also rethought in the varied tasks and jobs that place Covid-19 in a global and historical context.

The scientific mapping of the production related to the theme "education in times of pandemic Covid-19" made in the Scopus database, allowed a bibliometric analysis of the theme that described the main contemporary discussions and the intersection between the areas. As a result, it was identified that the research emerges in the multidisciplinary field, intersecting the discussions with the areas of Social Sciences, Psychology, Computer Science, Energy, Engineering and Medicine.

It is proposed that studies in different areas be analyzed by an integrated look at new ways of applying active methodologies in terms of teaching and learning in times of pandemic. The theme lacks research that addresses new practices of teaching and learning in times of pandemic, as it is very new.

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# The Hospitality Industry in Portugal in the Covid-19 Context



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## **Introduction: the pre-covid19 era**

Tourism is the largest industry in the world and is one of the most dynamic and vibrant sectors of the world economy (Costa et al., 2014; Devaraja and Deepak, 2014). The World Travel & Tourism Council's (WTTC, 2019) research reveals that the sector accounted for 10.4% of global GDP and 319 million jobs, or 10% of total employment in 2018. The World Tourism Organization (UNWTO, 2019) referred that the international touristic arrivals in the first quarter of 2019 increase in 4% compared to the same period of 2018. According with the UNWTO index (UNWTO, 2019) the confidence in global tourism performance grew up after slowing down at the end of 2018. The total exports earnings from the international reaches the 1,7 trillion US dollars in 2018 (UNWTO, 2019). At the same time, tourism industry faces a wide range of major challenges globally, such as fluctuations in the economy, seasonality, labour shortages and retention of quality personnel, increasing technological demand, providing and maintaining excellent guest care standards, providing personal exceptional experiences, sustainability, growing competition, difficulties in energy and resource management, cyber security and data privacy, and so on (Nain, 2018). Different from other sectors, the hospitality industry is unique in nature because it is service-oriented and has a strong emphasis on human exchange in the service delivery processes (Mmutle&Shonhe, 2017). According to Veiga et al (2017) the increase in tourist flow and the diversity of destinations has been driven by changes in consumption patterns as a way to respond to new motivations and new lifestyles.

According to the 13th edition of the Hotel Atlas of Deloitte, in 2018 Portugal set a new record in the tourism sector. Overnight stays exceeded 57 million, room revenue reached two and a half million euros and the average occupancy rate reached 64%. The main conclusions of the study are the following:

- At the end of 2018, Portugal had more 1,993 tourist facilities and 143,089 new accommodation units, 48 and 3,350 more, respectively, than in the previous year.
- In 2019, 49 new hotels opened, mostly four and five stars units.
- North and Algarve have the largest number of tourist resorts in the country (22% each)
- Madeira and Algarve have the highest average stay (5.2 and 4.6 days, respectively)
- Hotels are the most representative type of tourist resort in Portugal (73%)
- Lisbon recorded the second highest occupancy rate in Europe (80.5%)

The tourism slogan of Portugal is 'Europe's west coast ', a tag line that relates to Portugal, an expression that tries to make a parallel with US west coast, known for sunny skies and

golden beaches. According to the Travel and competitiveness report of world economic forum published in 2019, Portugal got the top score in Tourist service infrastructure globally, due to the measures taken by the country to achieve this, either public or private (airline companies, rent a car, local accommodation, travel agencies, government agencies and hotels).

There was a mass investment in new trends of tourism, like new experiences, walking tours, gastronomy, museums, as well as large investments in the major cities of Lisbon and Porto. Participation in important industrial exhibitions, fairs, presence in media as well as presence on social media were also important initiatives.

### **Employment**

Tourism is important for young people to have temporary jobs and prepare them for others.

There are several schools that specialized in teaching all aspects of hospitality and tourism. University education regarding tourism allied disciplines is of utmost importance, a country cannot have a sound tourism offer if their professionals are not well prepared.

### **The pandemic era**

The hospitality industry has been massively affected by the pandemic covid19 all over the world, and Portugal is no exception.

It hit hardly. Numbers from around 80% decrease in hotel accommodation and 90% decrease in tourist arrivals. These numbers however appear to be recovering during summer (mostly July and August), but still very different from recent years.

Tourism will take longer to recover than other industries. Most people have chosen and will continue to choose destinations in their own countries instead of going abroad. Things are expected to get better next year but a full recovery will not be attained at least in 2 years' time.

For instance, tourism events and festivals are the major attractions in Europe which could draw worldwide attention, but most of them were cancelled and postponed for next year, the same happened in Portugal.

The few that "survived" were imposed by authorities a strict social distance, masks, sanitation, fever control and above all a much more limited number of people allowed in each of them. And that is a thread that appears to have no end in sight.

Tourist guides have an important role as they are considered as the smiling ambassadors of a country. This pandemic has affected their lives, like many other professionals, these ones were also very much affected, most of them having temporary jobs.

It is a sad view to walk around Lisbon, our capital, without tourists and the associated merry image of the guides.

### **The post-covid19 in the near future.**

One of the effects will be on the public transport system on account of restriction regarding limited number of travellers.

We will witness major efforts from authorities to call for people good behaviour, along with increasing offer of public transportation, new methods of automatic sanitation, as major airlines have already done. A new layout in aircrafts and trains will try to overcome people's fear of travelling.

Masks, gloves, and sanitizers will continue to be mandatory physical components of post-covid19 tourism, at least until a vaccine is available. The whole hospitality industry will have to re-think the way they do business, and thus considering new business models.

Companies will merge, many will bankrupt, unemployment will rise.

The industry will have to shrink according to a decreasing demand.

But no matter how things will change in the pandemic aftermath, some major pillars will continue to be true, like:

- Type of service - In the hospitality industry, production and consumption are inseparable, so customers consume a mix of products and services.
- Communication - For service excellence to be achieved in the hospitality industry, two-way communication is a critical factor that requires the involvement and participation of customers and service staff in the service delivery process.
- Loyalty - The hospitality industry relies heavily on repeat customers. Building long-term customer relationships can be crucial to the survival of the organizations.
- Diversity in culture - People involved in the hospitality industry experience diversity in culture through interaction with others. Employees interact with clients from different regions, beliefs, religious values and some conflicts and misunderstandings can always occur.
- Labour-intensive - The hospitality industry is service-oriented in nature and requires a huge supply of work to create a memorable customer experience.

The traditional tourist goes to a hotel and stays by the pool or lays on the beach. But now other people travel because they want to see a certain museum, watch a typical event somewhere, hike up and down a mountain, eat a certain special and different kind of food. All these, and more, are reasons to travel abroad, and that makes a lot of difference from the past.

#### **Responsible tourism**

Responsible tourism plays a key role in Portugal as we have witness important actions towards that, like appealing to the behaviour of people when lodging, camping or hiking someplace (and preventing them from damaging), protecting the environment, as well as the local population, the ecosystems and biodiversity.

#### **Final Considerations**

The covid-19 pandemic is a different kind of big event for all of us, it is a mass traumatic event on a global community scale. It is ongoing, and although there are positive signs and the isolation is beginning to be less extensive, and social interactions is starting to become the “new-old normal”, there currently is no certainty about its end point.

The fact we had to combat the coronavirus by distancing ourselves from one another physically adds a new psychological challenge.

We all should be aware of how the pandemic is making people change their behaviour and act accordingly, either on our personal or professional life, either as a teacher or a student, whatever business we are involved, but the hospitality industry is all about travel, knowing places, meeting people and so it deserves special care from all of us.

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# Organizational Culture Management in Mergers and Acquisitions: University's Department Case



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As McKinsey consultants found, “some 95 percent of executives describe cultural fit as critical to the success of integration. Yet 25 percent cite a lack of cultural cohesion and alignment as the primary reason integration efforts fail” (O. Engert, B. Kaetzler, K. Kordestani, and A. MacLean, 2019). They propose to act in three key steps to understand and manage culture during a merger: diagnose how the work gets done –create a fact base and a common language; set priorities; align the top team around the planned cultural direction; hard-wire and support change – deliver a clear, coherent program woven into normal integration activities; finally – measure cultural integration during and after integration. A merger provides a unique opportunity to transform a newly combined organization, to shape its culture in line with strategic priorities.

The task of this research is to learn the organizational cultures integration problems, which arise in the process of mergers and acquisitions, and to develop recommendations on organizational culture management in the integration process.

J.W. Berry (1983, 1984) identified four modes of acculturation in mergers and acquisitions: integration, assimilation, separation and deculturation. A. Nahavandi and A. R. Malekzadeh (1988) developed this model. They proposed to take into account the subjective factors: how acquired firm’s employees value their own culture and how attractive for them is the acquirer’s culture (Figure 1).

|  |                       | How much do members of the acquired firm value preservation of their own culture? |               |
|--|-----------------------|---|---------------|
|  |                       | Very much   | Not at all    |
| Perception of the attractiveness of the acquirer | Very attractive       | Integration   | Assimilation  |
|  | Not at all attractive | Separation  | Deculturation |

**Figure 1. Acquired firm’s modes of acculturation**  
(A. Nahavandi and A. R. Malekzadeh (1988), p. 83)

From the acquirer's point of view, the relatedness of firms and their culture differences are taken into account, as shown in Fig. 2.

|   |           | Degree of multiculturalism |               |
|---|-----------|----------------------------|---------------|
|   |           | Multicultural              | Unicultural   |
| Diversification strategy:<br>Degree of relatedness of firms | Related   | Integration                | Assimilation  |
|   | Unrelated | Separation                 | Deculturation |

**Figure 2. Acquirer's modes of acculturation (A. Nahavandi and A. R. Malekzadeh (1988), p. 84)**

Integration implies a relatively balanced exchange of culture and management practices between partners and is not associated with major changes in the culture of both companies. A "partnership of equals" is possible, when individual cultures are preserved in a final unified.

Upon assimilation, the acquired firm adapts its culture to the acquirer. The dominance of the culture of the acquirer is not forced, but encouraged, especially if those acquired believe, that their culture and management practices have not been successful.

When separation is recommended, both companies remain structurally separate, without any exchange of cultures. This way is recommended if cultures are too diverse (e.g., plan-oriented and innovative companies).

Deculturation is the most frequent and destructive method of combining two different cultures. An acquirer destroys the culture of the acquired firm and imposes its own. As a result, the acquired, as a rule, worsens its performance.

As we see from the figures, an acquirer and the acquired firm has to agree about the ways of organizational culture management in mergers and acquisitions. It has to be congruence between the two companies regarding the preferring mode of acculturation. In this case the minimal level of resistance to change and cultural conflict may be expected. If it is incongruence between the two companies regarding the preferring mode of acculturation, the high level of resistance to change and cultural conflict may occur, which will result in performance decline after merger or acquisition.

The well-known example of negative effect of different organizational cultures on post merger's companies' performance is the case of DaimlerChrysler, reported by J. Badrtalei and D. L. Bates (2007). It is generally agreed, that cultural compatibility is the greatest barrier to successful partnership integration. As one of the lessons from the DaimlerChrysler case, authors mentioned that organizational culture must be blended rather than changed in mergers and acquisitions.

According to D. K. Datta (1991) research, differences in management styles have a negative impact on acquisition performance, even if acquisitions characterized by low post-acquisition integration. The reason is that the acquiring firm management often end up imposing their own style, systems, and culture on the acquired firm. At the same time, differences in reward and evaluation systems are more easily and quickly reconciled following an acquisition than differences in management styles.

The more recent case is Amazon's 2017 acquisition of Whole Foods, which illustrates the tight and loose cultures merge, when they will clash. According to the data on over 4,500

international mergers from 32 different countries between 1989 and 2013, on average, the acquiring companies in mergers with tight-loose differences saw their return on assets decrease by 0.6 percentage points three years after the merger, or \$200 million in net income per year (M. Gelfand, S. Gordon, C. Li, V. Choi and P. Prokopowicz, 2018). In order to achieve cultural harmony in the tight and loose cultures merge, authors propose to act in the next way: negotiate culture to achieve a compromise and create flexible tightness and structured looseness; develop a cultural integration plan; explain, what changes and why have to be implemented; be ready to change the cultural integration plan.

M. Schraeder and D. R. Self (2003) recommended to use such instruments to manage organizational culture in mergers and acquisitions: assess cultural compatibility; anticipate employee reactions; develop flexible integration plan, which includes the communication and negotiation with employees; share information about the integrating process; involve employees in the process; establish relationships and build trust; train, support and socialize employees.

R. A. Weber and C. F. Camerer (2003) used laboratory experiments to explore merger failure due to conflicting organizational cultures. Their results show, that merged experimental groups do considerably worse on average than the two separate premerger groups were doing immediately before the merger. Comparing the task completion times before and after the merger reveals, that both employees are performing worse after the merger. Therefore, if to concern only with employee productivity, the merger clearly negatively affects performance. The reason is the different organizational cultures conflict, when employees from two companies do not understand each other and have different approaches to problem solving and collaboration.

G. K. Stahl and A. Voigt (2008) suggested, that cultural differences in mergers and acquisitions could be not only the potential source of cultural conflict, but also the source of synergy in integrated company. The managerial task in this case is to manage organizational culture after mergers and acquisitions.

A. Kumar and R. Kumar Braskar (2005) suggested, that vitally important is to define the organizational culture in the new combined post-acquisition organization; to communicate preferable face-to-face with all involved parties during the integration process; to integrate as quick as possible to avoid or minimize resistance to change; to decide, what degree of organizational cultures' integration is needed, trying to save the best features of both organizational cultures in the new entity.

C. Lakshman (2011) proposed knowledge management based model of post-acquisition integration, which includes knowledge leadership (in the form of cause-effect beliefs of integration leaders; motivation for cultural integration; integration leader resolving conflicts; reducing causal ambiguity); cultural knowledge-sharing mechanisms (socio cognitive means of cultural knowledge sharing; target involvement in the integration process; early target involvement in integration process design), that have to lead to more effective integration after acquisition due to trust, commitment, low turnover and longevity.

A. S. Ivanova (2010) developed the model of organizational culture management in mergers and acquisitions in six steps: organizational cultures' analysis before the integration; education of employees; changes implementation; new motivation system development; evaluation and control; organizational culture improvement. Mitrofanova E.A. and Konovalova V.G. (2017) proposed to manage organizational culture in mergers and acquisitions as part of the change management process and create special Corporate Culture Transformation Management Committee at the new organization.

Generalizing the different authors' approaches to the process of organizational culture management in mergers and acquisitions, we could identify the main elements of this process (table 1).

As can be seen from the table, the authors agree, that the process of organizational culture management in mergers and acquisitions has to include the next steps: 1) organizational cultures' analysis and cultural compatibility assessment before the integration; 2) the organizational culture in the new combined post-acquisition organization definition and flexible integration plan development; 3) communication and negotiation with employees; sharing information about the integrating process; 4) employees' involvement in the integration process; 5) new motivation and reporting system development; 6) evaluation and control; organizational culture strengthening.

Finally, we developed the dynamic model of organizational culture management in mergers and acquisitions (Figure 3).

The arrows in the figure indicate, that the process is not unidirectional; the return arrows indicate, that in the organizational culture management in mergers and acquisitions it is possible to return to the previous stages, make refinements and changes.

#### Case study

Mergers and acquisitions are always a dramatic page in the companies' history. Last year we witnessed the organizational cultures conflict as a result of restructuring at the university's faculty: three departments were reorganized in two ones due to the duplication of disciplines, for which teaching they were responsible. In fact, one department's staff with a very strong organizational culture was distributed between two other departments. The professors of this department, name it "A", valued their own culture and thought, that the organizational culture of their new department, name it "B", is not attractive. The same thoughts were at the minds of department B professors: they valued their culture and decided, that department's A culture is unattractive.

According to A. Nahavandi and A. R. Malekzadeh (figure 1), the best way for organizational cultures management in this situation is separation. But the faculty's management decided to integrate and assimilate two departments' organizational cultures (figure 2) in order to take all the best from both. As a result, it was very hard process of organizational cultures transformation and new join one creation. From one side, all staff tried to do their best to integrate. From another, all the time it was possible to hear: "We never did things in such way, we did it in another manner!" The real challenges to change the situation were the quarantine limitations implementation due to Covid19 from the March, 12, 2020. All professors faced the new task: adopt for the work in distance mode. It was really new task for all colleagues, and nobody had previous experience in this kind of problem solving. What was the result on organizational cultures transformation?

**Table 1. The main elements of organizational culture management in mergers and acquisitions (developed by 7, 8, 10-14)**

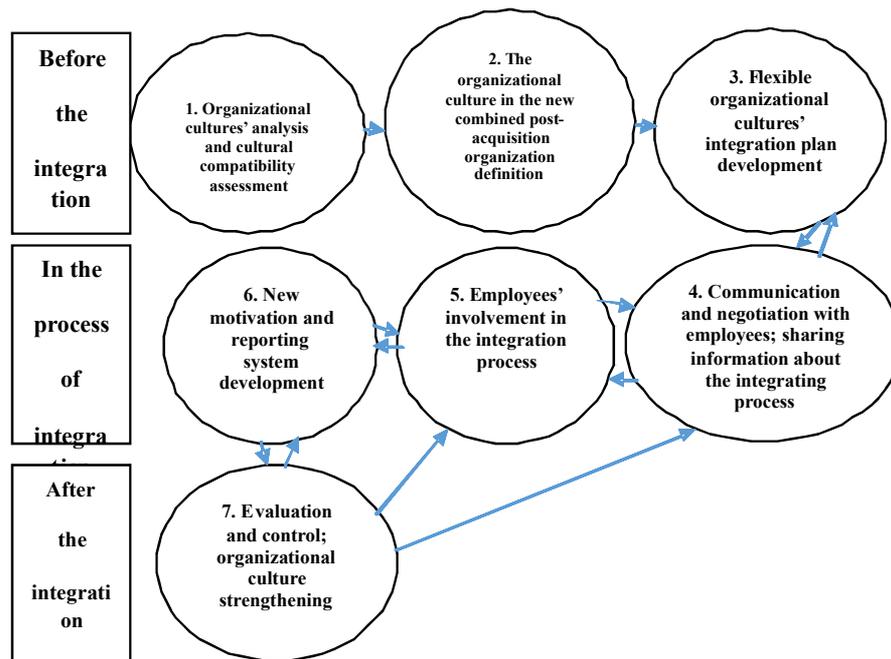
|  | The authors   |  |   |             |  |
|--|---|--|---|-------------|--|
|  | M. Gelfand,<br>S. Gordon,<br>C. Li,<br>V. Choi and<br>P.<br>Prokopowicz | M. Schraeder and<br>D. R. Self                                     | A. Kumar and<br>R. Kumar<br>Braskar   | C. Lakshman | A. S.<br>Ivanova   |
| Main elements of organizational culture management | culture negotiation   | cultural compatibility assessment; employee reactions anticipating | the organizational culture in the new combined post-acquisition organization definition |             | organizational cultures, analysis before the integration |

|  |  |   |  |  |  |
|--|--|---|--|--|--|
|  | a cultural integration plan development                  | flexible integration plan development   |  | motivation for cultural integration; integration leader resolving conflicts; reducing causal ambiguity | education of employees                                     |
|  | explanation, what changes and why have to be implemented | communication and negotiation with employees; sharing information about the integrating process                                     | communication preferable face-to-face with all involved parties during the integration process | cultural knowledge-sharing mechanisms  | changes implementation                                     |
|  |  | employees' involvement in the process; relationships establishment and building trust; employees' training, support and socializing |  | target involvement in the integration process  | new motivation system development                          |
|  | be ready to change the cultural integration plan         |   | decision, what degree of organizational cultures' integration is needed                        |  | evaluation and control; organizational culture improvement |

The most professors from both departments adopted for the new environment and provided distance learning. But small "opportunistic" group of professors did not agree with the changed situation and decided to wait for the end of quarantine and then work with students in a traditional offline form. But quarantine has not been canceled before the beginning of the new semester, professors were obliged to work in distance and blended forms. Three professors, which did not want to work in such way, resigned their jobs. So, employees, which did not adopt for the new task in the new circumstances, leaved the department. And the remaining employees changed their behavior and moved on the way of organizational cultures transformation and new join one creation.

#### **Conclusion**

We agree with McKinsey's consultants, which recommend for improving post merger integration to create a new task, on which employees from both the acquiring and acquired firm have to work together. By using a new task, the employees are inhibited from using the full extent of their culture that is familiar from old tasks, and are able to compromise on a new shared way of doing things. Similarly, it will be useful to develop new procedures, motivation and control systems in order to force employees from both organizations to work in a new way.



**Figure 3. The dynamic model of organizational culture management in mergers and acquisitions (developed by the author)**

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# CERN and STEM Education in the "Playing with Protons" Program



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## Abstract

Nowadays, it is widely accepted that children get more motivated for learning when they choose a subject at school. Thus, the teacher's role is to present knowledge in an attractive and interesting way. Inspiring students is crucial for the learning process. This is a difficult problem for STEM education because many primary school teachers do not necessarily have good knowledge of science. Teachers cannot inspire their students when they do not feel enthusiastic about a teaching subject. A new CERN pioneering program, "Playing with protons" was created to solve this problem.

**Keywords.** CERN, creativity, LHC, physics education, STEM, STEAM.

## Introduction

The trend of combinational teaching of Science, Technology, Engineering and Mathematics, the so-called STEM has appeared in the last decades. STEM education is a holistic approach to learning and it is closely related to everyday life and practical issues. (Dierking, Falk, 2016). By implementing STEM through projects in education, students acquire critical thinking skills, they are involved in the process of solving authentic problems and learn to collaborate in teamwork (Froschauer, 2016). In addition, decision-making, and communication skills should be among the main goals of STEM education (Foundations for Young Australians, 2015; Hajkowitz et al., 2016).

### 1. STE(A)M Education

Falk et al. (2016) identify six principles for improving STEM learning. The six principles are the following: learning should be a life-long process, STEM is worth learning, learning should include everyday experiences, educators and students should be involved in research, new technologies should determine the content and practices of STEM, broader socio-cultural and political factors should be considered (Falk et al., 2016). It is also important for students to deal responsibly with technology (Fernández-Manzanal et al., 2007).

This provides students with confidence and competence to function effectively as informed citizens (Ryder, 2001) that can participate to democratic civic decision-making. These skills are necessary in the 21st century, in order for people to deal with modern life

complex situations. These capabilities need to be developed in people from an early age. This is the most effective way of developing complex skills (Falk and Needham, 2013).

Another important issue is the education of teachers in STEM practices. A research was conducted in Australia among pre-service primary school teachers by a Chief Scientist of Australia (Prinsley, Johnston, 2015). The research investigated beliefs regarding STEM in terms of importance, innovation, skills in future, and high-quality specialist teachers to teach in primary schools and there were also questions on understanding concerning attracting high achievers to teaching, including STEM in teacher preparation, professional development, and leadership in primary schools. The questionnaire included questions about intentions to teach STEM focused on the interest connected to daily life, the ability to apply mathematics, the need for primary teachers to be supported by a specialist STEM teacher, the needs for separate subject on STEM in the university for pre-service teachers' university programs, and the teachers' ability in STEM to transform creativity and innovation among children.

Future teachers who answered the questionnaires placed emphasis on the fact that their knowledge of science and technology was minimal. However, they had positive intentions to teach STEM since they believed that STEM-related subjects are important for life.

Among the conclusions of the study are the following:

- Pre-service teachers should have experiences in STEM in order to apply their knowledge, their skills and the principles of STEM efficiently.
- Science knowledge and sound pedagogical practices should be integrated in order for teachers to practice STEM teaching in an optimal manner.
- Ongoing professional training in STEM education is necessary for all teachers.
- STEM should include school and non-school experiences in STEM-related activities. (Kurup, Li, Powell, Brown, 2019).

Teachers' platform of knowledge, confidence, and efficacy for teaching STEM influences students' learning and classroom practices (Nadelson et al., 2013). Teachers' ability in integrating background knowledge of technological pedagogical content knowledge to a STEM curriculum seems a challenge to pre-service and in-service teachers (Hofer, Grandgenett, 2012).

It is also essential for teachers to have a professional development education in STEM that would enable them to integrate disciplines and will provide them an understanding of teaching approaches that combine hands-on activities with the effort to develop twenty-first century competencies. Furthermore, there is a need for policies of STEM that are based on the four-dimensional framework: knowledge, skills, character, meta-learning. (Bybee, 2013).

Very recently, arts have also been incorporated into STEM teaching, making these projects even more creative and interesting. As a result, the STEM acronym is now becoming STEAM (Land, 2013). STEAM is an educational and interdisciplinary approach that aims to promote research spirit, logical thinking and social skills. Emphasis is placed on empirical and exploratory-discovery learning, autonomy and active participation of students, through trial and errors, in a series of interactive projects that incorporate the five fields of STEAM (Maslyk, 2016). The acquisition of basic skills through STEAM projects, prepares young people for the future, as STEAM learning is framed in the daily life of young people outside the classroom (Daugherty, 2013).

## **2. ?Playing with Protons? program and its goals**

In most countries, physics is taught in high-schools, in ways that don't motivate students and as a result they make them think that the subject is boring and useless for them. One of the reasons that in most cases science is taught only in high-schools is that there are not specialized science teachers in primary school and since modern physics can be a difficult subject, primary school teachers may lack the confidence and knowledge to perform well in

the classroom (Wilkins, 2010). In this manner, they are excluded from the creative world of the modern scientific approaches that extend the boundaries of science in a way that physics can meet philosophy and imagination (Etkina, 2015).

However, according to several studies, the public wants science to be taught early in primary education. The majority of participants in the above-mentioned studies believe that science in primary school will help students to perform well in high-school. (Belden, Lien, Nelson-Dusek, 2010)

Eshach and Fried (Eshach, Fried, 2005) posited that even very young children should be exposed to the world of science. Their assertions are as follows:

1. Children normally find pleasure in observing and contemplating nature.
2. The exposure of young students to science results in the development and adoption of a positive attitude towards it.
3. Early exposure to scientific phenomena prompts to better comprehension of the scientific terms studied formally later.
4. The utilization of scientifically informed language at an early age affects the eventual development of scientific concepts in a very positive way.
5. Children can understand scientific concepts and reason scientifically.
6. Science is an efficient means for developing scientific thinking.

"Playing with Protons" is a CERN project that is addressed to primary school students. This idea that the concepts of modern physics and science in general should be taught at an early age represents the added value of the program. This course was initially supported by the CMS and subsequently by the ATLAS experiments at the Large Hadron Collider (LHC) within the framework of the CREATIONS EU project (CREATIONS EU project website) and now it is supported by the REINFORCE (REINFORCE EU project website) and FRONTIERS (FRONTIERS EU project website) European projects. In CREATIONS, 16 partners from 11 European countries develop creative approaches based on art for an engaging science classroom in order to improve the skills of young people in STEM, raise student's interest and encourage science teachers to innovate. Combining science and art, partners are planning a variety of cultural events in which young people can experience an active and playful role within science and research. "Art@CMS", "Learning Science through Theater" and "Global Science Opera" are three of the programmes within the framework of the CREATIONS project. (CREATIONS EU project website).

"Playing with Protons" is the brainchild of Tina Nantsou, a physics teacher at Hill Memorial School in Athens, Greece. The project focuses on experiments conducted by the students themselves with everyday materials and objects and it results in the students becoming familiar with complicated scientific concepts as well as the latest developments in the field of particle physics research. Naturally, knowledge of modern physics should be explained to young students in a conceptual way rather than a mathematical way and a lot of hands-on activities should be utilized to provide a solid foundation to young students for a deeper understanding of scientific concepts (Playing with Protons website).

The project is combined with primary teacher teaching training taking place at CERN. (Trimoulla, 2016). 10 teachers from Greece and UK are selected in order to participate in the training program that takes place at CERN's facilities. They experiment with simple materials and when they return to their countries they diffuse the knowledge they acquire to their colleagues and to their students (Ioannidis, 2016). The main goals of the program are to enable primary school teachers to:

- Invent innovative scenarios and lesson plans to motivate their students and enrich the curriculum at the same time.
- Experience technology, science and innovation at CERN which is the largest particle physics laboratory in the world.

- Get acquainted with new teaching approaches based on hands-on activities and experiments.
- Diffuse the knowledge they acquired at CERN to their colleagues, peers and local communities.
- Feel confident when teaching science.

"Playing with Protons" enables primary teachers to improve their knowledge and teaching practice with creative methods that can attract the attention and get students engaged with science and technology ideas. The visit to CERN enables teachers to transmit first-hand knowledge to students. Experiential learning for teachers ensures experiential learning for students. This is one of the most effective ways to attract the attention of students and to stimulate them. Furthermore, teachers become part of the scientific community and in this way they can transmit the values of collaboration towards common goals that further the progress of human civilization. All the above ensure that students will have a high-quality education experience when they participate in a CERN project.

"Playing with Protons" includes continuing professional development (CPD) courses for primary school teachers, the development of learning resources and communities of interest, and continuous support for schools especially those in remote locations and schools with students who are members of relatively underprivileged communities.

The program allows primary school teachers, specialists in science education and researchers working at CERN to cooperate in order to create new and original approaches that would increase the level of engagement in natural sciences, experimentation and innovation in primary school students. In particular, Primary school teachers visit CERN experimental facilities to witness the one of a kind culture of the latest scientific discoveries, state of the art technology and innovation at the largest particle physics laboratory on the planet. They draw inspiration and they become very eager to share the knowledge they have just discovered with peers, students, parents and the larger community. They experiment with new teaching activities focusing on hands-on activities using simple materials to increase their engagement level. Furthermore, they use innovative methods for the development of new educational scenarios and lesson plans that will make the teaching and learning process of physics more engaging and effective. (Playing with Protons website).

As a Flexible zone teacher in three Primary schools of Artemida, Athens, I had the opportunity to participate in the program "Playing with Protons". Considering that the main challenge of the program is to cultivate science, motivation and creativity in primary school students, throughout the program, students in nearly all Primary school grades were involved in various creative activities. In particular, students performed artistic activities, constructions and general explorations of objects. They simulated physics experiments; they created collages and digital presentations for natural scientists. In addition, they depicted the CMS detector in multiple ways, using a variety of materials and techniques, including wood, collages, Lego, three-dimensional printing, and organizing an art exhibition at CMS, etc.

### **2.1. Domain specific objectives**

The primary area of study is the field of particle physics, but the fields of astrophysics and cosmology are also touched upon. Furthermore, the students learn about and become familiar with fundamental concepts from the fields of engineering, technology and history of science. To be more precise, once the program is completed, the students should be able to comprehend that:

- All matter consists of the same elementary particles which in turn form larger particles, such as protons, neutrons and eventually atoms.
- There are four natural fundamental forces or interactions (i.e. gravity, electromagnetism, weak nuclear forces and strong nuclear forces) that affect matter.

- Elementary particles are invisible to the naked eye and can't be viewed through ordinary microscopes, however, throughout the last century, particle physicists have devised increasingly advanced methods for their detection.

- The LHC for short is essentially the most powerful microscope on the planet. It was developed and built at CERN and it allows scientists to perform experiments involving particle collisions with the aim of getting a deeper understanding of matter's inner structure and the discovery of new particles.

- The dark matter and dark energy with which the universe is filled are currently essentially unknown qualities to scientists.

- The study of particles has a long history characterized by creativity and innovation on the part of scientists, collaborations on an international level and technological advancements.

- The study of particles has beneficially affected many aspects of our daily life because many of the scientific discoveries and technological advancements that resulted from this study have been applied and implemented in fields such as medicine, communications and transport.

## **2.2. General skills objectives**

- ❖ Collaboration
- ❖ Problem-solving
- ❖ Creativity
- ❖ Dealing with mistakes
- ❖ Communication and presentation

## **2.3. Thematic sessions-Scientific model**

The program proposes a series of five thematic sessions: cosmology, elementary particles, an introduction to CERN: past, present and future, accelerators and detectors at CERN and their technological applications, creativity zone.

Furthermore, the scientific model described in the program is the following:

?Phase 1. Question: students investigate a scientifically oriented question.

Phase 2. Evidence: students give priority to evidence.

Phase 3. Analyse: students analyse evidence.

Phase 4. Explain: students formulate an explanation based on evidence.

Phase 5 Connect: students connect explanations to scientific knowledge.

Phase 6. Communicate: students communicate and justify explanation ?

(Playing with Protons, CREATIONS-Demonstrator, CERN website)

## **3. Application of the ?Playing with Protons? program in three primary schools of Artemida**

The ?Playing with Protons? program was applied in three Primary schools of Artemida- the 2nd and 6th, as well as the 4th Primary School of Artemida- . The instructional design of the applied program was based on a mixed model that integrates elements from various learning theories and methodological approaches. In particular, the principles of the Inquiry teaching model, of constructivism and cooperative learning along with four leading approaches- Project Based Learning, Problem-Based Learning, Inquiry-based learning and Challenge-Based Learning--and the 5E Model of Instruction-engage, explore, explain, elaborate, evaluate- were utilized.

At the same time, the principles of neuro education, differential teaching as well as Howard Gardner's multiple intelligence theory are also applied. Moreover, linguistic and logical-mathematical skills are entwined with imagination, intuition, originality and artistic skills (Gardner, 1999, Sousa, Pilecki, 2013). The teaching practices of the program encourage the understanding and use of scientific language, mathematical understanding, the use of visual symbols, the use of the senses, artistic and manual work, body sensations and movement, the understanding of each other's position and cooperation, self-knowledge and

self-regulation, interaction with the natural environment, the use of musical shapes, the philosophical and moral dimension of existence.

New technologies have made a significant contribution to the implementation of the projects. High technology machines, such as 3D printers, were used. It is noteworthy that the teaching proposal for CERN's 3D printing has won an Educational Innovation Award at the European Contest "Ultimaker Education Challenge 2016". Also, during the projects, students have used a variety of digital tools that have transformed teaching into an attractive and dynamic process.

Cross-thematic integration and interdisciplinary are diffused in almost all proposed activities. The thematic sections of the program are holistically approached through the involvement of a variety of disciplines and cognitive subjects such as natural sciences (astronomy, physics, chemistry), mathematics, mythology, history, philosophy, literature, foreign languages (English, French) and predominantly through art (theater, music, painting). Cross-curricular teaching aims to unify knowledge and thus promotes the connection with everyday experience, higher cognitive functions such as analysis and synthesis, metacognitive skills, increased motivation, in-depth understanding, differentiated instruction. The role of the teacher is multifaceted: he is a facilitator, a role-model and a guide (Rowley, Cooper, 2009).

#### **4. Selected lesson plan**

**Session 1 (power point presentation & videos): Learn about CERN underground facilities).**

Engineering challenge: Create and build models and maquettes of CERN premises.

**Session 2 (power point presentation & videos): Learn about the CMS experiment and the science behind the experiment.**

Engineering challenge: Simulation of the CMS experiment.

**Session 3 (power point presentation & videos): The ATLAS and CMS detectors (learn the physics and engineering of the detectors).**

Engineering challenge: Construct models of a particle detector (ATLAS and CMS) (use of everyday materials).

#### **4.2. Scientific model**

**Phase 1: QUESTION: students investigate a scientifically oriented question**

Balance and navigation through dialogue aids teachers and students in creatively navigating educational tensions.

Ethics and trusteeship is an important consideration in experimental design and collaborative work, as well as in the initial choice of question.

**Phase 2: EVIDENCE: students give priority to evidence**

Risk, immersion and play is crucial in empowering pupils to generate, question and discuss.

**Phase 3: ANALYSE: students analyze evidence**

Students analyze evidence, using dialogue with each other and the teacher to support their developing understanding.

**Phase 4: EXPLAIN: students formulate an explanation based on evidence**

Students use evidence they have generated and analyzed to consider possibilities for explanations that are original to them. They use argumentation and dialogue.

**Phase 5: CONNECT: students connect explanations to scientific knowledge**

Students connect their explanations with scientific knowledge, using different ways of thinking and knowing ("knowing that", "knowing how", and "knowing this").

**Phase 6: COMMUNICATE: students communicate and justify explanation**

Communication of possibilities, ideas and justifications through dialogue with other students.

**Phase 7: REFLECT: students reflect on the inquiry process and their learning**

Individual, collaborative and community-based reflective activity consolidates learning and enables students and teachers.

#### 4.3 Sessions

School: 4<sup>th</sup> Primary School of Artemida, Greece, Athens

Grades: 1<sup>st</sup>-6<sup>th</sup> grades of Primary education

##### SESSION 1

**The Marquette of CERN's installations (construction, artistic representation)**

**Duration: 4 lessons X 45': 3h**

##### Objectives

-Learn about CERN underground facilities.

-Engineering challenge: Create and build models and maquettes of CERN premises.

##### SESSION 2

**Simulation of the CMS experiment with Led Flash Circuit and Led Chaser Circuit**

**Duration: 4 lessons x 45': 3h**

##### Objectives

-Learn about the CMS experiment and the science behind the experiment.

-Engineering challenge: Simulation of the CMS experiment.

##### SESSIONS 3

**Models of a particle detector (CMS and ATLAS)**

**Duration: 13h30 approximately**

##### Objectives

-The detectors CMS and ATLAS (learn the physics and engineering of the detectors)

-Construct models of a particle detector (CMS and ATLAS), [use of everyday materials].

##### SESSION 1

The maquette of CERN's installations (constructions, artistic representations)

##### SESSION 2

[Simulation of the CMS experiment with Led Flash Circuit and Led Chaser Circuit](#)

##### SESSION 3

1. Miniatures of the CMS detector using Lego

2. Wooden representations of the CMS detector

3. a) Paintings about the CMS Detector and Art @CMS Exhibition

b) [art@CMS. A virtual Gallery](#)-A collection of the best paintings at the art@CMS (CERN) of Michael Hoch, Lindsay Olson, Paco Falco, Chris Henschke, Xavier Cortada, Alison Gill made with the digital tool *artsteps*.

c. The CMS detector was represented in collages (materials such as jewelry, drinking straws, pills, toothpicks, bottle caps and pasta were used).

d. Collage of the particle detector CMS using the app *Hp Reveal* of the Augmented Reality on mobile and tablet.

4. 3D printing models of CERN (the process of printing and assembling the CMS detector lasted 100 hours. Additionally, 100 hours were required for printing the Globe of science and innovation and 2 hours for printing and assembling of little models of Higgs bosons).

5. The particle detector CMS dessert (a dessert consisting of butter, chocolate and sugar and weighing three kilograms).

6. "Playing with Particles", Applications for web and portable devices (cross-platform, Android - IOS)

"Detecting particles" (CMS, CERN) (30minutes)

[Level 1](#)

[Level 2](#)

It's a part of a [complete course](#) (26 applications) on particle physics using Flashcards and Games created with the Cram Web application. In particular, the theory is presented in 6

thematic units (13 applications) followed by exercises in the form of quizzes, created with the Quizglobal tool, that test and enhance the understanding of the theory (13 applications).

7. Models and Artistic representations of the particle detector ATLAS (CERN) with arts and crafts and using the technique "shadow and light" .

8. [Models of the Particle Detector CMS \(CERN\)](#) created by the students made with the digital tool *Powtoon*.

9. [Article on Wikipedia about the CMS experiment](#).

10. Poems about CERN set to music and visualized (inspired by astrophysics and particle physics). The Freinet technique was used for the creation of small books.

For more details and photos please visit the links:

1. [CMS, LHC](#)

2. [CERN](#)

3. [ATLAS DETECTOR](#)

4. [POEMS](#)

### **5. Challenges-Difficulties**

The main challenge I had to face was related to the Greek curriculum which does not include modern physics. I had to redesign the syllabus and be innovative and creative. I used materials that motivated my students' creativity, such as Lego, clay, cardboards, etc. My teaching style is creative and innovative. This is the reason why I promoted STEAM literacy in primary students by encouraging them to become 'out-of-the-box' thinkers and creators.

Another challenge was that I should teach particle physics to very young children therefore I had to come up with activities suitable for their age and interests. New technologies, such as 3D printers, made a significant contribution. Children were very enthusiastic about science. A great outcome of the above-mentioned activities is the production of original audio-visual and digital material in the form of educational resources about physics and, in particular, particle physics, in collaboration with my students. I think this is a valuable material for a wide range of people. In addition, the context in which I teach is a public primary school in an eastern suburb of Athens. The building and the infrastructure are in terrible condition, which make my efforts even more difficult. In addition, I have to deal with underprivileged children of low socio-economic and educational status.

### **6. Evaluation of the program**

The follow-up evaluation showed that teachers experienced higher science teaching confidence, higher interest in physics and science in general and increased creativity. A great majority of teachers agreed that they implemented their knowledge and shared it with their peers. (Alexopoulos et al 2018).The quantitative and qualitative data of tools including questionnaires and student interviews verify the positive acceptance of the program by both the students and the teachers who participated in it as well as by the parents. The contribution of the program to the connection of school knowledge with the needs, age, level and interests of students as well as real social situations was considered to be particularly valuable. Moreover, in this context, the creation of better relationships with all students and especially those with particular learning, cultural and linguistic needs was promoted. In addition, the 'Playing with Protons' gave students the opportunity to develop general skills including collaboration, communication, creativity, problem-solving and presentation. Cross-curricular and creative activities broke cultural stereotypes associated with science and scientists and demonstrated the value of learning modern physics and science at an early age.

In addition, teachers and students developed initiative actions, cultivated critical and creative thinking through methodologies related to a holistic and interdisciplinary approach to knowledge and the implementation of activities and projects at individual and group level which increased students' aspirations for science-related careers. The educational climate of the schools that implemented the program was positively influenced and this contributed to

the promotion of creative cooperation between all involved in the educational process. Students were open and responsive to new and diverse perspectives, they demonstrated originality and inventiveness in work, high order thinking and problem-solving skills and they elaborated original ideas to improve and maximize creative efforts.

It is noteworthy to mention that these projects have so far received 18 International awards and for these projects I was selected among the best 50 teachers in the world with the Global Teacher Prize 2019. (Global Teacher Prize Finalists 2019)

### Conclusions

The teaching implementations of the innovative "Playing with protons" program described above have provided students with a variety of opportunities to unravel their latent capabilities and broaden the perspectives through which they perceive the world and science. Designed teaching practices have mainly contributed to the students experimenting, identifying and discovering their strong and weak intelligences, inclinations and talents.

At the same time, the use of appropriate digital tools has created the prerequisites for more efficient performance by students during the learning process, since the teaching work tailored to their individual profiles has led to the creative production of works along with the acquisition of self-regulating learning and autonomy skills as well as cooperation and communication.

In conclusion, the implementation of the "Playing with Protons" program in Primary Education could be considered as contributing to the reforming of the teaching approach of various cognitive subjects, to the creation of a multipurpose, experiential learning environment, to the design of rich, polymorphic and multimodal courses and activities and to the selection of flexible techniques and strategies. Through the philosophy on which this innovative program is based, the students become more open towards science and society and the role of the teacher is upgraded, which is the most important factor for the success of any improvement in the education system.

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# Common Errors Encountered By Novice Programmer



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## Abstract

Writing correct codes may help Java programming students to become effective, efficient, and competent in writing codes in order to produce quality programs. This may also be a helpful assessment of the current teaching and learning methods being used to effectively educate students with the essential programming skills. This study looks and into the level finding of common errors encountered by Java programming students which is the basis for enhancement of a computer programming syllabus in College of Computer Studies of Far Eastern University, Diliman. In this study, 425 students were selected from which came the total number of 206 respondents. The research made use of the descriptive method to look into and assess the common errors encountered by Java programming students. Two-way ANOVA and Slovin formula were used to determine significant difference between selected variables.

The following findings and conclusions were drawn: The most common and familiar programming languages among Java programming students were C/C++ and Visual Basic Languages. On the other hand, the least familiar programming languages among Java programming students are ASP.Net, PHP and C#.

Three definite categories of common errors that Java programming students encountered during debugging using Java programming with minimum or “average” interference level as revealed by an overall mean value are arise here the errors.

There are no significant differences were exhibited by respondents as regards to frequency of errors and their age. But there are very significant differences in the errors encountered by Java programming students when grouped by course and gender. These are revealed by the computed analysis of F-ratio.

## Statement of the Problem

The study primarily focused on describing the experiences of students in learning Java programming. Specifically, this study sought to answer the following questions:

1. How familiar are the Java programming students with other programming languages?
2. What are the common errors that the Java programming students encounter in Java programming in syntax, identifier, computation, return statement, runtime errors and program execution?

3. Is there a significant difference in the errors encountered by Java programming students and the course, gender and age?
4. What recommendations do faculty members teaching Java programming give to the novice Java programming students?

**Conceptual Framework**

This study was conducted with the concept that after analyzing the syllabus used by faculty members in JAVA programming and identifying the common errors encountered by students, differences in errors encountered were tested to determine if they are significant or not. After this, the syllabus used was enhanced in such a way that the errors encountered will be lessened and JAVA programming skills of students will be strengthened.

| INPUT   | ? | PROCESS  | ? | OUTPUT  |
|---|---|--|---|---|
| <ul style="list-style-type: none"> <li>• Syllabus used in JAVA Programming</li> <li>• Common errors encountered by Java programmers:                             <ol style="list-style-type: none"> <li>1. syntax</li> <li>2. identifier</li> <li>3. computation</li> <li>4. return statement</li> <li>5. runtime errors</li> <li>6. program execution</li> </ol> </li> </ul> |   | Significant differences in the errors encountered by Java programming students between: <ol style="list-style-type: none"> <li>1. course</li> <li>2. gender</li> <li>3. age</li> </ol> |   | <ul style="list-style-type: none"> <li>• Enhanced syllabus in JAVA programming</li> <li>• Enhanced programming skills in Java programming.</li> </ul> |

**Research Design**

The descriptive survey method of gathering data was used in this study. Good and Scates (1954) defined descriptive investigation as a method to be used in research study, which includes all those that present facts concerning the nature and status of anything, a group of persons, a number of objects, a set of conditions, a class of events, a system of thought or any other kind of phenomena which one may wish to study. The term is sometimes referred to as “status studies”. The descriptive method is a design that describes the nature of a situation as it exists at the time of the study and to explore the course of the phenomena. This method is used to discover facts on which professional judgment could be based.

The data needed to draw conclusions relevant to the specific problems as cited in Chapter I are systematically gathered using the questionnaire.

**Population Frame and Sampling Scheme**

The initial step was to determine the total number of students enrolled under the College of Computer Studies of Far Eastern University, Diliman and this amounted to 425. The next step was to determine the total number of respondents for this study which comprised of two hundred six (206) or 48.47% of the total.

**Formula**

Slovin's formula was used to calculate the sample size (n) given the population size (N) and a margin of error (e). It is computed as  $n = N / (1 + Ne^2)$ . Slovin's formula is written as:  
 $n = N / (1 + Ne^2)$   
 n = Number of samples N = Total population  
 e = Error tolerance

$425 \times 48.47\% = 205.99$  or 206, rounded for convenience. The names of the students under the College of Computer Studies of Far Eastern University, Diliman were written in a piece of paper, mixed thoroughly in a regular box container ready for convenience to serve the purpose. There were two hundred six (206) individuals drawn by chance. Those individuals whose names were on the piece of paper were considered the sample of this study.

#### Description of Respondents

The respondents are distributed as follows: 87 from the Bachelor of Science in Computer Science and 338 from the Bachelor of Science in Information Technology.

The following data describe the profile of the respondents.

Table 1 presents the distribution of the respondents by course its frequency and percentage.

**Table 1. Distribution of Respondents by Course**

| Course | Total Population | Sample | Percentage | Rank |
|--------|------------------|--------|------------|------|
| BSCS   | 87               | 32     | 15.53      | 2    |
| BSIT   | 338              | 174    | 84.47      | 1    |
| Total  | 425              | 206    | 100.00     |      |

The following important recommendations were given by the faculty to lessen problems encountered by Java programming students:

- Rank 1.** Additional supplementary hands on activities (8 or 100%)
- Rank 2** Course syllabus enhancements (7 or 87.5%)
- Rank 3** Development of testing and debugging tool (6 or 75%)
- Rank 4** Insertion of related activities in the syllabus (5 or 62.5%)
- Rank 5** Assessment of the skills in structured programming (4 or 50%)
- Rank 6** Improvement of the analysis of the errors made (3 or 37.5%)
- Rank 7** Development of problem solving skills and cognitive foundations (2 or 25%)
- Rank 8** Extension the chances in recognizing the right coding convention (1 or 12.5%)

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# Data Envelopment Analysis and Its Application in Agricultural Economics Research



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## Introduction:

Technical efficiency of a farm can be defined as the ability of the farm to obtain the maximum possible output with a specified endowment of inputs given the technology and environmental conditions surrounding the farm. The production frontier is defined as the function that describes the greatest possible (frontier) output from a given combination of inputs. Therefore, failure to operate on the production frontier is Technical inefficiency. The Cobb-Douglas (C-D) functional form was generally preferred because of its known advantages. In principle Cobb-Douglas production function does not distinguish between the technical efficiency and allocative efficiency. It ignores the problem of technical efficiency by assuming the same technique of production for the entire sample farms and as such each sample farmer achieves perfect technical efficiency.

The estimation of production frontiers has proceeded on two general paths- deterministic and stochastic. In deterministic production frontier model, output is assumed to be bound from above by a deterministic production function so that all deviations from the frontier are attributed to inefficiency; the one sided error component which is assumed to be under the control of the farm. In a stochastic production frontier model, output is assumed to be bound by a stochastic frontier where disturbance term consists of two components – one component representing one sided, which captures random effects outside the control of the decision maker.

Farell (1957) made the earlier pioneering contribution under deterministic approach. He proposed that the efficiency of a firm could consist of two components: Technical efficiency, which reflects the ability of a firm to produce maximum output from a given set of inputs, and allocative efficiency, which reflects the ability of a firm to use the inputs in optimal proportions, given their respective prices and production technology. When a firm is technically efficient, the maximum output is generated from a combination of inputs.

An allocatively efficient firm should produce output using the lowest cost combination of inputs. Therefore, technical efficiency illustrates a comparison of actual output and the maximum output, while allocative efficiency deals with relation between the

minimum cost and actual cost and helps to identify the extent to which the cost to be reduced for production of the same quantity of output. These two measures are then combined to produce a measure of total economic efficiency (also termed as Overall Efficiency) (Coelli, Rao and Battese, 1998).

Following Farell (1957), Aigner and Chu (1968) and Timmer (1971) extended this deterministic frontier approach. According to Timmer, the technical efficiency of the farm is the ratio of actual output (Y) to the frontier output (Y\*), given the input use level. Later Aigner, Meeusen and Broek (1977) independently developed the stochastic frontier approach to measure technical efficiency.

Despite the extension and development of stochastic frontier approach, the deterministic frontier approach, was later generalized to multiple outputs and reformulated as a mathematical programming problems by Charnes, Cooper and Rhodes (CCR), (1978, 1979, 1981) thus initiating the mathematical programming approach to efficiency measurement, known as Data Envelopment Analysis (DEA). The CCR model which uses constant returns to scale, however the assumption of constant returns to scale is that the firm is operating at its optimal size. In practice this may not be the case and Banker, Charnes and Cooper (1984), proposed a variable returns to scale (VRS) specification (for an input – orientation), known as the BCC model. It is imposed a 'convexity constraint' onto the CCR model. (Gupta *et al*, 2006).

#### **Data Envelopment Analysis**

The deterministic, nonparametric approach that developed out of mathematical programming to measure efficiency is known as data envelopment analysis (DEA), while the parametric approach which uses a stochastic production, cost, or profit function to estimate efficiency is called the stochastic frontier approach (SFA).

Data Envelopment Analysis (DEA) is a Linear Programming methodology to measure the efficiency of multiple Decision Making Units (DMUs) when the production process presents a structure of multiple inputs and outputs. DEA is commonly used to evaluate the efficiency of a number of producers.

A typical statistical approach is characterized as a central tendency approach and it evaluates producers relative to an average producer. In contrast, DEA is an extreme point method and compares each producer with only the "best" producers. By the way, in the DEA literature, a producer is usually referred to as a decision making unit or DMU. Extreme point methods are not always the right tool for a problem but are appropriate in certain cases.

The concept of efficiency as it applies to Decision Making Units (DMUs), solutions, alternatives plays an important role both in Data Envelopment Analysis (DEA) and Multiple Objective Linear Programming (MOLP). Despite this and other apparent similarities, DEA and MOLP research has developed separately. We show that structurally the DEA formulation to identify efficient units is quite similar to the MOLP model based on the reference point or the reference direction approach to generate efficient solutions. DEA and MOLP should not be seen as substitutes, but rather as complements. We show that they cross-fertilize each other. MOLP provides interesting extensions to DEA and DEA provides new areas of application to MOLP.

DEA is a non parametric Linear programming approach to measure the efficiency of number of producers where as the Frontier production approach is a parametric approach. Since DEA is a deterministic approach it does not include the error component while Frontier analysis can be a stochastic approach and includes the random error term.

#### **Assumption**

A fundamental assumption behind an extreme point method is that if a given producer, A, is capable of producing Y (A) units of output with X (A) inputs, then other producers should also be able to do the same if they were to operate efficiently. Similarly, if

producer B is capable of producing Y (B) units of output with X (B) inputs, then other producers should also be capable of the same production schedule. Producers A, B and others can then be combined to form a composite producer with composite inputs and composite outputs. Since this composite producer does not necessarily exist, it is sometimes called a virtual producer.

The heart of the analysis lies in finding the "best" virtual producer for each real producer. If the virtual producer is better than the original producer by either making more output with the same input or making the same output with less input then the original producer is inefficient.

#### **Applications**

DEA has been applied in many situations such as:

- ✓ Agricultural Production Economics
- ✓ health care (hospitals, doctors)
- ✓ education (schools, universities)
- ✓ banks
- ✓ manufacturing
- ✓ benchmarking
- ✓ management evaluation
- ✓ fast food restaurants and
- ✓ Retail stores.

#### **Issues**

- ✓ Measurement of efficiency levels.
- ✓ identification of best practice
- ✓ identification of poor practice
- ✓ target setting
- ✓ resource allocation
- ✓ monitoring efficiency changes over time

#### **Advantages of DEA**

- ✓ DEA can handle multiple input and multiple output models.
- ✓ It doesn't require an assumption of a functional form relating inputs to outputs.
- ✓ DMUs are directly compared against a peer or combination of peers.
- ✓ Inputs and outputs can have very different units.

#### **Disadvantages of DEA**

The same characteristics that make DEA a powerful tool can also create problems. An analyst should keep these limitations in mind when choosing whether or not to use DEA.

- ✓ Since DEA is an extreme point technique, noise (even symmetrical noise with zero mean) such as measurement error can cause significant problems.
- ✓ DEA is good at estimating "relative" efficiency of a DMU but it converges very slowly to "absolute" efficiency. In other words, it can tell you how well you are doing compared to your peers but not compared to a "theoretical maximum."
- ✓ Since DEA is a nonparametric technique, statistical hypothesis tests are difficult and are the focus of ongoing research.
- ✓ Since a standard formulation of DEA creates a separate linear program for each DMU, large problems can be computationally intensive.

[www.etm.pdx.edu/dea/homedea.html](http://www.etm.pdx.edu/dea/homedea.html))

#### **Dea Formulation**

DEA can be formulated in different ways depending on what problem one is focusing on. To measure Technical Efficiency we have two forms of DEA: Output Oriented and Input oriented. To measure the Cost (Economic) efficiency a cost minimization form of DEA is available.

In the input-oriented case, the DEA method defines the frontier by seeking the maximum possible proportional reduction in input usage, with output levels held constant, for each DMU. While, in the output oriented case, the DEA method seeks the maximum proportional increase in output production, with input levels held fixed. The two measures provide the same technical efficiency scores when constant returns to scale (CRS) technology is applied, but are unequal when variable returns to scale (VRS) is assumed. The procedure for finding the best virtual producer can be formulated as linear program. Analyzing the efficiency of 'n' producers is then a set of 'n' linear programming problems.

#### DEA Input-Oriented Primal Formulation

$Min\theta$

$st., Y\lambda \geq Y_0$

$\theta X_0 - X\lambda \geq 0$

$\theta, \lambda \geq 0$

Where,

$Y_0$  is a  $M \times 1$  vector of  $M$  output quantities for the  $i$ -th producer

$X_0$  is a  $K \times 1$  vector of  $K$  input quantities for the  $i$ -th producer

$Y$  is a  $M \times N$  matrix of  $M$  output quantities for all  $N$  producers

$X$  is a  $K \times N$  matrix of  $K$  input quantities for all  $N$  producers

$\lambda$  is a  $N \times 1$  vector of weights; and  $\theta$  is a scalar

$\lambda$  is a vector describing the percentages of other producers used to construct the virtual producer.  $\lambda X$  and  $\lambda Y$  are the input and output vectors for the analyzed producer. Therefore  $X$  and  $Y$  describe the virtual inputs and outputs respectively. The value of  $\theta$  is the producer's technical efficiency.

#### Sample Applications

DEA is commonly applied in the electric utilities sector. For instance a government authority can choose Data Envelope Analysis as their measuring tool to design an individualized regulatory rate for each firm based on their comparative efficiency. The input components would include man-hours, losses, capital (lines and transformers only), and goods and services. The output variables would include number of customers, energy delivered, length of lines, and degree of coastal exposure. (Berg 2010) DEA is also regularly used to assess the efficiency of public and not-for-profit organizations, e.g. hospitals (Kuntz, Scholtes & Vera 2007; Kuntz & Vera 2007; Vera & Kuntz 2007) or police forces (Thanassoulis 1995; Sun 2002; Aristovnik et al. 2012).

#### Example

In the DEA methodology, formally developed by Charnes, Cooper and Rhodes (1978), efficiency is defined as a ratio of weighted sum of outputs to a weighted sum of inputs, where the weights structure is calculated by means of mathematical programming and constant returns to scale (CRS) are assumed. In 1984, Banker, Charnes and Cooper developed a model with variable returns to scale (VRS).

Assume that we have the following data:

- Unit 1 produces 100 pieces of items per day, and the inputs are 10 dollars of materials and 2 labour-hours
- Unit 2 produces 80 pieces of items per day, and the inputs are 8 dollars of materials and 4 labour-hours
- Unit 3 produces 120 pieces of items per day, and the inputs are 12 dollars of materials and 1.5 labour-hours

To calculate the efficiency of unit 1, we define the objective function as

- maximize efficiency =  $(u_1 \times 100) / (v_1 \times 10 + v_2 \times 2)$

which is subject to all efficiency of other units (efficiency cannot be larger than 1):

- subject to the efficiency of unit 1:  $(u_1 \times 100) / (v_1 \times 10 + v_2 \times 2) = 1$
- subject to the efficiency of unit 2:  $(u_2 \times 80) / (v_1 \times 8 + v_2 \times 4) = 1$
- subject to the efficiency of unit 3:  $(u_3 \times 120) / (v_1 \times 12 + v_2 \times 1.5) = 1$

and non-negativity:

- all  $u$  and  $v = 0$ .

But since linear programming cannot handle fraction, we need to transform the formulation, such that we limit the denominator of the objective function and only allow the linear programming to maximize the numerator.

So the new formulation would be:

- maximize Efficiency =  $u_1 \times 100$
- subject to the efficiency of unit 1:  $(u_1 \times 100) - (v_1 \times 10 + v_2 \times 2) = 0$
- subject to the efficiency of unit 2:  $(u_2 \times 80) - (v_1 \times 8 + v_2 \times 4) = 0$
- subject to the efficiency of unit 3:  $(u_3 \times 120) - (v_1 \times 12 + v_2 \times 1.5) = 0$
- subject to  $v_1 \times 10 + v_2 \times 2 = 1$
- all  $u$  and  $v = 0$ .

It should be emphasized that an LP of this form must be solved for each of the DMUs.

There are other ways to formulate this problem such as the ratio approach or the dual problem. The first constraint forces the virtual DMU to produce at least as many outputs as the studied DMU. The second constraint finds out how much less input the virtual DMU would need. Hence, it is called input-oriented. The factor used to scale back the inputs is  $\theta$  and this value is the efficiency of the DMU.

#### **An output – oriented DEA model**

*Max*  $\phi$

*st.*,  $-\phi y_i + Y\lambda \geq 0$

$x_i - X\lambda \geq 0$

$\lambda, \phi \geq 0$

Where,

$y_i$  is a  $M \times 1$  vector of  $M$  output quantities for the  $i$ -th producer

$x_i$  is a  $K \times 1$  vector of  $K$  input quantities for the  $i$ -th producer

$Y$  is a  $M \times N$  matrix of  $M$  output quantities for all  $N$  producers

$X$  is a  $K \times N$  matrix of  $K$  input quantities for all  $N$  producers

$\lambda$  is a  $N \times 1$  vector of weights; and

$\phi$  is a scalar

One should observe that  $\phi$  will take a value greater than or equal to one.  $\frac{1}{\phi}$  defines a

technical efficiency (TE) score which varies between 0 and 1. The above LP is solved  $N$  times- once for each producer in the sample. Each LP produces a  $\phi$  and a  $\lambda$  vector. The  $\phi$ -parameter provides information on the TE score for the  $i$ th – producer and the  $\lambda$  vector provides information on the peers of the (inefficient)  $i$ th – producer. The peers of the  $i$ th – producer are those efficient producers that define the facet of the frontier against which the (inefficient)  $i$ th – producer is projected.

#### **DEA using Linear Programming**

Data Envelopment Analysis is a linear programming procedure for a frontier analysis of inputs and outputs. DEA assigns a score of 1 to a unit only when comparisons with other relevant units do not provide evidence of inefficiency in the use of any input or output. DEA assigns an efficiency score less than one to (relatively) inefficient units from the sample could produce the same vector of outputs using a smaller vector of inputs. The score reflects the radial distance from the estimated production frontier to the DMU under consideration. DEA

assumes that the inputs and outputs have been correctly identified. Usually, as the number of inputs and outputs increase, more DMUs tend to get an efficiency rating of 1 as they become too specialized to be evaluated with respect to other units. On the other hand, if there are too few inputs and outputs, more DMUs tend to be comparable. In any study, it is important to focus on correctly specifying inputs and outputs.

#### Hypothetical Example

Consider analyzing the efficiencies of 3 DMUs where 2 inputs and 3 outputs are used. The data is as follows:

| DMU | input 1 | input 2 | Output 1 | output 2 |
|-----|---------|---------|----------|----------|
| 1   | 5       | 14      | 9        | 4        |
| 2   | 8       | 15      | 5        | 7        |
| 3   | 7       | 12      | 4        | 9        |

The linear programs for evaluating the 3 DMUs are given by:

#### LP for evaluating DMU 1:

$$\begin{aligned} & \min \theta \\ & \text{st.}, 5L1+8L2+7L3 - 5\theta < 0 \\ & 14L1+15L2+12L3 - 14\theta < 0 \\ & 9L1+5L2+4L3 > 9 \\ & 4L1+7L2+9L3 > 4 \end{aligned}$$

#### LP for evaluating DMU 2:

$$\begin{aligned} & \min \theta \\ & \text{st.}, 5L1+8L2+7L3 - 8\theta < 0 \\ & 14L1+15L2+12L3 - 15\theta < 0 \\ & 9L1+5L2+4L3 > 5 \\ & 4L1+7L2+9L3 > 7 \end{aligned}$$

#### LP for evaluating DMU 3:

$$\begin{aligned} & \min \theta \\ & \text{st} \\ & 5L1+8L2+7L3 - 7\theta < 0 \\ & 14L1+15L2+12L3 - 12\theta < 0 \\ & 9L1+5L2+4L3 > 4 \\ & 4L1+7L2+9L3 > 9 \end{aligned}$$

The solution to each of these is as follows:

| value    | DMU 1 | DMU 2 | DMU 3 |
|----------|-------|-------|-------|
| $\theta$ | 1     | 0.773 | 1     |
| L1       | 1     | 0.262 | 0     |
| L2       | 0     | 0     | 0     |
| L3       | 0     | 0.662 | 1     |

Note that DMU1 is overall efficient and DMU 2 is inefficient with an efficiency rating of 0.773333.

Hence the efficient levels of inputs and outputs for DMU 2 are given by:

- Efficient levels of Inputs:

$$0.262 \begin{bmatrix} 5 \\ 14 \end{bmatrix} + 0.662 \begin{bmatrix} 7 \\ 12 \end{bmatrix} = \begin{bmatrix} 5.938 \\ 11.6 \end{bmatrix}$$

- Efficient levels of Outputs:

$$0.262 \begin{bmatrix} 9 \\ 4 \end{bmatrix} + 0.662 \begin{bmatrix} 4 \\ 9 \end{bmatrix} = \begin{bmatrix} 5 \\ 7 \end{bmatrix}$$

Note that the outputs are at least as much as the outputs currently produced by DMU 2 and inputs are at most as big as the 0.773 times the inputs of DMU 2. This can be used in two different ways: The inefficient DMU should target to cut down inputs to equal at most the efficient levels. Alternatively, an equivalent statement can be made by finding a set of efficient levels of inputs and outputs by dividing the levels obtained by the efficiency of DMU 2. This focus can then be used to set targets primarily for outputs rather than reduction of inputs.

#### **DEA to find the Technical efficiency (Input oriented) and Cost efficiency of paddy farmers**

This study is confined to Malnad region of Karnataka state for the crop year 2004-2005. The area selected for study is Shimoga district. Shimoga district has both rainfed and irrigated area under paddy cultivation. Fifty farmers practicing modern agriculture from Shimoga taluk were selected randomly for the study. Simple random sampling technique was employed for selection of the farmers.

#### **Variable inputs selected for the DEA analysis**

- ✓ **Human labor:** Human labor was estimated in terms of eight hours of work per day at the prevailing wage rate in the study area. The prevailing wage rate was on an average Rs. 70 per male labor and Rs.35 for women labor in addition to the food and other forms of payments in kind.
- ✓ **Seeds:** In this area all farmers are using high yielding varieties of rice. The costs of the seeds are calculated at the local market prices for actual expenses incurred in the case of purchased seeds.
- ✓ **Farm yard manure:** The quantity of farmyard manure used in the cultivation of paddy was measured in terms of tonnes. The cost was measured at the prevailing market rate for a ton of FYM, which was on an average Rs. 290 per ton.
- ✓ **Fertilizer:** The major nutrients used for paddy cultivation are Nitrogen, phosphorus and potassium. Costs of fertilizer were based on the actual prices paid by the sample farmers for the products.
- ✓ **Tractor hour:** Most of the farmers used tractor for various activities in the paddy cultivation like summer ploughing, puddling and transportation etc. This variable is a good example for mechanization in rice production.

#### **Outputs selected for the DEA analysis**

- ✓ **Grain yield:** Rice grain yield is the primary product of the rice production. The average rice yield per acre was 22.33 quintal for the crop year 2004-2005.
- ✓ **Straw yield:** Straw is the byproduct in the rice cultivation. The average straw yield per acre is 1 tractor load.

Variable inputs and their relative market prices of the sample farms are presented in the Table 1. With regard to inputs, the distinction is made between man and woman laborers since both group forms the major chunk of total cost but female group is paid half of the wage paid to the man. Variation is seen in the number of man-days employed in the farm work per acre with maximum of 29 man-days and minimum of 6 man-days. And also in the case of fertilizer usage the maximum amount used is 274 Kgs/acre and minimum amount used is 60.80 Kgs/acre. Considering the contribution of the inputs to the total cost and variations in the quantity used across farms, the importance of these inputs including in the efficiency analysis is justified. The input prices faced by farms are almost same for all inputs except for seeds, this is due to usage of ordinary or medium kind of seed variety.

The average output realized by the farm is 23 Qtls/acre. Some farm has also recorded a low yield of 13 Qtls/acre. The output price obtained by farms doesn't indicate huge variation since the rice market is protected by market policy.

**Table 1:** Variable Inputs used on the sample farms

| Particulars                        | Mean     | Maximum  | Minimum |
|------------------------------------|----------|----------|---------|
| Labor (man-day)                    |          |          |         |
| Man Days (man-day)                 | 11.93    | 29.00    | 6.00    |
| Woman Days (woman-day)             | 28.06    | 48.00    | 18.00   |
| Total (man-day)                    | 39.99    | 76.00    | 27.40   |
| Seeds (Kg/Acre)                    | 28.65    | 36.00    | 20.00   |
| Fertilizer (Kg/Acre)               | 147.41   | 274.00   | 60.80   |
| Tractor (Hrs.)                     | 1.24     | 3.00     | 1.00    |
| Farm Yard Manure (Cart Loads/Acre) | 2.83     | 8.00     | 1.20    |
| Woman Labor Price (Rs./woman-day)  | 35.00    | 35.00    | 35.00   |
| Man Labor price (Rs./Manday)       | 70.00    | 70.00    | 70.00   |
| Seeds Price(Rs./Kg)                | 13.70    | 15.00    | 7.60    |
| Fertilizer Price(Rs./Kg)           | 6.40     | 10.00    | 4.00    |
| Farm Yard Manure (Rs./Cart load)   | 237      | 400      | 200     |
| Tractor (Rs./Hr.)                  | 344.00   | 350.00   | 300.00  |
| Total Cost (Rs./Acre)              | 4238.00  | 9274.00  | 2815.71 |
| Rice (Qtl)                         | 23.00    | 32.00    | 13.00   |
| Rice (Rs./Qtl)                     | 512.00   | 600.00   | 475.00  |
| Gross Margin (Rs./Acre)            | 11680.00 | 17280.00 | 6144.00 |

**Table 2:** Variables defined for farms in Rice production

| Output variable             | Input variable                 |
|-----------------------------|--------------------------------|
| $Y_1$ – output: Grain yield | $X_1$ – Male labor             |
| $Y_2$ – output: Straw yield | $X_2$ – Female labor           |
|                             | $X_3$ – Fertilizers            |
|                             | $X_4$ – Seeds                  |
|                             | $X_5$ – FYM (farm yard manure) |
|                             | $X_6$ – Tractor hours          |

The results of the DEA are reported in the Table 3 and 4.

**Table 3:** Descriptive summary of Technical, Cost and Allocative efficiency.

| Sl. No. | Particulars           | Mean | Maximum | Minimum |
|---------|-----------------------|------|---------|---------|
| 1       | Technical Efficiency  | 0.87 | 1.00    | 0.59    |
| 2       | Cost Efficiency       | 0.66 | 1.00    | 0.36    |
| 3       | Allocative Efficiency | 0.76 | 1.00    | 0.42    |

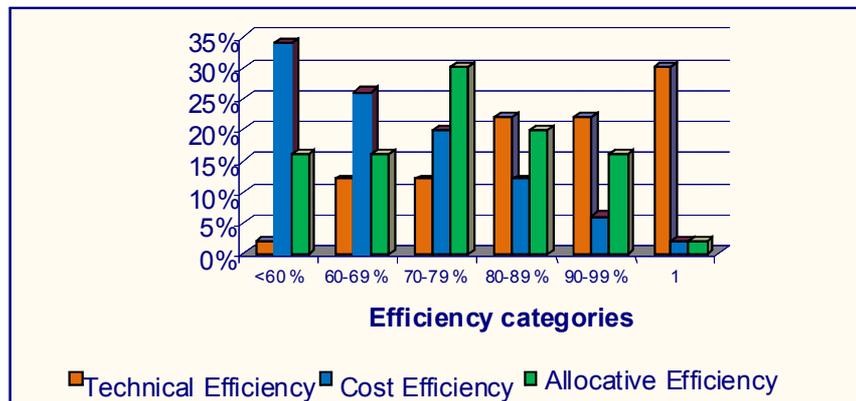
Summary statistics of technical, allocative and cost efficiencies score is given in the above table 3. The average score of technical efficiency is 87 percent with 26 farms achieving complete efficiency. On the contrary in cost efficiency only one farm is completely efficient and majority of the farms (25 farms) scores below 60 percent. The mean allocative efficiency score is 76 percent.

**Table 4:** Number of Farms in the Efficiency Categories.

| Sl. No. | Efficiency Categories | Technical Efficiency | Cost Efficiency | Allocative Efficiency |
|---------|-----------------------|----------------------|-----------------|-----------------------|
| 1       | <60%                  | 1 (2)                | 17 (34)         | 8 (16)                |
| 2       | 60-69%                | 6 (12)               | 13 (26)         | 8 (16)                |
| 3       | 70-79%                | 6 (12)               | 10 (20)         | 15 (30)               |
| 4       | 80-89%                | 11 (22)              | 6 (12)          | 10 (20)               |
| 5       | 90-99%                | 11 (22)              | 3 (6)           | 8 (16)                |
| 6       | 100%                  | 15 (30)              | 1 (2)           | 1 (2)                 |
|         | Total                 | 50 (100)             | 50 (100)        | 50 (100)              |

**Note:** The figures in the parentheses indicates the percentage of farms to total

The only one farm has scored 100 percent efficiency thereby achieving the frontier point. Considering the mean allocative efficiency, other farms can reduce the input costs by 24 percent by noticing the price of inputs during its purchase. Thus allocative efficiency conveys the percentage of cost that could be reduced and still produce the same output level. So from the results it is evident that though majority of the farms achieve 100% efficiency, the numbers are diluted when it comes to allocation. The farmers are over using the inputs relative to their price leading to allocative inefficiency. So DEA provides the precise estimates of efficiency level.

**Figure 1: Distribution of farms in different efficiency categories**

For the same data frontier analysis was done to compare the average technical efficiency of the fifty farmers. The same mean technical efficiency of 0.87 was obtained. By looking at the values for the allocative efficiency we could conclude that the inputs were overused. It could be concluded that by using lower level of input the farmers can produce the same level of output.

#### Case studies

##### Case study 1:

Assessment of Technical Efficiency in Arecanut Production: An application of Non-parametric Linear Programming. (M.T. Rajashekarappa, K.B.Umesh and N. Sivaramane, 2004).

Arecanut is a major plantation crop in the southern transitional and parts of central dry zones of Karnataka, where most of agricultural economy is dependent on arecanut cultivation. Holalkere, shringeri and Thirthahalli talukas of Chitradurga, Chickmagalore, Shimoga districts respectively were purposively selected for the study as these regions represented different production environments and had large area under arecanut cultivation. For this study, the arecanut gardens which were more than 10 years old were included for analysis as arecanut yield stabilizes from this period onwards. A sample size of 43, 46 and 42 farmers from holalkere, Shringeri and Thirthahalli talukas, respectively were interviewed during the agricultural year 1999-2000.

The objective of the study was to assess the technical efficiency in arecanut cultivation, which could be a major factor in explaining the difference between the potential and actual yield levels.

In this study, the Data Envelopment Analysis Program was used as it provides a greater advantage over the frontier production approach on several counts. Firstly, it allows data to behave itself and provides technical efficiency for each firm readily. Secondly, it details out the extent of over use of inputs in relation to output among different farms.

Variables used in the study were: Output in terms of q/ha, Inputs used viz, manure (tones/ha), fertilizers (q/ha), plant protection chemicals (kg/ha), human labor (mandays/ha) and machine labor (days/ha).

The farm specific efficiencies revealed wide variations in the level of technical, allocative and cost efficiencies across the samples. The results of the DEAP analysis reported that the farm level mean technical efficiency varied from 69 *per cent* in Shringeri taluka to 90 *per cent* in Thirthahalli taluka (table 5). This implied that there existed about 10 *per cent* to 31 *per cent* potential for increasing farmers' yield at the existing level of their resources.

The mean allocative efficiency was highest in Holalkere taluka (72%), followed by 63 *per cent* in Thirthahalli and 52 *per cent* in Shringeri taluka. The lower level of allocative efficiencies could be attributed to the lack of adequate farmers' awareness regarding technological developments. The cost efficiency was highest in Holalkere taluka (63%), followed by Thirthahalli (55%) and Shringeri (37%) talukas. (Rajashekarappa *et al*, 2004)

**Table 5:** Frequency distribution of farm specific technical efficiencies in Arecanut.

| Region       | Efficiency level (per cent) | Technical Efficiency | Allocative Efficiency | Cost efficiency |
|--------------|-----------------------------|----------------------|-----------------------|-----------------|
| Holalkere    |                             |                      |                       |                 |
|              | 25-50                       | 0 (0.0)              | 3 (7.0)               | 9 (21.0)        |
|              | 50-75                       | 9 (21.0)             | 16 (37.0)             | 23 (54.0)       |
|              | 75-100                      | 34 (79.0)            | 24 (56.0)             | 11 (25.0)       |
|              | Mean Efficiency             | 86                   | 72                    | 63              |
|              | No. of farms                | 43                   | 43                    | 43              |
| Shringeri    |                             |                      |                       |                 |
|              | 25-50                       | 8 (18.0)             | 20 (44.0)             | 36 (78.0)       |
|              | 50-75                       | 19 (41.0)            | 23 (50.0)             | 7 (16.0)        |
|              | 75-100                      | 19 (41.0)            | 3 (6.0)               | 3 (6.0)         |
|              | Mean Efficiency             | 69                   | 52                    | 37              |
|              | No. of farms                | 46                   | 46                    | 46              |
| Thirthahalli |                             |                      |                       |                 |
|              | 25-50                       | 0 (0.0)              | 5 (12.0)              | 13 (31.0)       |

|  |                 |           |           |           |
|--|-----------------|-----------|-----------|-----------|
|  | 50-75           | 5 (12.0)  | 32 (76.0) | 25 (59.0) |
|  | 75-100          | 37 (88.0) | 5 (12.0)  | 4 (10.0)  |
|  | Mean Efficiency | 90        | 63        | 55        |
|  | No. of farms    | 42        | 42        | 42        |

**Note: The values within the parentheses denote percentages of farms in each Efficiency category.**

**Source: Rajashekarappa et al (2004)**

In this study, the technical, allocative and Cost efficiency of individual farms has been estimated using farm level data of arecanut in Karnataka for the production period 1999-2000 using DEAP approach. The mean technical efficiency has been found to vary widely (69% to 90%) among the sample farms and across regions, which indicates that on an average, the realized output can be raised by 10 to 31 *per cent* without any additional resources in the arecanut growing regions. Various socio-economic, biophysical and technological factors may be responsible for the observed difference in efficiency in the farms. The results also show that through proper use of even the existing technology, a huge potential in improving productivity of arecanut can be exploited. So concerted efforts should be made to strengthen the extension services and training programs. In this regard CAMPCO (Central Arecanut and Cocoa Marketing and Processing Cooperative Ltd) and MAMCO (Malnad Arecanut Marketing Cooperative Ltd) can play a leading role, as they have much stake in the arecanut economy of Karnataka.

**Case study 2: Labor-Use Efficiency in Indian Banking: A Branch Level Analysis**  
(Abhiman Das, Subhash C. Ray and Ashok Nag, 2005)

This paper uses Data Envelopment Analysis to measure levels of labor use efficiency of the individual branches when measured against a benchmark constructed from the data from all branches in the sample. The study is designed to judge the branch-level labor cost-inefficiency of a single bank across the four biggest metropolitan cities viz. Mumbai Delhi, Kolkata and Chennai in India characterized by varied work culture.

The performance of each branch in the sample is measured against two different frontiers: one based on branches from all the four regions in the sample and the other based only on branches from the metro region where it is located. The first can be regarded as the national or *grand* frontier and the other as the regional or metro frontier. The data are based on 222 bank branches as on March 31, 2003 (and 191 as on March 31, 2002).

Labor cost efficiency score of each branch within each metro city was estimated for the years 2002 and 2003 separately based on their individual frontier and also based on the grand frontier comprising all the observations taken together. The role of each metro city in defining the overall efficiency is captured by an overall measure of the distance of individual frontier to the grand frontier and is called as *Area Efficiency*. Area efficiency broadly reflects impact of the social, economic and cultural factors in a particular area on the labor efficiency of a branch. While achievement of high overall efficiency becomes a target at corporate level, the issues relating to area efficiency call for actions at local/regional controlling offices. Table 6 presents the year wise average distribution of bank branches within metro, overall and area efficiency scores. The number of branches in the regions of Kolkata and Chennai were relatively higher in the sample used. Average labor efficiency of all four metro centers based on their respective within metro frontiers in 2002 stood around 77%. Even when judged against the within-metro frontiers, significant degrees of labor inefficiency on average are found for each region. For Delhi it was the highest, followed by Kolkata in 2003. However, except for Kolkata and Chennai, average labor efficiencies seem to have improved in other two cities in 2003. This was most pronounced in the case of Mumbai. By contrast, Kolkata showed a sharp drop in efficiency. This finding of substantial labor cost-inefficiency

at the branch level in each metro city signals the presence of substantial inefficiency at the bank level. Thus, even on the basis of data from a single bank, we can conclude that this bank has significant inefficiency relative to a 'true' best-practice bank frontier which includes only branches that are on the branch frontier. The bank as a whole is inefficient because most of its branches do not perform near the levels of its own best practice offices. The observed dispersion of efficiency, as measured by its Standard Deviation, of these branches was found to be relatively high. While the branches in Kolkata recorded low dispersion, those in Delhi witnessed higher variability. Higher dispersion in labor efficiency also suggests that the bank is not able to control fully the performance of its branches. (Das *et al.*, 2005)

**Table 6:** Mean efficiency of branches across regions: 2002 and 2003

| Region/Year | No. of Branches |     | Labor Efficiency                 |       |                             |       | Area Efficiency (%) |       |
|-------------|-----------------|-----|----------------------------------|-------|-----------------------------|-------|---------------------|-------|
|             |                 |     | Based on individual frontier (%) |       | Based on grand frontier (%) |       |                     |       |
|             |                 |     | 2002                             | 2003  | 2002                        | 2003  | 2002                | 2003  |
| Mumbai      | 32              | 39  | 78.23                            | 82.35 | 49.3                        | 62.87 | 64.48               | 77.08 |
| Delhi       | 33              | 46  | 66.09                            | 72.17 | 64.37                       | 59.64 | 96.21               | 87.5  |
| Kolkata     | 72              | 81  | 79.09                            | 74.35 | 47.29                       | 54.63 | 57.46               | 69.94 |
| Chennai     | 54              | 56  | 80.63                            | 78.01 | 65.73                       | 71.79 | 84.1                | 91.99 |
| All         | 191             | 222 | 77.14                            | 76.23 | 55.79                       | 61.44 | 72.14               | 84.94 |

**Source:** Das *et al.* (2005)

Estimates of labor cost efficiencies based on the grand frontier were lower as expected. Except for Chennai, the cost inefficiencies are substantial for all the other cities. Kolkata registered inefficiency of more than 50% in 2002. This suggests that the branches which were efficient within each metro region may not necessarily be efficient at all India level. Delhi recorded the highest level of area efficiency (when averaged over the two years). This is particularly interesting in light of the fact that both the within metro and the grand efficiency scores were higher in Chennai than in Delhi. However, the Delhi frontier appears to be closer than the Chennai frontier to the grand frontier. This clearly highlights the role of area efficiency. At the other end, low level of area efficiency of Kolkata clearly demonstrates the detrimental effects of poor work culture on the performance of branches. In other words, low level of area efficiency is reflected by high level of operating costs as compared to their outputs. In addition, these may indicate that the bank's management is not able to control fully the costs at its branch offices through its policies and procedures, incentives, and supervision. Rather, the quality and effectiveness of local management appears to be more important in determining the performance of branches. Within the metro regions, less than one-fourth of the branches were found to be cost efficient and in the aggregate scenario, only about 7%-8% branches were cost efficient (Table 7). It is also interesting to note that these proportions are quite stable across years despite the increase in the number of branches in 2003. None of the branches in Mumbai made it to the grand frontier in 2003. That is, the bank failed to create any model branch in Mumbai. The overall *area* efficiency of a region identifies how far the metro region as a whole lags behind the nation in terms of efficiency.

**Table 7:** Frequency Distribution of Efficient Branches: 2002 and 2003

| Region/Year | Based on individual frontier |      |            |       | Based on grand frontier |      |            |      |
|-------------|------------------------------|------|------------|-------|-------------------------|------|------------|------|
|             | Number                       |      | Proportion |       | Number                  |      | Proportion |      |
|             | 2002                         | 2003 | 2002       | 2003  | 2002                    | 2003 | 2002       | 2003 |
| Mumbai      | 5                            | 12   | 15.63      | 30.77 | 2                       | 0    | 6.25       | 0.00 |

|         |    |    |       |       |    |    |       |      |
|---------|----|----|-------|-------|----|----|-------|------|
| Delhi   | 7  | 13 | 21.21 | 28.26 | 5  | 4  | 15.15 | 8.70 |
| Kolkata | 15 | 13 | 20.83 | 16.05 | 3  | 8  | 4.17  | 9.88 |
| Chennai | 16 | 14 | 29.63 | 25.00 | 4  | 5  | 7.41  | 8.93 |
| All     | 43 | 52 | 22.51 | 23.42 | 14 | 17 | 7.33  | 7.66 |

**Source: Das *et al* (2005)**

From the regional and the national measures of the levels of efficiency of individual branches in a given region, we can construct a summary measure of the overall *area efficiency* of a region. Not surprisingly, Kolkata scored the least in this respect. Mumbai, the capital city of the politically turbulent state of Maharashtra had the second lowest score.

**Case study 3:** Measuring the Performance of Water Service Providers in Urban India: Implications for Managing Water Utilities (Shreekanth Gupta, Surender Kumar and Gopal K. Sarangi, 2006)

This study assesses the efficiency of urban water supply system in selected 27 Indian cities for the year 2004-05. It applies output oriented data envelopment analysis (DEA) as an analytical tool for measuring technical efficiency. Output oriented measures of technical efficiency tell us how much more a water utility can produce from a given amount of resources. Cities are categorized into two groups (e.g. Municipal Corporations and Government, and Municipal Corporations and parastatals) (A parastatal or para-statal is a fully or partially state-owned corporation or government agency) according to the management structures of their water utilities.

The present study has taken 27 cities into consideration for the analysis. The cities which are analysed in the present study are: Agra, Ahmedabad, Amritsar, Bhopal, Bhubaneswar, Chandigarh, Coimbatore, Guwahati, Hyderabad, Indore, Itanagar, Ludhiana, Mathura, Meerut, Mumbai, Madurai, Mysore, Nagpur, Nanded, Nasik, Pune, Raipur, Rajkot, Surat, Vadodara, Vijayawada, and Visakhapatnam. The selection of inputs and outputs for the estimation of technical efficiency is based on the availability of data as well on the knowledge gained from the literature survey. The variables chosen for the present analysis are as follows: revenue expenditure (rupees/year), water production capacity, and water served. The first two variables are treated as inputs and total water served (Water served is defined as lpcd multiplied by the population of the city) is used as output. (Liters per capita per day).

A water utility is said to display total technical efficiency ( $TE_{CRS}$ ) if it produces on the boundary of the production possibility set i.e., it maximizes output with given inputs and after having chosen technology. This boundary or frontier is defined as the best practice observed assuming constant returns to scale.

The total technical efficiency can be further decomposed into pure technical efficiency ( $TE_{VRS}$ ) and scale efficiency (SE). For the calculation of scale efficiency, the methodology suggested by Coelli *et al* (1998) was applied. Calculation of SE itself assumes the calculation of TE measures under both CRS and VRS. If there is a difference between the scores of technical efficiency under CRS and VRS for a certain farm, the difference indicates that a water utility is scale inefficient. Scale efficiency measure can be calculated by dividing the total technical efficiency by pure technical efficiency.

$$SE = TE_{CRS} / TE_{VRS}$$

Scale Efficiency can be interpreted as follows:

If  $SE > 1$ , then a water utility operates under increasing returns to scale. It means that a water utility is scale inefficient because to its possibilities it can achieve bigger output.

If the scale efficiency = 1, then the water utility is operating under constant returns to scale.

If the  $SE < 1$ , then a water utility operates under decreasing returns to scale and inefficiency is caused by too big output.

Using the data set for 27 cities, output oriented technical efficiency scorings are generated and are presented in Table 8. Since output oriented measure of technical efficiency is used, the efficiency scores greater than one implies that the utility has potential to increase its output for the given level of inputs. The efficiency estimates reveal that two cities, namely, Agra and Surat are operating at the frontier.

These cities are also operating at the optimal scale of operation. On the other hand, Mathura, Bhopal, Visakhapatnam, Nasik and Itanagar are the worst performing cities. These cities have the potential to increase the quantity of water supplied by three to eight times. The other cities have the potential to increase the desired output by some percentage to three times. Scale efficiency gives quantitative information of scale characteristics.

**Table 8:** Output-oriented technical efficiency of urban water providers in India

| Group                                  | City           | Scale Efficiency | Pure Technical Efficiency | Technical Efficiency at CRS |
|--|----------------|------------------|---------------------------|-----------------------------|
| Municipal Corporations and Government  | Bhubaneswar    | 1.074            | 1.08                      | 1.16                        |
|  | Chandigarh     | 1.471            | 1.02                      | 1.5                         |
|  | Raipur         | 1.025            | 1.6                       | 1.64                        |
|  | Greater Mumbai | 2.02             | 1                         | 2.02                        |
|  | Rajkot         | 1.146            | 1.78                      | 2.04                        |
|  | Nagpur         | 1.75             | 1.2                       | 2.1                         |
|  | Pune           | 2.14             | 1                         | 2.14                        |
|  | Ahmedabad      | 2.15             | 1                         | 2.15                        |
|  | Vadodara       | 1.51             | 1.47                      | 2.22                        |
|  | Vijayawada     | 1.455            | 1.56                      | 2.27                        |
|  | Indore         | 1.66             | 1.53                      | 2.54                        |
|  | Guwahati       | 2.93             | 1                         | 2.93                        |
|  | Itanagar       | 3.21             | 1                         | 3.21                        |
|  | Nasik          | 1.769            | 1.86                      | 3.29                        |
|  | Bhopal         | 1.419            | 2.65                      | 3.76                        |
|  | Average        | 1.69             | 1.32                      | 2.23                        |
| Municipal Corporations and Parastatals | Surat          | 1                | 1                         | 1                           |
|  | Agra           | 1                | 1                         | 1                           |
|  | Meerut         | 1.187            | 1.23                      | 1.46                        |
|  | Amritsar       | 1.252            | 1.27                      | 1.59                        |
|  | Nanded         | 1.073            | 1.92                      | 2.06                        |
|  | Coimbatore     | 1.21             | 1.81                      | 2.19                        |
|  | Ludhiana       | 1.779            | 1.31                      | 2.33                        |
|  | Mysore         | 1.044            | 2.28                      | 2.38                        |
|  | Madurai        | 1.016            | 2.48                      | 2.52                        |
|  | Hyderabad      | 1.849            | 1.46                      | 2.7                         |
|  | Visakhapatnam  | 1.324            | 2.99                      | 3.96                        |
| Mathura                                | 1.047          | 7.68             | 8.04                      |                             |
| Average                                | 1.2            | 1.82             | 2.2                       |                             |
| Overall Average                        |                | 1.43             | 1.55                      | 2.21                        |

Source: Gupta et al (2006)

The overall average figures of scale inefficiency reveal that the utilities are not utilizing their resources optimally. We find that Itanagar, Guwahati, Pune and Ahmedabad are most scale inefficient water utilities. These water utilities can improve their performance by changing the level of their operation.

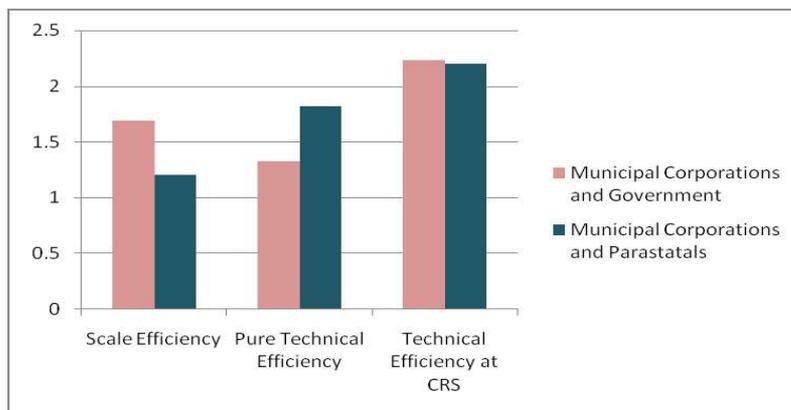
Technical efficiency is decomposed into scale efficiency and pure technical efficiency. Table 9 reveals the operating scale of different water utilities. The scale efficiency results indicate that only two of the utilities are operating at the optimal scale and seven cities are operating under increasing returns to scale. But all the remaining cities, i.e., eighteen water utilities are operating under DRS. These results have implication for urban domestic water pricing. Generally, in the public utility pricing literature it is assumed that the utilities are operating under IRS and the marginal cost-pricing rule that ensures economic efficiency is not applied since the full cost is not recovered. These results support the idea that to get efficiency in the operation of water utilities the water should be priced according to the marginal cost of supply of the water.

**Table 9:** Returns to Scale observed at various water utilities

| Returns to Scale                                     | Name of the City   |
|--|--|
| Constant Returns to Scale (Optimal Returns to Scale) | Surat and Agra   |
| Increasing Returns to Scale                          | Raipur, Madurai, Mathura, Bhubaneswar, Nanded, Guwahati and Itanagar   |
| Decreasing Returns to Scale                          | Chandigarh, Nagpur, Ahmedabad, Coimbatore, Vadodara, Vijayawada, Mysore, Hyderabad, Nasik, Bhopal, Visakhapatnam, Meerut, Amritsar, Greater Mumbai, Rajkot, Pune, Ludhiana, Indore |

**Source:** Gupta *et al* (2006)

Figure 2 shows the performance of water utilities according to their management structures. The efficiency scores reveal that the water utilities run by the combination of Municipal Corporations and parastatal bodies are performing not better than the other group in terms of overall technical efficiency.



**Figure 2:** Average Group Efficiency Estimates

**Source:** Gupta *et al* (2006)

The decomposition of technical efficiency results reveal that though the group consisting the utilities that are managed by Municipal Corporations in association of parastatals is not different in terms of overall technical efficiency, but they have relatively

better performance in terms of scale efficiency to the other group (Figure 7). The results presented in tables 8 and 9 also indicate that the scale efficiency is clearly linked to the management of the utility although in both the groups utilities are operating under DRS and IRS. In the group consisting of Municipal Corporations and Government there are four utilities and in the other group there are three utilities that are operating under IRS. *Per se*, the utilities operating under IRS are small cities in comparison to other cities, and the variation in efficiency scores warrants more analysis.

The results indicate that the utilities, which are run by Municipal Corporations and parastatals, perform relatively better in comparison to the group combined by Municipal Corporations and Government. Taking the variable of total water served as an indicator of the operating performance, we find that the utilities run by Municipal Corporations and parastatals are relatively scale efficient in comparison to the group combined by Municipal Corporations and Government. The offshoot of analysis suggests that as most of cities (e.g. eighteen out of twenty seven) are operating under decreasing returns to scale, marginal cost pricing principles can be followed. This is in contrast to the common pricing practice of utilities having the character of natural monopoly.

### Conclusions

The DEA is easy to calculate and interpret. The Efficiency analysis identifies inefficiency and suggests the best practices. The inefficient farms can follow thereby releasing the overused inputs into other economic activities. Benchmarking using the efficient farms would be helpful to find the lacunae in the practices of inefficient farm. The efficient farms can enhance their current practices by sharing the information with other frontier farms. The DEA is extremely useful in promoting the best agricultural practices through benchmarking. With information about other farm characteristics like age, education, technology adoption level, infrastructure availability, risk aversion etc., the inefficiency of the farms could be well justified by estimating the relationship between efficiency parameters (Technical efficiency, cost efficiency and allocative efficiency) and farm characteristics. Respective agricultural development programs could be framed to improve the efficiency of the farm.

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## Calling on Our Higher Selves in Mediation



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As future and present mediators, we are always at a critical juncture. We have choices as to how to respond to conflict. We need to decide how to provide a safe, trusting space for people to work together; how to approach the issues being presented; and how to acknowledge the differences that may be apparent or hidden that act as additional obstacles to the parties coming together. We can focus on how we “get through” this “next” mediation or how we can see the “next” mediation as another opportunity to help people learn from the conflict and about themselves. We are also always balancing any stressors happening in our own lives, despite our desire to be professional and present. In the time of Covid-19 with the additional pressures of a global pandemic intensifying financial, racial, religious, and health issues, the internal and external pressures are intensified.

With the use of virtual environments, mediators globally have moved sessions online. The new platform provides video and audio interaction to allow all participants an opportunity to connect, even when it is not possible in person. Numerous workshops and programs have been developed to help people become adept at using these technologies and many mediators quickly moved online. Clients have also had no choice but to adjust.

Whenever possible, mediations have continued during one of the most stressful times of our planet. It requires we slow down the process of “getting through the next mediation” and begin thinking more intentionally about the work we are doing. Kahneman (2011) calls the more intentional “slow thinking” a cognitive process that is more rational, deliberate, and effective. We are more vulnerable to mistakes when we move quickly and overconfidently.

Along with being more deliberate, our thoughts benefit from being more compassionate. Numerous authors in business, healthcare, leadership, and economics, have indicated that compassion is critical during this time. We know from Bloom’s (2016) work that empathy itself can cause us to lose perspective because we become enmeshed with the problems. Norton, Johnson, & Woods (2016) describe that lawyers are uniquely vulnerable to fatigue due to compassion. The competitive nature of law, self-reliance, lack of self-awareness, isolation, and acceptance of the adversarial environment all were seen as contributing factors to increased stress related illness and burnout among attorneys. Taking on the clients’ pain only adds to the pressure. Given that the majority of mediators are also lawyers, stress becomes a factor in many mediations. A reflective process that would help individuals see the need for a different model has not been the norm for most law firms, court systems, or mediations.

Bloom (2016) suggests that if we show “radical compassion” instead of “empathy,” we can become sensitive, respectful, and more helpful. Rather than producing burnout, radical compassion causes individuals to feel more energized, engaged, and willing to help more. Just as a physician is able to move from patient to patient, a mediator can avoid burnout and continue to attend to issues when dealing with multiple conflicting situations by using compassion not empathy. Bloom (2016) continued that compassion enabled individuals to see the suffering, show concern, exhibit kindness, and help. The helping process became rewarding instead of being draining. Jackson (2020) echoes this thought that compassion might emerge as a most important element in how we approach ourselves and our work, especially during the pandemic. It holds promise for lawyers, who are predisposed to being stressed and taking on the issues of clients.

From neuroscience, Singer and Klimecki (2016) validated that stressful situations had different effects on us depending on how we approached the conflicts. Empathy was stressful in and of itself. It was associated with “self-related emotion, stress, poor health, burnout, withdrawal and non-social behavior” (p. 875). Compassion did not produce the same outcome. Compassionate responses created “other-related emotion, positive feelings (e.g., love), good health, approach and prosocial motivation” (Singer & Klimecki, 2016, p. 875). They summarized that the research had implications for individuals helping other people in stressful situations. It clearly had ramifications for those in mediation and law.

Lawyers have not been at the forefront of discussing how to integrate compassion into practice. During the covid-19 crisis, this has not changed. However, we know from Detrani (2020), that “there is a sense of interconnectedness that brings comfort to those of us who tend to overthink things (*read: every lawyer ever*). An acknowledgment that we are in this together — whatever “this” turns out to be when it’s all said and done.” The demanding environment combined with individuals prone to stress, makes compassion a necessity. The mediation setting is an excellent place for the less adversarial environment to happen. Helping the mediator to not take responsibility for the outcome, emotional ownership for the pain that has happened, the onus to find a quick remedy. Especially during times of crisis and stress, it is important to respect, to listen, and to focus on what can be done together. It provides an environment that helps everyone.

We know that especially for mediators, a compassionate approach has value. Compassion has always been an important cornerstone for helping people change. The intersection between caring and understanding brought together the elements that also had the most influence on positive therapy outcomes (Bayne & Hays, 2017). Compassion also has a positive impact on conflict resolution. In a study of the impact compassion has on conflict, Klimecki (2019) cites “growing evidence that empathy and compassion are associated with more prosocial behavior in interpersonal relations. Furthermore, empathy and compassion have been associated with more favorable attitudes and higher readiness for reconciliation across a range of intergroup settings.” While mediators may not always see compassion as a power-full approach when entering into a conflicted situation, it is effective.

Compassion towards self also needs to be included. In a study by Yarnell and Neff (2011), they looked at how individuals balance their personal needs with the needs of other people when in conflict. “Across contexts, higher levels of self-compassion were related to greater likelihood to compromise and lesser likelihood to self-subordinate needs, as well as greater authenticity, lower levels of emotional turmoil, and higher levels of relational well-being” (p. 146). The application of self-compassion toward has legitimacy and value, especially for mediators. Knowing that all conflict is layered and intensified, taking time to respect and honor the struggle in each other and ourselves is important.

Christian (2017) described “compassionate curiosity” to explain approaching conflict with respect and staying present with the conflict. It was an active approach to taking

compassionate understanding into mediation. Compassion was not a static experience, but one that facilitated movement in mediation. At the heart of the process, what made a difference, was the mediator having an approach that respectfully embodied a caring attitude. Rosler, Cohen-Chen, and Halperin (2017) showed how compassion was important during the beginning of conflict. Helping individuals show compassion was critical in the important phase of conflict when it is easy for the process to escalate. Their research studies also pointed out that hope was important as the conflict “deescalated” and the process became more conciliatory. The value of respecting, understanding, and honoring the discomfort and anger people were experiencing and understanding how it was part of a process culminating in peaceful resolution of differences was anchored in psychological research. It has also been shown to be beneficial in mediation.

We gained an integrated perspective of the importance of systemic compassion from Rothbart & Allen (2019) in their study looking to promote peace. Their review showed how inducing compassion through mediation training, individuals in conflict felt more connected and had deeper positive feelings toward the other person or group. Drawing from brain research, they validated that the positive changes in perception were evident at the neurological level. A compassionate approach to resolving conflicts impacts not only the resolution of the issues, but creates a more positive, respectful environment. In the time of Covid-19, a compassionate approach may help conflicted parties not only find resolution to their concerns but become more understanding of other people.

Integrating compassion into our lives and our work takes effort. In an environment that is competitive, ego-driven, and layered with complex contextual pressures, it is even more challenging. Despite compassion having many intrinsic and extrinsic benefits, it takes time to master. “As with many habits that are useful, developing compassion takes consciousness, effort, and practice. We each have an innate capacity for compassion but must develop it like any other skill” (Noll, 2005). It is important to remember that it is a process. Becoming compassionate may be intertwined with emotions that we feel about our own abilities and worth, just as we learn to honor the value of others.

Approaching mediations with compassion means we need to be open to seeing clients, others, and ourselves with more consideration. It means we need to focus on the courage our clients have shown in taking their issues to a third-party mediator, the vulnerability involved in that process as well as respecting we are all experiencing a most stressful environment. It means as mediators, we do not need to make their pain our own when we want to be helpful. It means we all remember that underneath the anger is hurt and embarrassment. The vulnerability seldom shows itself in mediation, but it is always there. If we want to be more effective, we need to become more open to listening beyond the harsh words and seek to show compassion and understanding of the broader interests as well as the common humanity uniting them...and all of us.

For mediators who are lawyers, the message is even more pressing. In the midst of a global pandemic that has unsettled every area of our lives and threatens our existence, we must be more aware of the important lessons compassion offers us. As Detrani (2020) indicates, “the silver lining might just be that the legal world is a little bit kinder, a shade less cut-throat, a better place to find your way not just as a professional but also a person — a team in which we all root for each other.” We all have much to gain by moving away from looking at “wins” and “losses” and the commonly practiced expedient approach in focusing on quickly resolving the “next” conflicted situation.

We are at another juncture. As mediators, we need to once again move beyond taking on the pain of those in conflict and allowing our schedules to push us into automatic responses to resolutions. We need to remember we are peacemakers. We need to see the potential inherent in realizing each conflict is an opportunity to help people see hope even

when feeling hopelessness, to see that the “other” person in the conflict is more like them than someone who is different. We can be more compassionate and gentler with ourselves. We can begin realizing that we can take any conflict, be it between corporations, organizations, or individuals, and see it as a way to improve skills in listening as well as respecting the lessons learned from being vulnerable, and maybe even, healing relationships. To be the most effective during this time we can use this opportunity to call on our higher selves and make peace.

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# Premises of Developing and Implementing A Strategy for Identifying and Storing Talents in Public Organizations



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## Abstract

Our research starts from the premise that talent has its roots in the specific knowledge, skills and experience of employees with superior potential. The critical analysis of the specialty literature will follow the way of developing a strategy for identifying and retaining talents in the organization based on the statement that employees are unique in skills, behavior, thinking and so we can say that identifying talent in the process of recruitment and selection, as well as in the process of carrying out the activity of the organization is not an easy activity because, by definition, talented are those employees who constantly provide positive results and achieve superior performance, have expertise in sensitive areas of activity.

**Keywords:** talent management, public organisations, strategy, dimensions of talent.

## Introduction

The year 2020 began with many challenges for both employees and organizations, and one of these challenges was the crisis generated by the COVID-19 virus, a crisis that led to isolation, social distancing, all with negative effects on human behavior, as well as on the development in good conditions of the activity of the public organizations (Idowu et al., 2017).

In this context we will critically analyze, from a theoretical point of view, following to substantiate them also from a practical point of view in the third scientific research report, the premises for developing and implementing an effective strategy for identifying, motivating and retaining talents in organizations, with particularization on public organizations.

In our research we will seek to find answers to a series of questions such as:

Why are talents important for public organizations?

What are the methods for identifying talents in public organizations?

What motivates talented employees to stay in the organization?

Which strategies are more effective in retaining talents in public organizations?

In our research we start from the premise that talent has its roots in the specific knowledge, skills and experience of employees with superior potential.

### **The development of a strategy for identifying and retaining talents in the organization**

The literature abounds with definitions of talent and we presented some of them in the first scientific research report. Therefore, in this chapter we will refer to some of the characteristic elements of talent and talent management that support the argument for the need to develop a strategy for identifying and retaining talents in organizations.

People are unique in their skills, behavior, way of thinking and so we can say that identifying talents both in the recruitment and selection process and in the process of carrying on the activity of the organization is not an easy activity because, by definition, talented are those employees which constantly provide positive results and achieve superior performance, have expertise in sensitive areas of activity.

The literature positions the concept of talent according to certain key dimensions, such as the object-subject dimension (Bolander et. al., 2017). Talent as an *object* or the approach to talent as an attribute is a set of characteristics and attributes of individuals and not of a single person. Talent as a *subject* or approach to talent as a person, talent is associated with people or with certain people.

Robert E. Lewis and Robert J. Heckman (2006) consider that there are three approaches to talent management.

A first approach is the one through which the concept of talent management is considered as a label of human resources management and recruitment and selection practices, personal development, leadership and career planning.

Strategic talent management differs from strategic human resource management in that strategic talent management focuses on those employees who have and are identified as talents, while strategic human resource management focuses on all employees in the organization.

The second approach considers talent management as a set of processes that ensure an efficient succession of employees in the organization. Therefore, it is considered that talent management focuses on an analysis of employee needs and their promotion.

Akram Al Ariss, Wayne F. Cascio, Jaap Paauwe (2014) consider that the third approach actually refers to the talents and the management of employees in the organization.

David G. Collings and Kamel Mellahi (2009) move to the fourth approach to talent management and establish a relationship between identifying strategic positions in the organization and developing a group of talents who have the necessary skills to occupy these relationships.

Wayne F. Cascio and John W. Boudreau (2016) consider talent management as a process that identifies with strategic roles or key positions in the organization. Any talent management system consists of a consolidated process of differentiating roles within organizations, with a greater emphasis on strategic jobs than those that are not of strategic importance or, more importantly, between those organizational roles that have a higher impact on the performance of the organization, compared to those roles that can provide an above average impact.

The specialty literature in the field of talent management focuses on *the dimensions* of talent management or, as Cappelli and Keller (2014) call them, *the tensions* of talent management.

The dimensions of talent management are classified into exclusive dimensions, whereby talent is considered the attribute of the organization's elites (Schuler et al, 2011) and inclusive dimensions that consider talent to be an attribute of the individual and therefore any employee has a certain talent, thus becoming a strategic resource (Burlea-Schiopoiu, 2008; Collings and Mellahi, 2009).

The organization's responses to tensions are classified, by Anne E. Bardoel (2016), into five categories involving lack of recognition, opposition, spatial separation, temporal separation, and synthesis. Lack of recognition is not among the talent management strategies and can lead to contradictions between employees in unexpected and unproductive situations.

Opposition is a strategic approach because it involves the explicit recognition of tensions and a strategic decision can lead to the explicit resolution of a tension. Spatial separation involves the strategic application of different policies in different locations of the organization, depending on the context or the local separation of the organization's policies. Temporal separation involves taking into account the time that is very valuable in the strategic process of identifying and retaining talents in the organization. The synthesis refers to the development of new terms or concepts for resolving tensions through the involvement of leaders and the efficient use of the communication process.

### **The implementation of a strategy for identifying and retaining talents in the organization**

The elaboration of a strategy for identifying and retaining talents in the organization does not mean that the organization will have talents and will carry out its activity through their optimal capitalization, but on the contrary the process of implementing the strategy is the one that ensures the success of the strategy. Most research on how to implement talent strategies has been conducted in the United States, which is considered by David G. Collings, Hugh Scullion and Vlad Vaiman (2011) as a limitation of talent management research.

Cecile Dejoux and Maurice Thévenet (2010, 2016) identified talent with competence, expertise and potential, considering them important for employees. The difference between competence and qualification is that the individual, in terms of competence, is unique and can be proven by any employee, regardless of seniority in the organization, while qualification is a collective attribute. On the other hand, competence consists in taking initiative and taking responsibility in critical professional contexts, as well as practical intelligence with applicability in difficult professional situations, being a set of skills that can be used in order to solve a problem in a given situation (Burlea-Schiopoiu and Burdescu, 2016).

The difference between competence and expertise lies in the fact that expertise corresponds to a higher level of mastery obtained by extensive experience in a well-defined field, being generated by long-term experience and effort, while competence corresponds to the ability to master specific work situations by talented employees.

The success of implementing a talent management strategy lies in the efficiency of programs and processes designed to identify and develop leaders meant to support the development of the organization (Burlea-Schiopoiu and Remme, 2017). Therefore, leadership development is a very important process within organizations that can help retain and develop talents within the organization. Talent management incentive programs are designed to support organizations to assess employee leadership qualities in order to develop mentoring programs for these employees.

Public organizations can implement the talent management strategy either by focusing on the qualities of leaders or on what leaders undertake. Thus, the competitive business environment and workforce that have different levels of skills and abilities, impose contextual or relevant leadership styles that are based on situational variables and objectives set to provide superior performance.

Talent management practices must focus on developing leadership capacity within organizations with a considerable degree of flexibility, implementing a situational leadership approach. The situational approach or approach to leadership effectiveness considers the ever-increasing role of leadership in the process of improving the innovative skills of the organization. The implementation of a talent management strategy consists of a set of activities and processes that involve the systematic identification of key positions that

contribute, in a differentiated way, to achieving a competitive and sustainable advantage of an organization, but also to the development of talents with potential and performance in order to fulfill these roles and the development of a differentiated human resource architecture.

### Conclusions

Our research aimed to identify those elements that contribute to the identification and retention of talent in organizations, mainly in public organizations. Considering that talent identification is a difficult task for organizations, especially in the context in which, although due to the crisis caused by COVID-19, the global unemployment rate has risen, yet most sectors face a deficit of qualified staff, which makes finding and retaining talents a continuous challenge for organizations. Therefore, one of the conclusions we have reached is that organizations need to adopt an effective strategy to retain talent and that this strategy should be based on well-founded internal talent identification and retention programs.

Talent management is a process that identifies with strategic roles or key positions in the organization and any talent management system consists of a consolidated process of differentiating roles within organizations, with a greater emphasis on strategic jobs compared to those that are not of strategic importance or, moreover, between those organizational roles that have a higher impact on the performance of the organization, compared to those roles that can provide an above average impact.

Strategic talent management differs from strategic human resource management in that strategic talent management focuses on those employees who have and are identified as talents, while strategic human resource management focuses on all employees in the organization.

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# Particularities of Sustainable Development Management at the Agricultural Research-Development Station from Caracal



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## Abstract

The paper aims at the integrative approach of sustainable development management at the Agricultural Research-Development Station in Caracal (SCDA). Our current research aims to have, as a finality, the evaluation of sustainable development management in terms of implementing a strategy at SCDA Caracal.

**Keywords:** Sustainable development management, Agricultural Research-Development Station in Caracal.

## Introduction

Sustainable development is a concept that has emerged because of ethical issues, and one of the ethical norms on which this concept is based is that of the principle of fairness or justice. The premise of sustainable development is the responsibility, whether it is the responsibility for the environment, or the responsibility for the community in which it operates, or the responsibility for the organization itself as a viable entity, it is an integration of the economic mission into the core mission represented by the social mission (Burlea-Schiopoiu and Mihai, 2019).

The explanation behind this article is represented by the challenges posed by economic crises in recent years and, this year, the crisis caused by the COVID-19 pandemic, which emphasizes the importance of implementing sustainable development strategies and promoting responsible management in organizations, regardless of their size or field of activity.

The Agricultural Research-Development Station from Caracal (SCDA), on the background of these crises, noticed the growing urgency to address the issue of sustainable development, which consists of correlating all the resort's systems with the environment in terms of environmental ethics. SCDA Caracal's responsibility for sustainable development refers, on one hand, to ensuring economic performance and, on the other hand, to ensuring the viability of the environment through protection measures and the implementation of feasible research projects.

In addition to respecting environmental protection, SCDA Caracal considers that social legitimacy is an important criterion for implementing sustainable management, because responsibility for the community in which the resort operates has present and future implications for all stakeholders. Thus, an ethical challenge for organizations and individuals

is to develop an ethical attitude that considers freedom as an integrated responsibility of the individual with the organization, the society and the environment. For the development of such an ethical position, it is necessary to have a clear awareness of the ethical values and norms that must be learned through social processes that contribute to the development of ethical capacities.

### **Theoretical elements of sustainable development management**

Sustainable development management is based on a series of research work on how social and environmental issues can be overcome. These problems of humanity manifested themselves long before sustainable development emerged as a concept and thus became a concern for governments and organizations.

In the seventh and eighth decades of the XX century, the environmental management began to be widely promoted. This concern was generated by the oil crisis and was summarized in the Club Report of Rome and as a result, we are witnessing an alternative approach to business, with the launching of the concept of social entrepreneurship or the concept of entrepreneurship of sustainable development, that led to the emergence of a new type of organization based on the social side of the business and not on obtaining and maximizing profit.

These organizations focus their efforts on combining social, environmental and market principles, and under these conditions, social entrepreneurs join forces with business entrepreneurs in order to develop the well-being of the community in which they operate (Burlea-Schiopoiu, 2008).

In the current context, generated by the COVID-19 pandemic, sustainable development management could generate additional jobs and income, especially in the agriculture area. Moreover, production conditions must be in line with the new regulations imposed by COVID-19. Thus, current production and consumption patterns must adapt to the new rules and avoid causing irreversible damage to the environment. These impacts of economic activity are recognized today and are manifested as key concerns regarding the management of sustainable development (Idowu et al., 2017).

Research in the field of sustainable management refers to major threats to the viability and integrity of organizations and consists of addressing sustainable development issues both *by describing and analysing the complexity, dynamics and cause-effect relationships* through a methodology characterized by thinking and modelling systems, this being applicable to past, current and future sustainable development issues (De Vries, 2013), as well as by developing evidence-based solutions, solutions that produce changes in the lives of organizations that depend on actions taken by other stakeholders (Wiek et al., 2015). Thus, knowledge is supported by actionable evidence and, if implemented, can bring lasting change into the lives of organizations (Burlea-Schiopoiu, 2013a, 2013b).

Nina Kahma and Kaisa Matschoss (2017) agree that in the process of promoting innovation, especially in the case of energy markets that are constantly changing; the embracement of innovation is often conceptualized in terms of technology diffusion. Success or failure of new technologies depend on how they are able to move from one market segment to another, suggesting that non-use of technologies produces far more benefits than delayed embracement, as this non-use can manifest itself as an active resistance or barrier to change, and the abandonment of a high-performance and innovative technology has an important role in explaining its non-use.

Kristen Jenkins (2018) considers that normative approaches to the sustainable development of organizations have a positive impact on the environment and at the same time contribute to the promotion of social justice and poverty reduction, in order to take into account the dynamics, complexity, uncertainty and objectives based on the value of sustainable development.

Some researchers considered sustainable development as an exogenous environmental challenge to be solved by specific technological systems, while others considered it as a contingent manifestation of a complex, multidimensional phenomenon, while Raven and colleagues (2017) consider sustainable development a dynamic normative phenomenon that changes depending on the particularities of the environment in which it is implemented. All these elements of conceptual nature have an important impact on other notions such as the notions of transition and experimentation for which the technological implications acquire a defining meaning.

After a literature analysis, we were able to notice that solutions and decisions, in case of sustainable development management, are not simple technical elements or control procedures. Contrariwise, they are complex and require long-term processes that take place in the life of organizations, which implies not only a decision process of collective learning, but also a continuous adaptation of the management style to the particularities of the organization. The integration of different dimensions of social development in the concept of sustainable development is done according to their relative importance. Thus, Konrad Ott (2009) considers that all three dimensions (economic-social-environmental / ecological) are equally important without arguing based on this consideration of equality.

**Factors that motivate the Agricultural Research-Development Station from Caracal to focus on sustainable development management**

One of the main objectives of the management of SCDA Caracal is to increase economic efficiency. Therefore, the challenge of a sustainable development management focuses on the increase of ecological efficiency through a responsible management of the agricultural lands of the resort and implicitly of the environment.

In the case of SCDA Caracal, sustainable development management can lead to a reduction in the negative impact of fertilizers used on the environment.

The economic efficiency of the station must be intertwined with social efficiency, as the latter reflects the way in which the station evolves in terms of social and cultural requirements, as well as the legitimacy of its activities. All these elements of efficiency are correlated with reputation indicators, financial reporting, and the way in which the resort adapts and meets the requirements of society.

The economic challenge to which SCDA Caracal is subjected consists of maximizing the financial profit in relation to the financial resources, such as the invested capital. Therefore, there is another challenge that of implementing a sustainable development management, which consists of maximizing the performance of the environment and social ones according to economic indicators, being measured by what is called eco-efficiency and socio-efficiency. Taking into account the object of activity of SCDA Caracal, we can also think about ecological efficiency.

SCDA Caracal has two main sectors of activity, and namely:

- Research Sector
- Development Sector

**The research sector** operates on an area of 219 ha, having the following objectives:

- The research itself;
- Extension to farmers from the area of the obtained results and promotion of new creations in the field of cereals and industrial plants;
- Seed production from higher biological categories.

In recent years, averages of 50 research contracts have been concluded per year with institutes, research stations, national and multinational companies, such as:

INCDA Fundulea, Bayer, Biocrop, Caussade, Euralis, Limagrain, Pioneer, DonauSaat, KWS, Syngenta, Adama, SumitAgro, Maisadour, Rapool, Saaten Union, Monsanto, RAGT, Naturevo, etc.

The research topic addressed in the research contracts is the following:

- establishing sets of hybrids and varieties of cereals, industrial plants, legumes and fodder, adapted to the conditions of climatic stress specific to the area of influence of SCDA Caracal;
- elaboration of technologies and improvement of technological sequences for the cultivation of cereals, industrial plants and legumes;
- improving forecasting methods and herbage control in field crops;

The extension activity consists of the popularization of the new genotypes of cereals, legumes, industrial plants and fodder, as well as the presentation in demonstration fields of the new technologies and technological sequences.

Demonstration lots are set up for wheat, barley, triticale, sunflower, corn, sorghum and rapeseed. The multitude of genotypes presented in these demonstration lots allows the farmer to choose the most productive variety or hybrid.

The results are presented in scientific events, national symposia and days dedicated to the cultivation of straw cereals and industrial plants.

**The development sector** operates on an area of 2242 ha, within two vegetal farms.

The main crops are the following: wheat, rape, barley, triticale, peas, corn and sunflower.

The main purpose of activity is the production of seed from higher biological categories, in order to serve farmers in the country with certified seed material, from local varieties.

In order to increase institutional performance and develop a competitive infrastructure, in recent years (2015-2019) investments of 7,096,674 lei, VAT not included, have been made in machinery and equipment, meaning approximately 1.5 million Euros.

SCDA Caracal provides farmers all around the country with significant quantities of certified seed from higher biological categories, which is highlighted by the increase in sales from year to year.

If in 2016, the unit managed to sell 800 tons of grain, in 2019 the quantities increased, reaching 2500 tons.

The factors that influence the management of this sector are multiple and, in turn, are influenced by the particularities of the sector in which SCDA Caracal operates, namely, the education system (Burlea-Schiopoiu, 2011; Burlea-Schiopoiu et al., 2014).

*Customers' preference for organic products* is one of the factors behind the way in which the resort combines the principles of sustainable development with economic and financial aspects, such as making a profit.

Further on this matter, the station is involved, as a partner (The National Institute for Agricultural Research and Development - INCDA Fundulea being the coordinator), in two major projects of Agriculture and Rural Development (ADER), axis 111 (Improving the structure of winter wheat varieties in the south and east of the country by creating corresponding to market requirements) and axis 212 (Creation and promotion of new barley and two-row barley genotypes characterized by superior adaptability to different environmental conditions) - national scope, which runs from 2019 to 2022.

The axis 111 project aims to improve the economic results of farms, by increasing the usage efficiency of natural resources and technological inputs, for sustainable agriculture in the context of climate change, especially under conditions of drought and extreme temperatures. The establishment of this objective started from the reality that the South and East region of Romania is the largest wheat cultivator in the country (areas generally exceeding 1 million hectares), but it is also the most vulnerable in terms of climate change generated by rising temperatures and large fluctuations in the rainfall regime (2020 was a year marked by drought which led to significant losses for farmers who did not have irrigation systems). Together with SCDA Caracal, other partners are also involved in the

project, such as the following: Secuieni Agricultural Development Research Station, Teleorman Agricultural Development Research Station, and ValulLuiTraian Agricultural Development Research Station. Thomas et al. (2014) affirm that by 2050, due to climate change, 15-37% of a sample of 1,103 industrial plants and animals will disappear.

The project on axis 212 aims to improve the economic results of farms, by increasing the usage efficiency of natural resources and technological inputs, for a sustainable agriculture, in the context of climate change. Among partners, in addition to the project coordinator, there are the following: Turda Agricultural Research and Development Centre, Secuieni Agricultural Development Research Station, Brăila Agricultural Development Research Station, ValulLuiTraian Agricultural Development Research Station and Teleorman Agricultural Development Research Station.

In addition to the scientific research projects, SCDA Caracal has multiple collaborations with the business environment (agricultural companies).

Thus, in order to identify, as correctly as possible, the factors that influence the management of sustainable development, it is necessary to determine what are the main challenges that the resort faces and will face from a three-dimensional point of view: economic-social-ecological. From the analysis of the daily activity corroborated with the scientific research activity carried out based on the projects, we identified some of the challenges to which the resort must find an answer.

One of the challenging factors and perhaps among the most important are *innovation in order to achieve competitive differentiation* between SCDA Caracal and other research-development stations around the country.

In line with the innovation process, we need to focus on *reducing the costs of agricultural production and increasing economic and social efficiency*.

We innovate, we reduce costs, we increase economic and social efficiency, but we must not neglect *human resources, namely to attract, retain and motivate employees* to turn them into strategic human resources of the resort (Burlea-Schiopoiu and Remme, 2017). Not all the above factors can be capitalized if we do not *attract and retain customers*.

Therefore, another important factor refers to *the way the resort operates and adapts to the changes that occur in the internal and external environment*, so that it responds and adapts effectively to the new *business model generated by the restrictions imposed by competitors and by the COVID-19 pandemic*.

In achieving the most competitive management, we must focus on innovation and the efficiency of the business model because it is the premise for achieving sustainable profits, as innovation puts into practice the opportunities offered by the market and reduces the pressures coming from the competitive business environment. These kind of pressures create a systemic imperative and represent an opportunity to develop sustainable development goals, and the need for cooperative solutions leads to managing issues related to the institutionalization of sustainable development management, so that environmental and social goals become an integral part of the organization's management (Balan and Burlea-Schiopoiu, 2017; Burlea-Schiopoiu and Balan, 2018).

Heiko Spitzack and Eric G. Hansen (2010) consider that various ways of institutionalizing sustainable development expertise in management demonstrate that there is no single answer to the question of how sustainable development management should be organized, because for this type of management, sustainable development can become an isolated and poorly funded function, and at best, there may be organizational structures that define key indicators of social and environmental performance that are related to intrinsic motivation.

For implementing a sustainable development management, it is required support and commitment from top managers, who provide resources to ensure that sustainable

development management practices are integrated across the organization and into the core business model and processes. The involvement of external stakeholders allows the development of holistic solutions to sustainable development problems.

Among the factors that influence sustainable development in organizations, the relevant ones are related to *sustainable economic development, environmental issues, social responsibility issues, health and protection of employees and customers, the development of a long-term perspective.*

Some factors related to sustainable development trends that are considered critical for the organization are the following: *water deficit, climate change, waste management, food security.*

It is important for the organization to effectively communicate its sustainable development efforts and commitments, *either through a series of reports (integrated year report, social responsibility report, sustainable development report), on social networks, conferences and round tables.*

### Conclusions

Over time at SCDA Caracal there were many factors that led to the change of the business model (the elements that were changed in the business model are the following: *product offer, value chain processes, cost model, organizational structure*), as the resort faced a *shortage of human and sometimes even financial resources, customers began to turn to organic products, exerting some legislative and political pressure, involving competition in the development of organic products.*

In the process of implementing a sustainable management, SCDA Caracal has faced *problems related to reducing costs that are not related to production, internal recycling of waste, changes in pricing strategy, financial risk management, internal communication.*

The profit obtained from sustainable development activities is an innovative advantage through the early identification of efficient solutions and an important market share due to its ecological position, but it can also help reduce profits if some higher operational costs are put into practice or if the granted economic and financial incentives are insufficient.

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# The Future of Multilateralism with an Impact in World Economy Due to Covid-19



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## Abstract

Covering and encompassing across the globe, multilateralism seems to be in an emergency crisis conciseness. Skepticism or cynicism welfare of the multilateral order grounded in cardinal or fundamental liberal principles revealing and displaying throughout the Western world, inside the European nations, Brexit and, discordance over the European Union's (EU) the future is under a shell that's causing damage to the EU as a regional multilateral pillar, bordering the supranational bloc's capacity as a global actor as well. Nonetheless, to say at the same time, a more forceful, and decisive rather confidently China and Russia are looking for the outlook, to reshape multilateralism, challenging the primitive liberal principles that have guided the post-Cold War multilateral order, to which the world has become habituated. The multilateral order has witnessed tremendous prosperity in the post cold war era having multilateral cooperation in presence. Yet to say, multilateralism can only operate in the geopolitical context within which it exists. The woeful return of great-power competition, so noticeably diminishing during the heralding decades, is dissolving the very key foundations on which the multilateralism of the post-Cold War era stood. Deep cascades and vulnerabilities have been created between democratic and authoritarian states. As states continue to cannon those channels, the United States and other democratic countries have moved toward a conception of multilateralism that defends democratic interests within existing, and even the new ones.

The prospects of multilateralism at regional and global levels will also inspect and scrutinize ways in reforming the existing international organizations so they are better placed to get to grips with new global issues. The prospects of multilateralism as well as the adverse affects of COVID 19 will cover the area of discussion leading to democratic populism,

economic slowdowns, stagnation of supply chains, unemployment, change in people's behavior, and how with effective, efficient and innovative strategies that we can expect for better running global governance.

**Keywords:-** Future of Multilateralism, Transformation of Multilateral system, New actors, Multilateralism 2.0, Multi-polarity, World Economic Forum, shrinking of Economies, Unemployment, Power Politics, COVID 19, Uniting Of Nations.

### **Introduction**

Promotion, encouragement, facilitation and cooperation among countries has supervised and delivered concerted responses to development provocations with having multilateral organizations like IMF, UN and World Bank on a conventional ground. 65 years ago these organization, following Second World War marked an international plat for collective development assistance worldwide. The expeditiously changing landscape in which development takes place summons the prospects of multilateral development cooperation query. Expansion, growth are today in a state of variability. The international abode which continues to be defined by pecuniary (financial) and food crisis, undersupply of resources particularly land and water and the provocation of climate change bespeak the pivotal importance of multilateral agencies as apparatus and plat for associating with global problems that demands for collective efforts by nations. As of the new and re-emerging actors, such as the BRICS (Brazil, Russia, India, China, and South Africa), the private sector, continue to adapt, adjust and amend the international landscape, new provocations and opportunities for multilateral developmental cooperation that have begun to appear, including the need to streamline the international abet framework and reduce dismemberment and splitting, explore new models for diversification, augmentation and improve exemplary multilateral amplification of agencies for better reflection in new geopolitical realities. The kinds of multilateralism that would be required to pursue some of the alternative projects of society, namely those which concur with some of the indispensable normative allegiance of the MUNS (Multilateralism and United Nation System) programs that is, non-violent means for dealing with conflict, social equity, protection of the biosphere, and diffusion of power among social groups and societies. The art of war identified herein are both 'hierarchic' (i.e. relying on traditional international organizations) and 'flipped' (i.e. involving a new multilateralism to construct in civil society). (Michael Schechter (Ed) 1999: 2)

The transformation of multilateral system with two major and vast developments happening at the same place as, multilateralism is being currently transformed. Multi-polarity trend as expressed by the rising number of state that acts as key players stands first. Several states are becoming dominant players as global or regional actors that are what the today's reality pictures are. The voting behavior of BRICS countries in the UN and their presence further elucidate the trend. The new type of actors that are changing the nature and form of playing in the multilateral arena stands as second development. The statehood properties are increasingly present in the area if IR region since 1974. Apparently to say, it was on 3<sup>rd</sup> May 2011 the UNGA aggrandized the EU'S status by giving its speaking right (***Right to speak among the representatives of major groups***) this decree opened the doors for other regional organizations to plea the same speaking right, which indisputably will happen in the near future.

The rule of 'one state one vote' within the UN could in a way create imbalance and would bring about new latitudes with these two developments together as a whole, multilateralism is no longer the only player between states, but various regions as well as other actors are existing and are enormously and immensely changing the multilateral racket. Evidently to say, multilateralism is still based upon equilibrium and equivalence of state, these states are regarded as the constitutive element of the multilateral system as well as to determine the form of multilateralism it is their inter-dependence that defines.

Some truly globalized problems such as climatic change, proliferation of weapon of mass destruction and many more has led to an emergency of addressing it that has led to increasing paradox of governance. (Gill 1997: 1-2) The 'state' which is the building blocks of multilateralism seems less and less capable of analyzing the provocations of globalization, unilaterally to confront and get to grips with multilateral development is to use the allegory of multilateralism 2.0. It stresses on the emergence of network thinking and practices in International Relation. Secondly, it even transforms multilateralism from a close to an open and wide system. It was the primacy of sovereignty during multilateralism phase 1.0 that served the ultimate and most important principle in International Relation. But in juxtaposition to 2.0, there are players other than sovereign new state who to an extent provocations the conception of sovereignty where, regions now play a role of one such type of actors. The efforts of Para-diplomacy of the multilateral ambitions have as well increases the sub-national regions, resulting IR to become much more than just inter-state relation that boast major consequence for how International Relation gets to develop and becomes regularize as well as for how far International Relation is sought to be studied with its wider growing arena. The supra and sub-national government entities are both dependent agencies (whose degrees of freedom would go as far as states allow them to go) that is built largely by the state which pre se is a fascinating phenomenon, what was once an exclusive playground for state has now become room that state have to share with others. Irrespective of the differences in provincial size, citizenry, military and incomparable remunerative strength, the possibility of state-centered multilateralism comes only when states are equally looked on.

The Westphalia principle of sovereignty which says working with the principle of '*one vote one state*' though it is universally acknowledged, in reality its practice stands perplexing and finical. In multilateralism 2.0 these could be balanced and materialize though a more flexible system that compares actors in terms of certain dimensions and parameters such as economic powers.

In the present multilateral system the United Nations occupies a major position. With emerging 'mode of multilateralism 2.0' it needs to open up to regions, but as UN is a global organization with sovereign state, as members, this can be a problem. The institutional reform that aims in reinforcing multilateralism as the indispensable issue, in how to create balance of power and stability among UN members and as well 'balance of responsibilities and representation' for the people of our planet. A radically rethinking is fervent and vehemently needed which identifies that, next to states, world regions are based upon integration processes between states that plays a role in establishing an effective multilateralism.

In today's reality, 'world regions' are becoming increasingly important tool of global governance in overall developments. This particularly needs to be a lot more creative, innovative and effective, thinking based upon careful analysis of regional dimension of ongoing conflicts and chaos of existing cooperation between UN and regional organization. (Gill 1997:171-173)

The emerging new world order is a complex functioning order that gives challenges to any proposal to rethink multilateralism in a way that it incorporates regionalism and where it needs to be more flexible. Not only UN, but the regional organization themselves needs to adjust with the reality of multilateralism 2.0.

As 2020 began, it cogitated about the situation on where we stand and where we are heading, ecologically if we talk, by 2040 the average atmospheric temperature will increase by 3% which will destroy rather ruin numbers of ecosystems that are surpassing on tipping points.

No agreement as such has reached where the situation of '*more likely*' has changed to '*most desirable*' scenario. Nonetheless, to say all have agreed on the broad idea of working towards the global common good. Multilateralism at the present scenario is still facing

unprecedented crisis with old and new world powers challenging its values, aims, processes and institutions.

As UN at its center, multilateralism, for the developing countries is considered an indispensable pillar of the global systems as it provides for an world order not determined by 'might' but by a set of rules that applies to all. Multilateralism's current retreat necessitates a proactive strategy from developing countries to be a co-shaper of a new system.

The concept and foremost agenda for the upcoming year 2030 for the goal of sustainable development have marked and paved its way for a typically novel kind of multilateralism. Starting from the sectors like 'economic growth' to the level of environmental protection, the issues have covered the foremost intention of Sustainable Development Goals (SDG) which requires a greater level of collaboration, coordination and commitment hence forth. The global goals are also known as the sustainable development goals. In 2015, all united nation member states has adopted these as a 'universal call to action' in eliminating poverty, safeguard the planet and to make sure that peace and prosperity is both appreciated by people, by the year 2030. The amalgamation of 17 SDGs has recognized that action in one area will affect the outcomes in others and so the development must balance social, economic and environmental sustainability. As the pledge of 'No one leaves behind' which the countries have committed, so as to accelerate progress for those furthest behind first. In a way, SDGs are designed to bring the world to several cathartic life-changing 'Zeros' including rock bottom poverty, hunger, discrimination against women and girls. In the process of achieving these SDGs technology and importantly financial resources from all society are necessary from every context. In order to tackle a global and local challenge that appears to grow in scale and complexity, a postulated rather effective multilateral system comes out as a unique platform. The 2030 agenda comes out with the share responsibility of the member states and the UN development system (UNDS) which should effectively practice and make the agenda financially stable.

The goal or the target of achieving sustainable development leading to the future of multilateralism comes with the funding of both the member states and other funding partners. But while encouraging the contribution there's a worrying trend as member states prefers funding projects and activities of their interest so-called the '**EARMARK**'. The proportion of earmark contributions was about 54% in 2016. The most flexible source of funding by the member states and UNDP have been stagnated and declined in some cases, which is, a way, has reached as low as 12% by the end of 2017.

The stagnation not only limits the strategic and flexibility of fund usage in a way invites competition and mandate drift, as agencies compete or rather fights in a way to secure funds. The secretary general of UNDS has proposed funding in a way to unlock its full potentiality by putting forward a set of commitment focusing on the increase level of quantity funding, **core, pooled and thematic on member states**. This will enhance transparency, visibility, efficiency, evaluation and, reporting on consolidated results. Evidently, this has in a way stands as an incredible opportunity for the UNDS and the international community to increase effectiveness and impact.

The funding **compact** not only aims to improve the quantity and quality of budgetary resources for UN development operation, seeks to enhance the UNDS's visibility, normative responsibility, and accountability. It further encourages greater collaboration and innovative partnerships among UN organizations and private sectors of civil society.

However without a sturdy and broad-based political support the compact will lead to significant change. The decision-makers and the influencers here play a pivotal role as both the member states and the UNDS need to communicate the compact value.

Adequate, flexible, and predictable funding contribution to the UN development makes it possible to:

- To plan and to ensure as strategically as possible, no one is to be left behind.
- To find and play the part of coordinated, organized, and integrated solution as much as possible.
- Importantly to act spontaneously and decisively when natural or human caused disaster hits the way.
- To add up as much to the additional leverage development and climate finance.

Those of the US in the UN development have to ensure the fact that the member states and the other donors continue to trust and believe. As the trust-building process continues, it should always try to demonstrate that the effectiveness, reliability and efficiency of the partner on the road to a continuation of the coming year to 2030.

If we successfully try and proceed with this process, there will be no such reason as to why the UN development system should not receive quality funding as that of the other multilateral institutions do receive.

Refining the funding mechanism for development, the UNDS can effectively reinforce multilateralism and reaffirm trusts between member states and the UN. Evidently, to mention, a group of researchers and practitioners have identified some of the major key drivers that affect the direction of the future of multilateralism for the next 20 years.

- Climate change
- Power shift
- Technology
- Inequality

Apart from these key drivers, factors such as demographic growth and change will have a substantial impact where it is assumed that Africa itself would have 2 billion people with 9 billion people in the world.

Firstly, the climatic change stands as the most potent driver, what we get to see climate today as this world look massively different, the coastline will reshape, with countries like Laos. Bangladesh being below sea level, the entire region would turn extremely hot for human settlement. Such inundation would result in massive migration in and across Asian and African countries, also affecting Europe and North America.

Due to changing rainfall patterns and extreme weather across the globe, food production will be affected.

In the 'best case', the effects of **CLIMATE CHANGE** would increase the challenges to the degree that leaders and societies would understand the need to cooperate in a structured way to intercept the problems together moving to govern resources justly and sustainably. This diverse climatic change will result in an "every man for him" scenario, were states, close borders will meet the necessity of joint defense, rather than shaping a global common good proactively, with a view to solidarity and an understanding of common future.

Secondly, the key driving factor is the **POWER SHIFT** that will change the international dynamics drastically. Alongside China being a major power or the large power countries like the US, India and the EU will further establish itself as a 'Major' by 2040, cutting off the single hegemonic rule that would invest multilateral cooperation and guarantee its attractiveness. This, in a way, would make the world more volatile or flexible. Changes between forums are more likely, as powers will seek to circumvent institutions that block their immediate interests. Interestingly, the scenario speaks more for the proliferation of smaller coalitions of interest, particularly in settings like the G20, BRICS or G7. Some great powers even rediscovered the UN, which might allow for its strengthening and reform multilateralism, which is more about diffuse gains and not immediate counterstroke politics.

**TECHNOLOGY**, which itself gives us a notion of **NEW OPPORTUNITY**, a new world with an increment of lots of interactions **ACTS AS GAME-CHANGER**. Technology increases interactions in a vast new level and at points; it does even turns as the game

changer. Compiling and mining a large portion of quality data (Including through the internet of things) will be an indispensable element for the ultimate success, both for states and private actors. Technology can often change the increment of productivity and it might mean a more humane work environment if the shrinking demand for the human workforce is evenly translated into gains in leisure time. Alternatively, it can even lead to as of more extensive parts of the population without work. The technology could also allow for more targeted actions, thus even potentially supporting the sustainable use of resources, or new form of citizen participation, innovation can provide new solutions, which we might now see yet. The proliferation of advanced military and information technologies increase the risk of cybercrimes and weapon that the control of governments may or may not be on artificial intelligence. The most valuable resource “data” becomes the property of giant private companies creating tensions in societies that demand action from their (weakened) states.

### **Rising Inequality**

*Polarization and unrest* can be the most robust outcomes which might lead to inequalities within states. This could force states to become more inward-looking and defensive, if not seeking advantages beyond their border aggressively. This could further lead to a decrease of government’s ability to act faced with global problems. Yet there lives a possibility that in a scenario of global cooperation states would jointly regulate non state actors and include them in solutions for the global common good. In a club scenario, countries would at least work together, least far pushed by a likely next financial crisis.

Over the last about 75 years passed by, multilateralism has been a strong driver and pillar of global integration, peace, and prosperity. It has also been a crucial and played pivotal role over the formerly accomplishments of the G20, in addressing the pecuniary crisis and upgrading financial (pecuniary) stability.

Recently, however, with globalization, current forms of global governance has emerged, threatening the very edifice of the rule-based multilateral order, because of its competing economic model that have opened up partly , issues of fairness and the distribution of cost and benefit of maintaining the prevailing multilateral system. (Alan S Alexandroff, Andrew Fenton Cooper, 2010) The political restlessness with multilateralism notably in the US with insufficiency of the post bretton wood system has to address slow growth, rising inequality, rising migration, social fragmentation, and job insecurity associated with technological change, off shoring and automation. Most of the world’s biggest provocations are not a result of disagreement but a profound loss of direction about cooperation taking in the first place. A sense of multilateralism creeping beyond the boundaries as set by the principle of subsidiary that has created a backlash of democratic populism, protectionism and, nationalism. For the past couple of years, the proportion of voices and demands has grown louder and clear which ameliorate the current multilateral system as to reflect the unavoidable turnover in the economic, demographic and political weight of advanced and emerging economies which have undergone thorough changes. Governmental rigidities in the multilateral organizations such as IMF, World Bank, UN, WTO and others have adequately prevented reform from being achieved in the very first place. At the same time, ‘disillusionment with multilateralism’ led to contemplation of various alternatives such as replacement of multilateral agreement by bilateral deals or replacement of multilateral rules by geographically proximate countries. None of these alternatives, by far has substituted for true multilateralism, however, since the world is facing an inherently global provocations that require concerted global actions.

While in practice this may entail much thinner globalization, an inclusive and sustainable multilateralism is preferable as to no multilateralism at all. The provocation to set a legalized and authorized general principle to usher and impel global rule making that every nation agrees on and no one is left behind. The current economic globalization is designed to

maximize effective efficiency, minimize transaction costs, and reap the benefits of scale. Not surprisingly, corona pandemic and the resulting world economic slowdown are only aggravating the existing social inequalities within and among countries. In the middle of corona virus pandemic, several countries across the globe fell back in to lockdowns to “compact or iron the curve” of the infection. These lockdowns meant confining and quarantining millions of citizens to their homes, shutting down businesses, and halting almost all remunerative activities. As per International Monetary Fund (IMF), international remuneration is expected to decline or drop off by over 3 percent in 2020. Ever since the precipitous slowdown since the Great Depression of the 1930s.

Now with time, as some countries uplifted restrictions and gradually resuming their economies, here’s a look at how the pandemic has affected and how they have coped.

The pandemic has driven the global economy into a recession, which means the economy will start shrinking, and growth would stop.

In US, **Covid-19**-related disruptions and chaotic environment have led to millions of filing for unemployment benefits. As per a Reuters report, since March, more than 36 million has registered for unemployment gain, which reports for nearly a lenity of the work-age citizenry.

Additionally, an inception analysis by IMF also divulge the manufacturing output in most countries that has gone down, which gave back a descent fall in external demand and, a growing expectations as a drop down in domestic demand. It is affecting the inventive dimensions of countries as the containment measure implies working with less people creating disruptions in supply chains. It is affecting demand vehemently, as fewer jobs and less income mean less spending of capital locally and globally. Countries are also affected by the screwing up of global financial conditions and some are even hit by capital outrush.

#### **COVID-19 and global Rise (impact)**

The global economy is growing by 3% in 2020 which is an upshot far worse than the global financial crisis of 2008 as estimated by IMF. Economies of the countries like the US, Japan, UK, Germany, France, Italy, Spain. This is expected to contract this year by 5.9, 5.2, 6.5, 7, 7.2, 9.1 and 8% respectively. Advanced economies have smacked down and in conjunction they are expected to rise by 6% in 2020. Developing and emerging market will decline or drop off by 1%. The growth rate for 2020 is expected to be 2.2% if china is excluded from the cache of countries. In the first quarter of 2020, china’s GDP has deteriorated by 36%, while 5.5% of output has been cut down in South Korea, as the country did not impose the strategy of lockdown followed by aggressive testing, contact tracing, confining or quarantining.

The GDP of France, Spain, and Italy has cut down by 21.3%, 19.2% and 17.2% respectively in the European continent.

Drop off in travel industries and tourism has affected the global industrial activity in an enormous way. As in transportation section, the fall in oil price, which accounts for 60% of the oil demand was hit due to several countries imposing lockdowns. Reduce in food prices by 2.6% in 2020 caused by supply chain disruption and disturbance, border delays, food security concerns in regions affected by COVID 19 and export restrictions almost the globe, presented in a project by IMF. Assessment made by world economic forum (WEF) underpins SMEs (small and medium sized enterprises) and large businesses that are crucial for maintaining employment and financial stability overall.

In India, as announced by her finance minister Nirmala Sitharaman the package of *aatmanirbhar bharat* which is entitled to provide relief packages to medium, small, micro enterprises (MSMEs) in the form of increment in credit assurances and guarantees. Many of the advanced economies of the world have uprising rolled out a support packages while if we see in India its economic stimulus package is 10% of its GDP followed by US (13%),

Sweden (12%), Germany (10.7%) and so on. However, the WEF notes, “...there is concern that the size of packages may prove insufficient for the duration of the crisis; that disbursement may be slower than is needed; that not all firms in need would be targeted; and that such programmes may be overly reliant on debt financing.”

Nonetheless to say, the standing out of South Korea is hats offing, as their business and economic activities were not completely paused, and therefore, their economy was not severely and adversely affected.

China has not long ago elevated its lockdown and has since then been gingerly reopening its economy without a truculent and bellicose second wave of infections so far so found.

Further, even as the economic activity recommence gingerly, the situation will take time to anneal, as consumer behaviors has changed, as a result, of continued social distancing and unreliability, about how the pandemic will evolve or emit.

For instance, in the report of *World Economic Outlook* for 2020, the IMF mentions that firms can start hiring more people and expanding payroll ‘only slowly’, as it may not be clear about the demand for their output.

A comprehensible and effective communication, broad monetary and fiscal stimuli will be required to get more coordinated on a global scale for maximum influence, and, that would be most effective to augment or magnify in spending during the rehabilitation period.

### **Conclusion**

The globe is tending in becoming more and more multi-polar, a multi-polarity of weak stanchion. But as processing forward, a more bigoted or biased pillar will prioritize its own recuperation. (Gill 1997: 171-173) Apart from transpire of demographic challenge, china will have a rapid decline or drop off in workforce (in near decades) which will need to stimulate and facilitate the equilibrium of its remuneration so that it is export-led as its indispensable trading partners re-assess its supply chain. Other powers like Europe, Germany is also presuming to embrace a less export-led model, the EU will be more bigoted, focusing on protecting strategic construction of which it will apparently, give an expanded definition. Power is more uniformly scattered but the skyline of every country has diminished or dropped. In reality when the test of multilateralism happens, the major powers shall then realize, that like those patients who have suffered a drastic stretch of COVID19, and are all thoroughly weakened by its adverse affects, it is then, that the very, COVID19 crisis has not made any defeater, but dead losses.

The tendency of major power to move for more safeguarding and domestically-engrossed national posture, they select for what could be described as the weak political power, or unconventionally acknowledge that a more cooperative posture will benefit them in the middling term.

Multilateralism would be indubitably weakened with weak power politics keeping their beguilement too. Chintzy power politics also stands probable here, rather than making one’s own strength, the weak power political game use the potential of opponent’s weaknesses. The UN is likely to dwindle away, in this scenario, as UN cannot transform itself without its member states and also without a strong robust push. Differences lie, rather than active hostility or active antagonism. Without an active support it is enough to get weaken gradually, that is difficult to sort out. The restriction in its structure as shown a dealing with emerging transnational issues for which it did not come up, whether it is incendiary, decaying of states or the impact of new mechanizations.( Mario Telò 2012:159-161)

According to UN mission peace and security would remain as its core, always. The responsibility to protect lies with the shared interest among power in stopping the expansion of ungoverned spaces which in near future can become a port in storm for incendiary. Without fully endorsing democratization the agenda of the member state nurtures several

peace keeping operations in the early 2000s, which might agree to provide comprehensive support during the brink of collapse of states.

The worldwide crisis created due to COVID 19 has shown how the world is connected and how most challenges cannot find solutions purely depending upon its nations. Climate, pandemic, cyber, AI are global challenges that requires global coordination and cooperation with responsible responses. In this context, the need for the specialized agencies should be modernized and strengthened. Lastly, the crisis of COVID 19 demonstrate that in any major world crisis and effective, efficient, supportive and close response that must integrate technical, economic, pecuniary and political dimensions.

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# A Review of the Progression of the Accident and the Amount of the Radionuclides Released During the Chernobyl Nuclear Disaster in Ukraine



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This paper reviews the Chernobyl Nuclear Disaster. Vast areas of Belarus, the Russian Federation and Ukraine were contaminated and trace deposition of released radionuclides was measurable in all countries of the northern hemisphere. The above mentioned nuclear accident of 26 April 1986 occurred at the Chernobyl Nuclear power plant, located in Ukraine about 20 km south of the border with Belarus. An estimation of radionuclide amounts released has been given provided here. A crude analysis of air samples, taken at 400-600m above the ground in the vicinity of the Chernobyl power plant on 27 April 1986, indicated that large radioactive particles, varying in size from several to tens of micrometers, were found together with an abundance of smaller particles. From the radiological point of view,  $^{131}\text{I}$  and  $^{137}\text{Cs}$ , are the most important radionuclides to consider, because they were responsible for most of the radiation exposure received by the general population. The environmental behavior of deposited radio-nuclides depends on the physical and chemical characteristics of the radionuclide considered, on the type of fallout (i.e. dry or wet), and on the characteristics of the environment. Special attention has been devoted to  $^{131}\text{I}$ ,  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$ . Deposition occurred both on the ground and on water surfaces.

## **The accident at Chernobyl**

The accident at the Chernobyl nuclear power station occurred when a low-power engineering test of the Unit 4 reactor was being conducted. The Chernobyl reactor was of the type RBMK, which is an abbreviation of Russian terms meaning reactor of high output, multi channel type. It is a pressurized water reactor which uses light water as a coolant and graphite as a moderator. The events leading to the accident at the Chernobyl Unit 4 reactor at about 1.24 a.m. on 26 April 1986 resulted from efforts to conduct a test on an electric control system, which allows power to be provided in the event of a station blackout [1]. Actions taken during this exercise resulted in a significant variation in the temperature and flow rate of the inlet water to the reactor core (beginning at about 1.03 a.m.). The unstable state of the reactor before the accident is due to two factors: 1. basic engineering deficiencies (such as graphite-tipped control rods, instability at low power levels and large positive coefficient of reactivity under certain conditions) 2. faulty actions of the operators (e.g., switching off the emergency safety systems of the reactor) [1]. The relatively fast temperature changes resulting from the operators' actions weakened the lower transition joints that link the zirconium fuel

channels in the core to the steel pipes that carry the inlet cooling water[2]. Other actions resulted in a rapid increase in the power level of the reactor [3], which caused fuel fragmentation and the rapid transfer of heat from these fuel fragments to the coolant (between 1.23:43 and 1.23:49a.m) . This caused the generation of a shockwave in the cooling water, which led to the failure of most of the lower transition joints. As a result of the failure of these transition joints, the pressurized cooling water in the primary system was released, and it immediately flashed into steam. The steam explosion occurred at 1.23:49. It is believed that the reactor core might have been lifted up by the explosion [2], during which time all water left the reactor core. This resulted in an extremely rapid increase in reactivity, which led to vaporization of part of the fuel at the centre of some fuel assemblies and which was terminated by a large explosion attributable to rapid expansion of the fuel vapour disassembling the core. This explosion, which occurred at about 1.24a.m., blew the core apart and destroyed most of the building. Fuel, core components, and other structural items were blown from the reactor hall onto the roof of adjacent buildings and the ground around the reactor building. A major release of radioactive materials into the environment also occurred as a result of this explosion. The core debris dispersed by the explosion started multiple (more than 30) fires on the roofs of the reactor building and the machine hall, which were covered with highly flammable tar. Some of those fires spread to the machine hall and, through cable tubes, to the vicinity of the Unit3 reactor. A first group of 14 firemen arrived on the scene of the accident at 1.28a.m. Reinforcements were brought in until about 4a.m., when 250 firemen were available and 69 firemen participated in fire control activities. These activities were carried out at upto 70m above the ground under harsh conditions of high radiation levels and dense smoke. By 2.10 a.m., the largest fires on the roof of the machine hall had been put out, while by 2.30a.m. the largest fires on the roof of the reactor hall were under control. By about 4.50a.m., most of the fires had been extinguished. These actions caused the deaths of five fire fighters. It is unclear whether fires were originating from the reactor cavity during the first 20 h after the explosion. However, there was considerable steam and water because of the actions of both the fire fighters and the reactor plant personnel. Approximately 20h after the explosion, at 9.41 p.m., a large fire started as the material in the reactor became hot enough to ignite combustible gases released from the disrupted core, e.g. hydrogen from zirconium-water reactions and carbon monoxide from the reaction of hot graphite with steam. The fire made noise when it started (some witnesses called it an explosion) and burned with a large flame that initially reached at least 50m above the top of the destroyed reactor hall[2]. The first measures taken to control the fire and the radionuclide releases consisted of dumping neutron-absorbing compounds and fire-control materials into the crater formed by the destruction of the reactor. The total amount of materials dumped on the reactor was approximately 5,000t , including about 40 t of boron compounds, 2,400 t of lead, 1,800 t of sand and clay, and 600 t of dolomite, as well as sodium phosphate and polymer liquids. About 150t of materials were dumped on 27 April, followed by 300 t on 28 April, 750 ton 29 April, 1,500 t on 30 April, 1,900 t on 1 May, and 400 t on 2 May. About 1,800 helicopter flights were carried out to dump materials onto the reactor. During the first flights, the helicopters remained stationary over the reactor while dumping the materials. However, as the dose rates received by the helicopter pilots during this procedure were judged to be too high, it was decided that the materials should be dumped while the helicopters travelled over the reactor. This procedure, which had a poor accuracy, caused additional destruction of the standing structures and spread the contamination. The radionuclide releases from the damaged reactor occurred mainly over a 10-day period, but with varying release rates. An initial high release rate on the first day was caused by mechanical discharge as a result of the explosions in the reactor. There followed a five-day period of declining releases associated with the hot air and fumes from the burning graphite core material. In the next few days, the release rate

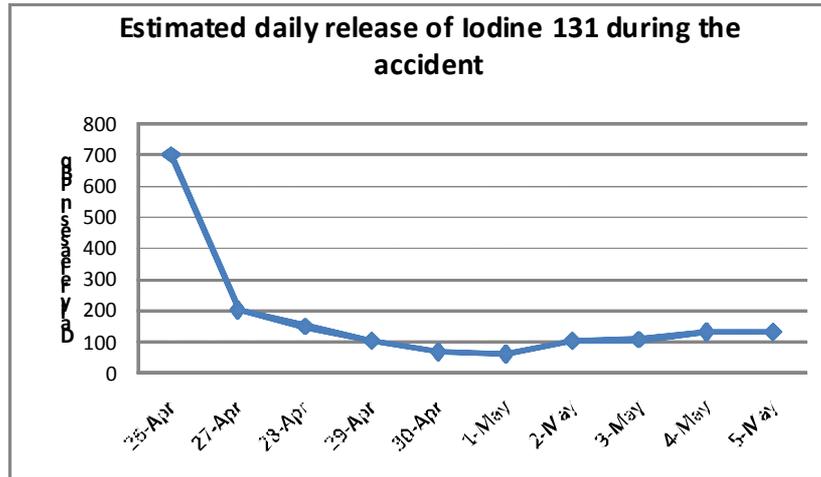
of radionuclides increased until day 10, when the releases dropped abruptly, thus ending the period of intense release. The increasing release rates on days 7 through 10 were associated with the rising temperature of the fuel in the core. Cooling of the reactor structure with liquid nitrogen using pipelines originating from Unit 3 was initiated only at late stages after the accident. The abrupt ending of the releases was said to occur upon extinguishing the fire and through transformation of the fission products into more chemically stable compounds [1]. Table I gives radionuclide inventory in Unit 4 reactor core at time of the accident on 26 April 1986 [1].

**Table I**

| Radionuclide      | Half life   | Activity (PBq)    |                  |
|-------------------|-------------|-------------------|------------------|
|                   |             | Estimates by [11] | Estimates by [1] |
| <sup>3</sup> H    | 12.3a*      | 1.4               |                  |
| <sup>14</sup> C   | 5730a       | 0.1               |                  |
| <sup>85</sup> Kr  | 10.72a      | 28                |                  |
| <sup>89</sup> Sr  | 50.5d*      | 3960              |                  |
| <sup>90</sup> Sr  | 29.12a      | 230               | 220              |
| <sup>95</sup> Zr  | 64.0d       | 5850              |                  |
| <sup>95</sup> Nb  | 35d         | 5660              |                  |
| <sup>99</sup> Mo  | 2.75d       | 6110              |                  |
| <sup>103</sup> Ru | 39.3d       | 3770              |                  |
| <sup>106</sup> Ru | 368d        | 860               | 850              |
| <sup>110</sup> Ag | 250d        | 1.3               |                  |
| <sup>125</sup> Sb | 2.77a       | 15                |                  |
| <sup>129</sup> Te | 33.6d       | 1040              |                  |
| <sup>132</sup> Te | 3.26d       | 4480              | 4200             |
| <sup>129</sup> I  | 15700000a   | 0.000081          |                  |
| <sup>131</sup> I  | 8.04d       | 3080              | 3200             |
| <sup>132</sup> I  | 2.3h*       | 4480              | 4200             |
| <sup>133</sup> I  | 20.8h       | 6700              | 4800             |
| <sup>134</sup> I  | 52.6min*    |                   | 2050             |
| <sup>135</sup> I  | 6.61h       |                   | 2900             |
| <sup>133</sup> Xe | 5.25d       | 6510              |                  |
| <sup>134</sup> Cs | 2.06a       | 170               | 150              |
| <sup>136</sup> Cs | 13.1d       | 110               |                  |
| <sup>137</sup> Cs | 30.0a       | 260               | 260              |
| <sup>138</sup> Cs | 32.2min     | 6550              |                  |
| <sup>140</sup> Ba | 12.7d       | 6070              |                  |
| <sup>140</sup> La | 40.3h       | 6070              |                  |
| <sup>141</sup> Ce | 32.5d       | 5550              |                  |
| <sup>144</sup> Ce | 284d        | 3920              | 3920             |
| <sup>147</sup> Nd | 11.0d       | 2160              |                  |
| <sup>154</sup> Eu | 8.6a        | 14                |                  |
| <sup>235</sup> U  | 704000000a  | 0.000096          |                  |
| <sup>236</sup> U  | 234000000a  | 0.0085            |                  |
| <sup>238</sup> U  | 4470000000a | 0.0023            |                  |
| <sup>237</sup> Np | 2140000a    | 0.00026           |                  |
| <sup>239</sup> Np | 2.36d       | 58,100            | 58100            |

\*a-years,d-days,min-minutes,h-hours

Figure I



## Release of radionuclides

### 1. An estimation of radionuclide amounts released

$^{131}\text{I}$  and  $^{137}\text{Cs}$  are the most important radionuclides to consider from the radiological point of view. It is because they are responsible for most of the radiation exposure received by the general population. Many estimates have been made of the radionuclide core inventory at the time of the accident. Some of these estimates are based on the burn-up of individual fuel assemblies that has been made available [4,1]. The average burn-up of  $10.9\text{GWdt}^{-1}$  [4], published in 1989, is similar to the originally reported value of  $10.3\text{GWdt}^{-1}$  [1], but with non-linear accumulation of actinides, more detailed values of burn up allow more precise estimation of the core inventories. Table I presents an extended list of radionuclides present in the core at the time of the accident. For  $^{137}\text{Cs}$ , the current estimates of core inventory at the time of the accident are 260 PBq. For  $^{131}\text{I}$ , the value is 3,200 PBq. Based on recent evaluations, the release of  $^{137}\text{Cs}$  is estimated to be 85 PBq, about 30% of the core inventory and that of  $^{131}\text{I}$  is estimated to be 1,760 PBq, about 50% of the core inventory [1]. In the UNSCEAR 1988 Report [5], estimates were made of the release of  $^{137}\text{Cs}$  and  $^{131}\text{I}$  in the accident. From average deposition densities of  $^{137}\text{Cs}$  and the areas of land and ocean regions, the total  $^{137}\text{Cs}$  deposit in the northern hemisphere was estimated to be 70 PBq, which is in fairly good agreement with the current estimate. The release of  $^{131}\text{I}$  was estimated in the UNSCEAR 1988 Report to be 330 PBq on the basis of the reported  $^{131}\text{I}$  inventory of 1,300 PBq [1] and of release fraction of 25% [5]. This, however, was the inventory of  $^{131}\text{I}$  at the end of the release period (6 May 1986). It would have been higher at the beginning of the accident. The  $^{131}\text{I}$  inventory is now estimated to be 3,200 PBq (as mentioned earlier), as shown in Table I. The variation with time of the daily releases of  $^{131}\text{I}$  is shown in the figure I.

### 2. Aerodynamic diameter of the radioactive materials released

There were only a few measurements of the aerodynamic size of the radioactive particles released during the first days of the accident. A crude analysis of air samples, taken at 400-600 m above the ground near the Chernobyl power plant on 27 April 1986, indicated that large radioactive particles, varying in size from several to tens of micrometers, were found, together with an abundance of smaller particles [1]. In a carefully designed experiment, aerosol samples taken on 14 and 16 May 1986 with a device installed on an aircraft that flew above the damaged reactor were analysed by spectrometry [1,6]. The activity distribution of the particle sizes was found to be well represented as the superposition of two log-normal

functions: one with an activity median aerodynamic diameter (AMAD) ranging from 0.3 to 1.5  $\mu\text{m}$  and a geometric standard deviation (GSD) of 1.6-1.8, and another with an AMAD of more than 10  $\mu\text{m}$ . The larger particles contained about 80%-90% of the activity of non-volatile radionuclides such as  $^{95}\text{Zr}$ ,  $^{95}\text{Nb}$ ,  $^{140}\text{La}$ ,  $^{141}\text{Ce}$ ,  $^{144}\text{Ce}$  and transuranium radionuclides embedded in the uranium matrix of the fuel [7].

### Conclusion

The Chernobyl accident was the result of a lack of "safety culture". The reactor design was poor from the point of view of safety and unforgiving for the operators, both of which brought about a dangerous operating state. The operators were not aware of this and also did not know that the test performed could have brought the reactor into an explosive condition. In addition, they did not comply with established operational procedures. The combination of these factors resulted in a very severe nuclear accident in which the reactor was totally destroyed within a few seconds. The duration of the radio nuclide release was very long, lasting more than a week with two periods of intense release. Another significant feature was the emission (about 4%) of fuel material which also contained embedded radionuclides of low volatility such as cerium, zirconium and the actinides. The composition and characteristics of the radioactive material in the plume changed during its passage due to wet and dry deposition, decay, chemical transformations and alterations in particle size. The area affected was particularly large due to the high altitude and long duration of the release as well as changes in wind direction. However, the pattern of deposition was very irregular, and significant deposition of radionuclides occurred where the passage of the plume coincided with rainfall. The releases of  $^{131}\text{I}$  and  $^{137}\text{Cs}$  are estimated to have been 1,760 and 85 PBq, respectively.

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# Political Dynamics of Assam in the Post-Assam Agitation Period



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## Abstract

This article is a comparative study of Assam assembly election results in the post 1979 period which brought a major political shift from its previous structure. Identity crises have been dominating issue for Assam and its indigenous people since the time of partition in its political atmosphere. Change in the demographic composition as shown by the census data and anomalies in voter list lead to event like Assam Agitation that came into end with signing of Assam Accord. Such events and process brought changes to the political dynamics in the state. This paper is an attempt to present an analysis about the transition of political dynamics of the state from 1979 to contemporary years. The state which politics was once known for its cultural identity politics is witnessing transition to communal politics alike mainland India in contemporary times due to latencies that came with Assamese subnationalism and Assam movement.

## Key words: Assam, Politics, Identity, Ethnicity, Nationalism, Subnationalism

Identity issues of Assam was never been taken seriously by the central government as we do not see any concrete steps which was alerted by M.C. Mullan about two decades prior to India's independence. Unlike western border that shared with Pakistan, eastern border shared with India added born Bangladesh is never being taken with utmost security concern. Unabated infiltration has been an unattended issue of eastern border since the time of partition, only difference with the western border here was that this separatism tendency has not been very strong and religion is not the cause for separatist tendencies wherever it was surfaced.

Assam movement is a political movement as it aims to restore its unique identity from the passive aggression of outsiders. India being a union of states with strong Centre, most important aspects of governance are under it such as citizenship, defence, foreign affairs etc. The issue of foreigners could only be dealt by union government and therefore coordination between state and union government have been utmost important. After independence, the greater Assam's (with four north-eastern states with present days' Assam) political environment was dominated by Indian National Congress (INC) till 1962, although there were as many twelve other political parties including independent candidates been participated in the Assembly elections. With many other attributes, hangover of independent movement, illiteracy and lack of electoral experiences can be attributing to the one-party domination in the political scenario. But, in spite of same party government in both Centre and State, issues of illegal migration not been attended and also eastern border was not been under vigilance and security as compared to western border that shared with West Pakistan.

In this section, I am discussing the political dynamics of the state that shaped by the issues of identity or, in other words latent functions or dysfunctions of identity movement.

We have 543 elected members parliament in Lok Sabha which is the strongest state institution of the country, out of which Assam have only 14 Lok Sabha Constituencies. If we examine the composition of representation of members, one can well understand the significance of Assam and North-eastern state in comparison to states like UP, West Bengal, Bihar and Rajasthan when it comes to Central politics. The issues of Assam's identity politics have some connections with the above states directly or indirectly when it projected as "outsiders" or "foreigners"/ "illegal migrants". In the previous chapter I have mentioned the events from the pre-independence days (grouping plan) as well as post-independence days where leaders like Gopinath Bordoloi been negotiated with the Central leadership for the safeguarding the state's socio-cultural demographic identity. The example of the neighbouring state Tripura being the burning instance of losing its identity to the outsiders in a passive aggression. For any political party to address Assam's identity crisis which have certain links with religion, language and region would open a Pandora box that would not be any political gain but to lose majority in many states. Besides many observers and scholars opined that till the surfaced of Assam Movement, it was Congress party overwhelm majority in the state and the union which pointed out lack of willingness to fix foreigner issue, rather been used the foreigner as assured "vote bank" and ignored the identity issue and seedling of subnationalism in the state and eventually led birth of a secessionist fraction along with Assam movement.

To understand the impact of identity politics and subnationalism in the political environment of the state, in this section I would like to analyse the Assembly election results of post movement years, i.e. after 1979. There are eight assembly elections held in post agitation period till date (1983, 1985, 1991, 1996, 2001, 2006, 2011, 2016).

Assam Agitation that surfaced loud just after the sixth Assembly, it also witnessed President's rule thrice in between December 1979 to January 1983. From 1979-85, Assam movement was at peak and due to wide spread protests and violent expressions in many places rocked the Assembly and Assamese subnationalism draw the attention of the Centre and the nation, although most of the narratives were misrepresented the cause of Assam. Many scholars tried to see it as an opposition sponsored movement against the Congress party which enjoyed unparallel domination in the state politics till 1978 since independence. But resting on historical events and statistical census data, my observation is that non-congress parties did influenced the movement but it for their own benefits not the movement's original goals and objectives. In fact, they diverted the original issues to communal politics that never yield positive results.

The seventh Assembly election of Assam that conducted in the year 1983 regarded as the "black chapter" of Assam's political environment by most of the indigenous people of the state. This Assembly election was participated by only four political parties namely, Indian National Congress (I), Indian National Congress (S), Communist Party of India (M) and Communist Party of India. 1983 Assembly election was held when Assam agitation was at its peak and one major demand of the movement was, revision of electoral rolls as there is unnatural growth in the voter lists which nothing but inclusions of illegal immigrants as per government data. While Assamese people viewed it a passive aggression of outsiders posing threat to the identity of the indigenous people of the state, the Centre was not seemed to take the concern of the people with serious importance. The union government did not only give thought over revising the electoral rolls, but also against to postpone the election even when people and many political parties were against holding election without revising the voter lists. Hence, 1983 election became an issue in itself unlike being a democratic tool it reduced to a state apparatus to control political will of people by political parties.

In spite of mass protests and opposition, the government and the election commission held the general election for seventh legislative assembly of the state which saw only 32.74 percentage of vote cast as compared to 66.85 per cent in 1978 election. There was only 1 to 10 percentage of poll in 29 constituencies with polling average below 10 percent in 30 per cent of total constituencies and below 20 per cent in 44 of total constituencies. Moreover, election for 16 constituencies was postponed to indefinite time due incongruous condition to hold election. It was such an environment 1983 legislative assembly election result was declared and formed government which cannot be regard as government by the people in true democratic sense. One important aspect needs to mention here is that, although due to foreigner issue, Assam was burning and AASU's call to boycott election unrest whole Assam, specially the Brahmaputra valley but the poll boycott did not have any effect in Bangla dominated Barak Valley and the areas where religious minority Muslim community was dominated. This aspect directed to dynamics of religious and linguistic identity in the subnational politics of the state.

**Table: The Seventh Legislative Assembly Election Result (1983)**

| Name of the Political Party        | Seats gain | Percentage of Votes obtained |
|------------------------------------|------------|------------------------------|
| Indian National Congress (I)       | 91         | 52.53                        |
| Indian National Congress (S)       | 2          | 6.05                         |
| Communist Party of India (Marxist) | 2          | 5.14                         |
| Communist Party of India           | 1          | 2.58                         |
| Independent                        | 10         | 26.04                        |

The six years long Assam agitation came to an end with the signing of Assam Accord and with it eighth assembly election came to held as one of the conditions of the Accord with revised electoral rolls. Assam Accord was signed in August 1985, its first deed was to dismiss the state government and announced fresh election which was held in December 1985. This was the time of strong wind of regional solidarity due to mass participation in Assam agitation on foreigner issue. Emergence of regional politics was the main distinctive feature of eighth legislative assembly general election 1985. People of the state felt that their issues can only be understood and resolve by a government that based on regional sentiment unlike national political parties who were found unsympathetic toward the issues of the state and its indigenous population. The regional politics that emerged in 1985 was founded on two polar opposites, pro-Accord and anti-Accord. When I said emergence of regionalism, I did not mean that there were no regional political parties before 1985, but the mood of the masses was not ripe for regional sentiment in pre-Assam movement days. Regional parties like Assam Jatiyatabadi Dal (AJD) and Purbanchaliya Lok Parishad (PLP) were there although but they could not incorporate all sections of Assamese society and worked unitedly for common cause. AASU took initiative to united all the regional sensitive parties and independent candidates and gave birth to the first united regional political party in the state and christened as Assam Gana Parishad (AGP) pro-Accord political group in the month of October 1985.

On the other hand, minority groups i.e. especially Muslim community and Hindu Bengali community (major portion of Muslim community were East Bengal origin and they speak Bangla or Sylheti) formed another political party that opposed the Accord came into existence as United Minority Front, Assam (UMF) by the eve of 1985 general legislative assembly election. Besides, Muslim and Hindu Bengali community, other religious and linguistic communities also that time gave support to the UMF, but they were hardly significant in numbers. The president of UMFA was Kalipada Sen. Thus, emergence of AGP and UMFA that symbolises pro and anti-Accord polarised politics that surfaced in 1985 that was not present till before in the political life of Assam. With the above historical

development in the political field in Assam, nine political parties and record number of independent candidates took part in the election and also record number of voters' participation (80 per cent to 98 per cent in one single constituency) was witnessed by 1985 general election.

**Table: 1985 General Election of Legislative Assembly of Assam Result**

| Name of the Political Party | Seats contested | Seats won | Percentage of Votes secured |
|-----------------------------|-----------------|-----------|-----------------------------|
| AGP                         | 105             | 63        | 34.54                       |
| INC                         | 125             | 25        | 23.47                       |
| IC(S)                       | 73              | 4         | 3.20                        |
| IC                          | 38              | 2         | 4.34                        |
| UMFA                        | 56              | 17        | 10.85                       |
| PTCA                        | 27              | 3         | 3.64                        |
| UTNLF                       | 15              | 1         | 2.10                        |
| BJP                         | 12              | ----      | 1.07                        |
| Janata                      | 15              | ----      | 1.45                        |
| Lok Dal                     | 19              | ----      | 0.23                        |
| CPI                         | 20              | ----      | 0.99                        |
| Independents                | 650             | 10        | 16.22                       |

**Source: Election2001( Published by Janasanyug Assam)**

The overwhelming participation of indigenous Assamese community (including all tribal communities) in the electoral process which otherwise mostly decided by *Ali* and *Kuli*<sup>1</sup> ensured the historic win of AGP to form. In the eve of starting 1986 new year, Assam ushered a new chapter forming its first government regional government with country's youngest chief minister (in thirty-two years) Prafulla Kumar Mahanta who led the Assam agitation on the banner of AASU. Mahanta's cabinet was also made the record of being youngest ever, as most of its ministers were between the age of 25-40 years. The performance of UMFA was also very significant with 17 seats and 10.85 per cent of votes gain. Congress party set as opposition with its second position in 1985 assembly election which was in majority in 1983 election. The Janata party which secured overwhelm majority in 1978 general assembly election smashed totally in 1985 general election of Assam legislative assembly.

But consecutive assembly elections held after 1985 till 2016 shows evanescent regional and subnational politics in the state. A close observation of the following tables presenting assembly election results of the state from 1991 onwards indicates the transforming political dynamics in the state with passing of time and events.

**Table: 1991 General Election Result of Assam State Legislative Assembly**

| Sl. No | Name of the Political Party | Seats Contested | Seats won | Percentage of Votes secured |
|--------|-----------------------------|-----------------|-----------|-----------------------------|
| 1      | INC(I)                      | 124             | 67        | 28.98                       |
| 2      | BJP                         | 47              | 10        | 6.42                        |
| 3      | CPI                         | 37              | 4         | 2.46                        |
| 4      | CPI(M)                      | 28              | 2         | 3.87                        |
| 5      | JD                          | 95              | --        | 4.81                        |
| 6      | JD(S)                       | 5               | --        | 0.02                        |

<sup>1</sup>All refers to Muslim voters and *Kuli* refers to tea garden Adivasi laborer who have been king-makers in electoral politics since the time of independence.

|              |             |             |             |               |
|--------------|-------------|-------------|-------------|---------------|
| 7            | JP          | 31          | --          | 0.32          |
| 8            | Lok Dal     | 4           | --          | 0.01          |
| 9            | IC(S)       | 45          | --          | 1.46          |
| 10           | CPI(ML)     | 2           | -           | 0.05          |
| 11           | RCPI        | 2           | --          | 0.01          |
| 12           | AGP         | 120         | 19          | 18.07         |
| 13           | NAGP        | 85          | 5           | 5.05          |
| 14           | AJD         | 20          | --          | 0.12          |
| 15           | ASDC        | 8           | 4           | 1.61          |
| 16           | URMCA       | 54          | --          | 1.32          |
| 17           | GGS         | 12          | --          | 0.51          |
| 18           | PTCA        | 15          | --          | 1.07          |
| 19           | UPCA        | 9           | --          | 0.22          |
| 20           | UMF         | 29          | --          | 1.31          |
| 21           | SLP         | 7           | --          | 0.08          |
| 22           | IPF         | 4           | --          | 0.11          |
| 23           | AJP         | 6           | --          | 0.04          |
| 24           | Independent | 855         | 13          | 21.60         |
| <b>Total</b> |             | <b>1650</b> | <b>125*</b> | <b>100.00</b> |

\*election in one constituency countermanded.

**Table: The performance of Political Parties in General Election of Assam Legislative Assembly 1996**

| Sl.No        | Name of the Political Party | Seats Contested | Seats won   | Percentage of votes secured |
|--------------|-----------------------------|-----------------|-------------|-----------------------------|
| 1            | INC(I)                      | 122             | 34          | 34.57                       |
| 2            | AIIC(T)                     | 106             | 2           | 3.70                        |
| 3            | BJP                         | 117             | 4           | 10.41                       |
| 4            | CPI                         | 11              | 3           | 1.96                        |
| 5            | CPI(M)                      | 10              | 2           | 1.94                        |
| 6            | JD                          | 33              | -           | 0.57                        |
| 7            | JP                          | 2               | -           | 0.01                        |
| 8            | SP                          | 1               | -           | 0.02                        |
| 9            | AGP                         | 96              | 59          | 29.71                       |
| 10           | ASDC                        | 5               | 5           | 1.98                        |
| 11           | IC(S)                       | 8               | -           | 0.12                        |
| 12           | Samajwadi Party             | 12              | -           | 0.04                        |
| 13           | Siva Sena                   | 5               | -           | 0.03                        |
| 14           | CPI(ML)                     | 5               | -           | 0.16                        |
| 15           | Amora Bengali               | 5               | -           | 0.01                        |
| 16           | URMCA                       | 9               | -           | 0.17                        |
| 17           | UMF                         | 19              | 2           | 1.12                        |
| 18           | RCPI                        | 6               | -           | 0.06                        |
| 19           | Independent                 | 657             | 11          | 17.47                       |
| <b>total</b> | <b>all</b>                  | <b>1228</b>     | <b>122*</b> | <b>100.00</b>               |

\*Four constituencies election were countermanded

**Table: Assam Assembly Election Results 2001**

| Sl.no        | Political Party                                     | Seats Contested | Seats Won  | Percentage of Votes secured |
|--------------|---|-----------------|------------|-----------------------------|
| 1            | Indian National Congress (INC)                      | 126             | 71         | 39.75%                      |
| 2            | Assam Gana Parishad (AGP)                           | 77              | 20         | 20.02%                      |
| 3            | Independent (IND)                                   | 393             | 19         | 19.51%                      |
| 4            | Bharatiya Janata Party (BJP)                        | 46              | 8          | 9.35%                       |
| 5            | Nationalist Congress Party (NCP)                    | 62              | 3          | 2.51%                       |
| 6            | Autonomous State Demand Committee (United) ASDC (U) | 5               | 2          | 1.11%                       |
| 7            | All India Trinamool Congress (AITC)                 | 23              | 1          | 0.55%                       |
| 8            | Samajwadi Party (SP)                                | 23              | 1          | 1.03%                       |
| 9            | Samata Party (SAP)                                  | 19              | 1          | 0.79%                       |
| <b>Total</b> |   | <b>916</b>      | <b>126</b> | <b>100.00%</b>              |

**Table: Assam Assembly Election Results 2006**

| Sl.no        | Political Party                           | Seats contested | Seats won  | Percentage of Votes secured |
|--------------|---|-----------------|------------|-----------------------------|
| 1            | Indian National Congress (INC)            | 120             | 53         | 31.08%                      |
| 2            | Asom Gana Parishad (AGP)                  | 100             | 24         | 20.39%                      |
| 3            | Independent (IND)                         | 316             | 22         | 16.60%                      |
| 4            | Bharatiya Janata Party (BJP)              | 125             | 10         | 11.98%                      |
| 5            | All India United Democratic Front (AIUDF) | 69              | 10         | 09.03%                      |
| 6            | Communist Party of India (Marxist) CPI(M) | 16              | 2          | 01.43%                      |
| 7            | Communist Party of India (CPI)            | 9               | 1          | 01.02%                      |
| 8            | Nationalist Congress Party (NCP)          | 45              | 1          | 02.13%                      |
| 9            | Asom Gana Parishad (AGP)                  | 93              | 1          | 02.51%                      |
| 10           | Autonomous State Demand Committee (ASDC)  | 5               | 1          | 0.89%                       |
| 11           | LokoSanmilan (LK)                         | 5               | 1          | 0.25%                       |
| <b>Total</b> |   | <b>977</b>      | <b>126</b> | <b>100.00%</b>              |

**Table: Assam Assembly Election Results 2011**

| Sl no.       | Political Party                              | Seats contested | Seats won  | Percentage of Votes secured |
|--------------|--|-----------------|------------|-----------------------------|
| 1            | Indian National Congress (INC)               | 126             | 78         | 39.39%                      |
| 2            | Bharatiya Janata Party(BJP)                  | 120             | 5          | 11.47%                      |
| 3            | All Congress India Trinamool Congress (AITC) | 103             | 1          | 2.05%                       |
| 4            | Asom Gana Parishad (AGP)                     | 104             | 10         | 16.26%                      |
| 5            | All India United Democratic Front (AIUDF)    | 78              | 18         | 12.57%                      |
| 6            | Bodoland Peoples Front (BPF)                 | 29              | 12         | 6.13%                       |
| 7            | Independent (IND)                            | 263             | 2          | 9.17%                       |
| <b>Total</b> | <b>No of Candidates</b>                      | <b>981</b>      | <b>126</b> | <b>100.00%</b>              |

**Table: Assam Assembly Election Results 2016**

| Sl. no       | Political Party                    | Seats Contested | Seats won  |
|--------------|------------------------------------|-----------------|------------|
| 1            | Bharatiya Janata Party (BJP)       | 89              | 60         |
| 2            | Asom Gana Parishad                 | 30              | 14         |
| 3            | Boroland People's Front (BPF)      | 13              | 12         |
| 4            | Rabha Jatiya Aikya Mancha          | 1               | 0          |
| 5            | Tiwa Jatiya Aikya Mancha           | 1               | 0          |
| 6            | Indian National Congress           | 122             | 26         |
| 7            | United People's Party              | 4               | 0          |
| 8            | All India United Democratic Front  | 74              | 13         |
| 9            | Rastiya Janata Dal                 | 12              | 0          |
| 10           | Janata Dal                         | 12              | 0          |
| 11           | Communist Party of India (Marxist) | 19              | 0          |
| 12           | Communist Party of India           | 15              | 0          |
| 13           | Independent                        | 497             | 1          |
| <b>Total</b> |                                    | <b>1064</b>     | <b>126</b> |

From the days of independence movement Assam (NorthEast) participated with Congress's programme and voluntarily be a part of Indian political with the hope retaining its unique socio-cultural identity of this territory when India got liberation. Unfortunately, in reality it witnessed only changed of rulers from White to Brown, indigenous to elite who have been practicing that old colonial theory of "we and them" even after seventy years of independence. INC had maximum tenure to have its government in the state legislative assembly and can be credited for development and blame for unsolved issues of the state. Two tenure of AGP a new regional political party turned out to be inexperienced to handle administration and governance with experienced parties in the Centre and complexities of identity crisis issue. After seventy years of independence and three decades of signing Assam Accord, neither the issues of identity crisis resolved nor illegal migrants deported. Till date no bi-lateral talk happened between India and Bangladesh about deporting illegal migrants without which no practical solution could be materialize in near future. Then in the last assembly election BJP came with the slogan of "*Jati, Matiaru Bheti*" (ethnic-nationality, land and home) which caught the imagination of voters and hope for *Bangadeshi* free Assam. Except for Muslim dominated constituencies, the party recorded landslide victory and came to the power in the state which is very significant for the saffron party to penetrate in the northeastern region. The data on securing votes by different political parties in the last

assembly election (2016) showed that previous votes of INC and AGP have gone to BJP, although AGP got 14 seats (69 in 1985 and 14 in 2016) as it alliance with BJP and INC lost 53 seats compared to the previous election and won only 26 seats in 2016 assembly election. However, as latent development of Assam Movement and Assamese subnationalism, minority solidarity registered constant growth which is the third powerful political party in the state at present. With this, the political dynamics of Assam is transforming from cultural secular ideological form to communal ideological form and ethnic subnationalism being overlapped by Hindu nationalism in the face of transforming religious linguistic composition of the state. This shift of Identity politics lies in the very nature of concept “identity” which is fluidic. Presence of various cleavages within identities in our country turns out to be blessings in disguise time to time when subnationalism confronted with national identity. Due to fluidic nature of identity in the presence of multiple identities in the globalized world any social movement that based on identity less likely to get desired results.

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## Situation of Street Children in Patna



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### Highlights

**To analyse the lifestyle and life skills, examine the nature and extent of the problems, explore the gender wise, region wise and category wise variation in problems faced of by Street Children in selected pockets of Patna and to suggest survival and coping mechanism for street children in response to their problems.**

In this twenty first century, it is well known that the street children are facing a lot of physical, mental and socio-economic problems throughout the world. The historical background of street children is linked with the development of industrialization and urbanization in developed and middle income countries. Currently, the problem of street children is more prevalent at middle and low income cities across India. However, compulsion to leave their home, means of surviving, health, physical and mental status, impact of substances use, poor working and living condition are found to be major issues faced by street children. In addition to the above, other reasons such as the adverse impact of poverty, physical and verbal violence, sexual abuse, unemployment, separation or death of parents, lack of infrastructure and industrialization and urbanization, have also been identified in other scholarly work.

According to the UNICEF and the World Health Organization (WHO), the steadily growing numbers of street children worldwide could be 100 to 150 million. India has the highest concentration as per the estimations by UNICEF with 11 million children living in the streets of India, while other groups put the numbers as high as 20 million. Two in three is a male. Moreover, while the majority of street children are between 11 to 15 years, a large percentage belongs to the 6-10 age groups. A large proportion of these children are laboring as porters at bus stands or railway stations; as mechanics in informal auto repair shops; as vendors of food, tea or handmade articles; as street tailors; or as rag pickers, picking things from garbage and selling usable materials to local buyers. **A study in 2007 in India found the following:** • 65.9% of the street children lived with their families on the streets. Out of these children, 51.84% slept on the footpath, 17.49% slept in night shelters, 30.67% slept under fly over & bridges, railway platforms, bus stops, parks and market places. • The overall incidence of physical abuse among street children, either by family members or by others or both, was 66.8% across the states, out of these, 54.62% were boys and 45.38% were girls.

Patna is the capital of the Indian state of Bihar and one of the oldest continuously inhabited places in the world. Ancient Patna, known as Patliputra, was the capital of the Magadha Empire under the Haryanka, Nanda, Mauryan, Sunga, Gupta, Pala and Suri dynasties. The modern city of Patna is situated on the southern bank of the Ganga River. The city also straddles the river Sone, Gandak and Pun Pun. The city is approximately 25 km long

and 9 km to 10 km wide. The bridge over the Ganga River named Mahatma Gandhi Setu is 5575m long and is the longest river bridge in India. The economy of Patna is based on the local service industry and the per capita gross district domestic product in Bihar is rs.31, 441. In June 2009, the World Bank ranked Patna as the second best city in India to start a business, after Delhi. In the recent years, the growth in Patna has been quite phenomenal with the improvement in the law and order after the change of regime. Several multinational companies have also come to Patna; one example is Tata consultancy services. The hinterland of Patna is endowed with excellent agro- climatic resources and the gains of the Green Revolution have enabled the older eastern part (locally called as Patna City) to develop as a leading grain market in the Bihar state.

The population of Patna is over 4,718,592 comprising of rural (2, 757, 60) and urban (1,961,532) population. The population density is 1471person per square kilometer and the growth rate is 30.17 (1991-2001). There are 839 females to every1,000 males. The overall literacy rate is 63.82% and the female literacy rate is 50.8%. Many languages are spoken in Patna. Hindi and Urdu are the official languages. The native dialect is Magadhi or Magahi, named after Magadha, the ancient name of Bihar. Dialects from other regions of Bihar spoken widely in Patna are Angika& Bhojpuri. Yet another language is Maithli from Mithilanchal. Other languages widely spoken in Patna include Bengali and English. Patna is also a major rail junction and is well connected with all major Indian cities and serves as an important transit point for a number of local people from other districts of Bihar and tourists from abroad. It is well connected through National High (NH) ways with other major cities like Mumbai, Delhi, and Calcutta etc. Despite all these improvements, Bihar accounts for 8.9% of the child labor in India.

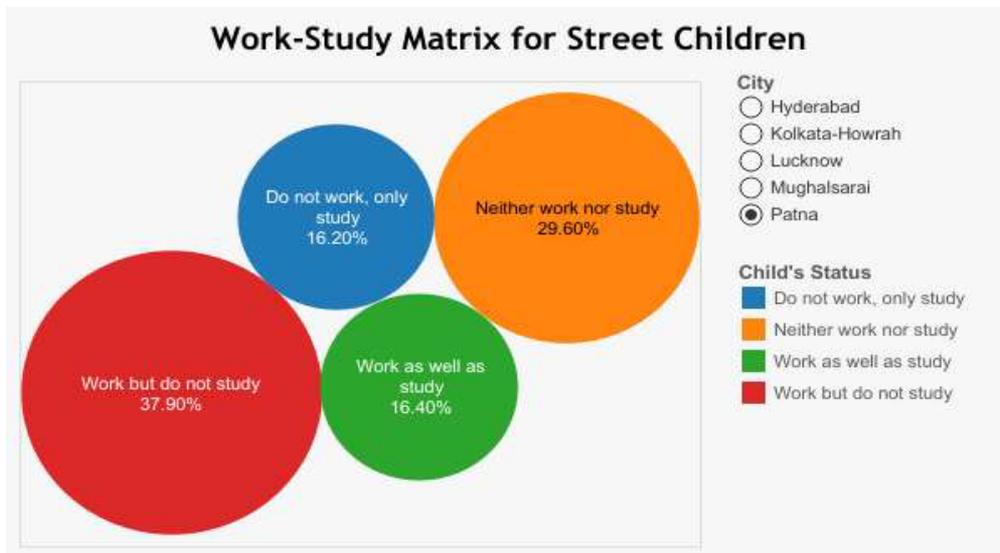
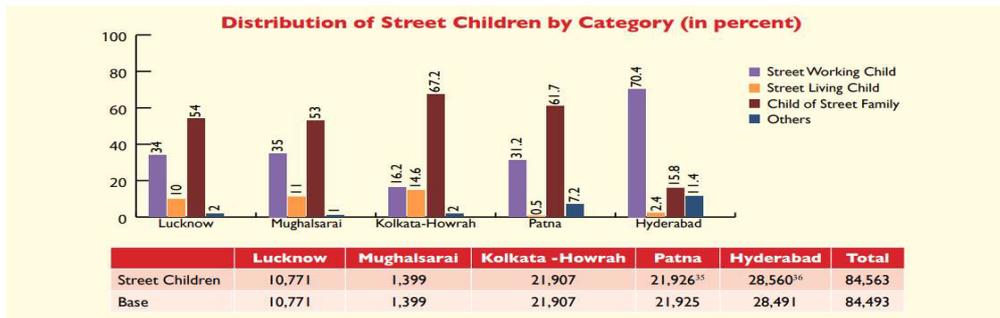
According to one of the study, 12.7 million children in the age group of 5-14 years were working. About 540,000 children were “main workers”, who worked for over six months, while 580,000 were “marginal workers” who worked for less than six months in India. The state of Bihar faces the challenge of getting its children into school, not work. The total number of children as main and marginal workers accounts for 0.54 million and 0.58 million respectively.

The unavailability of systematic data makes it difficult to arrive at a trustworthy figure on the number of street children in Patna Bihar; instead we can make only an educated guess which can be gained from social indicators such as primary school enrolment and the prevalence of child labor. Because of its capital status and easy accessibility from other places, a number of street children approximately 700 to 800 come to the city every year. Most of them come from rural areas of other districts to escape poverty, domestic violence, hostile behavior of parents and unemployment. **They could be easily seen roaming in and around Dakbanglow Road, R-Block, Karbighya, Gandhi Maidan, Bankipore Club, Patna Sahib, old Rajender Nagar bridge, Patna, Danapur, Rajendra Nagar, Patliputra Station and bus stand, etc.** Here they are involved in petty works like rag picking, boot polishing, begging for money and selling papers and magazines at road crossing, cleaning car mirrors at traffic red light signals, working as small labor (chotu) in small shops and food vendors.

**Proportion of Street Children in the City's Population**

|                                  | Lucknow   | Mughalsarai | Kolkata -Howrah | Patna     | Hyderabad | Total       |
|----------------------------------|-----------|-------------|-----------------|-----------|-----------|-------------|
| A. City Population <sup>32</sup> | 28,17,105 | 1,09,650    | 55,73,769       | 16,84,297 | 69,93,262 | 1,71,78,083 |
| B. Street Children               | 10,771    | 1,399       | 21,907          | 21,926    | 28,560    | 84,563      |
| B as a % of A                    | 0.4%      | 1.3%        | 0.4%            | 1.3%      | 0.4%      | 0.5%        |

<sup>32</sup>As per Census of India, 2011



Over the past century there has been an increasing challenge of several problems of the street children throughout the world. The study identified some of the pertinent issues of street children: status of street children across in regional pockets of Patna, alternative means of livelihood strategies of street children and social intervention in addressing the problems of street children.

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- Save The Children-SOP Bihar(2001)
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- CCHT, Bihar ( Unicef and Caritas) (2018)



### Reports

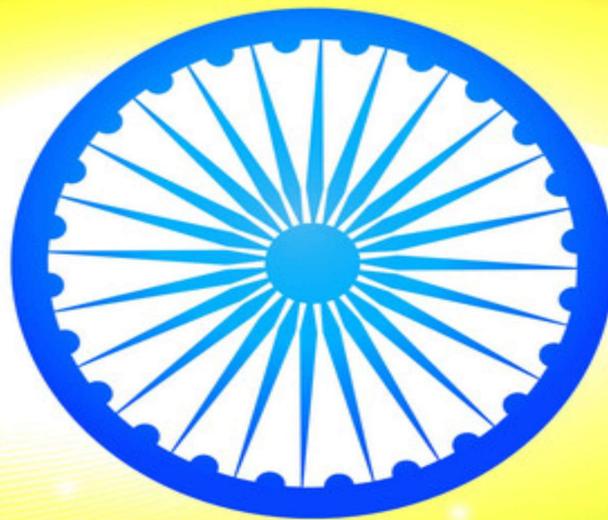
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