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Empowerment of Society Commence with Gender Equality

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ABSTRACT

Gender Equality is a term used to refer to equal rights, opportunities and power for all people irrespective of gender. It embraces a multifaceted and intersectional perspective on the disparities between girls and boys, men and women, and other sexes. It is very necessary in today's era as there are lots of disparities that discriminate between men and women in today's society. It includes sex trafficking, femicide, wartime sexual violence, gender wage gap and other oppression tactics. It is very necessary to remove these inequalities from society for better co-existence of individuals with different gender. All the people should be make a concerted effort through conscious thinking and action to avoid contributing to the imposition of gender inequality promoting equal ease of access to resources and opportunities regardless of gender, including economic participation and decision-making.

Keywords : Equal rights; Opportunities; Men; Women; Co-existence

INTRODUCTION

In this world, each person should have access to the same opportunities and rights. It ensures an environment that offers equality, fairness and justice. Every member of society longs for equality of status, of opportunities, and of rights. But it is seen that the inequality exists mostly because of culture, location, and gender. Many other factors also contribute to gender discrimination. In this century, we can see that the people are focussing on eliminating gender-based inequality by initiating various struggles and movements. This collective participation has ensured that the world is striving for progress and is moving in the correct direction. Men and women should have equal rights anywhere in the world. In order to achieve gender equality, men and women must have equal access to political, economic, educational, and health opportunities.

IMPORTANCE OF GENDER EQUALITY

A nation can only develop if its citizens are given equal value. This ensures that harmony is present between the individuals and that they feel equal to each other. When such an environment is provided, they will see no difference among themselves and can excel in every field. There are several instances where people of various genders are excluded from society. Not only men and women, but there are also a few other sections like transgender, gender neutral, non-binary, a gender etc. But still, many people are unaware of this, which totally alienates them from society. They are frequently cornered by

society and denied equal rights to health, education, decision-making, and economic independence in terms of wages as men.

This social structure has prevailed for long in society should be eliminated completely. One such example is where women are generally considered as the caregivers in the family. That's why women are mostly involved in household chores. There is only a small amount of participation by women in higher education, decision-making roles, and leadership roles. This gender disparity is a hindrance to the growth rate of the entire country. The economic growth rate of the country increases as the female workforce increases. Gender equality is increasing the overall well being of the nation along with economic prosperity in different ways.

HOW GENDER EQUALITY IS MEASURED

The level of gender equality in a nation has a significant impact on its overall development. There are many indexes available to gauge gender equality.

Gender-Related Development Index (GDI)

The Human Development Index (HDI) is a gender-specific measurement. When evaluating a nation's gender equality, the GDI takes factors like life expectancy, educational attainment, and incomes into account.

Gender Empowerment Measure (GEM)

The percentage of seats held by female candidates in the national legislature, the number of women in positions of economic decision-making, and the income share of female employees are all included in great details this statistic.

Gender Equity Index (GEI)

Three factors—education, economic engagement, and empowerment—are used to rank nations according to their levels of gender inequality. But GEI disregards the health parameter.

Inequity between genders in girls' education: It is very unfortunate that girls are restricted from getting proper education. Inequality between men and women in education is also made worse by conflict, poverty, and other forms of socioeconomic disadvantage. For instance, there is a 2.5 times greater likelihood for girls than for boys to drop out of school in nations where there is conflict. By the end of 2020, 9.7 million kids faced the possibility of being expelled from school, with girls at higher risk.

Young marriage: Gender-based violence, such as child marriage, is both a cause and an effect of gender inequality and discrimination. The COVID-19 epidemic is expected to undo 25 years of progress that saw a drop in the number of underage marriages, according to experts. In fact, according to Save the Children analysis, the epidemic will put an additional 2.5 million girls in danger of getting married by 2025, marking the biggest increase in the number of child marriages in almost three decades.

Violence against women: Everywhere in the world, across all echelons of society and economic class, gender-based violence occurs. While both boys and girls suffer unfavourable effects, girls are more vulnerable. According to estimates, one in three women worldwide has been the victim of physical or sexual abuse at some point in their lives, often at the hands of their spouses. Prenatal sex selection, female infanticide, neglect, female genital mutilation, rape, child marriage, forced prostitution, honour killings, and dowry killings are a few examples of possible forms of violence. Many of these egregious human rights abuses have been used as war weapons all around the world. Children who are refugees are particularly at risk.

Girls refuse to set limits on their aspirations in the face of significant obstacles that continue to deny them equal rights.

More and more girls are enrolling in and completing their education, and fewer of them are getting married or having children while still being children. But prejudice and limiting stereotypes are still widespread. Girls face new obstacles as a result of technological advancement and humanitarian crises, while enduring older ones like violence, institutionalised bigotry, and limited educational

and employment prospects. But not only to girls, such disparities are shown to boys too. They are forced to work as children, face gender-based violence, and are expected to earn and manage the family.

But now, people from various backgrounds are bravely speaking out against inequality. They are claiming their potential as global change-makers by leading initiatives to end gender bias such as child marriage, female genital mutilation, child labour etc and paving the way in the disciplines of science, technology, engineering, and math.

In many places, there are separate rules for boys and girls. For example, girls face more restrictions than boys even in schools, colleges etc. These institutions should not be promoting such agenda, but instead should focus on providing more education about equality. Everyone has the right to live a free and satisfying life because it is their personal right to live in this planet

Integrating gender equality outcomes across our programmes' life cycles and the target areas of our strategic plan, such as health and nutrition, education, water, sanitation, and hygiene (WASH), child protection, and social policy, puts a priority on the leadership and health of young women, while enhancing our systems and policies to promote workplaces and practices that are more gender-transformative.

Girls and boys should have equal access to opportunities, resources, and protections, according to gender equality. In 2021, UNICEF introduced a new gender policy (2021–2030) outlining our goals for achieving gender equality in all of our programmes, workplaces, and practices. The Gender Action Plan (2022-2025) lays out UNICEF's future course with a number of results and deadlines that benefit children, adolescents, and women everywhere [1].

Our gender policy and Gender Action Plan are grounded in research and incorporate recommendations from an independent assessment of UNICEF's prior Gender Action Plans, as well as information from numerous studies, data analyses (including those pertaining to the situation of girls), and a number of background papers on hot topics.

As we can take an example,the protests occurred in Iran, which began when a 22-year-old woman died on September 16 after being detained by the nation's morality police, have developed into one of the most significant persistent threats to theocracy since the disorderly months following the country's 1979 Islamic Revolution.

According to Human Rights Activists in Iran, an organisation that has been keeping track of the protests for their 54 days, at least 328 people have died and 14,825 more have been detained in the turmoil. While official media falsely reports that security forces have not killed anyone, Iran's leadership has been mum for weeks over casualty totals.

The protests may change as people return to the streets to commemorate those who were killed earlier on the 40th day, a practise popular in Iran and the wider Middle East. This shows that world is focusing on gender quality and is in the path of progress. As the women empowerment consist of 3L's they are learning, listening and leadership.

Freedom

Culture and social factors influence how much women can engage in public life (both legally and practically). The highest classes of numerous countries frequently practised seclusion of women within the home, and in some societies this is still the case today. Prior to the 20th century, it was also typical in much of Spain and other Southern European countries.

Dimensions of gender inequality are individual, systemic, formal and informal

Inequality reduction boosts economies and creates strong, resilient societies that enable everyone, especially boys and men, to reach their full potential.

Every person has their own aspirations and rights. people have started to raise daughters more like sons, but few people have the fortitude to do the opposite with sons.

In a free society, people are increasingly aware of their rights and what they can accomplish. It has been discovered that when men and women engage equally and hold the same positions, society advances and establishes a milestone. When gender equality is achieved in a community, everyone receives equal rights and opportunities in terms of political participation, health, employment, and education. Even within the family, when male and female members are treated equally, this is the optimum environment for development, learning, and significant value addition.

For a nation to advance in the correct direction, each gender must be valued equally. When both genders are given equal opportunity, society as a whole develops more successfully. Equal rights in governance, politics, the economy, the workforce, and other areas will undoubtedly raise our society to a new plane. The social stigma associated with women staying at home has changed. Girls now face an equal level of competition from boys in the classroom. Additionally, they are paving the way for historic developments in their fields.

Nowadays, women want to be financially independent before they get married. They learn the self-assurance they need to resist oppression and choose better options for themselves. Any form of discrimination hinders a country's development, and a country can only advance when all of its residents enjoy equal rights. The majority of modern nations have fairly little gender discrimination and give both sexes an equal chance. The Indian government is also undertaking numerous steps to reduce gender discrimination.[2]

To promote the education of young girls, they have launched the "Beti Bachao, Beti Padhao Yojana" social programme. In addition to this, the government implements numerous other programmes to raise awareness among the populace, like the Women Helpline Scheme, UJJAWALA, the National Mission for Empowerment of Women, etc. In addition, it is our duty as responsible citizens to educate people about gender discrimination in order to make the world a better place for women. [3-5]

CONCLUSION

Gender inequality has prevailed in the world for a long time. It is continuously evolving, and each generation has gone through various stages to overcome it. Countries that took the necessary steps to eliminate the stereotypical role of inducing gender inequality benefited from increased prosperity and better lives for all.

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Gender Equality: An Unnoticed Section

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ABSTRACT

This article addresses gender equality and focuses on the hurdles faced by transgender people. It is crucial to keep in mind that, while many individuals can speak about equality that applies to both men and women, there seem to be comparatively few individuals who have the ability to voice transgender issues. In most cases, people who identify themselves as transgender are denied even the most fundamental human rights. A lot of time, they experience school bullying, verbal abuse, abandonment of their family, being forced out onto the streets, and being turned down from jobs. They are often victims of gender-based violence. The issues and prejudices faced by transgender people in our society, as well as how transgender people, like any other person, can live a healthy, happy, and prosperous life with the support of legislation, all organizations, and the right education, have been discussed. As they always proclaim, "Transgender rights are Human right".

Keywords : Gender; Equality; Transgender; Harassment; Laws; Society.

INTRODUCTION

Gender equality is when people of all genders have equal rights, responsibilities, and opportunities. When discussing such matters, the first thing that springs to mind is the dominance of men and women in society, while transgender people are not given proper regard in this context. Both the male and female genders have equal rights, freedom to live their lives, and opportunities abound in the twenty-first century, whereas transgender people are denied basic needs and equal rights in society. Generally, Indian society fails to recognise the needs and struggles of a transgender person. So the role of transgender people in society and their fight for equality are discussed.

TRANSGENDER

A transgender person is someone whose gender expression or gender identity does not match the sex to which they were biologically assigned. Many transgender individuals struggle with dysphoria, which they try to overcome by transitioning, frequently taking on a new name and set of pronouns in the process.

PROBLEM FACED BY TRANSGENDER

When people, especially in India, hear the term "transgender," there will be a disturbed reaction on their faces. Even their own parents are unable to accept the changes in their life and, in most cases, drive them out of their homes. A study by a team

from the National Institute of Epidemiology found that among the 60,000 transgender people living in 17 states, including Tamil Nadu, do not receive support from their biological family

If an individual is educated properly, they may lead a fulfilling life, yet many schools and institutions do not admit transgender students. In a few instances, however, they are given opportunities but are unable to make use of them due to the hardship and unfair treatment they have received from their relationships, which has left them with a strong inferiority complex and a conviction that they are not good enough. However, sources claim that even though some transgender people are completing their education and stepping into the next part of their lives, which is work, the trans community still encounters unemployment at a rate that is twice that of the general population [1]. As a result, they seriously struggle to find employment and are badly treated at their places of employment, which would include sexual harassment.

A survey states that 97% of transgender people are sexually harassed and humiliated in the workplace. Most of the transgender people leave their jobs because they are not getting proper wages for the work they do, which forces them to earn their living as beggars on the streets. They don't have enough housing options, and many of them are residing in temporary housing, which prevents them from receiving valid ration cards and other government-provided benefits. Even the provision of a public rest room was lacking. Their largest issue is social prejudice, which keeps them from participating in social and cultural events and celebrations and prevents them from exercising their fundamental rights in the same way as others.

CAUSES

The main cause is a lack of public awareness. The general public is unaware of the difficulties that transgender people face. There are laws that govern all transgender people, such as the fundamental rights under Article 14 (Equality), Article 15 (Non Discrimination), Article 16 (Equal Opportunity in Public Employment), Article 19 (Right to Free Expression), and Article 21 (Right to Life) of the Indian Constitution [1], but these laws are not respected by society because there is no adequate punishment for those who violate these rules. Men and women have more organisation to speak out the issues faced by them whereas there is no proper recognized organisation to speak out for the transgender.

Another important aspect is the unhealthy mentality of society. People are not even realising that they are disrespecting another human being. Additionally, they have the confidence to harass them because no one will speak up for them. They beg along the sides of the road, but we, the men and women, are the main cause of that. If they are treated equally with some respect, they will be able to live a dignified life.

The most vital point is that we need to stop labelling every transgender person as a "prostitute." There are some, but we, as men and women, and our dysfunctional society, are to blame for their decision.

It can even be said that we are infected with the most dangerous disease called 'Discrimination'. This illness is being passed down from generation to generation, and we are still acting in the same way.

HOW TO GET RID OF DISEASE

The first step is to educate school students, how to treat a transgender as a normal human being and to make it apparent that transgender people are simply another form of gender. Detailed research on biological changes and how transgender individuals are viewed socially is vital. The government must strictly enforce the laws and organize new department separately to satisfy the needs of transgender people.

New laws have to be established and the penalties for those who break them should be severe.

The best messages are like bitter gourd; most people will only accept them for consumption if they are prepared well so that film or social media platform can be a well-prepared bitter gourd to

create a significant impact on society. This is why transgender representation in the media is crucial. Finally, before injuring a transgender person, all men and women should stop, put themselves in their shoes, and experience how they are hurting them.

"Little drops of water make a tremendous ocean," in the same way that a change in just one individual can lead to a significant shift in society.

Despite all of these challenges, many transgender people have succeeded in their lives through perseverance and ignoring social pressure, namely,

JOYITA MONDAL – the first transgender judge in North Bengal.

SHABI - the first transgender soldier to serve for Indian army (Navy).

SHABNAM MAUSI BANO is the first transgender Indian to be elected to public office and was also an elected member Madhya Pradesh state legislative assembly from 1998-2003.

AISHWARYA RUTUPARNA PRADHAN - the first transgender civil servant and Commercial tax officer.

K PRITHIKA YASHINI is India's first transgender police officer, as well as the state's first sub inspector.

SATHYASRI SHARMILA - First transgender lawyer.

These examples prove that transgender people are capable of anything and can accomplish everything if given the opportunity.

They are a combination of physically strong men and mentally strong women, hence, they can accomplish miracles when they receive their basic respect, needs, and equality.

CONCLUSION

Men and women currently have equal rights and are treated with respect, despite the fact that transgender people do not currently have access to basic needs. Treating them equally will result in more prosperous individuals who can enrich our society.

Since they are people with feelings, the matter may be accepted by the future generation and treat everyone equally.

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Impact of Rice Husk Ash as a Supplementary Cementing Material Used in Rigid Pavement

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ABSTRACT

This study investigates the effect of Rice Husk Ash (RHA) on the properties of hydrated cements with a view to improving their properties and making them more sustainable for the construction of high-grade concrete, which is conventionally used in rigid pavements. The variation of mortar properties was related to the activity of RHA, which was assessed by X-Ray Diffraction (XRD) analysis. Experimental results indicate the increased compressive strength of high-grade RHA mixed cement concrete by replacing up to 15% and 5% of Ordinary Portland Cement (OPC) and Portland Pozzolana Cement (PPC), respectively, by weight compared to that of high-grade virgin cement concrete. The incorporation of RHA also reduced the pH value and consequently the Alkali Aggregate Reaction (AAR).

Keywords : Rice Husk Ash; X-Ray Diffraction; Compressive Strength; Alkali Aggregate Reaction.

INTRODUCTION

Over 42 lakh km of roads exist in India (Kumar et al. 2001), making it the world's second largest road network, carrying 90% of passenger traffic and 70% of freight transport (Shukla et al. 2003). 90% of the paved roads are bituminous, balance are rigid pavement. From this statistical data, it is observed that rigid pavements are less favourable to our country, possibly due to their high initial construction cost. However, their maintenance cost is very low compared to that of flexible pavement. The Pradhan Mantri Gram Sadak Yojana (PMGSY) and Golden Quadrilateral projects undertaken by Govt. of India require a huge quantity of material, thus leading to a material crisis and utilizing the materials from the neighbouring lands. Besides the growing cost of production of Portland cement, this has motivated researchers to partially replace it with suitable Supplementary Cementing Materials (SCM). On the other hand, an exponential increase in the volume of siliceous waste materials (e.g., fly ash, agricultural waste and blast furnace slag) has provoked the attention of researchers and industry professionals towards replacement of cement with these materials. Industrial and agricultural waste materials with pozzolanic properties such as Blast – Furnace Slag, Fly Ash and Rice Husk Ash (RHA) are used in building materials with a view to enhance sustainability and improve the service life of structures. This leads to environmental benefits such as recycling waste whose disposal threatens the environment and reducing cement content and subsequent drop in energy consumption, non-renewable raw material consumption and CO2 emissions.

The suitability of RHA mainly depends upon its

silica content and large surface area, governed by the porous structures of the particles. Silica content, its reactivity and its mineralogical structure depend upon the combustion time, temperature and turbulence during combustion. The ash is composed of up to 97% of silica.

REVIEW OF LITERATURE

Investigators obtained a rapid analytical method for evaluating the presence of amorphous silica in RHA proposing that RHA is highly pozzolanic and suggesting its use as a supplementary cementing material and contributing towards sustainable development [1-8]. The reactivity of RHA depends on the temperature of incineration. The optimum combustion temperature for obtaining reactive RHA is 500°C. At temperatures beyond the nature of RHA changes from amorphous to crystalline. The RHA concrete produces a satisfactory slump and setting time and has been investigated and found to have excellent resistance to chloride ion penetration, surface scaling and excellent performance under freezing and thawing conditions. The pozzolanic reaction reduces the $Ca(OH)_2$ content of RHA concrete while improving its compressive strength and workability. The incorporation of natural RHA in structural concrete is not only a good alternative for the disposal of this residue but also improves the toughness of the pavement. Many researchers have used RHA to determine the various properties of concrete, but they have not used higher-grade concrete (M40) in their studies. Rather, some have used lower-grade concrete (M30) and others have not indicated anything about the grade of concrete used by them.

OBJECTIVES

The goal of this research is to look into the compatibility of such wastes with partial cement replacement. Given their compatibility, the study has continued to detect changes in the properties of standard cement for the purpose of producing low-cost blended cement. So, the objectives of this study are -

i. to investigate the possibility of using Rice Husk Ash (RHA) as Supplementary Cementitious Material (SCM).

ii. to evaluate the traditional properties of the proposed Rice Husk Ash (RHA) blended cement, such as standard consistency, setting time, and soundness.

MATERIALS USED IN THE INVESTIGATION

The RHA used in this investigational work was collected from the Rice Mill of Burdwan, a district of West Bengal. Ultra Tech Cement Limited supplied the cement used in this investigational work, which included Ordinary Portland Cement (OPC), 43 Grade (OPC), and Portland Pozzolana Cement (PPC). The super plasticizer (FOSROC made Auromix-400) used in this investigation collected from local market which mainly steadies the workability of the concrete mix and maintains it, hence obtaining a fairly workable concrete with high strength. It is also a high range water reducer (HRWR) with an IS 9103 polycarboxylic base and a specific gravity of 1.09. Aggregates of the Pakur variety and sand collected from the local market were used in laboratory experiments. Potable water was used for preparing concrete samples.

METHODOLOGY

The RHA has been added to the cement in the form of SCM. Then, concrete cubes of dimension 150mm x 150mm x 150mm were has been cast followed by compaction using needle vibrator by using coarse aggregate, fine aggregate, sand, water, admixture and the RHA blended cement as per design mix proportion in the Highway and Transportation Engineering laboratory, Indian Institute of Engineering Science and Technology (IIEST) Shibpur at room temperature. After 24 hours, the casted cubes subjected to curing before they were tested.

The analyses in this investigation have been done by following the Indian Standard (IS) specifications and standard specifications adopted throughout the world to determine the appropriate amount of RHA (% by weight of cement).

Measurement of classical properties of blended cement:

The classical properties of cement, such as fineness, standard consistency, and compressive strength, have been evaluated in this study to determine the grade and quality of the cement, as shown in **Table 1**.

Table 1: Consistency values for Portland Pozzolana Cement blended with RHA

Name of the Test	Standard Code
Fineness of cement by Specific Surface Method	IS: 269-1958
Consistency of Cement	IS: 4031 (part IV)
Compressive Strength Test	
at 7 days and 28 days	IS: 516-1959

Determination of the nature of RHA

An X-ray Diffraction (XRD) analysis was performed on a 4g RHA sample at the Department of Metallurgy and Material Science, IIEST, Shibpur, using a Philips PW 1830 diffractometer. Using a 35 kW, 25 mA power supply, electrons bombarded a copper filament to generate casting. Samples were characteristic Cu-Kα x-rays that after passing through a beryllium monochromatic filter, were radiated towards the sample at incident angles (θ ranging from 2.5°-40° (2θ = 5°-80°). Constructive interference at particular values of θ was detected as peak intensities in the XRD pattern. According to Bragg's law, the θ value at each peak is related to the inter-atomic spacing (d) of the crystals forming in the sample. For amorphous and poorly crystalline materials, the peaks are very broad and do not correspond to an identifiable θ value

Mixing, casting and testing of concrete cube

The design mix of M40 grade concrete was prepared as per IS: 10262-2009. The ingredients are mixed thoroughly by hand in surface-dry condition, and then a designed amount of water and admixture are added and mixed. The cubes were cast using a needle vibrator, as shown in **Fig 1**. The design mix of RHA blended cement samples was also prepared in the same manner, followed by cube cured as per the guidelines of standard code. The compressive strength of the cubes was tested at 7 and 28 days in the Highway Engineering Laboratory of IIEST, Shibpur.

Fig 1 Casing of Concrete cube by compaction with needle vibrator

RESULTS AND DISCUSSIONS

Interpretations of the experimental results along with discussions have been attached in this article.

Evaluation of classical properties of tested modified cement

The consistency of the cement samples after adding RHA in the proportion of 0%, 2.5%, 5% and 7.5% to the Portland Pozzolana Cement and Ordinary Portland Cement as SCM have been evaluated and furnished in the **Tables 1 and 2**.

Table 1 Consistency of cement samples after adding RHA

Percentage of RHA replaced	Consistency value
0 %	32 %
2.5 %	34.5 %
5 %	36.5 %
7.5 %	37.5 %
10 %	39.5 %

Table 2 Consistency of cement samples after adding RHA

Percentage of RHA replaced	Consistency value
0 %	28.5 %
5 %	29 %
10 %	32.5 %

15 %	38.6 %
20 %	44 %

Tables 1 and 2 show the increasing trend consistency values for increasing proportions of RHA blended with Portland Pozzolana Cement and Ordinary Portland Cement.

Determination of the nature of RHA using XRD

XRD was performed on the RHA sample to reveal the nature of RHA and shown in **Fig 2**. According to the XRD analysis performed on the RHA sample, the sample is crystalline in nature. The sharp peaks and distinguishable value in **Fig 2** indicate that the RHA is crystalline.

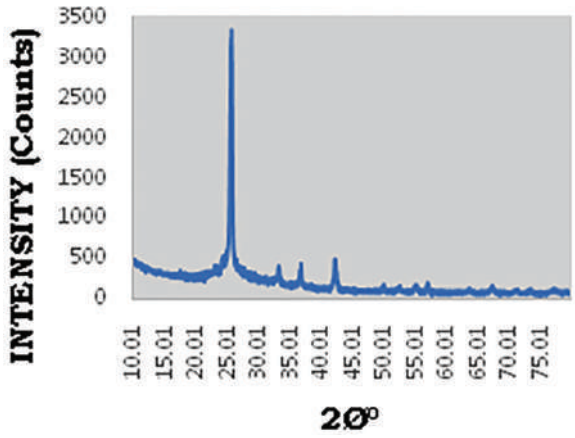

Fig 2. XRD graph of the RHA sample

The crystalline nature of the RHA is due to the presence of silica in the form of Cristobalite (Pavia et al. 2014), which lowers the reactivity of the RHA and does not allow the RHA to react readily with cement.

Evaluation of Compressive strength of RHA mixed concrete

The compressive strength of concrete having a varying ratio of RHA ranging from 0% to 10% mixed with cement has been determined for 7 days and 28 days, as shown in the **Tables 3 and 4**. Conducted Compressive strength test shown in the **Fig 3**. Each datum of compressive strength of mortar was obtained from the average of two samples.

The Compressive strength test results of the concrete samples furnished in **Table 3 and Table 4** indicate higher compressive strength values of the RHA blended mix compared to that of virgin cement concrete. Further better results are observed in the case of RHA blended OPC concrete compared to that of RHA blended PPC concrete for both the 7 days and 28 days tests.

Table 3 Compressive strength test results of concrete samples

Sl. No.	Blended Cement (% PPC replaced by RHA)	Compressive Strength (MPa)	
		7 days	28 days
1.	2.5 % RHA	22	36
2.	5.0 % RHA	34	49
3.	7.5 % RHA	30	44
4.	10.00 % RHA	28	40

Table 4 Compressive strength test results of concrete samples

Sl. No.	Blended Cement (% PPC replaced by RHA)	Compressive Strength (MPa)	
		7 days	28 days
1.	5.0 % RHA	50	62
2.	10.0 % RHA	47	60
3.	15.0 % RHA	46	59
4.	20.0 % RHA	34	47
5.	25.0 % RHA	32	45

Fig 3. Compressive strength test being conducted

6.4 pH value analyses of blended cement concrete

The pH value determination test conducted on concrete with blended OPC (15%) and PPC (5%) after 7 days of curing showed pH readings of 11.2 and 11.675, respectively, as shown in **Fig 4**. This pH value is considerably lower than the pH value of sound concrete, which has a pore-water pH of 13 -13.5 [A.C.I. Committee Report].

Fig 4 pH value determination of RHA blended OPC

Fig 5 pH value determination of RHA blended PPC

The lower value of the pH of the RHA blended concrete mix considerably reduces the damage to concrete caused by the Alkali Aggregate Reaction which mainly occurs at higher pH levels. **Fig 5** shows the pH value of RHA blended PPC.

CONCLUSION

Based on the findings, it is possible to conclude that RHA can be used as a SCM at 15% by weight with OPC in the construction of higher-grade concrete traditionally used in rigid pavements to provide satisfactory compressive strength. However, while this value is slightly lower than 5% RHA blended OPC concrete, the waste consumption is maximum for preparing a comparable amount of concrete. Furthermore, at 5% by weight with PPC, RHA can be used as SCM, though the compressive strength will be slightly lower than the standard value. So utilization of RHA in the construction of rigid pavement as a partial replacement of cement not only decreases the construction cost but also reduces environmental pollution.

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Infrastructure Development and Industry Innovation

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ABSTRACT

The key elements that enhance society in the fields of industry, innovation and infrastructure are discussed here, along with research and ideas in detail. A thorough analysis of different industry sectors and innovation in various fields is proposed here. The types and methods for developing our country's economy are suggested in relation to infrastructure.

Keywords : Technology, Growth, Economy, Development, Production.

INTRODUCTION

There is no denying the importance of industry; it was the gradual growth and expansion of one industry that paved the way for the creation and growth of other sectors that are now a part of modern societies, such as banking, large-scale industrial production, capital concentration, labour division, increased productivity, new innovative technologies, etc. Below mentioned are some of the industries that are fast growing in today's world.

Pharmaceutical Industry

In recent years, the world went through many diseases and pharmaceutical companies were part of the effective solution to these pandemics. That is why governments and people have trusted the industry and are asking it to help end COVID-19.The pharmacy industry is essential to the healthcare industry as a whole. Along with fundamental technical knowledge, a specialist in the modern pharmacy sector needs to be proficient in administration and computation. The pharmacy sector needs to advance because scientists are employing more and more technologies to predict the future of healthcare. There is no denying that pharmacy has a very broad application across the world. According to Mr Sudarshan Jain, Secretary General, The Indian Pharmaceutical Alliance (IPA), Mumbai, the country's pharmaceutical market is anticipated to reach $130 billion by 2030 and overtake all other nations as the world's top supplier of pharmaceuticals. **Fig. 1** depicts the top ten pharma industry trends and innovations in 2022. **Fig. 2** depicts the market of the Indian pharma industry in the upcoming years.

Automobile Industry

In India, the automobile sector employs 13 million members of the working class. Four categories—two-wheelers, passengers, commercial vehicles, and three-wheelers—make up the automobile industry. The key growth engine of the automobile industry in India is the rise in demand for cars and other vehicles, which is fuelled by the rise in income. The

development of the automotive industry has also been aided by the advent of specialized financing options and simple repayment plans. **Fig. 3** depicts the Indian automobile industry's market based on the various types of automobiles. The automation in automobiles has made our lives more sophisticated, as in [1].

Fig. 1. Top 10 Pharma Industry Trends & Innovations in 2022.

Fig. 2 Indian Pharmaceutical Market

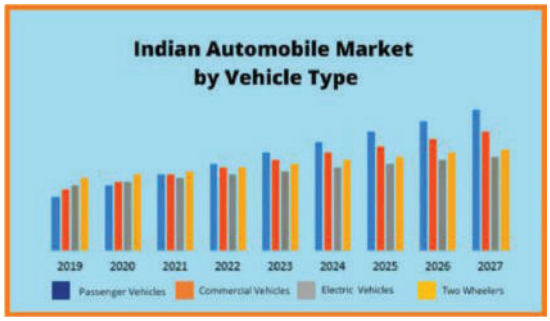

Fig. 3 Indian Automobile Market based on different vehicle types

Role of the Automobile Industry in India GDP-Growth

- In 2007, the growth rate for passenger cars was 13.50%.
- In 2007, the growth rate for utility vehicles was 10.10%.
- Multipurpose vehicles experienced a 24.40% growth rate in 2007.
- Maruti Udyog Ltd. is the biggest automaker in the nation, and its growth rate in 2007 was 20.7%.
- Honda Siel Cars India Ltd, the industry pioneer in India for the production of luxury vehicles, saw a growth of 16.1% in 2007 and sold 41,638 units.
- In August 2007, General Motors India reported a 114% increase in national sales.

Construction

Numerous jobs in civil engineering and construction make up the vast sector of the economy known as construction. Construction work includes designing homes, roads, bridges, and other structures. The Indian construction market is estimated to expand at a rate greater than 10% throughout the projected time frame. (2022-2027). As COVID-19 swept over the country in April 2020, killing the sector, the Indian construction industry, which was already battling with inadequate management and a lack of control over its labour force, completely lost its central hold. The availability of building materials and price inflation have become serious problems. The cancellation and postponement of projects had a direct impact on MSMEs, with many being forced to close their doors or reduce their operations.

Electronics

The vacuum diode, invented by J.A. Fleming, signalled the start of the actual history of electronics. The vacuum triode, created later by Lee De Forest later, was used to magnify electrical signals. As a result, tetrode and pentode tubes were developed, and they dominated the world until World War II. The invention of the junction transistor in

1948 marked the start of the transistor era. These transistors gained popularity and wide application in a range of electronic circuits due to their utilization of germanium and silicon semiconductor materials.

Between 1958 and 1975, smaller, medium-sized, and very-large integration integrated circuits (ICs) as well as those that could integrate more than a thousand components on a single chip were created. In addition to streamlining the design of electronic devices, the development of Junction Field Effect Transistors (JFETs) and Metal-oxide-semiconductor field-effect transistors (MOSFETs) between 1951 and 1958 continued the creation of more dependable and potent transistors.

Digital integrated circuits (ICs) were yet another durable IC innovation that altered the design of computers as a whole. Transistor-transistor logic (TTL), integrated injection logic (I2L), and emitter-coupled logic (ECL) technologies were used to create these integrated circuits. Later, these digital ICs used fabrication design techniques for PMOS, NMOS, and CMOS [2].

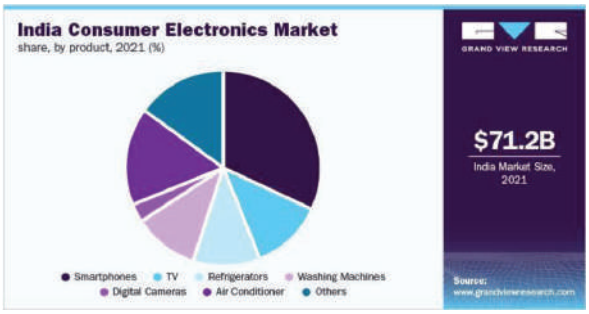

Fig. 4. India Consumer Electronics Market

The applications of electronics in daily life are as follows:

1. Refrigerators, air conditioners, washing machines, vacuum cleaners, microwaves, and other home appliances are examples. Examples of audio and video systems include headphones, DVD players, loudspeakers, colour TVs, video game consoles, etc.
2. Real-time automation creation is the primary goal of this sector. This includes applications for renewable energy sources, solar systems, biomechanics, robotics, mechatronics, power converting technologies, industrial automation and motion control, motor drive control, machine learning, and power electronics.
3. By boosting output and efficiency, machines save time and money. Furthermore, it is secure to use machines for challenging jobs.

Oil and Gas Industry

Oil and natural gas, the two main fuel sources in the world, are important players in the energy sector and have an effect on the international economy. Processes and systems for the production and delivery of oil and gas are extremely complex, capital-intensive, and reliant on cutting-edge technology. Historically, due mostly to the upstream or production stage of the sector, natural gas has been linked to oil. For a sizable portion of the history of the industry, natural gas was regarded as an annoyance, and it is still flared in vast quantities in many parts of the world, including the United States. Natural gas now contributes more significantly to the world's energy needs as a result of shale gas development in the United States.

Innovations

3D Printing

Making ideas into goods is easier with 3D printing. With the use of technology, numerous materials can be produced accurately and quickly [3]. Additionally, 3D printing speeds up manufacturing, streamlining the prototyping process and enabling firms to always be one step ahead of the contest.

Benefits of 3D printing include:

•AM significantly shortens the production cycle, provides superior process flexibility and meets the market's constantly shifting demand.

• Per-unit manufacturing is an option when producing in small batches. Costs are unimportant.

•Through the quality control inspection, one of the subsequent processes, AM reduces assembly errors and the costs associated with using pre-assembled parts. **Fig. 5** shows the use of 3D printing in current trends and future trends.

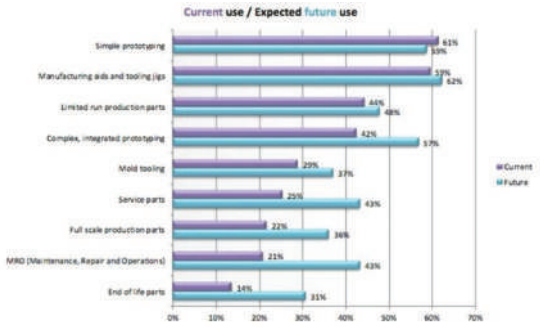

Fig.5 Use of 3D Printing in current trend and future trends.

Semiconductors

The electronics and energy sectors both depend on semiconductors. They are significant because of their chemical composition. Semiconductors lack a fixed value for conductivity, unlike other substances that can function as either an insulator or a conductor. They are insulators by nature but can be made to function as a conductor by applying external stimuli. Furthermore, their ability to transport electrical current by positively charged particles known as "holes," in addition to electrons, enables the production of electronic components such as transistors and solar cells. **Fig. 6** shows the use of semiconductors by different sectors in India.

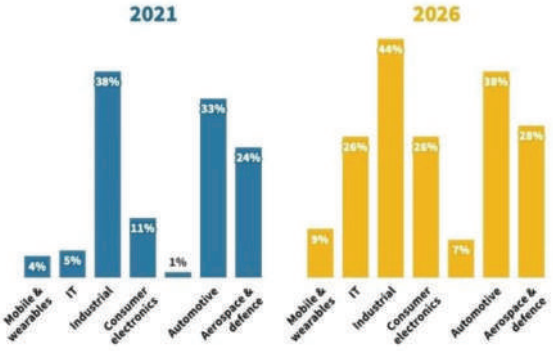

Fig.6 Use of Semiconductors by different sectors in India.

Artificial Intelligence

Artificial intelligence (AI devices make housework easier and more efficient than manual labour. AI increases the speed and effectiveness of information processing. In the sphere of medicine, for instance, early disease detection has become easier. AI data that performs morphological assessment reduces the work of medical professionals and facilitates disease detection. **Fig. 7** shows use of artificial intelligence in different fields.

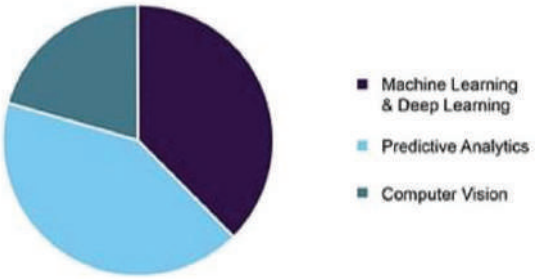

Fig. 7. Artificial intelligence used in different fields

Applications

In the financial industry, artificial intelligence will be used to counteract market manipulation, fraud, higher trading costs, and decreased trading costs.

In the agriculture sector, artificial intelligence is employed to provide creative production, storage, and distribution choices. Information will be received quickly, which will aid in selecting the fertilizers and chemicals to utilize for the crop [4].

Face Recognition

The majority of studies and applications for face recognition are still in their infancy and rely on small databases. The biometric identification process needs to be performed with a video camera aimed at the subject's face. Many existing strategies have a glaring weakness in the possibility of aesthetic manipulation or system confusion.

Cloud Computing

A technique known as "cloud computing" allows users to fully utilize their information technology capabilities and deliver them via the Internet in several service models [5].

It is also an easy approach to cooperate online with people from a computer or network server while sharing folders with them. Sharing can be done publicly or privately. A cloud computing system typically comprises several clouds that connect using web services and application programming interfaces.

Internet of Things

Technology from the Internet of Things Smartphones, televisions, smartwatches, home appliances, sensors for "smart home" and "smart city" systems, and more are among the gadgets (or "things") connected to the Internet. Most of the time, none of these components need a person to engage with them in order to communicate with one another or the control software. As IoT matures into a stand-alone system, the Internet within the Internet, will continue to produce massive amounts of real-time data [6]. **Fig 8** depicts different sectors of IOT.

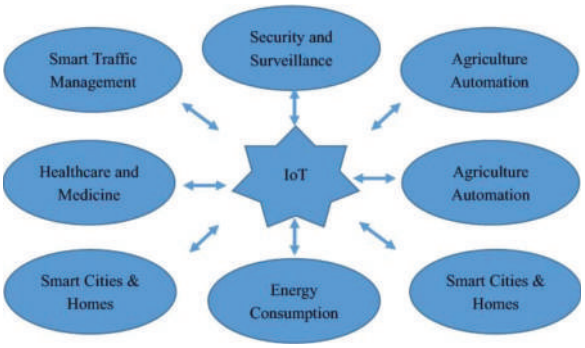

Fig. 8 Different sectors of IoT.

Drones

Drones are a result of the development of technological innovation and the emergence of various requirements in a variety of living domains. Drones are flying robots that can be controlled remotely or autonomously. They are often referred to as unmanned aircraft or unmanned aerial systems.

AGRICULTURE

Drones are often used in agricultural operations. At the beginning of the crop year, farmers can utilize drones to inspect the state of the land. They also provide 3D maps of soil testing. Additionally, information on controlling nitrogen and irrigation for improved crop development is provided via drone-based soil and field investigations. Drones are more helpful in agriculture and smart farming than satellite technology since they can give farmers a broad view of their farms. **Fig. 9** shows the advantages of using drones in agriculture.

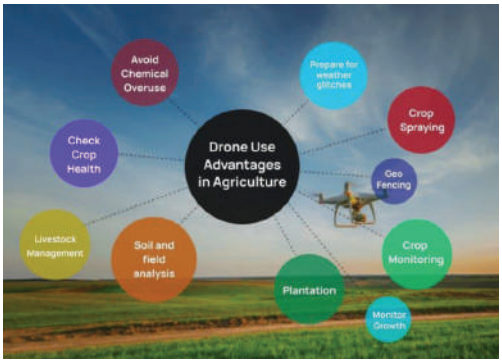

Fig. 9 Drone-use in agriculture.

MEDICINE

The medical field is another where drones are actively used and where their use is expanding. Drones are frequently used in the healthcare industry to deliver first aid kits, pharmaceuticals, vaccines, and blood to remote regions as well as to provide catastrophe assessments in areas with high contagion risk and transport test samples and equipment safely. Drones have the potential to revolutionize medicine in the twenty-first century, despite significant legal limitations. Drones, which have had success in the medical and healthcare areas, appear to hold promise for this industry's future. In **Fig. 10**, a drone is carrying a blood product for transfusion.

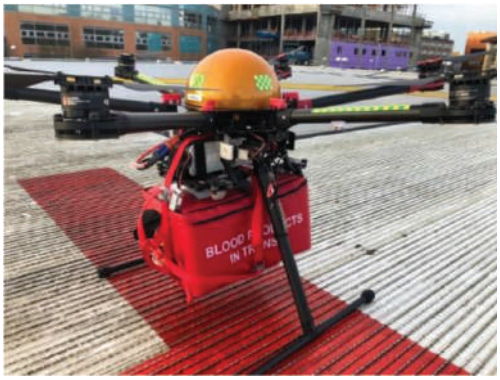

Fig.10 Drone carrying blood product for transfusion.

Infrastructure

The infrastructure sector is the key engine of the Indian economy. Because of its importance to India's overall economy and its potential to ensure that world-class infrastructure is constructed in the country on schedule, the Government places spends

a lot of emphasis on this sector. In other words, the infrastructure sector catalyzes the growth of related industries such as townships, housing, built-up infrastructure, and construction development projects.

A wide range of structures and systems that require physical parts are referred to as infrastructure, including the electrical grid that runs throughout a city, state, or country [7]. Infrastructure includes buildings or equivalent physical assets like bridges and highways that are essential to a nation's economy in addition to enabling its inhabitants to participate in the social and economic community and meeting their basic requirements like food and water. Usually, this manifests itself in the form of production that is carried out directly by the Government or by a body that is bound by stringent legal regulations.

INFRASTRUCTURE TYPES

Hard Infrastructure

Physical infrastructure is necessary for the operation of a contemporary, industrialized nation. A few examples include roads, highways, and bridges, as well as the machinery required to run them, including transit buses, cars, and oil refineries. Technical elements like cabling and networking hardware make up the hard infrastructure and are essential to maintaining business operations.

Soft Infrastructure

This is a reference to the human resources and institutions necessary to support an economy that offers the populace particular services like banking, healthcare and education.

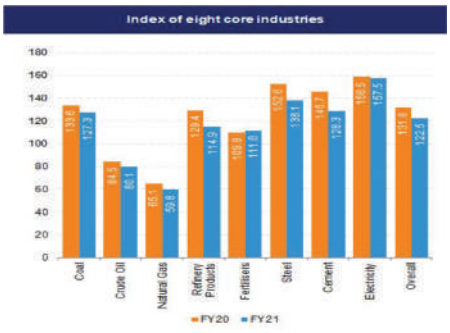

Fig. 11 Index of eight core industries.

According to the IBEF (India Brand Equity Foundation), India plans to invest US$ 1.4 trillion in infrastructure over the next five years [8]. Infrastructure-related operations accounted for about 13% of the US$81.72 billion in total FDI inflows in FY21. To realize the goal of housing for everybody by 2022, India will need to build 43,000 homes per day until that time. The Pradhan Mantri Awas Yojna scheme has been sanctioned 122.69 lakh homes, grounded 103.01 lakh homes, and completed 62.21 lakh homes as of August 22, 2022. (PMAY-Urban). **Fig. 11** gives a detailed survey of innovation in the world's regions in various industries. The Top 100's geographical and industry distributions offer insights into the regions with particularly strong innovation momentum during the previous two years

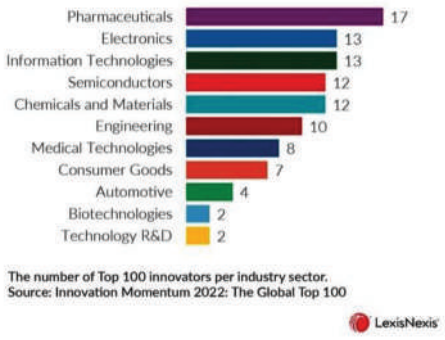

Fig.12 Innovation – New Lexis Nexis report

Fig. 12 depicts the survey of companies that make innovations in all sectors. America, notably the United States, is home to nearly half of the top 100 companies. The pharmaceutical, medical and information technology sectors employ them primarily [9]. The remaining five percent originates from the CEMEA (Central Europe, Middle East, and Africa) region, where the two most populous industrial sectors are chemicals and materials and engineering. Asia focuses on electronics, chemicals and materials, and information technologies and is home to about one-third of the companies.

Garry Bowditch, a renowned Australian infrastructure specialist, recently emphasized that

'Three strategies to raise the calibre of investments in infrastructure

When the word "sustainable infrastructure" is used in its broadest sense, it refers to all four sustainability components: social, environmental, economic, and institutional sustainability. When I speak about institutional sustainability, I mean a framework in place that ensures good governance, or the appropriate upstream planning, preparation, execution, and management of infrastructure projects through transparency, accountability, measurability, and result monitoring.'

This architecture is crucial because it can provide both the capabilities to manage and lessen the risks associated with infrastructure projects as well as the security needed for long-term investments [10].

More precisely, Mr Bowditch offers three imperatives for better infrastructure project preparation and implementation in his article "Infrastructure Imperatives for Australia," which can serve as important recommendations for the creation of sustainable projects funded by the IDB:

1. Creating markets for infrastructure and service initiatives: Governments traditionally approach infrastructure procurement on a project-by-project basis, and as a result, their interactions with the market are frequently fragmented and uncoordinated. This is another rationale for reforming infrastructure management. This might increase the price of infrastructure and lower the quality of market replies, which would affect the market's expansion and the ability of bidders to provide the finest services and innovative solutions.
2. Improve the investment appeal of infrastructure projects: Raising private financing for infrastructure projects is essential if Latin America and the Caribbean and the rest of the globe are to close their infrastructure gaps. A long-term infrastructure pipeline and a more thorough, inclusive, and objective cost-benefit analysis are the essential tools for accomplishing this.
3. Infrastructure should be updated to encourage radical innovation and higher productivity. When talking about how to improve our infrastructure, the significance of strong governance institutions cannot be stressed enough. Multilateral development banks can still help, even though our partner states' sovereign sovereignty over this issue is what matters. The International Development Bank (IDB) Conferences held in Paraguay and Colombia over the past twelve months. This is why the launch of the International Infrastructure Support System was recently hosted by IDB. The Sustainable Infrastructure Foundation developed this platform, which has the support of numerous national and multilateral development banks.

CONCLUSION

Technology advancement in the industrial sectors is aided by innovation, which also fosters the development of fresh talent. Industrialization-fueled economic growth reduces income poverty by creating job opportunities.

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It's Code Red for Future Resources

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ABSTRACT

The document demonstrates how responsible consumption and production aim to break the current cycle of economic growth, resource use, and environmental degradation that has fuelled unsustainable global development for decades, as well as the goals they have achieved to improve sustainability. Furthermore, the measure is put in place to solve them and find a solution so that the future is not offensive.

Keywords : Sustainable development; circular economy; carbon footprint; Green house gas; Biodiversity.

INTRODUCTION

The main objective of responsible consumption and production is to combine sustainability and economic growth in a way that does not degrade the environment. There are two approaches that help define sustainable consumption of resources. They are:

1) Ecological/environmental footprint.
2) Material footprint

Ecological Footprint

Ecological footprint, also known as environmental footprint is a resource analysis tool used to measure the productive area required by the human population present in a particular region to produce the resources used by them. It is also used to measure how much space is needed to absorb carbon dioxide emissions. It is used for tracking productive areas such as meadows, crop land and forests and excludes deserts and glaciers.

Material Footprint

The Material footprint is based on consumption. It is an indicator of usage of resources. It is used to list the links present from the start to the end of processing a raw material into a useful product or service used by humans. It shows the impact of the extraction of raw materials, processing and consumption of resources available.

2030 Agenda for SDG:

There are 17 Sustainable Development Goals (SDG) listed sited by the United Nations General Assembly (UN-GA).It was set up in 2015 and each year an annual report is submitted to check the level of implementation of the SDGs. The 17 SDGs are represented in the **Fig 1.**

SDG 12 focuses on responsible consumption and production. It is meant to ensure better ways of consumption and usage of resources, improving efficient energy usage and production and ensuring a better life for all. It has 11 targets. There are two types of targets: "outcome targets" and "means of achievement targets. The 'outcome targets' are: a 10-year framework program; Efficient use of natural elements and resources; Reduction of food waste by 50 %, including post harvest losses; Management

of chemicals and chemical wastes from beginning to end; Reduction, recycling and reuse; Creating awareness on sustainable consumption; Following public procurement practices for sustainability; Encouraging production companies to follow sustainable goals. The outcomes of these targets contribute to the responsible consumption and usage of resources.

Fig.1 Sustainable development goals

The 'means of achieving targets' are: support developing countries in their research and scientific development, develop and implement of sustainable development impact monitoring tools, reduce the resources that encourage wasteful consumption. These targets are specified in order to increase the outcomes.

The United Nations Department of Economic and Social Affairs submits annual SDG progress reports. These reports give detailed statistical data on the consumption of resources. Every four years the Global Sustainable Development Report is also submitted. Many documents are already present in the existing literature [1-4].

Indian start-ups that follow SDG12

In India many start-ups like Organic India, Sampurnearth, Pro nature Organics, Puremart, and Korra.in are designed to meet the goals of Sustainable consumption and production of resources. Loopworm is an Indian start-up that is one among the topmost start-ups that follow SDG12.

Loopworm is an Agri-Biotech company located in Karnataka. It is based on sustainable animal feed for cattle. In today's world agriculture has become unsustainable as humankind requires a lot of area for production and usage of many agrochemicals have degraded the soil. In addition, animal feed production has impacted agriculture as a part of land is used for production of fodder. Loopworm farms an insect breed known as black soldier flies which converts food waste into Protiworm. Protiworm is a type fish feed which when dried and processed can be used as an animal feed. They provide higher digestion ability and pelletability. During this process, fertiworm is produced which is a natural fertilizer.

Sustainability is not just saving it up for the future but also an ability to sustain to develop using only the resource available without compromising the quality of life of those who are going to come after us. The ecological importance of sustainability is at least as important as social and economic .The issues with fair working conditions and circular economy also must be looked at where it comes to our everyday consumption as we tend to fail on our values.

Fair-working Condition

We have the right to a safe workplace free from hazards that could cause you serious harm and free from coercive working conditions. Depending on the situation, one may also be eligible for certain equitable work practices, such as days of rest, sick leave, leave and scheduling.

Circular Economy

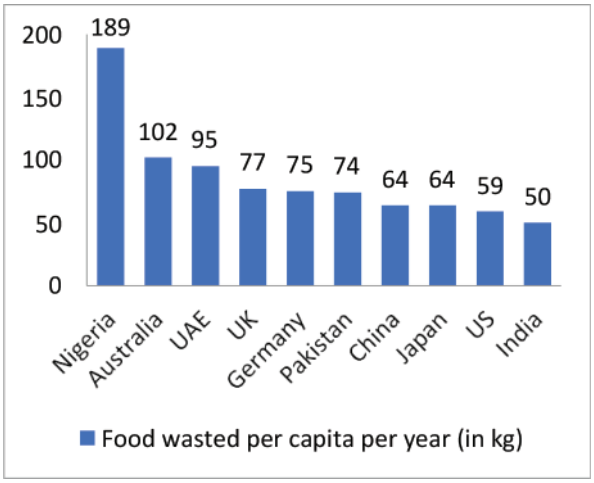
The circular economy is a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution as shown in **Fig 2**.

The airplanes which is flying at 10 km above the ground leaves heavy particles and carbon-di-oxide on the atmosphere and yet it is used on our regular basis without compromising because it is practiced in that way. Such an inability to act on our values results from attitude, from the difference in behavior, and there are multiple reasons why they

are psychological, based on money and time. The brain does not like tomorrow's changes and they are thought as additional work.

Fig. 2 Circular Economy

A small change in our routine can make a big difference in society, but they are ignored thinking it will have no greater impact. For example, it is estimated that the average amount of domestic solid waste was 0.3 kg/person/day, of which plastic waste accounted for 12% with a generation rate of 0.035 kg/person/day. It shows the lack of awareness among humans regarding the separation of waste and recycling it. However, less than 10% of the plastic waste generated globally has been recycled so far. A somewhat larger portion (12%) has been incinerated and the rest has simply ended up in landfills and our oceans. At least 14 million tonnes of plastic end up in the ocean each year, and plastic makes up 80% of all marine debris found from surface waters to deep-water sediments.



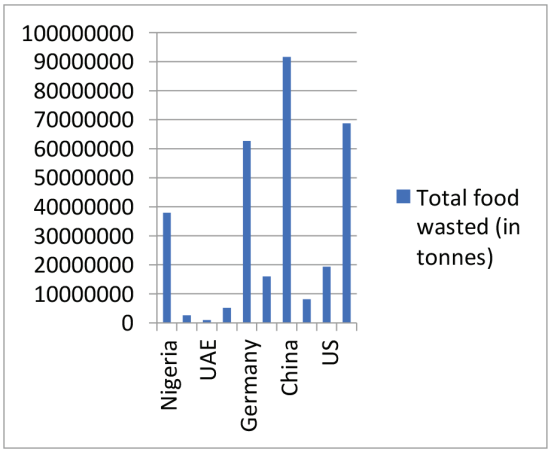


Fig. 3 Food wastage statistics

An estimated 1.3 billion tonnes of food is wasted globally each year as shown in **Fig. 3**, one third of all to the food produced for human consumption, according Food and Agricultural Organization (FAO) of the United Nations. The amount of food wasted costs 2.6 trillion USD annually and is more than enough to feed all the 815 million hungry people in the world – four times over.

A question may arise here that how food waste is related to sustainability. Throwing away or unhedging food can seem like meagre damage to the planet compared to other issues, but the haunting reality is that it is just as harmful. When we throw away food, we also throw away the precious resources that were used to make that food. This includes the use of land and natural resources, the social cost to the environment, and our biodiversity. Food waste accounts for one-third of human- caused greenhouse gas emissions and generate 8% of greenhouse gases annually. Considering these statistics, there is a huge need to reduce this environmental footprint.

The following seven simple steps outline the steps one can take to prevent food waste. Those little changes in our routine can have a very significant positive impact. The steps are, take an inventory, create a meal plan, save and eat leftovers safely, store food appropriately, buy "ugly" foods, compost, use leftovers creatively.

About a quarter of people (24%) believe the choices they make as consumers can have a significant

positive impact on efforts to tackle climate change, according to an ING(Internationale Nederlanden Groep) survey of 4,000 consumers from across Europe, North America and the Asia-Pacific region. Those choices include which products they buy and the extent to which they recycle.

Three-quarters of them (72%) say their purchasing choices today are more influenced by environmental factors than they were before the pandemic. This momentum will give a boost to environmental campaigners, who have worked hard to overcome the widespread perception that individuals are powerless to fight climate change and will give them confidence that an individual can bring in a lot of change and have a huge can impact on the environment.

The sustainable consumption and prediction of economic growth is expected to be sustainable. So what kind of process can be put in place. There are many ways to increase resources in an effective way for the future. It should be decoupled from economic growth and environmental degradation. The more our natural resources increase, the more our future life is better.

We need to improve our sustainability in both the discomfort and production phases. There is much chaos to reach resources efficiently. This means that some times there is a problem around us that is more difficult to resolve the release of waste and polluting toxic materials as well. Waste and pollution are the most important causes of the destruction of own resources. As such, we are responsible for change to ensure the health of the environment and our own health. Even if the authorities take steps to keep resources sustainable we as a individuals should be held accountable for the destruction that mankind is causing.

There are several bases that can be implemented to achieve sustainability. This is the simple way which can implementable they are reduce recycle and re-use. These ways are the main reason for making changes.

Reduce

Reducing what we can reduce the quantity that is used in the big extra should be reduced.

The most common waste is the food and food waste should be reduced, because food is a basic need for living. In many places water waste is in high and it should be saved. It should be used in small amount that is when it is needed. Other polluting wastes, that detoriate the environment, must also be reduced. It is essential to make a proper management to reduce the waste.

Recycle

Recycling consists of converting waste into a new object, that is, recovering it from its former object. It ensures the sustainability of the environment by removing raw material inputs and diverting waste into the economic system. Papers and a lot of other things can be recycled and used for other purposes. Water can also be recycled.

Reuse

Reusability is the practice of using a product or element to perform a different function. It helps save time, money, energy and resources as well. Research has demonstrated that reusing a product can reduce CO_2 emissions and the carbon footprint.

CONCLUSION

The main objective of this study is to shed some light on the importance of sustainable consumption practices. Moreover, attempts have been made to highlight the dictates of sustainable consumption and to understand the reasons behind the deviation from sustainable consumption.

Moreover, it is also understood that sustainable consumption heavily relies on five basic principles, namely, conscious attempts to meet basic needs, moderation in expenditure, focus on quality of life rather than materialism, care for future generations, and care for environmental consequences. This study concludes by highlighting five reasons that are responsible for the deviation from sustainable consumption practice. It is hoped that, future researchers will carry out more studies on the topic of sustainable consumption, particularly in the context of developing countries.

This is due to the fact that the concept of sustainable

consumption in developing countries may differ from that in developed countries. Furthermore, the level of awareness of sustainable consumption practises can be examined from a variety of country and cultural perspectives. Also, further studies can be carried out to examine the sustainable practices among individuals as well as industries.

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Local Failure Identification in Progressive Collapse Analysis

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ABSTRACT

General codes like GSA, Euro code and ASCE 7 provide different design and analysis guidelines for progressive collapse analysis of structure. Threat independent approach is applied here for the progressive collapse analysis. For complex structures, aim of this article is to find local mechanism where local failure sequence identification has been considered which may lead to catastrophic collapse of the structure. A new method has been implemented to identify key elements, the identification and strengthening of which will improve the system and prevent disproportionate collapse.

Keywords : Redundancy, Truss

INTRODUCTION

A structural member may fail either due to normal loads or due to abnormal loads (loads outside the design envelope). This member failure may act as an initial damage for the whole structure. If there is sufficient redundancy in the structure, it will attain a new equilibrium configuration. In certain cases, however, some member(s) may get overstressed and a cascade like failure may occur. If this happens, the structure may experience large deformations and non-linearity in geometry and material behavior may become important. Thus, for a given initial damage, we need to analyze the structure to find out if any weak path leading to system failure is present. Weak path may be local instability if sufficient redundancy is not present in the structure which may lead to catastrophic collapse.

After 1968 Ronan point collapse the structural engineers investigate the progressive collapse behaviour of structures later the report [1] says about the statistics most of the building collapse are progressive in nature. Not only Ronan point but Murrah Federal Building (1987) and World Trade Centre (2001) collapse occurred due to local damage which leads to catastrophic collapse or certain portion of the collapse. The main reason of that collapse is absence of sufficient redundancy in respect the initial damage. Reliability based progressive collapse analysis is a challenge as this analysis procedure is sequence driven event. Progressive nature failure is not only happened

by abnormal load, but some sequence driven progressive failure analysis was done by [2-3]. For complex structure like truss buildings can be decomposed in series and parallel system which is known as generalized Daniel system. In manner structures are analysed [4] where element behave in elastoplastic and softening, [2-3] by fatigue induced. The structure has been analysed for reliability bound in generalized Daniel system [5-6].

In large or complex structure, the numbers of sequence or local failure sequences are numerous. So, identification of the local failure sequence is very tedious job. There are several works are present in literature. Not only the local failure events but also the complete failure paths are so many. Therefore research have been developed to identify the critical sequence or paths like, non-sampling-based methods such as the incremental load method [7], the truncated enumeration method [8], [9], the β-unzipping method [10], Selective searching scheme have been used to identify the dominant failure modes. Most widely used search scheme is branch and bound method [11]. This search scheme also developed for risk analysis by [2, 12], Linear programming method also developed to identify the dominant failure modes [13-14]. But there have shortcomings like many dominant sequences missed out and not in gradually decreasing order Failure mode incorporates sequential failure and simultaneous failure whereas sequential failure defines failure of members one after one and others are not failed. But in mode failure two member can fail simultaneously.

Threat independent approach is followed in this procedure. For complex structure by rigorous analysis of system reliability the key element is tried to identify. Thus, necessary repair strategy and strengthen can reduce the risk of the structure.

Redundancy and local instability

Local or global instability is quite related to redundancy of the structure. In structural analysis and design redundant structure is important so that it should have sufficient load path which transfer the load without collapsing. The Oxford dictionary is saying "Redundancy" is "exceeding what is necessary or natural; superfluous". But more precise definition can be found in the book probability and risk analysis [15]. There author describes a non-redundant system is such that failure of any component equivalent to collapse of the entire structural system. Another redundancy is defined in structural engineering text book is degree of global indeterminacy i.e. depends on number of unknown equilibrium equation and number of unknown forces. [16] demonstrated that degree of indeterminacy is not the measure that system's reserve strength or the redundancy. There author describes that absence of critical member whose failure can collapse of the structure is the redundancy. In this fact [17] proposed system safety performance matrices for skeletal structure. The author demonstrated a measure based on the distance from the structural stiffness matrix to set of singular matrices. Generally, for the displacement based structural analysis determinant zero of the stiffness matrix is unstable structure. It is desirable to have the stiffness matrix K for the skeletal structure "farther away" in appropriate distance measure from the set of noninvertible singular matrices representing various unstable states for that structure. Demmel (1987) [18] has shown that larger the condition number, the system is more near to set of singular matrices Yes with high condition number the stiffness matrix can be invertible by pseudo inverse or Moore–Penrose inverse and the solution is least square solution.

If the structure follows

$$P = Ku \quad (1)$$

where P is load, K is global stiffness matrix and u is displacement

Now, let a change in force ΔP cause the change Δu in displacement:

$$\text{Now, } K(u + \Delta u) = P + \Delta P \quad (2)$$

Subtracting (1) from (2) $\Delta u = K^{-1} \Delta P$

$$\text{Or, } \|\Delta u\| = \|K^{-1}\|\|\Delta P\|$$
$$\text{Or, } \|\Delta u\| = \|K^{-1}\|\|Ku\|\frac{\|\Delta P\|}{\|P\|}$$
$$\text{Or, } \|\Delta u\| \leq \|K^{-1}\|\|K\|\|u\|\frac{\|\Delta P\|}{\|P\|}$$
$$Or, \frac{\|\Delta u\|}{\|u\|} \leq Cond(K)\frac{\|\Delta P\|}{\|P\|} \quad (3)$$

The relative change in displacement can be as large as *Cond* (*K*) times the relative change in force.

Hence structure is totally dependent on the condition number of the global stiffness matrix. After removal of any member, if the condition number of the global stiffness matrix is exceedingly large the system will be defined as unstable. Because a small increment of load will cause a high response of the structure. [3] used the condition number as measure of local instability. Besides, there are several conditions have been applied as local instability which is not implemented here. The conditions are 1. No. of members failure more than global degree of indeterminacy, 2 large displacement occurs, 3 less than three members are connected to a nonsporting node for 3D structure. But, if the structure is very complicated, there more condition needs to implement to reach the target structure which consider as local instability.

Based on this fact [17] proposed shortest distance, δs (Reciprocal condition number), is also the system safety performance metric for the performance objective of stability and is given as

$$\delta s = n/||K||\ ||K^{-1}\ || \quad (4)$$

δs is conveniently range between 0 and 1.(Higher the value indicating more stable.)

Table 1 represents the geometric properties and **Table 2** shows reciprocal condition number for individual member removal.

Bhattacharya (2021) [19] has demonstrated the identifying the critical elements of 6-member truss structure. Members 3, 4 and 5 are 25% strengthen by mean strength. That is incorporated by area. There author described member 6 is the weakest member. But that is not critical element which is different discussion. There author demonstrated dominant sequences are 6-5, 5-6 and 6-1 which are contributing 75% of the system failure probability. Hence member 6 is weakest link in the system whose absence is largely depends on the system collapse. This phenomenon can be demonstrated by condition number. By this measure we can identify the weakest link whose removal can cause collapse of the structure.

$$\text{Or, } \frac{\|\Delta u\|}{\|u\|} \leq Cond(K)\frac{\|\Delta P\|}{\|P\|}$$

Equation 3 can be demonstrated by consider the same 6-member truss with constant force 110 kN and the displace is measured at the right top node Δ. Hence removal of member 6 causes largest displacement of the structure. Applying larger load will cause large displacement due to removal of member 6. Global degree of indeterminacy is m+r-2j=2. Hence 3-member removal will cause unstable truss. Despite that 2 members' removal can cause ill-posed system. Ill-posed system is such that system's stiffness matrix is not invertible. Local mechanism occurred due to the removal of the member(s)**Table 4** which is set of ill-posed set of system. Now, 11 single member removal scenarios **Table 5** can generate and can be checked which member highly responsible for system collapse of the structure. From this 11 scenarios member 1's removal is contributing closes distance to ill-posed system. Hence member 1's removal can be considered as local instability as its absence causes large displacement for the further perturbation. Therefore, member 1 is the weakest link whose absence in the system is highly reliable to collapse. For the sake of system reliability and consistency requirement between the system failure probability of intact structure and conditional failure probability of damaged structure the local instabilities are considered. Though the ill-posed system stiffness matrix can be invertible by pseudo inverse and response can be found out least square solution. But the result will be highly sensitive **Table 6**. In [20] the authors also analyzed complex structure where critical element have been identified by robustness analysis. The key element more dependent on the position of the structure. Based on geometric properties it may go to lower importance or higher importance. **Table 3** presents the displacements

for different member removal. **Fig 1** shows the 6 member truss and **Fig 2** shows the 11 member truss

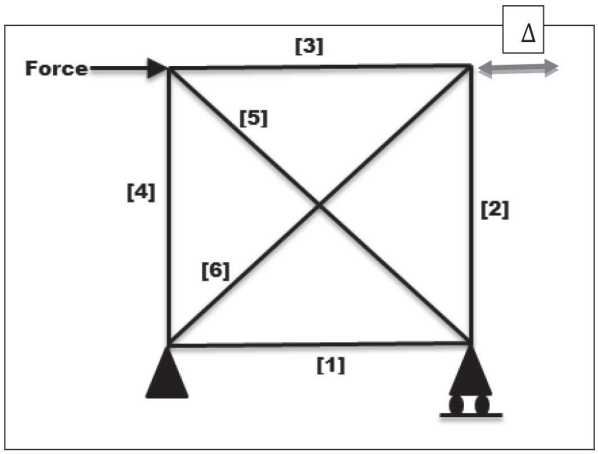

Fig 1 6 member truss

Table 1 Geometric properties

Members	Area (cm^2)	E(GPa)
1	6.7	200
2	6.7	200
3	8.46	200
4	8.46	200
5	8.46	200
6	6.7	200

Table 2 Condition number and reciprocal condition number for individual member removal

Measure	$\|\|K\|\| \|\|K^{-1}\|\|$	$\delta s = n/\|\|K\|\| \|\|K^{-1}\|\|$
Intact truss	9.4591×10^{7}	8.4574×10-8
Member 1 removed	7.6519×10^{7}	1.0455×10^{-7}
Member 2 removed	2.1693×10^{8}	3.6879×10^{-8}
Member 3 removed	7.6459×10^{7}	1.0463×10^{-7}
Member 4 removed	7.6262×10^{7}	1.0490×10^{-7}
Member 5 removed	4.6493×10^{7}	1.7207×10^{-7}
Member 6 removed	1.5147×10^{8}	5.2814×10^{-8}

Table 3 Displacements for different member removal

Member removed	1	2	3	4	5	6
Δ						
(mm)	-3.0	6.6	0	-3.0	-3.0	6.6

Table 4 Mechanism cases

Measure	$\|\|K\|\| \|\|K^{-1}\|\|$	$\delta s = n/\|\|K\|\| \|\|K^{-1}\|\|$
Intact truss	1.5963×10^{8}	7.5175×10^{-8}
Member 2, 10	2.0647×10^{17}	5.8119×10^{-17}
Member 9, 10	2.1335×10^{17}	5.6245×10^{-17}
Member 7, 8	3.6922×10^{16}	3.2501×10^{-16}

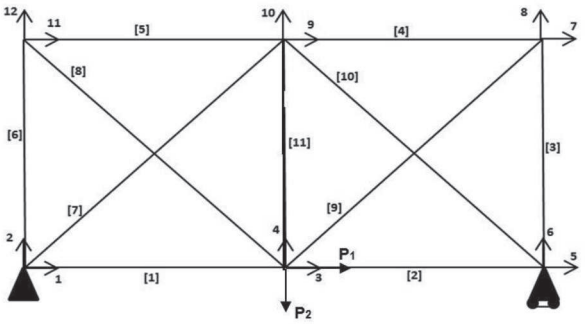

Fig 2 11 member truss

Table 5 Condition number and reciprocal condition number for individual member removal

Measure	$\|\|K\|\| \|\|K^{-1}\|\|$	$\delta s = n/\|\|K\|\| \|\|K^{-1}\|\|$
Member 1 removed	1.1308×10^{9}	1.06119×10^{-8}
Member 2 removed	5.0291×10^{8}	2.3861×10^{-8}

Member 3 removed	4.1186×10^{8}	2.9136×10^{-8}
Member 4 removed	2.6017×10^{8}	4.6123×10^{-8}
Member 5 removed	3.1694×10^{8}	3.7862×10^{-8}
Member 6 removed	3.5544×10^{8}	3.3760×10^{-8}
Member 7 removed	2.7660×10^{8}	4.3218×10^{-8}
Member 8 removed	1.7005×10^{8}	7.0567×10^{-8}
Member 9 removed	2.3270×10^{8}	5.1568×10^{-8}
Member 10 removed	2.5368×10^{8}	4.7303×10^{-8}
Member 11 removed	1.7136×10^{8}	7.0028×10^{-8}

Table 6 Displacements for individual member removal for 11 member truss

Member removed	1	2	3	4	5
Δ1(mm)	-10	-8.5	-9.6	-9.6	-9.8
Δ2(mm)	16	1.5	1.3	1.3	2.4
Member removed	7	8	9	10	11
Δ1(mm)	-8.3	-9.8	-9.6	-8.5	11.1
Δ2(mm)	0.6	2.4	1.3	1.5	0.5

DISCUSSION AND CONCLUSIONS

A comparative study has been discussed in this paper. Degree of indeterminacy is not always a measure of structural redundancy. Exceedingly large condition number can be a measure of local failure structural system. In this way the key element can be identified whose removal can large deformation in structural system. Not only that but local mechanism can be identified in this manner. For large structural system local mechanism can lead to disproportionate collapse. This study can be further expanded in dominant sequence search strategy. Among the failure mechanism member 1 is the key element by as per single member removal. Member 1's strengthening may increase system's efficiency. In this way progressive collapse can be arrested by reducing the risk of initial damage.

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Oxygen Level Monitoring in an Oxygen Cylinder Using IOT

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ABSTRACT

The purpose of this study is to develop an IOT-based technique for oxygen cylinder level monitoring. When an oxygen cylinder is being used to give oxygen to a critically ill patient, knowing how much oxygen is within is crucial information. An I2C Oxygen Sensor is used to calculate the oxygen content. LM35DZ A temperature sensor is also utilised to view the cylinder's inside temperature in Celsius. The temperature and oxygen sensor output can be seen on mobile devices. Using the Arduino IDE 1.8, a programme is created with specified requirements to present the output in the app. When the oxygen level falls below a predetermined threshold, a bell alerts the patient's caregivers. When the cylinder's oxygen level is low, a Notification Alert is also generated. A mobile application can be used to view the amount of oxygen inside the cylinder. The objectives for this article are satisfactorily met.

Keywords : I2C oxygen sensor; LM35DZ sensor; Arduino IDE 1.8.

INTRODUCTION

Our main source of life support is oxygen. Without the air we breathe, we would perish within hours. There are various gases in clean air, but oxygen is the one that matters most to humans. 19–21% of the oxygen in clean air is oxygen. Four fundamental elements of life— carbohydrates, water, proteins, and energy—support the creation and maintenance of all bodily processes. The majority of scientists concur that oxygen is actually the most important component of all four life-support systems. A healthy person's body contains about three times as much oxygen as air does. The body may become a breeding ground for harmful bacteria, viruses, fungi, and other microorganisms when body oxygen levels drop to dangerously low levels for extended periods of time. Most of infectious diseases and parasites are anaerobic, meaning they cannot survive in an environment with lots of oxygen. Research suggests that infectious germs have a harder time reproducing and proliferating when the body's oxygen levels is within the usual range. Normal blood should have an oxygen partial pressure of about 97%.

Hemoglobin molecules, which are iron-rich, are found inside every red blood cell. These haemoglobin molecules hold 97% of the oxygen that is delivered to the cells, with the remaining 3% dissolving in the blood plasma. The cells cannot receive an appropriate and regular supply of oxygen when blood oxygen levels are low for long periods of time, and it may be difficult for them to fend off the invasion of microbes, which reduces natural

life-support. In this situation, an oxygen cylinder is utilised to pump oxygen into the human body when the lungs of a human body are unable to take in the proper amount of oxygen. Consequently, a suitable setup for oxygen supply from an oxygen cylinder might be considered one of the life-saving devices. It is crucial to constantly check on the condition of such gadgets. It is rarely the case that the amount of oxygen in the cylinder goes ignored. When the patient is uneasy because there isn't enough oxygen in the cylinder, there are unexpected rushes that could have disastrous effects. The various existing studies are presenting [1-8].

So, this study suggests a method for centrally monitoring the oxygen levels in the cylinders that are present in a hospital. Additionally, it measures the oxygen level in the cylinder locally and sounds an alarm when it drops below a preset level so that the patient's caretaker, as well as the nurses and ward boys who are on duty, may provide additional support. The amount of oxygen is measured for this purpose using an I2C oxygen sensor. When the pressure drops below a preset lower threshold, a buzzer will beep and the sensor's result will be shown on the phone.

Additionally, when the oxygen level in the cylinder is low, a notice alarm is also sent. Additionally, an app transmits the oxygen level to mobile devices. Using the Arduino IDE and a specific programme, an app is developed. Since the oxygen cylinder is portable, the suggested device's power source is a battery. Monitoring The battery's condition is crucial, and the suggested technique takes this into consideration.

EXPERIMENTAL SETUP

An experimental setup is used to demonstrate the proposed measurement technique. Here, the pressure head of the oxygen cylinder is detected using a pressure nozzle. At the nozzle's tip, an I2C oxygen sensor is utilised to measure the oxygen pressure as given **Fig 1**. The data conversion unit and micro-controller receive the pressure reading from the I2C oxygen sensor and process it. When necessary, the output triggers the buzzer on a cell phone. The Arduino programme, which is run through IDE, is made to send information about the oxygen level to a mobile application. It displays the circuit board.

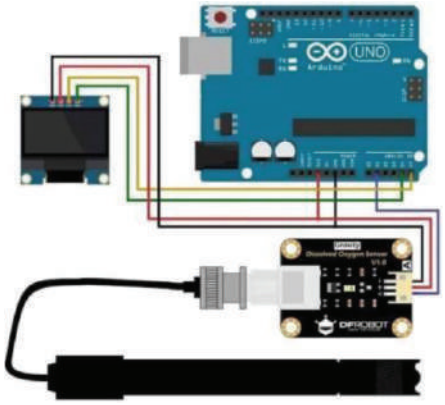

Fig 1 Circuits for I2C oxygen sensor

The I2C Oxygen Sensor measures the ambient O_2 content with accuracy and convenience and is based on electrochemical principles. **Fig 1** represents circuits for I2C oxygen sensor and **Fig 2** I2C oxygen sensor. This oxygen sensor for Arduino can be used in a wide range of industries, mines, warehouses, portable devices, air quality monitoring devices, and other spaces where the air is difficult to circulate. It also has high anti-interference ability, stability, and sensitivity. This compact dfrobot oxygen sensor supports I2C output, it can be calibrated in the air, can accurately measure the oxygen concentration in the environment. It is compatible with many mainboards like Arduino Uno, esp32, Raspberry Pi, and so on. Its effective range is 0~25% Vol, and resolution can reach to 0.15%Vol. It supports a wide range of input voltage: 3.3V to 5.5V. Furthermore, the lifetime can last up to two years. You may quickly and simply create your own oxygen concentration metre using a basic Gravity interface and useful sample code.

Fig 2 I2C oxygen sensor

WIRELESS COMMUNICATION

Working at 315 MHz are the wireless transmitter and receiver modules. They work well with microcontrollers to build a fairly straightforward wireless data link, and they can fit neatly onto a breadboard. The modules can only broadcast data in one direction with a single pair of transmitter and receiver; to function as a transmitter/receiver pair, you would need two pairs (of different frequencies).

THE PROGRAM

```
#include "DFRobot_OxygenSensor.h"
#define COLLECT_NUMBER 10 // collect number, the collection range is 1-100.
#Define Oxygen_IICAddress ADDRESS_3
/* iic slave Address, the default is ADDRESS_3.
      ADDRESS_0   0x70   // iic device address.
      ADDRESS_1   0x71
      ADDRESS_2   0x72
      ADDRESS_3   0x73
*/
DFRobot_OxygenSensor Oxygen; void setup ()
{
Serial.begin (9600);
While (! Oxygen.begin (Oxygen_IICAddress)) {
 Serial.println("I2c device number error!");
 delay (1000);
}
Serial.println ("I2c connect success!");
}
Void loop ()
{
Float                oxygenData                =
Oxygen.ReadOxygenData(COLLECT_NUMBER);
Serial.print (" Oxygen concentration is ");
   Serial.print (oxygenData);
 Serial.println ("%vol"); delay (1000);
} #include "DFRobot_OxygenSensor.h"
#define COLLECT_NUMBER 10 // collect number, the collection range is 1-100.
#Define Oxygen_IICAddress ADDRESS_3
/* iic slave Address, the default is ADDRESS_3.
   ADDRESS_0   0x70      // iic device address.
   ADDRESS_1   0x71
   ADDRESS_2   0x72
   ADDRESS_3   0x73
*/
*/
DFRobot_OxygenSensor Oxygen; void setup ()
{
 Serial.begin (9600);
While (! Oxygen.begin (Oxygen_IICAddress))
  { Serial.println("I2c device number error!");
delay (1000);
}
Serial.println ("I2c connect success!");
}
void loop ()
{
   float                oxygenData
=
Oxygen.ReadOxygenData(COLLECT_
NUMBER);
Serial.print(" Oxygen concentration is "); Serial.
print(oxygenData);
  Serial.println(" %vol");
  delay (1000);}
```

RESULTS & CONCLUSION

The proposed measurement method was put to the test, and the outcomes were compared with the pressure measuring tool that was already in use

and reported in the table. The monitoring station's display at specified oxygen pressure level was set to 3. 5 MPa. **Table 1** presents the result status of the buzzer for various oxygen pressure levels.

Table 1 Status of the buzzer for various oxygen pressure levels.

Sl. No	Available Instrument in MPa	Proposed technique in MPa	Buzzer
1	17.01	17.01	Off
2	10.35	10.35	Off
3	3.25	3.25	On

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Resilient Infrastructure Sustainable Industry and Foster Innovation

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ABSTRACT

Flexible infrastructure and sustainable industrialization are built in order to promote infrastructure that provides the basic physical systems and structures essential to the operation of a society or enterprise. Industrialisation drives economic growth, creates job opportunities and thereby reduces income poverty. The purpose of innovation is to come up with new ideas and technologies that increase productivity and generate greater output and value with the same input. Improving productivity and innovation is a central challenge in all industries, but particularly in construction where improvements have been slow. Opportunities and obstacles related to both product and process standardization for continuous improvements and the relationships between clients and contractors are revealed. Hence, the implementations of industrialized construction requires tightly focused governance at the outset of projects and profound changes to established attitudes, norms and regulations. Economic growth, social development and climate action are heavily dependent on investments in infrastructure, sustainable industrial development and technological innovation. In the face of a rapidly changing global economic landscape and increasing inequalities, sustained growth which makes opportunities accessible to all people.

Keywords : Industry; Innovation; Development; Infrastructure; SDG Goals.

INTRODUCTION

Infrastructure provides the basic physical systems and structures essential to the operation of a society or enterprise. Industrialisation drives economic growth, creates job opportunities and thereby reduces income poverty. The purpose of innovation is to come up with new ideas and technologies that increase productivity and generate greater output and value with the same input. Improving productivity and innovation is a central challenge in all industries, but particularly in construction where improvements have been slow.

Past Present and Future of Industry

Industrialization is a transformation away from an agricultural or resource-based economy, toward an economy based on mechanized manufacturing. Industrialization is usually associated with a greater average income and improved living standards. Early industrialization occurred in Europe and North America during the 18th and 19th centuries, and later in other parts of the world. Numerous strategies for industrialization have been pursued over time, with varying levels of success. [1] Industrial development requires not only machinery

and equipment but also requires the energy, skilled manpower, management, banking, insurance and transportation services. These activities and facilities will directly lead to the development of the industrial sector of the economy. **Fig 1** shows the schematic diagram of future of industry

Fig 1 Future of Industry

Industrial Development

Industrial development unleashes dynamic and competitive economic performance which generates income and employment, facilitates international trade and increases resource efficiency, and is thus a major driver of poverty alleviation and shared prosperity. [2] Although industrialization contributes to the universal objective of economic growth, its impact differs depending on the country's stage of development. In developed economies, industrial growth is reflected in achieving higher productivity, embracing new technologies, intelligent production processes and reducing the effects of industrial production on the environment and climate. For developing economies, industrialization implies structural transformation of the economy from traditional sectors such as agriculture and fishery to modern manufacturing industries fuelled by innovation and technology. Such an expansion of the manufacturing sector creates jobs, helps improve incomes and thus reduces poverty, introduces and promotes new technologies and produces essential goods and services for the market.

Industrialized economies continued to dominate global manufacturing production, however, their share dropped from 67.7 % in 2007 to 55.7 % in 2017 [2]. This long-term trend illustrates the relocation of manufacturing production from industrialized economies to the developing world.

Developing and emerging industrial economies have maintained a strong pace of manufacturing growth, much higher than that of the world and of industrialized economies. Least developed countries have immense potential for industrialization in food and beverages and textiles and garments, with good prospects for sustained employment generation and higher productivity.

However, the world still has a long way to go to fully tap this potential. Least developed countries, in particular, need to accelerate the development of their manufacturing sector if they are to meet the 2030 target, and scale up investment in scientific research and innovation. **Fig 2** shows the growth of industrial economy in various countries.

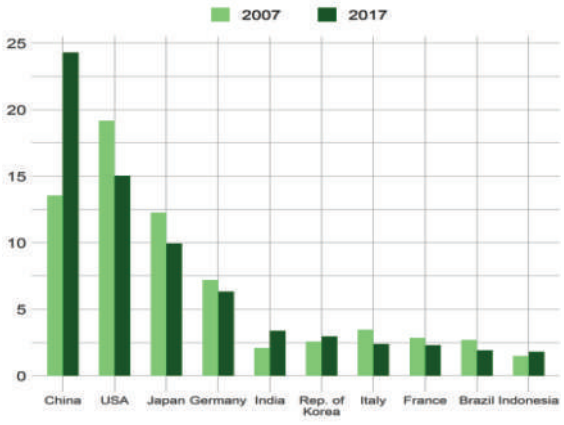

Fig.2 Growth of Industrial Economy

Innovation for Future

Today, we live in a dynamic and turbulent global community. The wave of mega-trends, including rapid change in globalization and technological advances, is creating new market forces. For any organization to survive and prosper in such an environment, innovation is imperative. However, innovation is no longer just for creating value to benefit individuals, organizations, or societies. The ultimate purpose of innovation should be much more far reaching, helping create a smart future where people can enjoy the best quality of life possible. Thus, innovation must search for

intelligent solutions to tackle major social ills, seek more proactive approaches to predict the uncertain future, and pursue strategies to remove barriers to the smart future [3]. This study explores the detailed requirements of a smart future, including both hardware types and soft social/cultural components.

Technological advancement and increased productivity means major changes for careers. The world economy could more than double in size by 2050 due to continued technology-driven product improvements.

According to the new World Economic Forum report, nearly 133 million new jobs may be created by 2022 while 75 million jobs are displaced by AI, automation and robotics [4]. New-roles Source: World Economic Forum - The Future of Jobs Report 2018. Manual, low-skilled jobs and middle-income roles such as accountants, lawyers and insurance clerks are the ones that will be affected the most over the next decade.

The biggest issue here is not necessarily that these jobs would disappear completely but the fact that polarization of the labor force would become more significant. New skill sets are required in both old and new occupations. How and where people work will also continue to change. There will be more demand for experts, whereas "regular workers" are at risk of having to settle for low-income positions. **Fig 3** compares the rules of workers at various stage of development.

Fig.3 Balancing the roles at various stages of development

Innovation and technological progress are key to finding lasting solutions to both economic and environmental challenges, such as increased resource and energy-efficiency [5]. Globally, investment in research and development (R&D) as a proportion of GDP increased from 1.5 % in 2000 to 1.7 % in 2015 and remained almost unchanged in 2017, but was only less than 1 % in developing regions.

Infrastructure

The evaluation of the country totally depends on the availability and accessibility of its infrastructural provisions. infrastructure plays a indispensable role in the upgrade of the country's well being . It also plays a crucial role in contributing to the higher rate of economic upswing. According to Dr V. K. R. V. Rao, "The link between infrastructure and development is not a once for all affair. It is a continuous process and progress in development has to be preceded, accompanied and followed by progress in infrastructure; if we are to fulfil our declared objectives of a self-accelerating process economic development" [1].

In terms of communications infrastructure, more than half of the world's population is now online and almost the entire world population lives in an area covered by a mobile network. It is estimated that in 2019, 96.5 % were covered by at least a 2G network.

The importance of infrastructure for sustained economic development is well recognized. High transaction costs arising from inadequate and inefficient infrastructure can prevent the economy from realising its full growth potential regardless of the progress on other fronts [6]. Physical infrastructure covering transportation, power and communication through its backward and forward linkages facilitates growth, social infrastructure including water supply, sanitation, sewage disposal, education and health, which are in the nature of primary services and has a direct impact on the quality of life. The performance of infrastructure is largely a reflection of the performance of the economy. Infrastructure industries are measured by six key infrastructure and core industries (i.e., electricity, crude oil, petroleum refinery products,

coal, steel and cement). In this paper, the overall growth and performance of infrastructure services has been examined in depth on the basis of the different parameters such as trends in growth of physical output in infrastructure sectors, telecommunications, power, ports, railways, civil aviation, and post so as to examine whether there is a negative or positive association between infrastructure development and India's economic growth.

SDG Goals

Sustainable Development Goal 9 (SDG 9) is based on three interconnected pillars: infrastructure, industry and innovation. These pillars all share the objective of achieving socially inclusive and environmentally sustainable economic development. Realizing SDG 9 by 2030 will require overcoming resource constraints, building and strengthening developing countries' capacities, and exploring innovative ways to solve development challenges, in order to build resilient infrastructure, promote sustainable industrialization and foster innovation. SDG 9 has approximately 20 targets and indicators related to its three pillars and is closely linked to other SDGs related to job creation, sustainable livelihoods, improved health, technology and skills development, gender equality, food security, green technologies and climate change.

SDG 9 is one of the SDGs that is reviewed by the 2017 session of the High-level Political Forum on Sustainable Development (HLPF), which is convening under the theme 'Eradicating poverty and promoting prosperity in a changing world' from 10-19 July 2017 [3]. In addition to SDG 9, the HLPF will review six other SDGs: SDG 1 (no poverty), SDG 2 (zero hunger), SDG 3 (good health and well-being), SDG 5 (gender equality), SDG 14 (life below water), and SDG 17 (partnerships for the Goals).

This policy brief reviews progress on SDG 9 and considers the role of SDG 9 in achieving other SDGs. The brief reflects on relevant events leading up to the HLPF, including the UN Economic and Social Council's (ECOSOC) Special Meeting on 'Innovations in Infrastructure Development and Promoting Sustainable Industrialization,' the Multi-Stakeholder Forum on Science, Technology and Innovation for the SDGs (STI Forum) and the UN General Assembly (UNGA) High-Level SDG Action Event on Innovation and Connectivity, all of which took place in May 2017. The brief also draws on the '2017 HLPF Thematic Review of SDG 9' and other reports to illustrate gaps and challenges in achieving SDG 9 [7]. The Review considers progress on SDG 9 at the global level, explaining, for example, that East and South Asia have made significant progress, while industrialization levels remain low or have stagnated in Sub-Saharan Africa. The Thematic Review highlights a significant increase in mobile coverage and internet access globally, while acknowledging that coverage and access vary depending on the country, region and level of economic development. In addition, the Review underscores linkages with and positive impacts on other SDGs, as infrastructure, industry and innovation are enablers of growth and sustainable development and can enable SDG implementation more.

During the event, leading innovators from the major corporations of the world will interact with Member States on how emerging technologies can transform efforts aimed at the successful implementation of the 2030 Agenda.

The adoption of the 2030 Agenda for Sustainable Development saw world leaders commit to 17 comprehensive, integrated and ambitious Sustainable Development Goals (SDGs) [3]. The world in which the SDGs were adopted is radically different from that of the Millennium Development Goals. Giant leaps in technological advances are converging to make the unthinkable possible. These advances are also raising questions on societal impact.

Solutions

The solutions are to increase the understanding and awareness of the opportunities and challenges of new technology and exponential change, [7] strengthen the ability of the United Nations to act as a catalyst for innovation and solutions in support of the implementation of the Sustainable

Development Goals, rally leading innovators and technology companies to develop, incubate and resource cutting-edge innovations to solve pressing challenges in support of the goals and explore how to support collaborative platform(s) to facilitate the sharing of the best ideas and innovations to inform policy and inspire collective action for scale and global impact.

CONCLUSION

Resilient infrastructure and sustainable industrialization are key enablers of poverty eradication and can promote inclusion, connectivity and equality within societies. However, these sectors can be complex and expensive to develop, especially in countries in Africa and countries in special situations. The Special Meeting will aim to bring the challenges involved to the attention of national, regional and international actors, and to forge solutions to bridge the gaps in infrastructure, industrialization and innovation across countries.

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Sustainabilty and Transition of the Energy Systems

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ABSTRACT

This article examines the significance of final consumption processes for understandings of prospective transitions towards more sustainable societies. It argues that most existing conceptualisations either place too much emphasis on technology or on 'consumer behaviour', ignoring the deeply intertwined relationships between the two. After briefly reviewing recent contributions to the technology-oriented multi-level perspective (MLP) and to social scientific explanations of 'behavioural change', a practice based approach to understanding final consumption and sustainability is outlined. Practice-based approaches reveal processes of reproduction (stasis) and change in forms of consumption, which are argued in present conceptual insights into sustainability transitions. By examining the tensions and crossovers between the MLP and practice-based approaches to consumption, three specific forms of interaction are identified for further conceptual and empirical exploration: the social relations of consumption; co-dependent changes in production and consumption; and, technologies, practices and consumption.

Keywords : Sustainability transitions; Final consumption; Socio-technical systems; Theories of practice; Multilevel perspectives.

INTRODUCTION

The environmental sustainability of final consumption is quickly becoming a vexing contemporary issue. Simply put, despite some progress in reducing the environmental impacts of supply chains and some consumer substitution of more for less sustainable goods, overall levels of consumption continue to rise, with corresponding increases in the environmental impacts of daily life [1]. Recent climate science paints a bleak picture of escalating emissions and temperature effects, with 2 degree containment looking increasingly unlikely [2]. With claims that climate change is the most dramatic challenge that modern capitalist economies have yet faced, urgent societal responses are still required. The challenge is heightened by the historically slow pace of required social, cultural, and technological changes.

Despite the growing body of evidence linking rising final consumption (that is, consumption of goods and services by private consumers as opposed to business-to-business consumption) and environmental impacts, debate remains confined to relatively narrow frames of reference focused

primarily on efficiency gains. The mantra of simultaneously addressing the sustainability of production and consumption is well-rehearsed, but the relationship between the two remains undefined and all too easily packaged as a matter of supply and demand. From the standpoint of production, the challenge is framed as a matter of developing less resource-intensive production technology and organisational structures, more environmentally friendly products and services, or palliative solutions (such as solar radiation management or geo-engineering) that do not necessitate changes to processes and forms of final consumption. The frame of reference is even more uncertain from the standpoint of final consumption, and it is a matter of either consuming less or, more frequently, making different choices in what to buy and how to live one's life. Consumption itself is treated as a relatively static affair: ways of life are, effectively, inert and responsive to external stimuli, while pro-environmental consumption is presented as a matter of voluntaristic switching of consumer choices toward more environmentally sensitive alternatives.

Consumer behaviour has arguably become a more popular option in policy rhetoric. Changes in consumer behaviour, it is hoped, will provide a much less expensive path to more sustainable societies than massive investments in infrastructure technology development and implementation. Even in the case of 'greener' products, focus is shifting to the issue of the barriers to widespread adoption, particularly in the context of overcoming habitual consumer behavior.

The shift away from "pure" technological fixes is welcome in many ways, but it risks creating a false dichotomy in which technology and behaviour are viewed as separate solutions to the climate change challenge. Transition studies in socio-technical systems,particularly those framed in the Multi-Level Perspective (MLP), have persistently challenged polarised views of technology and behaviour by drawing attention to the complex relational and recursive inter-connections between innovation, social life and economic organisation.

Multi-Level Level Perspectives on Transition and Final Consumption

The MLP on sustainability transitions is considered first because it has emerged as a dominant approach for understanding major system level shifts in social, economic, and technological arrangements at a scale that many believe is required to meet today's environmental sustainability challenges.

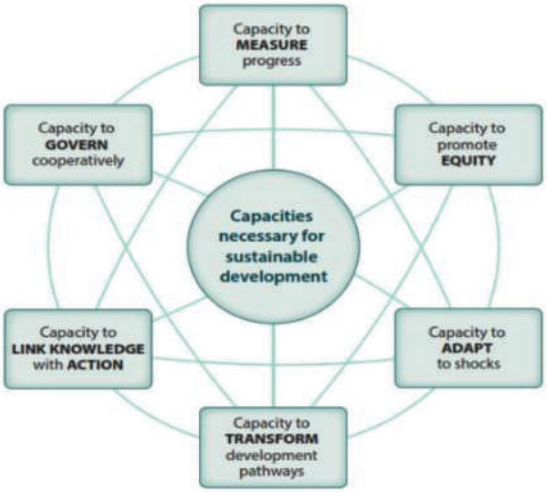

Fig 1 Multi-Level Level Perspectives on Transition and Final Consumption

The MLP on transitions **(Fig 1)** provides a theoretical account, supported by numerous case studies, of the recursive ways in which technological and organisational innovations emerge in relation to broader socio-cultural, economic, and political contexts. The approach advocates for a socio-technical focus, implying an inextricable link between society and technology. Geels (2010: 495) summarises its multi-dimensional, nested hierarchical framework as follows: 'The MLP distinguishes three analytical levels: niches (the locus for radical innovation), socio-technical regimes, which are locked in and stabilized on several dimensions, and an exogenous socio-technical landscape. These 'levels' refer to heterogeneous configurations of increasing stability. The MLP proposes that transitions, which are defined as regime shifts, come about through interacting processes within and between these levels. Existing regimes are characterised by lock-in and path dependence, and are oriented toward incremental

innovation along predictable trajectories, making transitions difficult. Radical innovations emerge in niches where committed actors foster alignment and development across multiple dimensions in order to create 'configurations that work'. These niche innovations may spread more broadly if external landscape developments put pressure on the regime, resulting in cracks, tensions, and windows of opportunity. Subsequent struggles between niches and regimes, as well as potential replacement, occur on multiple dimensions (e.g. markets, regulations, cultural meanings, infrastructure) and are enacted by interpretive actors who fight, negotiate, search, learn, and build coalitions as they navigate transitions.'

Consumption, behavioural change and the sustainability challenge

Final consumption is often conceptualised as a matter of relatively autonomous consumers exercising decisions or choices, often within markets, regarding the many different goods and services that they can acquire and use. This conceptualisation of the consumer is firmly rooted in an ontological position that describes as 'the portfolio model of the actor… in which individuals carry a relatively stable and pre-existing set of beliefs and desires from context to context. Given the situation, they select from this portfolio "those elements that seem relevant and [use] them to decide on a course of action".' According to Whitford, the portfolio model has come to gain 'paradigmatic privilege', and can be found at the core of a wide range of approaches to understanding action. With respect to final consumption, this can be applied to theories of rational choice, planned behaviour, and some accounts of reflexive and ethical consumers.

The current political fashion for 'behavioural change' initiatives appears to be deeply rooted in the 'portfolio model' (at least in the UK and the US). Perhaps the most prominent are social marketing and information campaigns, which hope that individuals will conform to the model of rational actors and see that it is only reasonable to change their lifestyles and contribute to the planet's survival. Where this strategy fails, an attempt is made to increase people's commitment to the tenets of ethical consumption, whether through 'bottom-up' political mobilisation or an appeal to the societal responsibilities of 'citizen-consumers'. If people held green values tenaciously and deeply enough, they might be more assiduous in turning their general sympathy for the environment into new behavioural commitments. And yet, even where apparently pro-environmental values are found, they do not necessarily translate into pro-environmental actions. For example, DEFRA (2008) report on a range of evidence which reveals that the percentage of people's attitudes to pro-environmental consumer behaviours was consistently higher than the percentage of people who took measures to change their behaviour. While some of this discrepancy can be explained by survey respondents not being sure about what steps they could take, the evidence does suggest that the relationship between 'attitudes', 'values' and 'behaviour' is not straightforward. The 'value – action gap' reveals a critical lacuna in policies for changing patterns and forms of final consumption.

Final consumption: A practice-based approach

Some suggest that 'a practice turn' in the social sciences has been experienced over the last couple of decades. The gist of this is to conceptualize human action in a rather different fashion to that presented by the portfolio model by shifting the core analytical focus away from discretionary individual actions and toward 'blocks' or 'patterns' of actions. In outlining a theory of practice, makes a critical conceptual distinction between practices as 'entities' and as 'performances'. Practices are configured or shaped as entities (as recognizable, intelligible and describable) by the many elements that comprise the conditions of existence of a practice. While there is no single typology of the elements that configure practices, the most frequently cited are cultural conventions and representations, material objects, normative understandings of competent performance, social and economic institutions, and spatial and temporal organization. Arrangements of such 'elements' both configure how practices are conducted and make them identifiable to practitioners and non-practitioners alike.

Practices also exist as performances: it is through the 'doing' of practices that the pattern provided by the practice as entity becomes meaningful and the entity is reproduced and modified. In this respect, practice-based approaches can be regarded as 'meso' level analytical constructs. In their focus on practices as entities they identify a range of relatively stable elements that configure (at a macro level) blocks and patterns of action, while practices as performances draw attention to the (micro-level) production and reproduction of the 'doings' of daily life. It is this recursive interaction (between entity and performance) where the dynamics of reproduction and change are located.

Social differentiation of practices and their performance

The performance of any practice is socially differentiated such that groups both understand and engage in the same practice in variable ways. Two prominent theoretical strands offer important insights into how social relations impact on processes of consumption. The first, social worlds, provides an account of how commitments to different forms of consumption are produced and reproduced through inter-personal associations. Distinctions between insiders and outsiders, newcomers and established participants, and regular or infrequent performers within any set of practices play a critical role in shaping how those practices are understood by the different participants, and what the subjective bases of competent and satisfactory performance (including modes of consumption) are for those groups (Becker, 1984; Gronow, 2004). The second relates to Bourdieu's (1984) account of social distinction, which argues that social groups are objectively positioned within any 'field' of consumption, and it is this positioning that structures the ways in which they engage in practices. Objective positions in social space derive from differential levels of key resources: material wealth (economic capital); cultural knowledge and know how (cultural capital); and, access to networks (social capital). Such resources produce dispositions that are internalized as 'habitus', and which form the basis of judgments of taste as social groups appropriate and reject different modes of consumption as being for and not for 'us'.

Multiplicity of practices

It is well established that tackling sustainable consumption is about more than simply switching to environmentally sensitive products and technologies, but requires also tackling escalating volumes of consumption. Portfolio models of action tend to retreat into assumptions of avarice and materialism (fuelled by the commercial interests of producers) when attempting to account for the rising volumes of consumption that mark out the contemporary period. Warde's second theme provides an alternative explanation of how such escalation occurs, namely through the multiplication and diversification of practices. The first focuses on the infiltration of products across practices. Warde provides the example of radios and CD players being inserted into cars as an illustration of how products related to 'other' practices are imported into the practice of motoring. The global energy consumption is given in **Fig 2**.

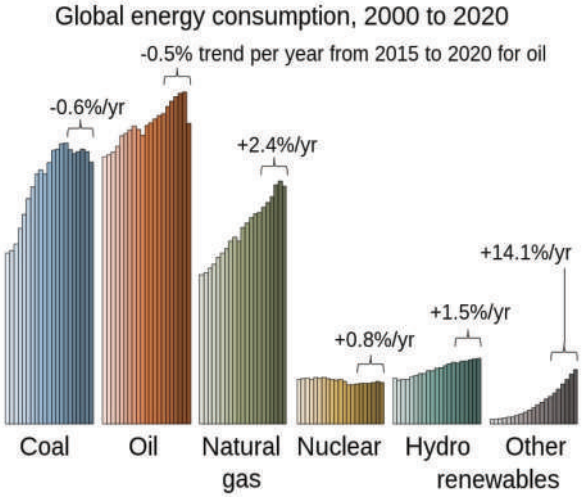

Fig 2 Global energy consumption 2020-22

How technologies are intertwined with practice and consumption

The MLP and practice based approaches to final consumption share an interest in technological change as an important component of change processes. For the MLP, technology is core to both

the theoretical account of historical transformations and also as a lens for empirical study. Transitions are always about how one set of technologies come to be replaced by another. Indeed, even in its excursions into more cultural aspects of social life, such as the transition to rock and roll, the technologies of records and radios take centre ground. Practice approaches accord much less analytic privilege to technology, which is understood as one of several key elements that comprise a practice as an entity. Empirical research using practice approaches to investigate changes in final consumption would consequently start by looking at the elements that comprise the practice in question or at the doings that constitute the practice as performance.

Despite the importance of technology in MLP analysis, no significant research has been conducted on how consumers (whether special or ordinary users) interact with technologies. Given the early work in science and technology studies, this is somewhat perplexing, but it does provide an obvious path for extending the MLP. Similarly, there is room for practice-based studies to expand on insights from early STS and related studies in order to better understand how and why new products and technological infrastructures are acquired, as well as how they affect practises as they are absorbed into everyday ways of life.

CONCLUSION

This paper began with the well-observed claim that significant transitions toward more sustainable forms of consumption are required if the risks of human induced climate change and other environmental problems are to be averted. The MLP on socio-technical systems has emerged as a promising approach for understanding prospective sustainability transitions. However, as its principal proponents have recognised, the approach has not yet explored trajectories in processes of final consumption that will also be of critical importance in developing pathways for societal transitions toward more sustainable ways of life.

Approaches to behaviour change with respect to sustainable consumption are currently dominated by portfolio models of action which treat behaviours and technologies as discrete mechanisms for rendering consumption more sustainable, where one becomes a barrier to the development of the other (i.e. behaviour resists uptake of more efficient technologies or technologies constrain pro-environmental behaviours). Furthermore, such approaches to behaviour change, which draw on variance theories of cause and effect, are at fundamental odds with the process theoretical orientation of MLP. Rather, this article has argued that practice-based approaches to understanding processes of final consumption, with their emphasis on the recursive relationship between practices as socially ordered entities and as performances, present a more robust and suitably nuanced set of conceptual tools for advancing understandings of sustainability transitions.

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Study on Repairs and Rehabilitation of Damaged Civil Engineering Structures in Visakhapatnam City

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ABSTRACT

An investigation was carried out concerning the maintenance of the civil engineering structures in the Visakhapatnam city. The Civil Engineering constructions which are constructed within 50 years from the investigation year are observed for any maintenance related problems and repair works required for the rehabilitation of that civil engineered structure. It is observed that most of the civil engineered structures like buildings have developed cracks in columns, walls, beams. Growth of the plants from the walls of the building is also seen. It is also observed that some buildings which are in collapsible state are still partially in use.

INTRODUCTION

The civil engineering structures in the vicinity of the Visakhapatnam city are observed for the deterioration or damaged parts in the structures due to age factor and other factors like maintenance, weather conditions, and improper construction. Structural failures are a result of many causes that need to be analyzed and studied before allowing the occupants to live. These appear because of the lack of proper care while construction of buildings. Whenever a small crack appears, this eventually goes on enlarging itself unless treated by structural engineers. For prevention, it is advised to keep vigilance and strict supervision or inspection from time to time by experts to avoid any kind of accidents. There are some instances where the quantity is given importance over quality on construction sites. This is because money is mostly the governing factor at sites which affects the quality. At first, the work may seem to be perfect without any appearance of failure, but when time goes by, the real problem starts to show up. Some preventive measures are taken to repair such failures, but it is better to take preventive measures at site than after damage to the buildings. The observed structures in the study are mostly buildings that are constructed from concrete, brick masonry suing steel reinforcement. The observed constructions are reviewed for the defects and are provided with some remedies in this report. Most of the constructions in which the defects are seen are the residential buildings, some newly constructed residential buildings are seen with cracks and left untreated and some residential buildings have deteriorated so severely that they cannot be inhabited and are abandoned. Most of the structures that were reviewed can be repaired and rehabilitated up to some extent and some are needed to be reconstructed. By neglecting the structures after finding a defect without proper treatment they might risk the life of the people in

the building there are many cases in the world that took many lives due to improper maintenance.

OBJECTIVE OF THE STUDY

1. To identify the defects that will occur in the buildings along the lifespan of the building.
2. To create awareness among the residents of the buildings to do a proper maintenance.
3. To find the average lifespan of the structures at which they start showing deterioration
4. signs.
5. To identify the reasons for the failure of the structures.
6. To know whether the residents of the building are willing to repair the building if it has any defects

Limitations

The study is done within a radius of 10km in Visakhapatnam Urban Areas so it might be difficult to come to a general conclusion on the structures.

The Methodology is done in subtle manner for a clear understanding and it is a specific study only.

The study is done through visual observation of structures only and the inner defects are not identified.

Any strength of the materials with which the structure is constructed is unknown and the degree to which the structure is defected is also unknown for some structures as the tests are not conducted.

Methodology

To get awareness about the structural conditions for a long time exposed to various weather conditions of the Visakhapatnam City. The following conditions are explained in a very subtle way by using pictorial representations to convey the conditions of civil engineering structures

Deterioration of Iron Tank

Fig 1 Practical example of deterioration of iron tank Corrosion is the primary means by which metals deteriorate. Most metals corrode when placed in contact with water (or moisture in the air), acids, bases, salts, oils and certain chemicals.

Fig 1 Practical example of deterioration of iron tank

The areas of steel tank above the water line is more oxygenated and acts as cathode, whereas the areas below water line is not exposed to air and act as anode. Thus, the anodic area below water line undergoes oxidation and gets corroded.

Remedies

If the tank is set on soil, then a good quality coating combined with cathodic protection is the best long-term corrosion protection method.

If the tank can be electrically isolated, galvanic anodes will provide a low cost, low maintenance method of corrosion control.

Growth of plants from concrete

Fig 2 shows the formation of cracks in the concrete due to plant growth.

Due to shrinkage of the concrete after construction voids are left in the concrete.

Fig 2 Growth of plants from concrete in Visakhapatnam

When there are voids or gaps left in the concrete the growth of plants may occur due to the air pollination. This leads to the growth of plants in the voids and causes the concrete to crack which results in the damage of the structure.

Remedies

Proper maintenance of the structure

Proper inspection and early identification of weeds.

By using weed killers

By plucking out the weed from the roots from the structure and filling the void with a thick cement mortar paste to cover up the void

In the case of formation of cracks due to the weed, a slurry paste of cement mortar of rich mix is prepared and is injected in the cracks after plucking out the plant.

Growth of plant from pipe

Plant growth caused due to the leakage of the pipe.

When pipe is not fixed to the wall properly then the water will leak through the gap resulting in supply of water to the seed that is brought there either by air pollination and birds. **Fig 3** shows the growth of plant from pipe.

Fig 3 Growth of plant from pipe

Leaving the plant may lead to cracks

This also leads to the blockage of the water.

Remedies

By cutting down the plant traditionally.

By using weed killers

Plant should be plucknout from the wall with roots

Wearing out of concrete

The ropes that are used in the harbor for holding the ships for docking and undocking purposes. **Fig 4** shows an example of wearing out of concrete.

Fig 4 Wearing out of concrete

These ropes when dragged from a same place for an extended period of time the concrete there cut and becomes worn-out.

Remedies

The place where the concrete wears out can be patched with cement mortar of adequate mix

Proper gunting should be provided so that a proper bond is formed between the new cement mortar and the old structure.

If the weared out part is too big to cover then proper casting should be done with proper grade of concrete.

Deteriorated Brick Wall

Deteriorated pointing affects many old houses. mortar starts to disintegrate between the bricks, which can cause the entire wall to collapse, or single bricks to crumble.

During the time period dirty or stained brickwork can be caused by moisture and dirt along with

rain or sprinklers. **Fig 5** shows an example of deteriorated brick wall.

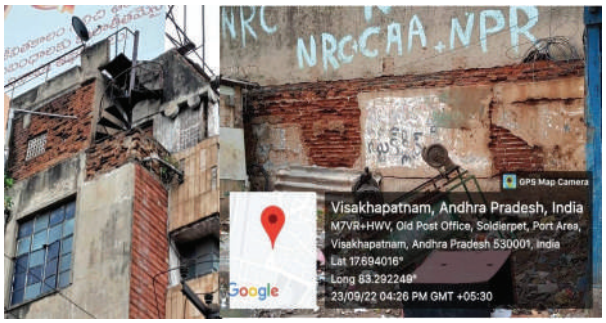

Fig 5 Deteriorated Brick Wall

Spalled brickwork is also common. once bricks have been wet, the expansion of freezing water breaks off the top surface of the brick, leaving the inner surface exposed.

After a time, most of these bricks will crumble completely.

Remedies

Cleaning brickwork for normal dirt and grime, simply use plain water, rinsing with a hose and scrubbing with a stiff bristled brush. for stubborn stains add 1/2nd ammonia to a bucket of water. don't use a power washer except as a last resort.

If we have a crumbling brick problem, this will make it worse (old windows don't stand up to high pressure water very well).

Removal of organic growth a moist brick will often lead to growth a variety of molds and mosses. first, scrape the moss off the surface with a non-metallic spatula (the same kind used on teflon).second, apply a wash of 1 part bleach to 4 parts water to kill the spores.

Spalling of column

Column deterioration can occur due to a change in the column packing status, an accumulation of contaminant components, micro particle blockage, desorption from the solid phase, or other factors.

Low quality concrete cover over reinforcing steel. **Fig 6** shows an example of spalling of column.

Fig 6 Spalling of column

Corrosion of embedded reinforcing steel, because the corrosion products (rust) occupy more volume than the original steel, and the resultant pressure spalls the concrete.

When proper cover is not provided the steel may come near to the inner face of the column and cause tension that the surrounding concrete is not good at taking which result in spalling.

Inadequate cover over reinforcement

Remedies

Plasting is a temporary option that can be. opted.

Plasting the column at the damaged part will give some time.

Reconstructing of building is the best course of action.

Leakage of pipes

Common causes of leaky plumbing include water pressure issues, pipe damage, and climate harm.

Wet areas of grass beside the home's exterior walls may causes algae formation. **Fig 7** shows an example of leakage of pipes.

Fig 7 Leakage of pipes

Dripping sounds – of course, if a pipe is leaking,

you may be able to hear faint drops of water dripping inside your walls.

Leakages may be caused due to the majorly by the climatic conditions.

Leakages may be caused due to usage of faulty materials.

Leakage caused due to improper water tightening.

Remedies

The leak of the pipe should be sealed using an leak proofing material like m-seal etc.

Leakages can be dealt with by covering the leak with epoxy putty.

If the leakage is too big the pipe should be replaced with a new pipe.

In the case of small leaks clamping can be adopted.

Cracks in stone masonry

There are a number of possible causes for cracks in stone walls including weak ground conditions, movement in ground due to subsidence or changes in the water table within the ground.

Cracks will often follow the "line of least resistance" through the window or door openings, where masonry is thinner. **Fig 8** shows an example of cracks in stone masonry

Fig 8 Cracks in stone masonry

Cracking resulting from shrinkage can occur in concrete masonry walls because of drying shrinkage, temperature fluctuations, and carbonation.

Remedies

A pointed trowel can be used to thoroughly fill the cleaned cracks with vinyl concrete patches stained to match the color of the stone masonry.

Cracks are filled up to the surface of the masonry, and any excess patched are scrapped away with a trowel. then the patch is allowed to dry for 24 hours.

Seepage of water from slab

Due to lack of water proofing water seeped through the slab to the interior.

Seeping of water from slab leading to falling of the sealing. **Fig 9** shows an example of seepage of water from slab.

Fig 9 Seepage of water from slab

Seepage leading to weaken the structure

The seepage from the slab is spreading to the support walls and beams.

Remedies

Proper water proofing should be done to the slab.

Proper damp proofing should be done to the wall.

These following methods are to be followed

Membrane damp proofing

Integral damp proofing,

Surface treatment

Cavity wall construction

Barnacle formation on concrete rocks

Barnacles: many barnacles live in the spray zone and protect themselves from drying out by retracting their bodies inside a hard, volcano-shaped shell.

Fig 10 shows an example of barnacle formation on concrete rocks.

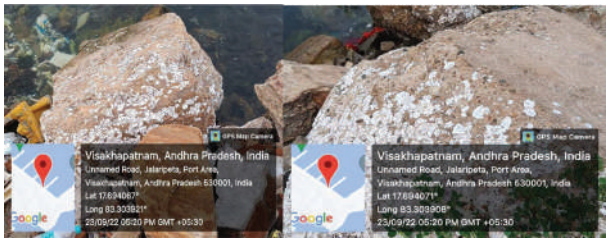

Fig 10 Barnacle formation on concrete rocks

They have a special cement, keeping them tightly fastened to rocks as waves rush over them.

Water temperature and salinity are the main factors controlling barnacle distribution.

Remedies

Barnacles can be removed using a mixture of distilled water and citric acid from the surface of the rocks.

Pressure washing can be done to remove barnacles.

By following the procedure mentioned in the reference video the barnacles can be removed

Damaged supports of municipal tank

Irregular maintenance may cause these problems.

Bond failure in two-course construction due to differences in shrinkage. **Fig 11** shows an example of damaged supports of municipal tank.

Fig 11 Damaged supports of municipal tank

Corrosion of embedded reinforcing steel, because the corrosion products (rust) occupy more volume than the original steel, and the resultant pressure spalls the concrete.

Expansive effects of alkali silica reaction.

Low quality concrete cover over reinforcing steel.

Inadequate depth of cover over reinforcement.

Joint spalls are often caused by improperly constructed joints lead to joint spalling.

Remedies

Clean and coating corroded steel bars.

Apply repair material mixture.

If affected area is adjacent to a joint, ensure that it is restored properly so as to give some allowance for expansion of the member.

Roughen affected surface and apply suitable adhesion agent to improve bonding.

After that, patch the area using suitable admixture.

The best recommended patching material is portland-cement-based or epoxy.

It is required to select patching material with thermal expansion close to that of existing concrete.

After patching proper curing shall be done.

This is a temporary measure and for some period of time

Crack in brick masonry wall

Crack formed due to the gap between the lintel and the window leading to large vertical crack in the wall because of vertical joints. improper maintance leading to spreading of crack. **Fig 12** shows an example of crack in brick masonary wall.

Fig 12 Crack in brick masonry wall

Seepage of water from cracks outside leading structure to weaken.

Remedies

- Removing excess loose cement mortar and applying a rich cement mortar paste over the between the crack. if the wall is too weak then the wall should be reconstructed for the best.

Formation of Algae

Green algae begins to grow on concrete and cement when the surface is relatively moist and shaded most of the day

It grows due to the seepage of moisture from the ground due to faulty waterproofing or if the water is stagnated at a shady place near to the structure. **Fig 13** shows an example of formation of algae.

Fig 13 Formation of Algae

Even though it does not cause any permanent damage to the structure's stability, it can be troublesome if left untreated.

Since the growth can be somewhat slippery, it can become a safety hazard when left to manifest, it can also cause permanent discoloration on the concrete.

Remedies

Use boiling water

Dry it away

Use a pressure washer

Use bleach or vinegar

Steam clean

Use commercial products

It is observed that the most of the civil engineering structures that were studied are needed to be repaired for the longevity of the structure. It was observed that most of the educated citizens were aware that it is required to do maintenance work for the safety of the residents in the building. Some people has shown interest in maintenance of their construction to avoid the failures that might cause if ignored, but some are unable to repair due to their financial status. Apart from poor maintenance if the materials used at the time of construction are not of good material then the construction will not have a long lifetime and defects can be found at the early stages of the building use. Steel structures like tanks are also needed to be maintained properly for their longevity. In damaged structures like walls, beams, slabs etc., compound walls can be neglected but if the walls supporting the structure are damaged then the walls should be repaired, the same goes for the beams as they are the load carrying structures from the slab. If there is a need for the repair of the beam or slab or column or any major structures in the building then they should be repaired immediately.

CONCLUSION

Based on the study and the observations the following measures are recommended to the people of the study area

1. Most of the structures that have defects are residential buildings like old apartments and in some new apartments minor defects are observed like minimal cracks so the old building which are having major defects like column deterioration, wall deterioration, are needed to be repaired.
2. Some steel structures are needed to be cleaned from rust as they are exposed to the harsh weather conditions and some needed to be welded at the joints and should be painted to increase their lifespan for some time if the replacement is not possible.
3. The building near the sea is affected by the efflorescence, sand blasting, salinity of sub-soil water these should be treated properly.
4. Most of the failures in the structures observed in the study is due to formation of the cracks in the structure which led to the dampness and deterioration of the structure so the cracks should be treated at the early stages when the crack is small with proper methods.

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The Importance of Gender Equality in Today's World

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ABSTRACT

In this paper, the views on gender equality has been emphasised by the authors and how efficiently it can bring out positive outcomes in the society if it is accepted. It was also discussed on the common misconception of considering gender equality to be a women-centric issue in the world. Right to equality is one of our six fundamental rights in the Indian Constitution, which ensure that no person should live a deprived life because of their caste, religion, gender, place of birth and race. For many years it has been observing discrimination based on everything, and gender has become a major topic. According to Indian Laws, the human race is divided into three genders - Male, Female and Trans. So gender equality means people of all genders have equal rights, responsibilities and opportunities. They have equal rights to do work or not to do work.

Keywords : Equality; Men; Women; Inequality.

INTRODUCTION

Gender equality, is the state of equal ease of access to resources and opportunities regardless of gender. Gender bias is undermining our social fabric and devalues all of us. It is not just a human rights issue, it is a tremendous waste of the world's human potential. At home, gender equality is equal participation of all males/females/trans in decision-making, household chores, and care. Each and everyone must be treated equally and respectfully. Gender equality plays a significant role in schools. Giving unbiased examples, involving in equal curricula, and ensuring sanitation facilities are enough. Many girls left school because of poor facilities. Comprehensive sexuality education programmes give kids and teens empowering information, abilities, and attitudes. Teaching them to respect gender equality and stand against discrimination helps make a good society. Not only women, the discrimination also sustains in case of men too!

WHERE DOES GENDER EQUALITY PREVAIL?

We come across this issue in our day-to-day life, in our homes, communities, social media and what not? The unequal responsibility for household work, with mothers bearing the brunt of care giving chores. Men are also subjected to judgements when they are trying to look after the household work and being supportive to their wives, instead of being employed. Who designates a chore to be done only by 'women' or 'men'? Is there any sort of rule that tells a woman who chose to join the air force or army less feminine?

or a man choosing to be a makeup artist or stay at home to take care of the household chores make

him less masculine? Discriminatory teaching practices and education materials also produce gender gaps in learning and skills development. As a result, nearly 1 in 4 girls between the ages of 15 and 19 are neither employed nor in education or training compared to 1 in 10 boys. Though we talk from both the aspects, women are considered to be most affected.

IS RAISING GENDER ISSUE AN ACT OF FEMINISM?

Although the term feminism hasn't existed for quite so long, the fight for gender equality has been going on for centuries. feminism initially referred to feminine qualities of character. Claiming the gender equality to be a "female problem" deprives men from their own right. Equality is never equal to being biased. Gender equality should always be appreciated only if it's a human right, neither a female right nor male right.

IS GENDER EQUALITY A CONCERN FOR MEN?

When a female files a complaint against a male for sexually harassing her, the common people mindset is to accuse the man for the crime that is said to be committed by him. Do we ever think that there might be an equal probability for the woman to lie and accuse him. Are women the only victims and men the only predators when it comes to harassment cases. Where does the concern for men vanish in these cases? Does it even exist? Men are too often expected to concentrate on the material needs of their families, rather than on the nurturing and caring roles assigned to women. **Fig 1** depicts the change from inequality for different genders.

Fig 1: Image depicting the change from inequality to equality

Men also have the right to assume a more nurturing role, and opportunities for them to do so should be promoted. Equally, however, men have responsibilities in regard to child health and to their own. Societal norms and conceptions of masculinity and expectations of men as leaders, husbands or sons create demands on men and shape their behaviour. The adoption of a gender perspective is an important first step; it reveals that there are disadvantages and costs to men accruing from patterns of gender difference. The UNESCO image of gender equality is given in **Fig 2**.

Fig 2: UNESCO image of Gender Equality

HOW DOES GENDER INEQUALITY AFFECT WOMEN

In many societies, women's choices around education, marriage, employment, and childbearing are severely limited and often prescriptive. Women form the majority of those living in poverty. They have fewer resources, less power and less influence compared to men, and can experience further inequality because of their class, ethnicity and age, as well as religious and other fundamentalism with the prevalence of gender discrimination, and social norms and practices, girls become exposed to the possibility of child marriage, teenage pregnancy, child domestic work, poor education and health, sexual abuse, exploitation and violence. Many of these manifestations will not change unless girls are valued more.

GENDER EQUALITY: WHY IS IT IMPORTANT?

Gender equality prevents violence against women and girls. It's essential for economic prosperity. Societies that value men and women equal are safer

and healthier. Gender equality is a human right. It also changes our perspective about the outer world and the future generation will be able to understand the discrimination and act wisely. If voicing against racism is important then voicing against "gender inequality" which tends to deprive the country from its good economy is also important!

HOW DO WE FIX THESE ISSUES?

Commitment and bold action are needed to accelerate progress, including through the promotion of laws, policies, budgets. There has been much progress in increasing access to education, but progress has been slow in improving the gender sensitivity of the education system, including ensuring textbooks promote positive stereotypes. This is critically important for girls to come out of schools as citizens who can shape a more equal society and also educating the younger generation is also important and teach them that basic chores at home are never a men or a women work it's a always a part of the basic human needs and these life skills need to be practiced by all no matter what the gender is. 'A crime is always a crime and an achievement is always a victory irrespective of the gender of the person'.

WHAT IS THE PART OF TRANSGENDER IN GENDER EQUALITY

Discrimination based on gender is something we see every day. Moreover, in today's era, it is not like only women are suffering. However, sometimes men also become the victims of gender inequality. Nevertheless, other than them, there is one more gender who has been going through suffering for ages. Who was even not recognised as a third gender for a long time? Transgender people of the third gender who are neither male nor female were not treated as part of society until 2014. In 2014, the Government of India recognised them as the third gender. But still, they find it challenging to live a simple life like the other two genders. They are forced to involve in begging and other illegal work because they are not getting the chance to go to school to get employment because of their unrecognised gender. Society was never fair to them. Now a days good changes in their condition and people's thoughts are observed.

CONCLUSION

Therefore, gender discrimination is never a solution for the economic problem in our country and there is no profit in assuming one gender to be superior to another. "Gender equality" is a right to be obtained. "Men and women have roles, their roles are different but their rights are equal", its always important to respect it and move towards it for a better society in future.

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The Role of Engineers to Promote Sustainable Labour in Post-Covid-19 Era

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ABSTRACT

The Sustainable Development Goals were formulated by the United Nations (UN) in 2015 aiming to alleviate poverty, safeguard the planet, and guarantee universal peace and prosperity by 2030. The Sustainable Development Goal 8 (SDG 8) aims to promote ceaseless, comprehensive and sustainable economic progress, full and productive employment and decent work for everyone. The outbreak of the Covid-19 pandemic coupled with global political tension and rising inflation necessitated innovative actions to adapt to the new circumstances to attain the objectives. The consequences of the setback afflicted mankind in every field, making it difficult to achieve the targets by 2030. Developing countries like India needs to rebuild its action plans and modify the metrics to satisfy its growing population. The international engineering fraternity can play a major role in realizing these aims through value-oriented technical services. This paper suggests actionable engineering measures and novel frameworks for SDG 8 in line with holistic indicators of socio-economic growth.

Keywords : Economic Growth; Decent Work; Covid-19; Engineers; India; SDG 8.

INTRODUCTION

In 1987, the United Nations (UN) released the Brundtland Commission Report [1] which emphasized sustainability as a system of balancing the needs of the existing generation and the generations to come. The UN designed ambitious agenda 2030 project in which decent work and Economic Growth are considered the eighth Sustainable Development Goal [2]. The global economic recovery from inflation was hampered by the pandemic, along with political tensions worldwide, leading to employment market challenges.

Decent Work and Economic Growth in 2022

The UN recognized 12 Targets and 17 indicators for Sustainable Development Goal 8 (SDG8) to mould an egalitarian economy [2]. **Table 1** summarizes the target of SDG 8.

Table I : Targets of SDG 8

Sl. No.	Target
1	8.1: Sustainable economic growth
2	8.2: Diversify, innovate and upgrade for economic productivity
3	8.3: Promote policies to support job creation and growing enterprises
4	8.4: Improve resource efficiency in consumption and production
5	8.5: Full employment and decent work with equal pay

6	8.6: Promote youth employment, education and training
7	8.7: End modern slavery, trafficking, and child labour
8	8.8: Protect labour rights and promote safe working environments
9	8.9: Promote beneficial and sustainable tourism
10	8.10: Universal access to banking, insurance and financial services
11	8.a: Increase aid for trade support
12	8.b: Develop a global youth employment strategy

After a hike of about 1.4 % in 2019, global real Gross Domestic Product (GDP) per capita dropped steeply by 4.4 % in 2020. Global real GDP per capita is estimated to have recoiled at a growth rate of 4.4 % in 2021 and is estimated to rise again by 3.0 % in 2022 and 2.5 % in 2023 based on pre-war calculations. The war in Ukraine is likely to demote international growth. The real GDP of least developed countries had improved by 5.0 % in 2019 but displayed no growth in 2020 because of the disturbance made by the epidemic. There was no Global real GDP growth in the Least Developed Countries (LDC) in 2020 [3]. This especially affected the Indian populace which relies on manufacturing, agriculture and medium and small-scale enterprises (MSE) [4].

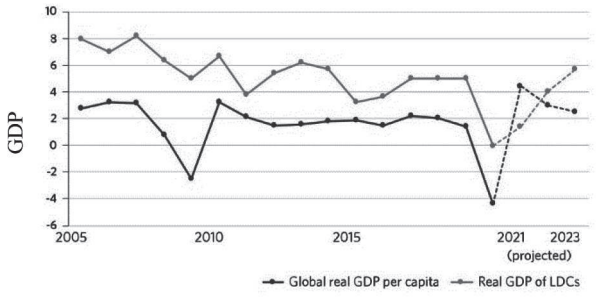

Fig. 1 Annual growth rate of global real GDP per capita and annual growth rate of real GDP of LDCs, 2005–2023 (percentage)

Fig 1 presents the Annual growth rate of global real GDP per capita and annual growth rate of real GDP of LDCs, 2005–2023. The rising inflation and supply chain disturbances made employment tough. International Labour Organisation (ILO) estimates that unemployment will prevail above its 2019 level until at least 2023. Latest projections pointed out that the number of children in child labour increased to 160 million (63 million girls and 97 million boys) globally at the start of 2020, conveying an advance of 8.4 million children in the last four years and translating into about 1 in 10 of all children in child labour worldwide. Equal treatment in employment is part and parcel of decent work. Globally women resume being paid 19 % less than men as per an International Labour Organization (ILO) 2018/2019 report. In 87 % of nations with current data, professionals earn per hour on average greater than double what workers in elementary occupations get. The fraction of the universal youth not in education, employment or training (NEET) is recently at an unprecedented level since 2005. The world's GDP from tourism nearly halved between 2019 and 2020 and the tourism field dealt with its worst crisis in recent history. However, The COVID-19 pandemic seems to have further strengthened the applications of digital modes of financial access. [3]

Why the sub-goals should be changed?

Sub-goals 8.1, 8.2 and 8.3 focus straight on economic development and production seeking for 7% GDP rise p.a. in the least developed nations' high-value added and labour-intensive sectors, while economic growth is related to resource and energy utilization, tourism, financial markets foreign direct investments, trade-related technical assistance in sub-goals 8.4, 8.9, 8.10, and 8. a, respectively. Only two are indeed connected to the decency of work (sub-goal 8.7 and 8.8), the undue gravity is given to economic enhancement conflicts Sustainability ideologies.

GDP as a key metric was developed in the times of World War 2 (WW2) but it does not address wage gaps, social divides or the well-being of citizens. rather it serves as a proxy for the same. Critics of SDG8 also propose to uphold the right not to work above the privilege of decent work. Distributional issues and economic disparity could be resolved

only by actions to lessen inequality, and not by further economic expansion. [5]

The ecological effects of paid employment, as a phenomenon, have historically been detrimental. Mean working hours in the US between 2007–2013 as an example had a solid positive interrelation to carbon emissions [6] and similar outcomes can be seen in another research. Particularly, work in factories and the manufacturing field need high levels of energy per hour worked [7] hinting at a high energy footprint contrasted to most entertainment pursuits.

How should it be changed?

New indicators like Happiness Index should be recognized, changes should be incorporated from IPCC findings. Democratic worker participation should be ensured and societal dependence on unsustainable work should be examined. The secondary and tertiary effects of exported consumer goods must be identified.

How can Engineers help?

Being the ones to extend value-based services to the nation and society, engineers can design and develop innovative technologies to replace indecent labour. Engineering can further the progress of artificial intelligence to ensure new indicators of socioeconomic well-being are attained. Through proper Life Cycle Assessments (LCA), material footprints could be analysed. Environment Impact Assessments (EIA) can be carried out to save nature for the future.

Value Engineering (VE) is the need of the hour to ensure end value to customers. This can also reduce unwanted energy expenditure in manufacturing processes strong policies and stringent implementation of occupational safety norms could reduce exploitation in the workplace, industries being one of the areas where child labour is practised.

Hence engineers can help shape a sustainable work culture.

CONCLUSION

Ensuring better working conditions and securing socio-economic growth have always been interdependent. Hence the ideas conveyed in SDG8 are valid for building a sustainable future. However certain changes are to be made to the existing framework to adapt the same to the post-pandemic era, engineers can be the harbingers of the new wave with tools like LCA, EIA etc.

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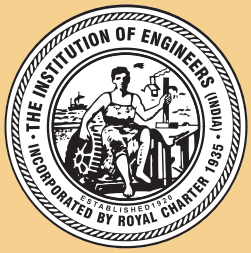

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