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Adoption of united nations sustainable development goals 2030 in environmental management system by earth moving and construction equipment industries in India

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ABSTRACT

United Nations General Assembly on 25 September 2015 adopted the resolution"Transforming our World: The 2030 Agenda for Sustainable Development" and adopted 17 Sustainable Development Goals (SDG) for actions over the next 15 Years. These goals intend to transform the world by simultaneously ensuring human wellbeing, economic prosperity and environmental protection. SDGs came subsequent to the Millennium Development Goals (MDGs) which were adopted by governments in 2000 and lasted up to 2015. These global Sustainable Development Goals were decided by the Heads of Countries and Government and High Representatives Meeting at United Nations Headquarters in New York from 25 to 27 September 2015. The new goals along with targets have come into effect from 1 January 2016. The Governments of respective countries will have to decide how these global targets will be incorporated into national planning, processes, policies and strategies for implementation. The objective will only be achieved when stake holders at various levels adopt these goals including the manufacturing industries. The industries will have to understand these goals and then incorporate them into strategies with action planning for rolling out the implementation.

Key words: *Sustainable development goals, Environmental management system, Sustainability, Earth moving & Construction equipment*

Introduction

Impact on environment by the developmental activities is seen in various forms which include change in the natural habitat of the area, deforestation, extinction of wild life species, global climate change, loss of bio diversity, ozone depletion, emission of toxins to air causing damage to living organisms and humans, water depletion and resource depletion. Water contamination, land contamination, air pollution, noise pollution are the menace which no one is untouched with.

The importance of environmental protection was realized globally for the first time at United Nations Conference on Human Environment held at Stockholm in 1972. This conference laid the foundation of modern global environmental law and recognised that different approaches are required to tackle problems of developed and developing countries. The need for the balance between development and environment was identified as a major agenda for future. Since then there have been several discussions, negotiations, agreements led by the United Nations. Few important ones which have led the way towards sustainable development are :

a. The Montreal Protocol on Substances that Deplete the Ozone Layer, 1987
b. The Report of the World Commission on Environment and Development, The Brunt land Commission, 1987
c. United Nations Conference on Environment and Development, UNCED, also known as the Earth Summit and Agenda 21
d. The UN Convention on Biological Diversity, 1992
e. Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and their Disposal, 1992
f. The UN Framework Convention on Climate Change, 1992 and the Kyoto Protocol, 1998
g. Millennium Development Goals, 2002 (MDG)
h. United Nations Conference on Sustainable Development or Rio+20, June 2012

In 2015, United Nations came up with sustainable development goals with an aim to transform the world by 2030. The MDGs focused on social outcomes, and key development priorities of infrastructure and energy were absent (Jaiyesimi, 2016). One of the main aims of United Nations is to end poverty, (Sachs, 2008), the ratio of which across the world is disheartening (Fukuda and Hulme, 2011).

Sustainable development is the key conceptto meet the challenges of continuing growth without destroying the environment and social harmony. (Gupta and Chiyarath, 2013). However, the interpretation will vary from country to country. (Srivastava and Ramchandran, 2016)

This paper attempts to find out the implementation of UN Sustainable Development Goals in the Environment Management system adopted by Earth Moving and Construction Equipment Industries in India.

"Construction equipment" (CE) refers to heavy-duty self-propelled vehicles, specially designed for executing construction tasks. Its use is significant in civil projects. The term CE refers to the machinery used for earth-moving operations, for example, excavators, dump trucks, loaders, compaction rollers, graders, scrapers. Those earthworks mainly consist of four basic processes: excavating, hauling, spreading, and compacting (Peurifoy and Ledbetter, 1985). For selecting proper excavation machine for a construction site, technical specifications, purchasing cost, fuel consumption, service conditions, secondary and replacement part markets and comfort of the operator are the criteria considered (Temiz and Calis, 2017).

Environmental initiatives lead to benefits for organization which in most cases meant reduction in waste, cost savings and improvement in product and process quality. Therefore, the efforts to improve business operations that are aligned with sustainability concepts are part of the larger continuous pursuit of corporate sustainability, (Bonn, and Fischer, 2011) and thus adopting sustainable development goals makes a better business sense.

Sustainable Development Goals 2015

Moving forward, United Nations General Assembly on 25 September 2015 adopted the resolution "Transforming our World: The 2030 Agenda for Sustainable Development" and adopted 17 Sustainable Development Goals (SDG) for actions over the next 15 Years.(UN SDG, 2015)

The sustainable development goals are built up further to the Millennium Development Goals and are intended to what they did not achieve. MDGs included a set of eight goals having social priorities worldwide about poverty, hunger, maternal health, diseases, primary education, gender equality and environmental sustainability with global partnership having time bound objectives (Sachs, 2012). The SDGs are integrated and indivisible and balance the three dimensions of sustainable development the economic, social and environmental.

The SDGs are implicitly interdependent and there are interactions amongst the goals both supporting and conflicting which may give diverging results (Nilsson *et al*., 2016). These interactions can synergise, where progress in one goal favours another goal or trade off, where progress in one goal hinders the progress in another goal (Pradhan *et al.,* 2017). Five priorities in SDGs for addressing have also been suggested which are Climate Change,

Energy, Food, Health and Water (Lu *et al.,* 2015).

India, along with other countries is signatory to the UN SDGs of September 2015. The goals are comprehensive and focus on five Ps – People, Planet, Prosperity, Peace and Partnership. In India, NITI Aayog, (National Institution for Transforming India), UN Office, New Delhi, Research & Information System for Developing Countries, RIS, New Delhi, State Governments are responsible for effective implementation of Sustainable Development Goals. (India and Sustainable Development Goals: The way forward, 2016). The NITI Aayog, being the centralised key agency has also launched the *India Index* to monitor the implementation and progress of SDGs by States in India. *(SDG India Index, 2018)*

These goals for implementation seek to strengthen global partnerships for achieving the targets by 2030 and bringing together national governments, national and international communities, civil societies, public and private sectors and others. Despite progress in certain areas, more needs to be done to accelerate progress to achieve the desired results and focus on those areas where the progress is slow currently. (https://sustainable development.un.org)

Sustainable production or sustainable manufacturing is one of the sustainable development goals. Different focus areas for actions to enhance performance include product, process, technology, supply chain, organisation, employees and customers, (Moldavska, and Welo, 2017). The SDGs are defined but there are challenges in achieving the SDGs and these are defining the indicators, financial resourse for implementation, monitoring and ownership, measuring progress (Prabhakar, 2018). SDGs also do not provide effective guidance to achieve the goals and targets which will lead to the transformation required by 2030, (Bengtsson *et al.,* 2018). Also as the global economy has grown and developed, issues related to sustainable development are receiving increased importance at both national and international level (Singhal, 2014).

The concept of sustainable development about satisfying environmental, economic and social goals is relatively easy to comprehend but the difficulties arise in applying the principles of sustainable development in practice (Azapagic and Perdan, 2000) but the SDGs help in identifying the actions which can be implemented by the organisations towards sustainable development.

United Nations Sustainable Development Goals 2015

1. No poverty
2. No hunger
3. Good health and well being
4. Quality education
5. Gender equality
6. Clean water and sanitation
7. Affordable and clean energy
8. Decent work and economic growth
9. Industry, innovation & infrastructure
10. Reduce inequalities
11. Sustainable cities and communities
12. Sustainable consumption and production
13. Climate action
14. Life below water
15. Life on land
16. Peace, justice and strong institutions
17. Partnerships for the goals

These SDGs have specified targets to be achieved by 2020 and 2030.17 SDGs have a total of 169 associated targets.

Multinational companies in BRICS countries are not adopting all the Sustainable Development Goals in its entirety as assessed through the reflection in vision and mission statements through a study on sample companies in these countries. The most highlighted and adopted sustainable goals are Peace, Justice and Strong Institutions and Decent Work and Economic Growth (Ali *et al.,* 2018). SDGs in implementation pose challenges as well as provide opportunities in developing countries and as countries are different their challenges and prospective are also different and therefore each country should have National plan of action for each SDG, (Jaiyesimi, 2016). These plans will then drill down to different sectors and organisations for implementation. Apart from government, NGOs Private sector should also be equally involved to accelerate the attainment of these goals, (Jayaprakash *et al.,* 2018). The Table 1 below describes the SDGs relevant to manufacturing industries and initiatives taken by the industries.

Without profound understanding of these goals, involvement of top management team, extended management team, business managers and their managerial action the desired transformation of achieving the favourable results will not be possible to be achieved in the manufacturing organization, (Rajala *et al.,* 2015)

Table 1. SDGs relevant and applicable to manufacturing industries

Sustainable Development Goal relevant to Manufacturing organization	Target	Initiatives by Industries
Goal 1. End poverty in all its forms everywhere	By 2030, eradicate extreme poverty for all people everywhere. People living on less than $1.25 a day. Ensure significant mobilization of resources from a variety of sources for development programs to end poverty in all its dimension.	CSR activities Adoption of Village, School. Vocational training to enhance the skill of youth in adopted school and village adopted to make them employment worthy. Promote and encourage education in adopted school and villages
Goal 3 Ensure healthy lives and promote wellbeing for all at all ages	By 2020 reduce the deaths and injuries by 50% due to road accidents. By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution.	Road safety is a national initiative by government of India and adopted by industries as well. Comprehensive Health & Safety and Environment management system.
Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	By 2030 ensure that all girls and boys complete free, equitable and quality, pre-primary, primary and secondary education. By 2030 substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills for employment and entrepreneurship. By 2030 substantially increase the supply of qualified teachers.	CSR initiatives by industries focusing on education and skill development.
Goal 5 Achieve gender equality and empower all women and girls	End all forms of discrimination against all women and girls. Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision making in political, economic and public life. Enhance the use of enabling technology, information and communication technology, to promote the women empowerment.	Equal opportunities to women without any discrimination in industries. CSR initiatives focus on women empowerment POSH, Prevention of sexual harassment at work place policy is adopted by the organisations.
Goal 6 Ensure availability and sustainable management of water and sanitation for all	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, substantially increasing recycling and safe reuse By 2030, substantially increase water use efficiency across all sectors and ensure sustainable withdrawals and supply of fresh water to address water scarcity. By 2030, implement integrated water resources management at all levels	Water conservation and management by industries. CSR initiatives on water management and participation in Clean India Mission initiated by Government of India.

Table 1. *Continued ...*

Sustainable Development Goal relevant to Manufacturing organization	Target	Initiatives by Industries
	Support and strengthen the participation of local communities in improving water and sanitation management.	
Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all	By 2030, increase substantially the share of renewable energy By 2030, double the global rate of improvement in energy efficiency. Promote investment in energy infrastructure and clean energy technology.	Focus includes Renewable energy – Solar, Wind Power and use of PNG as clean fuel in place of fossil fuels.
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	By 2030 Improve resource efficiency in consumption and production and endeavor to decouple economic growth from environmental degradation. Promote safe and secure working environments for all workers.	Environment Management system adopted by industries. Focus on environment Vs development. Industries are required to undergo environment assessment before the commencement of manufacturing either through environment impact assessment study or through consent to establish process. Focus on safe working environment through Occupational health & safety management system in industries.
Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Develop quality, reliable. Sustainable and resilient infrastructure. By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes.	Green building certification of industrial buildings. CII and India Green Building Council norms available. Environment impact assessment process and Consent to establish process available and complied. ISO 14001, Environment Management system complied by the industries
Goal 12 Ensure sustainable consumption and production patterns	By 2030, achieve the sustainable management and efficient use of natural resources. By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and environment. By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse. Adopt sustainable practices and to integrate sustainability information into their reporting cycle. Promote public procurement practices that are sustainable.	Focus on efficient use of resources by industries. ISO 14001:2015 version incorporates life cycle perspective and the same is widely adopted by the companies. GRI report, Internal reports, Annual Report for stake holders are published by industries. Training on environment and sustainability by industries. Participation in seminar and conferences on environment and sustainability by industries. External assessment by industries through CII and other industrial forums on green rating.

Table 1. *Continued ...*

Sustainable Development Goal relevant to Manufacturing organization	Target	Initiatives by Industries
	By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development.	
Goal 13 Take urgent action to combat climate change and impacts	Improve education, awareness and human and institutional capacity on climate change mitigation, adoption, impact reduction and early warning.	Monitoring of the Greenhouse Gas generation by industries. Actions to reduce the greenhouse gas generation. Adoption of clean technologies.
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Promote the rule of law at national and international levels. Substantially reduce corruption and bribery in all their forms. Promote and enforce non-discriminatory laws and policies for sustainable development.	Implementing Environment and sustainable legislations applicable to the organization. Adoption anti bribery policies. Complying with the existing and newly introduced laws.

Methodology

For knowing the understanding of sustainable development goals and to what extent these are linked and taken into consideration by the industries a questionnaire was framed and taken to earth moving and construction equipment industries which are a sample of engineering industries, automobile industries and heavy engineering industry. This segment covers a vast band of industries coming under engineering sector. Questions were formulated to assess the extent of implementation of sustainable development goals. The other source of information is the website of the industries participated.

The response was taken in the scale of Very Low, Low, Neutral, High, Very High levels and Significant increase, Increase, No change, Decrease, Significant decrease. Where the response is in Very High, High Level the implementation of SDG element is considered positive (√) and where the response is neutral or no change the response is N and where the response is Very Low, Low or Decrease or significant decrease the response is taken as (X). Objective is to check the response from the industries on compliance with SDG element (Table 2).

Results and Discussion

The study shows that the sustainable development goals which are relevant to manufacturing organsations are all very well adopted by earth moving and construction equipment industries. Goals 5, 7,8,9,12,13 are very well implemented. Response is neutral on Goal 1 and 4 and Goals 2, 10, 11,14,15,17 were observed not directly linked to manufacturing activity.

When it comes to implementing the sustainable management system, the earth moving and construction equipment industries have all adopted ISO 14001, the environmental management system. Mostly the organisations have adopted the environmental management system voluntarily because of the benefits. These organisations have adopted environmentally sound practices and about 50% make

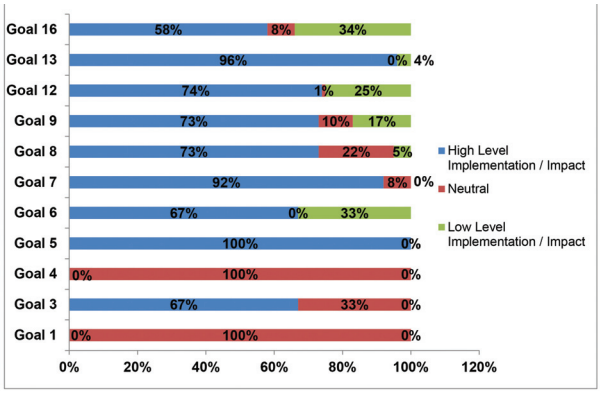

Table 3(2). SDG adoption level by Earth moving and construction equipment industries

Table 2. SDGs adopted by Earth moving and construction equipment industries

SDG Element/ target	SDG Goal Reference	JCB India, Ballabgarh	JCB India, Pune	Mahindra Construction Equipment Ltd, Pune	Hyundai Construction Equipment India Private Limited, Pune	Escorts Construction Equipment Limited, Ballabgarh	Manitou Equipment India Pvt Ltd, Greater Noida
ISO 14001 Certified	Goal 9, 12	√	√	√	√	√	√
Has company adopted/ implemented Environment & sustainable manufacturing practices voluntary due to its benefits?	Goal 8, 12	√	√	√	√	√	√
Is use of Nano Technology made in painting process which is a clean technology?	Goal 8, 9, 12	√	√	×	×	×	√
Is Lead free painting process used?	Goal 9,12,	√	√	√	√	√	√
Do you use Powder coating instead of liquid painting?	Goal 9,12	√	√	×	×	×	×
In ovens is natural gas used instead of fossil fuels?	Goal 9,12,13	√	√	"	√	√	×
Is all treated water reused inside the plant and company is zero discharge facility?	Goal 6	√	√	×	√	√	×
Is any recycled component used in your machine?	Goal 12	×	×	×	×	×	×
Do you identify impacts from your activities on environment and initiate actions?	Goal 8	√	√	√	√	√	√
Do you identify the impact of product on environment?	Goal 8, 13,	√	√	√	√	√	√
Is mechanism of Legal compliance, capturing new requirements, and voice of community in place and resources available?	Goal 5, 16	√	√	√	√	√	√
Is investment done in technologies that reduce CO2/GHG emission?	Goal 13	√	√	√	√	√	√
Do you track and monitor energy consumption?	Goal 7, 9, 12	√	√	√	√	√	√
Is use of renewable energy made?	Goal 7	√	√	√	√	√	N

Table 2. *Continued ...*

SDG Element/ target	SDG Goal Reference	JCB India, Ballabgarh	JCB India, Pune	Mahindra Construction Equipment Ltd, Pune	Hyundai Construction Equipment India Private Limited, Pune	Escorts Construction Equipment Limited, Ballabgarh	Manitou Equipment India Pvt Ltd, Greater Noida
Is product designed and manufactured to reduce impact on environment. Fuel, Carbon, Consumable efficient?	Goal 8, 12, 13	√	√	√	√	√	√
Are Packaging improvement projects implemented. Reduced and reusable packaging?	Goal 8,9	√	√	N	N	N	N
Do your suppliers also consider minimizing environmental impact?	Goal 12, 16	×	×	×	×	N	√
Is mass balancing study input – output study for major raw materials done?	Goal 8, 9	√	√	√	√	√	N
Do you Measure, Monitor performance of Specific water, energy, CO2 emission, Hazardous waste, Solid waste generation?	Goal 8, 12,	√	√	√	√	√	√
Injury prevention programs, monitoring performance, health check of employees working in air and other pollution areas in place?	Goal 3, 8	√	√	N	N	√	√
Involvement in CSR activities with communities withcontribution in Education, Health, Cleanliness, Environment improvement?	Goal 1,4, 8	N	N	N	N	N	N
Is the product eco-efficient during use? Fuel efficiency, consumable replacement?	Goal 12	√	√	√	√	√	√

Table 3(1). SDG adoption level by Earth moving and construction equipment industries

SDG	Number of Questions covering SDG aspect	No. of responses expected	Very high/ high level implementation/ impact (√)	% age	N (Neutral)	% age	Very low / low level implementation/ impact(×)	% age
1. No poverty	1	6	0	0%	6	100%	0	0%
2. No hunger	0	0	0	0%	0	0%	0	0%
3. Good health & wellbeing	1	6	4	67%	2	33%	0	0%
4. Quality education	1	6	0	0%	6	100%	0	0%
5. Gender equality	1	6	6	100%	0	0%	0	0%
6. Clean water & sanitation	1	6	4	67%	0	0%	2	33%
7. Affordable & clean energy	2	12	11	92%	1	8%	0	0%
8. Decent work and economic growth	10	60	44	73%	13	22%	3	5%
9. Industry, innovation & infrastructure	8	48	35	73%	5	10%	8	17%
10. Reduce inequalities	0	0	0	0%	0	0%	0	0%
11. Sustainable cities & communities	0	0	0	0%	0	0%	0	0%
12. Sustainable consumption & production	12	72	53	74%	1	1%	18	25%
13. Climate action	4	24	23	96%	0	0%	1	4%
14. Life below water	0	0	0	0%	0	0%	0	0%
15. Life on land	0	0	0	0%	0	0%	0	0%
16. Peace, Justice & strong institutions	2	12	7	58%	1	8%	4	34%
17. Partnerships for the goals	0	0	0	0%	0	0%	0	0%

use of the nano technology for pre-treatment before painting and make use of lead free paint. Powder coating as a paint technology is widely used and so is the case with use of clean fuel PNG in place of fossil fuels. 67% of the organisations are zero discharge and make use of the treated water within plant however none of the organization is using any recycled component at the end of life cycle of product. Environmental impact in the plant and product in use in its life cycle are well monitored and controlled by the organisations, however, carrying out the life cycle analysis is not done by any of the organization surveyed here. Addressing the legal requirement is done by all the organisations and all organisations take effective measures to reduce greenhouse emission. Energy conservation, use of renewable energy is made by these organisations. Making machines fuel and carbon efficient is also a focus of these organisations however, improving on packaging got a neutral response and organisations focus for involving suppliers also in the Environment management system is not included in these organisations program. Mass balance study to monitor the use of resources is also done by these organisations and all of these also focus on water, energy, CO_2 emission, Hazardous waste, Solid waste generation measurement and monitoring. Injury prevention and monitoring health status is also done by 67% of the respondent organisations. Regarding community involvement through the CSR initiatives none of the organization chose to share information. Overall, the organisations' environmental management system has incorporated the Sustainable development goals and are being practiced and benefits seen by the organisations Table 3(1) and 3(2).

Conclusion

In the Report, (Our Common Future, WCED, 1987), Sustainable Development, has been defined as: "the kind of development that meets the needs of the present without compromising the ability of future generations to meet their own needs". These sustainable development goals contribute to the objective of

getting closer to the ultimate aim of sustainable development. Towards this goal, the earth moving and construction equipment industry in India is contributing in a very positive manner. We at present have the responsibility to conserve and preserve our resources and the environment for the future generations. The journey which initiated from 1972 is continuing.

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