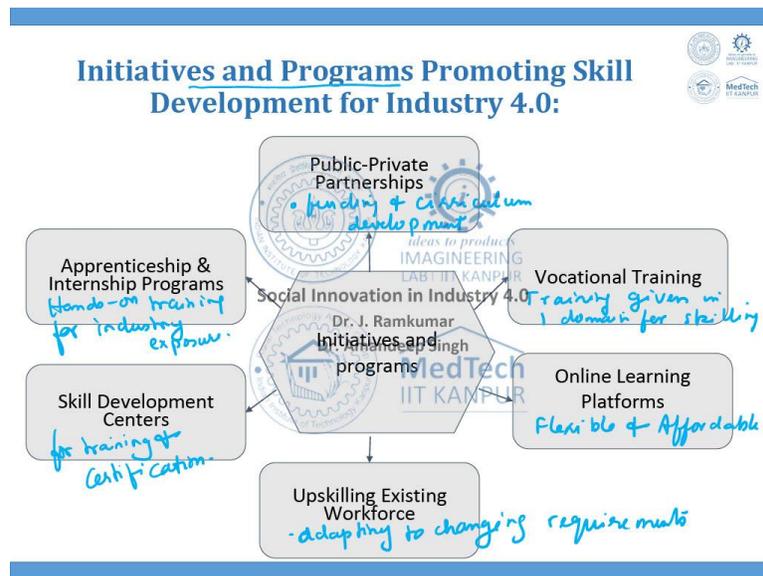


Social Innovation in Industry 4.0
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Lecture 07
Uses of Social Innovation in Industry 4.0 (Part 2 of 2)

Welcome to the next lecture on Use of Social Innovation for Industry 4.0.



So, who are all the major partners? So, Initiative and Programs Promoting Skill Development for Industry 4.0 is going to be Public-Private Partnership, where in which they play an important role in funding and curriculum development.

Next is Vocational Training. Vocational Training is tailored training given in one domain for skilling.

Then, Online Learning Platforms. This is flexible and affordable. Next is Upskilling Existing Workforces. We have adaptability, which is a very big challenge. Adapting to changing requirements.

Then, Skill Development Centers for training and certification. Apprenticeship and Internship Programs. So, it is more towards hands-on training for industry exposure. All these things are part of Initiatives and Programs Promoting Skill Development for Industry 4.0. All these things are been done. Many of the countries across the globe have implemented all these things, especially in the country like India, developing country, you see all these programs are intact and lot of people are been given new knowledge.

There are Public-Private Partnership going on in a big way, Vocational Trainings, Online Training Platforms, Upskilling Existing Workforces are been done, Skill Development

Centers and Apprenticeship and Internship Programs are done. So, all these things are getting integrated as part of curriculum today under the new education policy.



Sustainability and Environmental Impact

Linking Industry 4.0 with Sustainability Goals:

- Resource Efficiency *- this predictive maintenance + efficient production.*
- Circular Economy *- durability, reuse & recycling using AI, IoT + block-chain.*
- Sustainable Supply Chains *→ transparency, traceability & ethical sourcing through digital technologies.*

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Promoting Environmentally Friendly Practices:

- Energy Management *- smart monitoring & smart grids.*
- Waste Reduction *- waste recycle & waste management good practices.*
- Green Infrastructure *- eco-friendly building, transportation & data centers.*

The Sustainability and Environmental Impact. Linking Industry 4.0 with Sustainability Goals there is Resource Efficiency. So here, efficiency is through predictive maintenance and efficient production comes under the Resource Efficiency.

The Circular Economy is durability, reuse and recycling using AI, IoT and blockchain. So, all these things are very efficiently used for Circular Economy. Sustainable Supply Chain. We have transparency, then we have traceability and ethical sourcing through digital technologies. We have discussed in plenty.

So, I will just quickly go through Linking Industry 4.0 with Sustainability Goals is Resource Efficiency. In Circular Economy durability, reuse, recycle all these things are used. In Sustainability Supply Chain transparency, traceability and ethical sources.

Promoting Environmental Friendly Practices like Energy Management is today efficiently. What we are trying to talk about is smart monitoring. And, if you wanted to look at your own city, there are lot of project which are going on smart metering of power consumption, smart monitoring and smart grids. Why today Energy Management is very important?

Because today they have started doing trading or fixing price on hourly basis depending upon the demand. Smart monitoring and smart grids are part of Energy Management which is Promoting Environmental Friendly Practice which is part of Circular Economy. Waste Reduction.

This is more towards waste recycle and waste management good practice. And, Green Infrastructure is making eco-friendly buildings, transportation and data center.

These are all Promoting Environmental Friendly Good Practices. Energy Management, Waste Management. Waste Management can be in terms of water or the waste whatever we get, we generate everyday. And the last one is Green Infrastructure.

Today, there is a big drive which is going towards building up buildings with socially available or closely available material. So, they are trying to talk about more and more Green Infrastructure which comes into eco-friendly buildings. So, the buildings are now expected to have energy efficiency, have transparent glass, try to have sunlight falling into your room so that your energy consumption is reduced, try to have passive ventilation systems. So, all these things are part of eco-friendly buildings.

All these things are part of environmental impact and sustainability, which in turn can be integrated with Social Innovation using Industry 4.0.

Examples of Social Innovation for Sustainable Industry 4.0:

- Eco-Design and Product Lifecycle Management - C2C
- Smart Cities and Sustainable Urban Development - Smart grids, EV
- Sustainable Manufacturing Networks - circular economy
- Environmental Monitoring and Conservation - Rain forest connections IoT
- Digital Platforms for Sustainable Consumption - IoT devices for detecting deforestation

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 Strength of Free cycle on ability
 resource, quality & waste reduction

So, today we talk about some of the Examples of Social Innovation for Sustainable Industry 4.0 are Eco-Design and Product Lifecycle Management. So, here we talk about C to C, that is Cradle to Coffin.

Trying to have a complete control over the design and move along with the product till it is put under a coffin. What the carbon emission it does, what is the amount of energy which is consumed by the product. This is what is that Eco-Design and Product Lifecycle Management.

Smart Cities. So, here I have already talked about smart grids, smart management systems, E-Vehicles, all these things are Sustainable Urban Development. Sustainable Manufacturing Network is more towards Circular Economy.

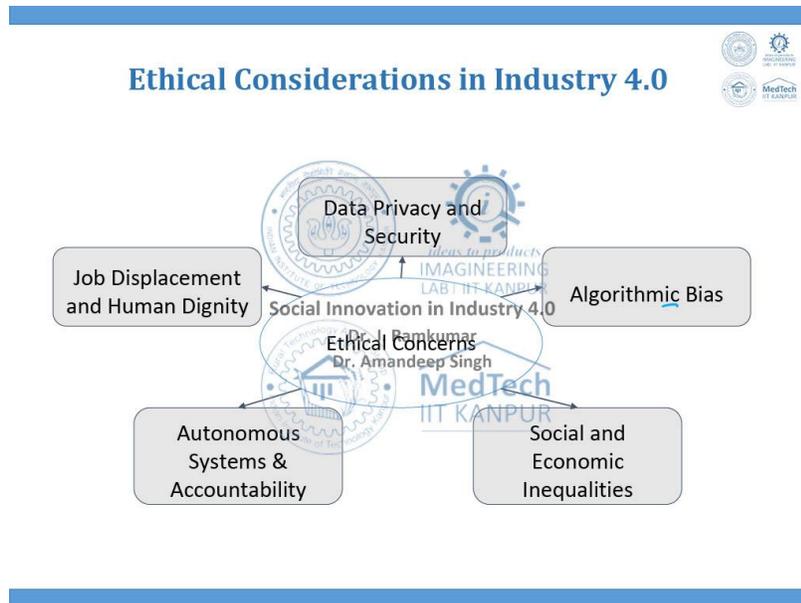
Then, Environmental Monitoring and the Conservation is going to be rain-forest connections, IoT devices for detecting deforestation. Actually, in this project they put several of the carbon dioxide sensors at regular intervals like your mobile antenna, and if

at all, there is a carbon emission comes and carbon dioxide release happens, immediately, what it does is, the sensor predicts, then there is a matrix of sensors.

These sensors communicate to the higher ups or whatever it is, such that immediately, they start reacting to the situation and they try to do Environmental Monitoring and Conservation. Digital Platform for Sustainability is shareable and free cycle enabling, resource sharing and waste reduction.

For example, you can have a single database where in which multiple people can access, and when they access this database multiple, this can be company 1, company 2, company 3, 4, company 5.

So, all these people can connect with themselves, and then they can connect, they can share, and they can use a same database so that they can reduce the time wastage which is there.



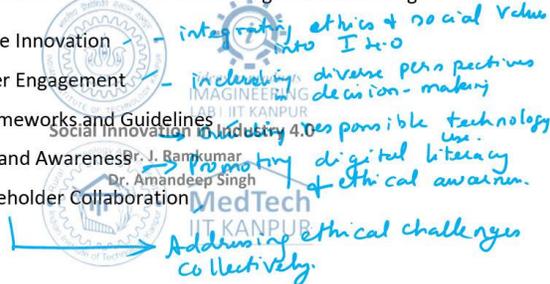
Ethical Consideration for 4.0. We have Data Privacy, Algorithm, Bias, Social and Economic Inequalities, Autonomous Systems and Accountability, Job Displacement and Human Dignity, all these things we have dealt in large. So, I would just try to keep moving to the next slide. So, Ethical Consideration for Industry 4.0.

Ethical Considerations in Industry 4.0



Importance of Social Innovation in Addressing Ethical Challenges:

- Responsible Innovation
- Stakeholder Engagement
- Ethical Frameworks and Guidelines
- Education and Awareness
- Multi-Stakeholder Collaboration



Responsible Innovation, it has to be a Stakeholder Engagement, it has to have Ethical Frames and Guidelines, Education and Awareness and Multi-Stakeholder Collaboration. So, all these things are part of Ethical Industry 4.0. So, in Responsible Innovation you will have integrating ethics and social values into Industry 4.0.

Then, Stakeholder Engagement will be including diverse perspectives in decision-making. Then, Ethical Framework and Guidelines, it is going to be guiding responsible technology use.

Then, Education and Awareness is promoting digital literacy and ethical awareness. The last one is Multi Stakeholder Collaboration, you will have addressing ethical challenges collectively.

Ethical Considerations in Industry 4.0



Initiatives for Responsible Data Governance and Algorithmic Fairness:

- Data Protection Regulations: *implementation of GDPR → Europe.*
- Ethical AI Principles: *fairness, transparency, Accountability*
- Auditing and Certification: *Social & environment performance.*
- Diversity and Inclusion in AI Development: *→ Open AI's efforts to address biases in AI models & promote inclusive AI development.*

So, continuing with the Initiatives of Responsible Data Governance and Algorithmic Fairness Data Protection Regulation is very important. So, lot of countries have implemented.

So, implementation of GDPR in the European Union for protection of personal data, it is done in Europe. So, that the data privacy it is in Europe. So, it is done. And, the next one is Ethical AI Practice, it is adapting principles like partnership.

So, there are lot of AI ethical principles are guided by ensuring fairness, transparency and accountability. This is part of Ethical AI Principles have been done.

Auditing and Certification. Big organizations are always involved in certifying the companies meetings, whether the companies meet the social and environmental performance standards. And, Diversity and Inclusiveness is open AI efforts to address biases in AI models and promote inclusive AI development, by considering Diversity and Inclusion in the AI development.

Social Entrepreneurship in Industry 4.0



- ★ Social entrepreneurship involves using
 - business principles and
 - innovative approaches
 to address
 - social
 - environmental challenges,
 aiming to create positive impact alongside financial sustainability.
- ★ In the context of Industry 4.0, social entrepreneurship leverages
 - advanced technologies and
 - digital innovations
 to tackle
 - social and
 - Environmental
 problems while embracing the transformative potential of Industry 4.0



Social Entrepreneurship in Industry 4.0. Social Entrepreneurship involves using business principles and innovative approach to address social and environmental challenges aiming to create positive impact alongside financial sustainability. This is what is Social Entrepreneurship business principles, innovation, social environmental sustainability, all these things are part of Social Entrepreneurship.

In the context of inducing Industry 4.0 the Social Entrepreneurship leverages advanced technology, digital innovation to tackle societal and environmental problems which embracing the transformative potential of Industry 4.0.

Examples of Social Enterprises Leveraging Industry 4.0 Technologies:



- Accessible Healthcare: *mClinica - digital platform, analyzes data connects to pharma & health care providers in SE Asia.*
- Sustainable Agriculture: *Farm bot - open source farm robot & IoT that enables individual to grow their own food using sustainable practices.*
- Renewable Energy Solutions: *off Grid Box: solar powered energy system to rural & remote areas, addressing energy poverty & promote sustainability.*
- Inclusive Education: *Ex e-Lion: Kenya - digital learning tools (interactive) for students in underserved community.*
- Waste Management and Recycling: *Ex: Recyclepoints (Nigeria) - reward based system for recycling, using IoT based waste collection bins & a block chain platform to incentivize recycling behaviour.*



Some of the Examples of Social Enterprises Leveraging Industry 4.0 Technologies are: For example, M-Clinica which is a digital platform, which analyzes the data and connects to pharma (pharmaceutical or pharma company for pharmacies) and health care providers

in south-east Asia. This is a social enterprise which is giving accessible health care M-Clinica. Sustainable Manufacturing, it is a company which gives Farmbot, which is open source FarmRobo and IoT, that enables individuals to grow their own food using sustainable practices. So, that is Sustainable Agriculture FarmBot.

Then, Renewable Energy Solutions. It is off grid box. This is the company name, And, they do solar powered water and energy systems to rural and remote areas, addressing energy poverty and promote sustainability. You see, there are so many companies and all these companies are very successful Inclusive Education.

Its example is eLumino which is a social enterprise in Kenya, developing interactive digital learning tools, for students in underserved community. So, this is an Inclusive Education, again social enterprise where in which it is using Leverage of Industry 4.0 technology.

The example of last one is going to be recycle point which is in Nigeria, here, implementation of a reward based system for recycling, using IoT based waste collection bin and a block-chain platform to incentivize recycling behaviour. Some of the very successful startups or social entrepreneurs who are existing today, who have used Industry 4.0 for social entrepreneurship or social enterprise development.

Summary



Social innovation plays a crucial role in leveraging the benefits of Industry 4.0 while

- addressing its challenges
- ensuring a more
 - Inclusive
 - sustainable
 - ethical digital transformation.

The adoption of social innovation, in Industry 4.0 should be a collective effort, driven by

- partnerships
- collaboration
- shared commitment to
- social and environmental well-being.



To Summarize, in this lecture what we have seen is, Social Innovation plays a crucial role in Leveraging the benefits of Industry 4.0, while addressing its challenge ensure a more inclusive, sustainable and ethical digital platform.

The adoption of Social Innovation in Industry 4.0 should be collective effort, driven by partnership, collaboration, shared communities to social and environmental well-being.

So, for driven by, I repeat, the adoption of Social Innovation in Industry 4.0 should be a collective effort which is driven by partnership, collaboration, shared commitment to social and environmental well-being.

These are the References, which I have used Murray, The Open Book of Social Innovation, then Hopkinson, Rapid Manufacturing: An Industrial Revolution for the Digital Age, then Nicolopoulou, Sustainable Entrepreneurship and Social Innovation.

So, the assignment for this lecture is going to be please go through the examples of Social Enterprises, which are developed across the globe under the area of Inclusive Education and Sustainable Agriculture. So, take the 5 best examples, to the best of your knowledge in the area of Social Entrepreneurship, which is developed across the globe, not in particular country, across the globe, best practices in developed country, developing country, underdeveloped country, wherever you want, please take it.

And then, what you do is, you keep only 2 theme focus areas is Inclusive Education and Sustainable Agriculture. How is IoT helping you to do social enterprise in the area of Inclusive Education and Sustainable Agriculture, such that it tries to help to fulfill the unmet needs. Thank you very much.