### Project Details

<table>
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<th>Project Title</th>
<th>Dynamics of Circular Economy: An analysis of Policies and Practices across Supply Chains</th>
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World is facing unprecedented challenges including climate change, resource scarcity, and environmental degradation leaving none of the corners untouched. To address these challenges, this research proposal aims to investigate the **impact of policy frameworks** and **cross-functional collaborative efforts** to drive the implementation of Circular Economy (CE) principles at a **macro level**. To gain a comprehensive understanding in shaping CE, proposed macro level study is needed to harmonize and sustain the loops. At the micro level, products are designed based on raw material availability. But, industries are also constrained by raw material priced on the macro level where supply and demand determine a market price. Government policies create impact on prices and raw material decisions. After the product usage, collection to recycle or reuse or rework needs other dynamics to get into it. For an instance, a leased car is returned to a dealership while a can of soda is a too small as object to keep track and the product becomes residual waste on roadsides. Similar, examples can be seen from all sectors.

The transition to a CE is gaining momentum worldwide as its potential to address pressing environmental and economic challenges is already recognized. But, the implementation of CE is itself facing barriers and dealing with **multiple challenges** such as Ineffective Business Models, Lack of Waste Infrastructure, Consumers Expectations, Government Regulations, Lack of Recycling Technology, High Investments, Ownership of End of Life Material, Policy Gap, Awareness Gap, Capacity Gap etc. [1, 2, 3].

Picking a **macro-level approach** has an immense potential to reflect a holistic solution towards its implementation. Eco-friendly waste management needs **local governance** based decentralised regulations; however, policies are formulated at top level. To get desirable and optimised outcomes, CE principles need a collaborative approach and a united effort. With emerging influencer industry, textile and fashion industry has seen a tremendous growth but traditional stereotypes of used materials to re-use are impacting its CE model. Date label on eggs may be labelled for pantry storage, but will last longer when refrigerated. **Expiration dates** are mostly misunderstood and turn the product to waste but it actually falls below the manufacturer’s quality standards and still usable. **Lack of funding and other incentives** make the adoption of CE practices difficult to sustain. Because of lack in proper infrastructure and connectivity, nearly one-third of plastics are not collected by a waste management. More than 40 years after the launch of the first universal recycling symbol, **only 14% of plastic packaging is collected** for recycling [5]. **There could be more plastics than fish in the ocean by 2050** [5] including WWF, WEF, Greenpeace, and UNEP. Conducting ‘Waste Audit’ can be seen as practical approach. But, these all challenges need a well-searched formulation for a holistic envision towards CE implementation.

The transition to a Circular Economy is a complex and multifaceted process which needs proper regulations and an integrated effort to reach competency. **Hazardous wastes** demand different treatment. At the global scale, restrictions on the treatment and recycling of toxic materials, and restricted circulation can be considered urgent for efficient circular economy in the near future. This approach needs to be translated and integrated into the UN's Basel Convention. At the countries or regional scale, **more regulatory policies** related to waste management should be implemented for toxic materials and substances, and even prohibition of their recycling in backward technological circumstances [6].

CE model as a **vital strategy** needs a comprehensive framework and a **holistic approach**. Political obstacles to putting an optimal price on resource use, Poor institutional cooperation across international supply chains, Lacking policies to internalize externalities, Limited public procurement incentives, Insufficient in infrastructure for recovery and innovation, Obstructing laws and regulations, Heterogeneous regulations across countries, **Weak capacity for reversed logistics**, Path...
dependency to linear system, Rules and time-consuming administration, No accreditation system, No monitoring of waste management, Inertia in consumer behaviour and business culture, etc. are appearing challenges [7] to CE implementation which require an in-depth analysis to deal with and to understand relevant dynamics. A macroscopic study is needed to formulate a solution that can spin the gears of CE across supply chains, and to bring positive change by bridging the gaps through involving policies, industrial collaborations, and consumer’s stereotypes. The proposed research proposal aims an inter-disciplinary approach to study the dynamics involved in CE taking into consideration of Policies, Environmental and Societal challenges, and Industrial practices. Following are the research objectives planned for the research proposal.

RESEARCH OBJECTIVES:
1. To comprehensively assess the present state-of-the-art of CE adoption.
2. To conduct SWOT/PESTLE analysis on existing policies and regulations on CE adoption.
3. To identify key drivers and barriers affecting the efficient and effective integration.
4. To prioritize the key drivers and barriers responsible for CE integration.
5. To establish/ understand/ investigate the role of industrial cross-functional collaborations in facilitating CE practices.
6. To analyse impact of societal mind-set or cultural lags in using the recycled or refurbished products in CE implementation.
7. To provide a comprehensive set of recommendations for policy makers, industries, and citizens to implement the CE effectively.

References:
Ph.D. Supervisors

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<tr>
<th>Role</th>
<th>Name of Faculty</th>
<th>Academic Unit in IITD/Institute/University</th>
<th>Email ID (Official)</th>
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<tbody>
<tr>
<td>Supervisor 1</td>
<td>SURYA PRAKASH SINGH</td>
<td>MANAGEMENT STUDIES</td>
<td><a href="mailto:sprsingh@dms.iitd.ac.in">sprsingh@dms.iitd.ac.in</a></td>
</tr>
<tr>
<td>Supervisor 2</td>
<td>ABHIJIT MAJUMDAR</td>
<td>TEXTILE &amp; FIBRE ENGINEERING</td>
<td><a href="mailto:majumdar@textile.iitd.ac.in">majumdar@textile.iitd.ac.in</a></td>
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Project requirements (Student qualifications, experience required, etc)
*The candidate will be shortlisted based on common shortlisting criteria decided by ScRC (SIRe)

- B.Sc./B.Tech/ B.E.
- Master Degree in any discipline

Source of fellowship/funding
(CSIR/UGC/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE/IRD/FITT Project details, if any)

Institute Fellowship /Own Fellowship

Role of Faculty Members involved:

**Supervisor-1**
Prof. S P Singh will take care of problem identification and formulation. He works in the circular supply chain and also supervised PhDs in the area of Block Chain and Industry 4.0 models for supply chain. He has published papers in the similar areas.

**Supervisor-2**
Prof. Abhijit Majumdar will take care of solution methodologies to develop framework. He works in circular supply chain and his expertise in textile industries would be an added advantage to supervise the candidate. He has also supervised and published papers in circular supply chain models.