Mona Abadian

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Professional Summary

- Ph.D. candidate and GRA with expertise in circular economy (CE) and industrial ecology for sustainable industry transition
- Skilled in Life Cycle Assessment (LCA), Material Flow Analysis (MFA), and system modeling for developing data-driven solutions with a systems thinking approach.
- Proficient in applying both quantitative and qualitative research tools to analyze complex systems and support decision-making.
- Experienced in managing interdisciplinary research projects across academic and industry settings.
- Experienced in leading cross-functional collaboration to develop strategies to enhance sustainability

Education

Virginia Polytechnic Institute and State University, Dep. Sustainable Biomaterial, Blacksburg, VA |2022 - 2026 (Spring - Anticipated) |
Doctor of Philosophy (Ph.D.), Forestry Products and Natural Resource Management (focused on Sustainability and CE)
Advisor: Dr. Jennifer Russell | GPA: 3.92
Proposed Dissertation Title: "*Strategic transition to circularity in the flexible polyurethane foam industry using multi-approach methodologies"*

Tehran Business School, Tehran, Iran|2020-2021
Master of Business Administration (MBA), Strategic Management

Amirkabir University of Technology, Dep. Textile Engineering, Tehran, Iran |2014-2016|
Master of Science (M.Sc.), Textile Engineering, Chemistry and Fiber Science (Focus on polymers)
Advisor: Dr. Reza Mohammad Ali Malek |Thesis Title: *Development of pH-sensitive Poly-Amid fabric by conventional dying and printing compared to Cellulosic Halochromic fabric*

Amirkabir University of Technology, Dep. Textile Engineering, Tehran, Iran | 2010-2014|
Bachelor of Science (B.Sc.), Textile Engineering, Chemistry and Fiber Science (Focus on polymers)
Advisor: Dr. Nahid Hemmatinejad, Dr. Niloufar Eslahi | Thesis Title: *Producing Hydrogel by Katrine extraction from wool fiber for Wound dressing*

Research Interests

- Apply CE principles, industrial ecology concepts, and governance perspectives to advance sustainability in industrial and societal systems.
- Use system thinking to address sustainability challenges across products and industry value chains.
- Model dynamic material and value flows across the industrial value chain to identify opportunities to enhance circularity within complex systems
- Develop Strategies and pathways for systemic change toward low-carbon and resource-efficient economies across the material and product value chains.
- Conduct interdisciplinary research exploring the interrelations between technology, policy, and stakeholder behavior in circular transitions

Academic and Industry Experience

Graduate Research Assistant| 2022 – Present | Virginia Polytechnic Institute and State University | Blacksburg. VA

Funded by the National Science Foundation (NSF) | Award #2132183

- Emerging Frontiers in Research and Innovation (EFRI)
- Engineering the Elimination of End-of-Life Plastic (E3P)
- Grant Opportunities for Academic Liaison with Industry (GOALI)

Part 1: Co-developed strategic pathways for a circular value chain in the Polyurethane (PU) foam industry

- Led a cross-functional and interdisciplinary team of 20+ researchers and industry leaders
- Conceptualized and developed research by integrating stakeholders' values and life cycle perspective
- Facilitated and held **three** interdisciplinary workshops and **five** semi-structured interviews for data collection
- Applied participatory qualitative methodologies (Backcasting) for co-development strategies
- Engage with stakeholders from academia, industry, and government
- Publish the research result as a whitepaper, including developed strategies across the value chain

Part 2: Model and quantify flows and stocks of flexible PU foam across the entire value chain in the U.S.

- Modeled and quantified material stocks and waste flows by using static and dynamic Material Flow Analysis (MFA)
- Conduct a comprehensive data collection from open databases (e.g., the US Census Bureau, USITC, and industry reports).
- Analyzed and visualized big data sets by using STAN and Python to find hotspots for circularity transition
- Developed and evaluated the impacts of circular strategies, such as policy and technology interventions, by combining MFA and scenario analysis
- Develop a data-driven report to guide decision-making for industry leaders and policymakers.

Part 3: Evaluate the environmental impacts of emerging circular technology (Chemical Recycling)

- Conducted a prospective consequential LCA for two recycling technologies
- Collected life cycle inventory (LCI) data from open databases, scientific articles, and industry reports.
- Used OpenCL to assess the environmental impacts.

Part 4: Evaluating addressed circular economy innovations in research for industry implementation

- Conducted a systematic literature review
- Investigated CE solutions by reviewing 125 scientific articles
- Provided a comprehensive industry report to provide insight for industry stakeholders.

Sustainability and Systems Engineering Intern |May 2025 – August 2025 | Roche

- Assessed consumable diagnostic kits sustainability baseline by using screening LCA
- Assessed sixteen environmental impact categories and identified hotspots for GHG hotspots
- Developed and prioritized circular design strategies to support net-zero and waste reduction goals
- Collaborated across a cross-functional team (R&D, supply chain, marketing, and manufacturing) to embed the sustainability concept into business operations.

Sustainability and Packaging Material Specialist| 2019 – 2022 | Nestle |Qazvin, Iran

- Led the research on sustainable materials for circular packaging
- Developed and implemented a sustainability roadmap at the factory level to improve material efficiency
- Reported annual sustainability progress by evaluating GHG emissions, material volume, and cost.

- Led data collection and performance tracking, ensuring alignment with sustainability goals and the ESG framework.
- Collaborated with cross-functional teams (procurement, engineering, production) to ensure the sustainability actions were on track and in progress.
- Prepared sustainability reports with standardized formats for corporate sustainability performance tracking

R&D researcher| 2017-2019 | Zarrin Roya (Hygiene company) |Tehran, Iran
- Research on sustainable material alternatives for optimizing formulation to improve the quality and reduce the materials for environmental and sustainability goals.
- Developed acquisition layer structures to enhance recyclability and cost-efficiency through collaboration with suppliers.
- Initiated and led product research activities, driving product innovation and technology platforms.
- Accountable for delivering all product research outcomes in Technical Readiness reviews for projects involved.

Research Assistant and Lab Coordinator| 2014 -2016 | Amirkabir University of Technology | Tehran, Iran
- Assisted undergrad students in lab experiments and enhanced collaborative research among the team.
- Collaborated with lab mates to brainstorm ideas and collaborate with fellow researchers to share ideas and exchange insights to have a better overview of the research
- Track and inventory analysis for the lab supplies

Publications

Academic Peer-Reviewed: Abadian, M., & Russell, J. (2024). *Exploring Backcasting as a Tool to Co-create a Vision for a Circular Economy: A Case Study of the Polyurethane Foam Industry*. *Circular economy*, *2*(2). https://doi.org/10.55845/UZXQ5070

White Paper: Abadian, M., Russell, J. D. (2024, March). Co-creating a vision for circularity in the Polyurethane foam industry, Whitepaper to spur discussion, innovation, and circular economy transition - Shared internally.

In-progress publications – ready to submit
Academic Peer-Reviewed: Abadian, M., & Russell, J. (2025). *Overview of flexible polyurethane foam flows and stocks in a mattress value chain – using material flow analysis and scenario analysis.*

Peer-reviewed Conference Proceedings and Presentations

1. **Abadian, M.**, Russell, J. D. (2025, October 6-8). *Linking Material Flow Analysis and future scenarios to advance circularity in the Flexible PU foam industry.* Polyurethane Technical Conference, Center for Polyurethane Industry (CPI), St. Louis, Missouri, U.S

2. **Abadian, M.**, Russell, J. D. (2025, October 6-8). *Assessing Circularity in the Flexible PU Foam Industry with Material Flow Analysis.* GPSS Research Symposium, Graduate School, Virginia Tech, Blacksburg, VA, U.S.

3. **Abadian, M.**, Russell, J. D. (2025, November 2nd). *Material Flow Analysis of Flexible PU foam in mattresses and furniture in the US in 2021.* Sustainability Committee meeting, Polyurethane foam Association, New Orleans, U.S.

4. **Abadian, M.** Russell, J. D. (2024, September 30 – October 2). *Navigating the Circular Economy pathways for sustainable transition in the polyurethane foam industry.* Polyurethane Technical Conference, Center for Polyurethane Industry (CPI), Atlanta, Georgia, U.S.

5. **Abadian, M.** Russell, J. D. (2024, September 30 – October 2). *Advancing Circular Economy in mattresses and furniture through Material Flow Analysis (MFA) in the U.S.* Polyurethane Technical Conference, Center for Polyurethane Industry (CPI), Atlanta, Georgia, U.S.

6. **Abadian, M.** Russell, J. D. (2023, October 31 – November 2). *Pathways to Circular Economy – A co-created vision by and for the polyurethane industry, Fall Meeting,* Polyurethane Foam Association, Toronto, Ontario, CA

7. **Abadian, M.,** Russell, J. D. (2023, September 25 - 27). *Pathways to Circular Economy - A co-created vision by and for the Polyurethane foam industry*. Polyurethane Technical Conference, Center for Polyurethane Industry (CPI), San Antonio, Texas, U.S.

8. **Abadian, M.** Russell, J. D. (2023, June 13 –15). Developing a circular economy transition pathway in the polyurethane foam industry by using a backcasting funnel method. International Symposium on Sustainable Systems and Technology (ISSST), Fort Collins, Colorado, U.S.

9. **Abadian, M.** Russell, J. D. (2023, May 31 – June 02). *Co-creating a Vision for Circular Economy: a case study of the polyurethane foam industry via backcasting*. Product Lifetime And The Environment (PLATE), Espoo, Finland, http://urn.kb.se/resolve?urn=urn:nbn:se:kth:diva-335952

10. **Abadian, M.** Russell, J. D. (2023, May). Unleashing the potential: refining and maximizing value from polyurethane depolymerization products, EFRI Stakeholder meetings, Arizona State University (ASU), Tempe, AZ, U.S.

11. **Abadian, M.** Russell, J. D. (2023, April). Waste management and circularity of crosslinked polyurethane foam -EFRI Stakeholder meetings, Arizona State University (ASU), Tempe, AZ, U.S.

Academic Poster Presentations

1. Abadian, M. Russell, J. D. (2025, April). Model (static) of the Flexible PU foam industry value chain with Material Flow Analysis (MFA). Interface Global Change Center (IGC) Symposium, Virginia Tech, Blacksburg, VA, U.S

2. Abadian, M. Russell, J. D. (2024, January). Material Flow Analysis (MFA) to enhance the circularity in the polyurethane foam industry. EFRI project annual stakeholder meeting, Arizona State University (ASU), Tempe, AZ, U.S.

3. Abadian, M. Russell, J. D. (2024, April). Co-creating circular economy vision in industry by using backcasting: " A case study on polyurethane industry". Interface Global Change Center (IGC) Symposium, Virginia Tech, Blacksburg, VA, U.S

4. Abadian, M. Russell, J. D. (2023, May). Developing a circular economy vision in the PU foam industry by using backcasting. Sustainable Biomaterial Symposium, Virginia Tech, Blacksburg, VA, U.S.

Lecture and Invited talks

Guest Lecturer, "*Using LCA for sustainable design*", Sustainability by Design, Spring 2025, Virginia Tech, Blacksburg.

Leadership and voluntary Experiences

President| Iranian Society at Virginia Tech | 2023 – Present |Blacksburg, Virginia

- Led a team of **seven** graduate students in organizational activities
- Plan and coordinate the **six** different cultural events
- Budget management for two years

Sustainability Chair| Interface Global Change Center |2025 – Present |Virginia Tech| Blacksburg. Virginia

- Lead the sustainability initiatives within IGC
- Support other chairs in implementing a sustainability culture in the events

Skills

- Data Analysis and Visualization: Excel – STAN - Python
- Software: Microsoft Office, MATLAB
- Project Management and Strategic Planning
- Interdisciplinary Research Method Development
- Languages: English, Persian

Certification

- **Introduction to ESG, Environmental, Social, and Governance**: LinkedIn
- **Packaging Safety and Compliance (Level B)**: Nestlé Switzerland, Orbe
- **Open Innovation**: Durham University, Online Course
- **Negotiation and Communication:** Radman Institute
- Certified in **DISC Behavioral Skills**