Hesam Mahmoudi, PhD

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Research Interests

Behavioral Operations Research, Data-Driven Decision Making, Public Health Systems Engineering, Healthcare Operations, Human-Centered Systems, Complex Systems Analysis, Systems Engineering, System Dynamics Simulation, Public Policy Modeling

Education

Postdoctoral Research Fellow   2023 – present
Massachusetts General Hospital, Harvard University
Supervisors: Dr. Scott Gazelle, Dr. Chi-Fu Jeffrey Yang
- Simulation modeling for lung cancer screening and the emerging social disparities
- Opioid epidemic modeling and analytics

Ph.D. in Industrial and Systems Engineering   2019 – 2023
Virginia Tech
Dissertation: "Essays on Dynamics of Experiential Learning and Capability Development in Cancer Research Innovation"; Winner of Torgersen Research Excellence Award.
Dissertation Advisor: Dr. Navid Ghaffarzadegan

M.Sc. in Management Science   2010 – 2013
Graduate School of Management and Economics, Sharif University of Technology, Tehran, Iran

B.Sc. in Electrical Engineering   1999 – 2004
Electrical Engineering Department, Sharif University of Technology, Tehran, Iran

Honors and Awards

- 2nd place in the Paul E. Torgersen Research Excellence Award for PhD dissertation among PhD students in Virginia Tech's College of Engineering, $500.   April 2023
- The Fabrycky GTA Award for excellent GTA performance, $1000, Grado Department of Industrial and Systems Engineering, Virginia Tech   2022 – 2023
- Honorable Mention of the Lupina Young Researchers Award for best Health System Dynamics paper, for the paper "What Causes Disagreement Among Physicians? Dynamics of Customers' Perception and Physicians' Experiential Learning", System Dynamics Society   2021
- Granted Membership of VTGrATE, the Virginia Tech Academy for Graduate Teaching Assistant Excellence   2019 – 2023

Teaching Experience

Graduate Teaching Assistant
- Grado Department of Industrial and Systems Engineering, Virginia Tech (2019 – 2022)
  ISE Graduate Seminar (Fall 2022), Fundamentals of Systems Engineering (Fall 2022), System Dynamics Modelling of Socio-Technical Systems (Fall 2021), Engineering Economy (Summer 2020), Industrial Cost Control (Spring 2019)
- Graduate School of Management and Economics, Sharif University of Technology, System Dynamics (2011)

Instructor
Systems Thinking and Complexity, Youth Encounter on Sustainability (YES), myclimate Switzerland (December 2016)

Other
- Advising: Undergraduate research project on mental model analysis.
  - The student received Outstanding Undergraduate Research Award at Virginia Tech (Fall 2021 – Spring 2022)
- Guest lecturer: Introduction to Systems Thinking, Design Research, Industrial Design Department, Virginia Tech (2021-2022)
- Guest lecturer: Mental Models, Dialogue, and Double-loop Learning, Organizational Behavior, Graduate School of Management and Economics, Sharif University of Technology (2017-2018)

Publications

Peer-Reviewed Journal Papers

1. **Mahmoudi, H.**, Chang, D., Lee, H., Ghaffarzadegan, N., Jalali, M.S., A critical assessment of large language models for systematic reviews: utilizing ChatGPT for complex data extraction, accepted for publication at *JMIR AI* – Link.

2. Lee, H., **Mahmoudi, H.**, Chang, D., Jalali, M.S., 2025, Review of human behavior integration in COVID-19 modeling studies, *Journal of Public Health* – Link.

3. de Nijs, K., de Koning, H.J., Cap, P., **Mahmoudi, H.,** Diasporra, M., Garner, R., Jeon, J., Feuer, E.J., Yong, J.H.E., Gazelle, S.G., Meza, R., ten Haaf, K., Efficiency of the annual CT screening interval for those at a lower risk of lung case – a CISNET comparative modelling study, *Journal of Thoracic Oncology*, 19:10:S372-S373 – Link.

4. Liu, N., **Mahmoudi, H.**, Triantis, K., Ghaffarzadegan, N., 2024, A multi-dimensional index of evaluating systems thinking skills from textual data, *Systems Research and Behavioral Science*, 1-15 – Link .

5. Jalali, M.S., **Mahmoudi, H.**, 2024, In response to: "Never the strongest: reconciling the four schools of thought in system dynamics in the debate on quality" — beyond pragmatism, *System Dynamics Review*, 40: e1759 – Link.

6. Davis, K., Grote, D., **Mahmoudi, H.**, Perry, L., Ghaffarzadegan, N., Grohs, J., Hosseinichimeh, N., Knight, D., Triantis, K., 2023, Comparing self-report assessments and scenario-based assessments of systems thinking competence, *Journal of Science Education and Technology*, 32: 793–813 – Link.

7. Haque, S., **Mahmoudi, H.**, Ghaffarzadegan, N., Triantis, K., 2023, Mental models, cognitive maps, and the challenge of quantitative analysis of their network representations, *System Dynamics Review*, 39: 152-170 – Link.

8. Davis, K., Ghaffarzadegan, N., Grohs, J., Grote, D., Hosseinichimeh, N., Knight, D., **Mahmoudi, H.**, Triantis, K., 2020, The Lake Urmia Vignette: a tool to assess understanding complexity in socio-environmental systems, *System Dynamics Review,* 36:191-222 – Link.

Manuscripts in Preparation

1. **Mahmoudi, H.**, Potter, A., Lee, H., Di Silvestre, J., Eckel, A., Munshi, V., Gazelle, G.S., Yang, C.J., Discrepancies in modeled smoking exposure and their impact on screening policy, to be submitted in September 2025.

2. **Mahmoudi, H.**, Potter, A., Gazelle, G.S., Yang, C.J., From perceptions to participation: a behavioral modeling approach to lung cancer screening, to be submitted in December 2025.

3. **Mahmoudi, H.**, Osi, A., Ghaffarzadegan, N., Experiential learning and specialization in stages of innovation: evidence from cancer treatment research, to be submitted in October 2025.

4. Liu, N., **Mahmoudi, H.**, Tomai, M., Madsen, P., Triantis, K., Cyclic attention shifts in organizations: modeling the dynamics of competing goals, to be submitted in January 2026.

5. Hasgul, Z, **Mahmoudi, H.**, Sadeghieh, T., Plouffe, R., Graham, E., Johnson, K., Jalali, M.S., Simulating the opioid crisis in Canada: adapting US models for policy insights, to be submitted in October 2025.

Selected Conference Presentations

1. **Mahmoudi, H.**, Potter, A., Gazelle, G.S., Yang, C.J., From eligibility to uptake: endogenizing participation behavior in lung cancer screening models, International Conference of the System Dynamics Society, Boston, USA, August 2025.

2. Hasgul, Z., **Mahmoudi, H.**, Plouffe, R., Sadeghieh, T., Johnson, K., Graham, E., Jalali, M.S., Modeling opioid crisis in Canada: a systems approach to policy and intervention strategies, International Conference of the System Dynamics Society, Boston, USA, August 2025.

3. **Mahmoudi, H.**, Potter, A.L., Di Silvestre, J., Eckel, A., Munshi, V., Gazelle, G.S., Yang, C.J., Improving lung cancer screening equity: the role of stratified smoking history generation, Society for Medical Decision Making Annual Meeting, Ann Arobor, Michigan, June 2025.

4. Hasgul, Z., **Mahmoudi, H.,** Plouffe, R., Sadeghieh, T., Johnson, K., Graham, E., Jalali, M.S., Modeling Canada's opioid crisis: a systems approach to policy and intervention strategies, Society for Epidemiologic Research Conference, Boston Massachussets, June 2025.

5. **Mahmoudi, H.**, Ghaffarzadegan, N., Dynamic divergence among physicians emerging from experiential learning, Society for Medical Decision Making Annual Meeting, Boston, Massachusetts, October 2024.

6. **Mahmoudi, H.**, Ghaffarzadegan, N., Endogenous heterogeneity and organizational learning in cancer research centers' innovation strategy, International Conference of the System Dynamics Society, Chicago, USA, July 2023.

7. **Mahmoudi, H.**, Ghaffarzadegan, N., Endogenous heterogeneity and organizational learning in cancer research centers' innovation strategy, Society for Judgment and Decision Making Doctoral Symposium, June 2023.

8. **Mahmoudi, H.**, Ghaffarzadegan, N., Insights on our "War on Cancer": endogenous heterogeneity and organizational learning in cancer research centers' innovation strategy, Virginia Tech Cancer Research Alliance Retreat, Children's National Hospital Research Center, Washington DC, May 2023.

9. **Mahmoudi, H.**, Ghaffarzadegan, N., Agree to disagree: expert disagreement as a dynamic decision-making problem, INFORMS Annual Meeting, Indianapolis, Indiana, USA, October 2022.

10. Liu, N., **Mahmoudi, H.**, Triantis, K., Roets, B., Modelling the dynamics of mental workload and fatigue in safety-critical monitoring roles, INFORMS Annual Meeting, Indianapolis, Indiana, USA, October 2022.

11. **Mahmoudi, H.**, Ghaffarzadegan, N., Experts learn to disagree—and that's not a bad thing, Carnegie School of Organizational Learning (CSOL) conference, Pacific Grove, California, August 2022.

12. Haque, S., **Mahmoudi, H.**, Ghaffarzadegan, N., Triantis, K., How analyzing mental maps fail, International Conference of the System Dynamics Society, Frankfurt, Germany, July 2022.

13. Dehdarian, A., Dorani, K., **Mahmoudi, H.**, Khandan, M., What systems thinking means to different networks of researchers, International Conference of the System Dynamics Society, Virtually and in Frankfurt, Germany, July 2022.

14. **Mahmoudi, H.**, Ghaffarzadegan, N., A dynamic theory of divergence among physicians emerging from experiential learning, IISE Annual Conference & Expo, Seattle, Washington, USA, May 2022.

15. Haque, S., **Mahmoudi, H.**, Ghaffarzadegan, N., Systems thinking and mental map classification, IISE Annual Conference & Expo, Seattle, Washington, USA, May 2022.

16. **Mahmoudi, H.**, Ghaffarzadegan, N., Dynamic divergence among physicians emerging from customers' perception and physicians' experiential learning, INFORMS Annual Meeting, Virtually and in Anaheim, California, USA, October 2021.

17. **Mahmoudi, H.**, Ghaffarzadegan, N., What causes disagreement among physicians? Dynamics of customers' perception and physicians' experiential learning, International Conference of the System Dynamics Society, Virtually Chicago, USA, July 2021.

18. Liu, N., **Mahmoudi, H.**, Triantis, K., A multidimensional comprehension index of systems thinking, International Conference of the System Dynamics Society, Virtually Chicago, USA, July 2021.

19. **Mahmoudi, H.**, Ghaffarzadegan, N., What causes disagreement among physicians? An exploration of customers' perception and physicians' experiential learning, INFORMS Healthcare Conference 2021, Indianapolis, Indiana, USA, July 2021.

20. **Mahmoudi, H.**, Liu, N., Triantis, K., Roets, B., A dynamic model of workload and fatigue as predictors of errors in safety critical monitoring roles: railway traffic controllers, INFORMS Annual Meeting, Virtually Philadelphia, Pennsylvania, USA, November 2020.

21. **Mahmoudi, H.**, Dorani, K., Dehdarian, A., Khandan, M., Mashayekhi, A.N., Does systems thinking assessment demand a revised definition of systems thinking, International Conference of the System Dynamics Society, Albuquerque, New Mexico, USA, July 2019.

22. Dorani, K. Mortazavi, A., Dehdarian, A., **Mahmoudi, H.**, Khandan, M., Mashayekhi, A.N., Developing question sets to assess systems thinking skills, International Conference of the System Dynamics Society, Cambridge, Massachusetts, USA, July 2015.

Additional Training

New England Future Faculty Workshop   Aug 2024
Workshop on navigating the academic job market, Organized by Northeastern University, Harvard Medical School, Boston University, and Bay Path University

Academic Aspire INFORMS   Summer 2024
Summer program on navigating the academic job market, organized by University of Oklahoma

Cancer Health Disparities Ideation Minilab   Fall 2023 - Spring 2024
Embracing the Complexity: Transdisciplinary Approaches to Advance the Science of Cancer Health Disparities, organized by National Cancer Institute

CSOL Academy   Summer 2022
   Summer school on organizational theory, learning, decision making, and adaptation, organized by the Carnegie School of Organizational Learning

TOM PhD Summer School   Summer 2021
   Summer school on computational organization science, organized by the Theoretical Organizational Models Society

Professional Service

Thread Chair, Reviewer, Session Chair   2019 – 2025
   International Conference of the System Dynamics Society

Organizer   2025 – present
   Health Policy Special Interest Group, System Dynamics Society

Contributing Member   2022 – present
   Health Policy Special Interest Group, System Dynamics Society

Contributing Member   2021 – present
   Theoretical Organizational Models Society

Work Experience

Cofounder, Chairman, and Commercial Manager, Tom Kesht Alborz   2009 – 2019

Manager and Member, Evaluation Subgroup, Asemaan Group   2009 – 2019

Cofounder, Financial Manager, Spriss Games   2011 – 2019

Steering Member, Global Cultural Program, International Center, University of Alberta   2006 – 2008

Language Skills

   Persian: Native   **English:** Fluent

References

Dr. Navid Ghaffarzadegan
   Associate Professor, Industrial and Systems Engineering, Virginia Tech; navidg@vt.edu

Professor G. Scott Gazelle
   Professor, Institute for Technology Assessment, Massachusetts General Hospital, Harvard Medical School, Harvard University; gsgazelle@mgh.harvard.edu

Dr. Chi-Fu Jeffery Yang
   Associate Professor of Surgery, Division of Thoracic Surgery, Department of Surgery, Massachusetts General Hospital, Harvard Medical School, Harvard University; cjyang@mgh.harvard.edu

Professor Konstantinos Triantis
   John Lawrence Professor, Department of Industrial and Systems Engineering, Virginia Tech; triantis@vt.edu