# Eva Haviarova, Ph.D.

Associate Processor &
Director of the Wood Research Laboratory
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## Expertise

Dr. Eva Haviarova is an associate professor of Wood Products Engineering and Strength Design in The Department of Forestry and Natural Resources, Purdue University. She is responsible for teaching, research and extension. She is conducting research in areas of Strength Design, Sustainable Product Development, Value Added for Hardwoods, Design and Development of Low-Cost Furniture for Underprivileged, Design of Light Timber Frame Structures, and Global Sustainability Issues, and Wood ID. She has published over 50 peer-reviewed publications and delivered over 180 professional presentations. Through her outreach activities, she is working with the forest products industry.

## Education and Training

Ph.D., 2000, Wood Science and Technology, Purdue University, IN
B.S., 1992, Wood Products & Furniture Design, Technical University of Zvolen, Slovakia

## Research and Professional Experience

***2009-present*** ***Associate Professor***, Department Forestry and Natural Resources, Purdue Univ.
***2001-2009*** ***Assistant Professor***, Department of Forestry and Natural Resources, Purdue Univ.
***2004-present*** ***Director of Wood Research Laboratory***, Department of Forestry and Natural Resources, Purdue Univ., Lafayette, IN
***2001-2004*** ***Manager and Director of Wood Research Laboratory***, Department of Forestry and Natural Resources, Purdue Univ., Lafayette, IN
***1995-1997*** ***Graduate Research Assistant***, School of Forestry Wildlife and Fisheries, Louisiana State University, Researched biomass utilization and supply chain for forest products industry in Louisiana State. ***1997-1993*** ***Graduate Research Assistant***, School of Wood Science and Technology, Technical University, Zvolen, Slovakia, Researched use of alternative woody materials in furniture production.

## Selected Grant Support

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|---|---|
| USDA Forest Service; PI; Creation of IN Forest Products Web Community | 2006-2008 |
| National Science Foundation; PI; International Twinning Program | 2006-2008 |
| Center for Advanced Mfg.; PI; Value-Added Agriculture | 2007-2008 |
| USDA Forest Service; Co-PI; Visualization for Veneer Industry | 2008-2010 |
| Sustainable Hardwood Ecosysyem; Co-PI; Woody Biomass Use | 2009-2012 |
| Sun grant – NIFA; Co-PI; Development of Biomass Calculator | 2014-2016 |
| FSMIP – USDA Forest Service; PI; International Trade in Easter Europe | 2016-2018 |
| US FS Wood Innovation Grant; Co-PI; Low-value Hardwood for CLT | 2018-2022 |

**Research and Research Products**

Dr. Haviarova's primary emphasis is integrating her research program fully with her engagement work; therefore, much of her research either originates from, or is directly related to, her state, national, and international engagement activities. Dr. Haviarova's long-term research focus is on Furniture Strength Design and Product Sustainability. In addition to peer reviewed publications, Dr. Haviarova has given 30 notable invited lectures and has published 89 research abstracts. She has graduated four PhD and two MS students. Dr. Haviarova received research grants totaling $261,126, of which $137,626 has come directly to her

a. **Peer-Reviewed Journal Articles** (total of 50; selection)

1. *Quesada, H., ***E. Haviarova**, and I. Slaven. 2009. Research Conducted in Forestry and Secondary Wood Products Industry in Central America and Costa Rica: Value-added analysis. The Journal of Forest Products Business Research. Electronic Volume 6, Article 4. (top tier, IF not available). Contribution: Helped conceive the research question and design, assisted with data analysis, and edited manuscript.
2. *Erdil, Y., *C. Eckelman, and ***E. Haviarova**. 2009. Design and Construction of School Work Table for Developing Countries. Forest Products Journal. 59(1/2):50-56. (top tier, IF 0.45). Contribution: Helped design research, assisted with data collection/analysis, and edited manuscript.
3. *Coretti, A., R. Serrano, C. Madriz, ***E. Haviarova**, and C. Eckelman. 2009. School Furniture for Developing Countries: A Field Performance Evaluation. Forest Products Journal. 59(7/8):1-5. (top tier, IF 0.45). Contribution: Helped design research, assisted with data analysis, and edited manuscript.
4. ***Haviarova, E**. and *C. Eckelman. 2009. Semi-rigid Connection Factors for Small Round Mortise and Tenon Joints. Forest Products Journal. 59(9):1-6. (top tier, IF 0.45).
5. *^Šimek, M., ***E. Haviarova**, and C. Eckelman. 2009. Bending Moment Resistance of Ready-to-Assemble Furniture Joints. Wood and Fiber Science. 42(1):92-98. (top tier, IF 0.88). Contribution: Helped conceive research question, design research, assisted with data collection/analysis, and edited manuscript.
6. ***Haviarova, E.** and *C.A. Eckelman. 2010. Knee Bracing of Frames Constructed with Round Mortise and Tenon Joints. Forest Products Journal. 60(4):395-399. (top tier, IF 0.45).
7. *Eckelman C.A. and ***E. Haviarova.** 2011. Withdrawal Capacity of Joints Constructed with 9.5-mm and 15.9-mm Through-Bolts and Nominal Diameter 15-mm and 25-mm Pipe-Nut Connectors. Forest Products Journal. 61(3):257-264. (top tier, IF 0.45). Contribution: Helped to design research, assisted with data collection/analysis, and edited manuscript.
8. *Eckelman, C.A. and ***E. Haviarova.** 2011. Rectangular Mortise and Full-Width Tenon Joints in Ready-to-Assemble Light-Frame Timber Constructions. Wood and Fiber Science. 43(4):346-352. (top tier, IF 0.88). Contribution: helped conceive research question, design research, assisted with data collection/ analysis, and edited manuscript.
9. *Likos, E., ***E. Haviarova**, *C.A. Eckelman, Y.Z. Erdil, and A. Ozcifci. 2012. Effect of Tenon Geometry, Grain Orientation, and Shoulders on Bending Moment Capacity of Mortise and Tenon Joints. Wood and Fiber Science 43(4):462-469. (top tier, IF 0.88). Contribution: Conceived research question, helped design research, assisted with data analysis, and edited manuscript.
10. *Likos, E. ***E. Haviarova**, *C.A. Eckelman, Y.Z. Erdil, and A. Ozcifci. 2013. Static versus cyclic load capacity of side chairs constructed with mortise and tenon joints. Wood and Fiber Science 45(2):1-6 (top tier, IF 0.88). Contribution: Conceived research question, helped design research, assisted with data analysis, and edited manuscript.

11. *Koreny, A., *^M. Simek, *C.A. Eckelman, and ***E. Haviarova**. 2013. Mechanical Properties of Knock-down Joints in Honeycomb Panels, BioResources, Vol. 8(4), 4873-4882. (top tier IF 1.55). Contribution: Helped conceive research question, design research, assisted with analysis, and edited manuscript.
12. *^Kasal, A., ***E. Haviarova**, ^H. Efe, C. Eckelman, and Y.Z. Erdil. 2014. Effect of adhesive type and tenon size on bending moment capacity and rigidity of T-shaped furniture joints constructed of Turkish beech and Scotch pine. Wood and Fiber Science 45(3): 287-293. (top tier, IF 1.55). Contribution: Helped conceive research question, design research, collect/analyze data, and edited manuscript.
13. *Uysal, M., ***E. Haviarova,** and *C. Eckelman. 2015. A comparison of the cyclic durability, ease of disassembly, repair, and reuse of parts of wooden chair frames. Materials and Design 87: 75-81. (medium tier, IF 3.2). Contribution: Conceived research question, helped design research, assisted with data collection/analysis, and edited manuscript.
14. *Eckelman, C.A. and ***E. Haviarova**. 2015. Withdrawal and Compression Tests of Pinned-End-to-End Round Mortise and Tenon Joints. Wood and Fiber Science 47(3): 217-224. (top tier, IF 0.88). Contribution: Helped conceive research question, helped design research, assisted with data collection/analysis, and edited manuscript.
15. *^Kasal, A., *C.A. Eckelman, ***E. Haviarova**, Y.Z. Erdil, and I. Yalcin. 2015. Bending Moment Capacities of L-Shaped Mortise and Tenon Joints under Compression and Tension Loadings. Bio-Resources 10(4): 7009-7020. (top tier, IF 1.55). Contribution: Helped conceive research question, helped design research, assisted with data analysis, and edited manuscript.
16. *Gaff, M., *M. Gašparík, *V. Borůvka, and **E. Haviarová,** 2015. Stress Simulation in Layered Wood-based Materials under Mechanical Loading. Materials and Design 87: 1065-1071. (medium tier, IF 3.2). Contribution: Helped with data analysis and edited manuscript.
17. *Eckelman, C., *M. Uysal, and ***E. Haviarova**, 2016. Statistical Lower Tolerance Limits for Rectangular Mortise and Tenon Joints. Bio-Resources 11(3): 7162-7171. (top tier, IF 1.55). Contribution: Helped conceive research question and design, assisted with data analysis, and edited manuscript.
18. *Eckelman, C., ***E. Haviarova**, A. Kasal and Y. Erdil. 2016. Lower Tolerance Limit Approach to Equation-based Rational Design Values for T-shaped Mortise and Tenon Joints. Wood and Fiber Science 49(1):113-121. (top tier, IF 0.88). Contribution: Helped conceive research question and design, assisted with data analysis, and edited manuscript.
19. *^Kasal, A., *T. Kuşkun, ***E. Haviarova**, and Y. Z. Erdil. 2016. Static Front to Back Loading Capacity of Wood Chairs and Relationship between Chair Strength and Individual Joint Strength. Bio-Resources 10(4): 9359-9372. (top tier, IF 1.55). Contribution: Helped conceive research question and design, assisted with data analysis, and edited manuscript.
20. *Eckelman, C., ***E. Haviarova**, ^A. Kasal and Y. Erdil. 2017. Lower Tolerance Limit Approach to Equation-based Rational Design Values for L-shaped Mortise and Tenon Joints. Wood and Fiber Science 49(2): 219-230. (top tier, IF 0.88). Contribution: Helped conceive research question/design, assisted with data analysis, and edited manuscript.
21. *Eckelman, C., ***E. Haviarova**, ^A. Kasal and Y. Erdil. 2017. Lower Tolerance Limit Approach to equation-based rational design values for **T**-shaped mortise and tenon joints. Wood and Fiber Science 49(1):113-121. (top tier, IF 0.88). Contribution: Assisted with data analysis and edited manuscript.
22. *Uysal, M. and ***E. Haviarova**. (2018). Estimating Design Values for Dowel Joints with Statistical Lower Tolerance Limit Approach. Bioresources 13(3): 5241-5253. (top tier, IF 1.55). Contribution: Helped conceive research question/design, assisted with data collection, analysis, and edited manuscript.
23. *Kuskun, T., ^Kasal, A., **Haviarova, E**., Kilic, H., Uysal, M. and Y. Erdil. 2018. Relationship between Static and Cyclic Front to Back Load Capacity of Wooden Chairs and Evaluation of the Strength Values According to Acceptable Design Loads. Wood and Fiber Science 50(4): 402-410. (top tier, IF 0.88).

Contribution: Helped conceive research question/design, assisted with data analysis, and edited manuscript.

24. *Uysal, M., *Tasdemir, C., **Haviarova, E**. and Gazo, R. 2019. Basic Manufacturing Feasibility and Load Carrying Capacity of CNC Router Cut Joints Constructed of Medium Density Fiberboard and Plywood. Bioresources 14(1): 1525-1544. (top tier, IF 1.55). Contribution: Helped conceive research question/ design, assisted with specimen design/data analysis, and edited manuscript.
25. Wu, F., Gazo, R., **Haviarova, E**., & Benes, B. 2019. Deep Learning for Wood Identification Based on Longitudinal Section Images. Computer and Electronics in Agriculture (in print).
26. Wu, F., Gazo, R., **Haviarova, E**., & Benes, B. 2019. Efficient Project Gradient Descent for Ensemble Adversarial Attack. arXiv preprint arXiv:1906.03333.
27. Uysal, M., & **Haviarova, E**. 2018. Estimating Design Values for Two-Pin Moment Resisting Dowel Joints with Lower Tolerance Limit Approach. BioResources, 13(3): 5241-5253.
28. Uysal, M., **E, Haviarova**. 2019. Lower Tolerance Limits for Screw Withdrawal in Wood. Wood and Fiber Science 51(4) http://www.swst.org/wp/publications/wood-fiber-science/prepublication-list/

b. **Peer-Reviewed Proceedings** (selection)

1. ***Haviarova, E**., *J. Bois, and H.P. Quesada. 2013. Development of Optimal Forest Products Supported by LCA, In: Proceedings of ISCHP 2013 – 4th International Scientific Conference on Hardwood Processing. Florence, Italy, pp.327-334.
2. *Gazo, R., *J. Vanek, *M. Abdul-Massih, ***E. Haviarova**, and *B. Benes. 2013. An Efficient Pith Detection for Computer Tomography Scanned Logs Using CUDA. International IUFRO In: Proceedings of MeMo Wood – Measurement Methods and Modeling Approaches for Predicting Desirable Future Wood Properties. Nancy, France. Electronic.
3. *Uysal, M., ***E. Haviarova,** and *C.A. Eckelman. 2014. Furniture Design and Product Development Principles Considering End-of-Life Options and Design for Environment Strategies. Sustainable Resources and Technology for Forest Products. 57th International Convention of Society of Wood Science and Technology, Zvolen Slovakia, 8 pg.
4. *^Tončíková, Z. and ***E. Haviarova.** 2017. Differences in Environmental Impacts of Materials and Technologies Used in the Furniture Industry: a case study of COMBO STOOLS. Healthy Houses – Healthy interior 2017, Hrube Sury, Slovakia.
5. Uysal, M., ***Haviarova, E.**, and Eckelman C.A. 2017. Determining Reasonable Design Values of Rectangular Mortise and Tenon Joints by Using Probabilistic Approach. Pages: 202-210, in the XXVIIIth International Conference: Research for Furniture Industry, September 21-22, Poznan, Poland.
6. *^Toncikova, Z. and ***E. Haviarova.** 2017. Combo Stools. Exhibit Proceedings for Design Forum 2017, Slovak Center of Design, Nitra, Slovakia. pg. 4.
7. *^Toncikova, Z. and ***E. Haviarova.** 2017. Life Cycle Analysis of Combo Stools. Exhibit Proceedings for Bratislava Design Week BADW 2017, Design Lab., Bratislava, Slovakia. pg. 32.
8. *Kuzman, M.K., **E. Haviatova**, and D. Sandberg. 2017. Architects perception of modified wood: a parallel study in selected countries of Europe and selected regions in USA. COST Action FP1407 3rd Conference, Kuchl, Salzburg, Austria.
9. *Uysal, M. and ***E. Haviarova.** 2018. A review based on reliability of furniture. Proceedings of the 61st International Convention of Society of Wood Science and Technology and Japan Wood Research Society, Nagoya, Japan, November 5-9. (Pg. 454-461).
10. *^Kuzman, M.K., **E. Haviarova,** and D. Sandberg 2018. Architects perception of modified wood: a parallel study in selected countries of Europe. The 9th European Conference on Wood Modification: in

association with COST FP 1407 ModWoodLife. Bugers' Zoo Arnhem, The Netherlands, September 17-18, (Pg. 1-9).

11. ^*Kuzman, M. K., and ***E. Haviarova** 2018. Development of Multi-Story Timber Buildings in Europe and US., 11th International Scientific Conference WoodEMA, Increasing the Use of Wood in the Global Bio-economy, University of Belgrade, Serbia (Pg. 200-206).

12. ^*Kuzman, M.K., Sandberg, D. and **E. Haviarova** 2018. Architects' perception of EWPs and modified wood in contemporary timber architecture. World conference on timber engineering, Seoul, Republic of Korea, (Pg. 1-6), August 20-23.

**Teaching and Teaching Products**

Teaching comprises 40% of Haviarova's time. She currently teaches 4.5 required courses, *Furniture Product Development and Strength Design* (FNR 41910), *Identification and Basic Properties of Wood* (FNR 31110), *World Forests and Society* (FNR 23000), and *Global Sustainability Issues* (FNR 30200). She co-teaches *Furniture Design for Computer Numerically Controlled (CNC) Manufacturing* (FNR 48400). She has also led several study abroad programs (FNR 49800, SA 21257). Dr. Haviarova spearheaded an extensive effort to develop an undergraduate major, *Sustainable Biomaterials: Process and Products Design* and two related minors. Most recently, she co-developed a *Forestry Sustainable Biomaterials* concentration.

a. **Peer-Reviewed Publications** (total of three; selection)

Underlined names indicate Dr. Haviarova's graduate students, asterisk (*) designates primary author(s), (^) designates visiting scientist(s).

1. *Quesada, H.P. and ***E. Haviarova**. 2014. Incorporating Experiential Learning and Education for Sustainable Development into Study Abroad Programs. Natural Science Education Vol. 43:1-10. https://dl.sciencesocieties.org/publications/nse/abstracts/43/1/127

b. **Peer-Reviewed Teaching Proceedings** (total of four, selection)

1. ***Haviarova, E**. 2011. Approach to Furniture Design Education at Purdue University. Annals of Warsaw University of Life Sciences-SGGW. Forestry and Wood Technology. č. 73, s. 36-43. ISSN 1898-5912, 8 pg.
2. ***Haviarova, E**. and *H.P. Quesada. 2014. Incorporating Experiential Learning and Education for Sustainable Development into Study Abroad Programs. Sustainable Resources and Technology for Forest Products. Proceedings of 57th International Convention of Society of Wood Science and Technology, Zvolen Slovakia, 8 pg.

c. **Teaching manuscripts** (four)

1. ***Haviarova, E**., *Gazo, R. and R. Paul. 2012. Manual of Furniture Design for CNC Manufacturing - Collection of Student Designs Created in FNR 48400, Purdue University. 124 pg.
2. ***Haviarova, E**. 2012. Furniture Design Approach at Purdue University, Wood Research Laboratory, Purdue University, 16 pg. (Used in class FNR 48400).
3. ***Haviarova E.**, *^Z. Toncikova and E. Vahidi. 2016. Sustainable Product Development Manual, Wood Research Laboratory, Purdue University. (Used in class FNR 48400, 41910).

4. *^Toncikova Z. and ***E. Haviarova.*** 2016. Overview of Environmental Design Tools, Wood Research Laboratory, Purdue University. (Used in class FNR 48400 and 41910).

**Extensions and Extension Products**

Through her extension program, Dr. Haviarova provides "knowledge to go" for wood product manufacturers, organizations, and individuals at state, national, and international levels in the area of forest products and related subjects. Specifically, Dr. Haviarova has: 1) written 13 peer-reviewed extension publications (five since last promotion) and 28 expert reviewed publications (eight since promotion), 2) authored 20 peer-reviewed extension proceedings (seven since last promotion), 3) produced eight videos since last promotion, 4) delivered 114 extension presentations (77 since last promotion), 5) given 23 invited presentations since last promotion, 6) supervised development of nine web sites (five since last promotion), 7) organized 72 conferences and workshops (52 since last promotion), 8) prepared 16 exhibits (eight since last promotion) and 9) provided industry technical assistance on >100 occasions. To date, Dr. Haviarova has received funding for nine external and four internal engagement grants as a principal investigator. The total amount of extension-related grants is $458,668 all of which is directly attributable to her.

Underlined names indicate Dr. Haviarova's graduate students, asterisk (*) designates primary author(s), (^) designates visiting scientist(s).

**a. Peer-Reviewed Extension Publications** (total of 13; selection)

1. *Slaven, I., ***E. Haviarova**, and D. Cassens. 2010. Storage Properties of Wood Waste for Energy. Extension Publication, Purdue University, Lafayette, IN. (6,314 downloads) https://www.extension.purdue.edu/extmedia/ID/ID-421-W.pdf
2. *Yuan, Z. and ***E. Haviarova.*** 2010. The CNC Technology Used for Furniture Manufacturing. China Academic Journal. 2010-06-08:47-50. (Data not available)
3. ***Haviarova, E.*** and *C.A. Eckelman. 2014. Light-Timber Frames for Transitional Disaster-Relief Housing. Extension Publication FNR-493-W, Purdue University, Lafayette, IN. 6 pg. (850 downloads) https://edustore.purdue.edu/item.asp?Item_Number=FNR-493-W
4. ***Haviarova, E.***, *C.A. Eckelman and D.E. Warner. 2015. How to Build a Simple Chair for Schools or Homes in Disadvantaged Areas of the World Using Local Resources and Low-End Technology. Extension Publication FNR-499-W, Purdue University, Lafayette, IN. 6 pg. (2,119 downloads) https://edustore.purdue.edu/item.asp?Item_Number=FNR-499-W
5. ***Haviarova, E***., ^M. Šimek and H. Quesada 2017. Tvrdé dřevo ze Severní Ameriky a jeho možnosti využití ve východní Evropě (North American Hardwoods and their Possible Use in Eastern Europe). Dřevostavby (Wooden Buildings), December 2017. (Data not available) http://stavba.tzb-info.cz/drevostavby/16638-tvrde-drevo-ze-severni-ameriky-a-jeho-moznosti-vyuziti-ve-vychodni-evrope

**Expert Reviewed Extension Publications** (total of 28; selection)

1. DJ Case & Associates (Seng, P.) et al. 2018. Indiana Hardwood Assessment. Report prepared for Indiana Department of Agriculture. Pg. 140. (Data not available) https://www.in.gov/isda/files/IN-Hardwood-Assessment-Final.pdf *My role: Cooperating with Department of Agriculture, DJ Case consultant group, Center for Rural Community Development, responsible for database development; industry mapping, industry quantitative and qualitative information collection.*

2. Uysal, M. and Haviarova, E. 2019. Design of Environment Strategies and End-of-Life Options for Wood Furniture Industry. FNR Department at Purdue.
3. Uysal, M. and Haviarova, E. 2019. How to Build Easy-Assembly and Disassembly Stools with CNC Router-Cut Joinery Techniques. FNR Department at Purdue.
4. Haviarova, E. 2018. Round Mortise and Tenon Joints and Production Equipment. FNR Department at Purdue.
5. Haviarova, E. 2018. Design for Grade-School Chair - 14 inch. FNR Department at Purdue.
6. Haviarova, E. 2018. Design for Kindergarten Chair - 12 inch. FNR Department at Purdue.
7. Haviarova, E. 2018. Design for High-School Chair - 16 inch. FNR Department at Purdue.
8. Haviarova, E., Uysal, M. 2019. How to Repair Wooden School Furniture. FNR at Purdue.

**b. Peer-Reviewed Extension Proceedings** (total of 20; selection)

1. ***Haviarova, E**. and *C.A. Eckelman. 2010. Light-Timber Frames for Transitional Disaster Relief Housing. Society of Science and Technology, Innovative Wood Products are the Future. International Convention, Geneva, Switzerland. Electronic Proceedings, 12 pg.
2. ***Haviarova, E**., and *R. Gazo. 2010. Enhancing the Competitiveness of Forest Product Industry by Developing Web Community Portal. In Proceedings of Economika a Manazement Podnikov, International Scientific Conference. Technical Univerzity, Zvolen, Slovakia. CD ROM, 9 pp.
3. ***Haviarova, E**. and *F. Zhao. 2012. LCA Supported Sustainable Product Development for Furniture Industry. Paper presented at IUFRO Division 5 Conference, Estoril, Portugal.
4. ***Haviarova, E**. 2012. Wood, the Most Interesting, Innovative and the Best Material for our Society, Annual Meeting - Society of Wood Science and Technology, Beijing, China, CD ROM.
5. ***Haviarova, E**. 2015. Sustainable Products Development and Wood Based Products. Healthy Houses - Healthy Interior, Bratislava, Slovakia. 9 pg.
6. ***Haviarova, E**., *Uysal, M. and *C.A. Eckelman. 2015. Increasing Service Life of Wooden Chairs as Considering Sustainable End-of-Life Options. International Scientific Conference on Hardwood Processing (ISCHP2015), Quebec City, Canada. pg.193.
7. ***Haviarova, E.**, *Uysal, M. and *C.A. Eckelman. 2015. Determining Tension and Compression Strength and Basic Manufacturing Feasibility of CNC Router-cut Joints. International Scientific Conference on Hardwood Processing (ISCHP2015), Quebec City, Canada. Pg.195.

**c. School Furniture Construction Manuals**

Dr. Haviarova's **School Furniture in Developing Countries Project** has resulted in the development of construction manuals that are unique to school furniture production in specific countries. Individual manuals are needed for many countries because of differences in locally available raw materials, construction techniques, school requirements, and anthropometrics of the target school populations. In Afghanistan, for example, significant variation in the available material resource had to be addressed. Furniture constructed of wood species that had been imported from Russia and Pakistan had to be redesigned to allow the use of wood from newly established poplar plantations. To date, **10 school furniture construction manuals (four since last promotion) have been prepared for six countries** (Costa Rica, Uganda, Kenya, Haiti, Jamaica, and Afghanistan), **four NGOs** (Marigold, Shelter for Life, Global Partnership for Afghanistan, and Humble Way), and the **National Guard** from Indiana and Texas.

**d. Extension Videos** (total of eight, plus four blogs)

1. School Furniture Series, Video 1 – Processing Lumber to Basic Components.
   ***Haviarova, E.** and *N. Osborn. 2015. Chair Blanks Production – School Furniture Series (230 views) https://youtu.be/LLWszBQPpD4

2. School Furniture Series, Video 2 – School Furniture Components Machining.
***Haviarova, E.** and *N. Osborn. 2015. Chair Parts Machining – School Furniture Series (77 views) https://youtu.be/RU8mN9lWEIw
3. School Furniture Series, Video 3 - School Furniture Assembly.
***Haviarova, E.** and *N. Osborn. 2015. Chair Assembly - School Furniture Series (80 views) https://youtu.be/AwzdqfCDF7Q
4. Zhao, Y., and E. Haviarova. SUBO & Furniture Design. 2018. Promotional videos for Sustainable Biomaterials Products and Process Design at Purdue Wood Research Laboratory. (160 views)

***Blogs with imbedded videos:***

5. Barth, L. and **E. Haviarova**, 2019. A Part of Nature from Day One, Digital Agriculture, School of Agriculture, Purdue University (52 views) https://www.asec.purdue.edu/visionaries/storydetails.cfm?storieid=1
6. Frazier, R. and **E. Haviarova**, 2019. Finding Creative Uses for Residue Material, Digital Agriculture, School of Agriculture, Purdue University (41 views) https://www.asec.purdue.edu/visionaries/storydetails.cfm?storieid=2
7. Tucker, H. and **E. Haviarova**, 2019. Wood Engages All the Senses, Digital Agriculture, School of Agriculture, Purdue University (24 views) https://www.asec.purdue.edu/visionaries/storydetails.cfm?storieid=3
8. Hill, S. and **E. Haviarova**, 2019. Building Sustainability, Digital Agriculture, School of Agriculture, Purdue University (39 views) https://www.asec.purdue.edu/visionaries/storydetails.cfm?storieid=4

**e. Web Pages** (total of nine; selection)

1. ***Haviarova, E.** 2008-19. Indiana Forest Products Web Community (Totals: 63,675 users, 232,934 unique views) *http://www.indianaforestproducts.com*
2. ***Haviarova, E.** 2012-19. Forestry and Wood Products Careers (Totals: 50,885 unique views) *http://indianaforestproducts.com/careers.php*
3. ***Haviarova, E.** 2015-19. Wood Research Laboratory, FNR (Totals: 60,199 unique views) *http://www.purdue.edu/woodresearch/*
4. ***Haviarova, E.** and Farley L. 2015-18. Biomass Calculator, FNR Extension (Transitioning to new server, data currently not available) *http://www.purdue.edu/biomasscalculator/*
5. *^Toncikova, Z., and ***E. Haviarova**, E. 2017-19. Combo Chairs and LCA (Data not available) *https://combochairs.wixsite.com/combo*

**f. Workshops, Conferences, Seminars, Tours, and Short Courses organized by Haviarova** (more than 70 products)
**g. Extension Presentations** (total of 120)
**i. Exhibits** (total of 16)
**j. Industry Technical Assistance** (more than 100)

**Membership in Professional Associations**

Society of Wood Science and Technology (President 2018-2019); Forest Products Society (elected Board Member 2008 – 2011); Xi Sigma Pi Forestry Honor Society; Ohio Valley Section of Forest Products Society; North American Colleges and Teachers of Agriculture, Indiana Hardwood Lumbermen's Association.

**Awards and Honors**

Elected Vice President of Society of Wood Science and Technology, International Professional Organization, 2017 – 2019; Nominated for the College of Agriculture Richard L. Kohls Outstanding Undergraduate Teaching Award, Purdue University, West Lafayette, IN, 2017 & 2019; Nominated for the Faculty Engagement Scholar Award, Purdue Office of Engagement, Purdue University, West Lafayette, IN, 2017; Indiana Hardwood Lumbermen's Association (IHLA) President's Award (in recognition of exceptional contributions to Indiana's forest products industry and to the members); IHLA Annual Convention, Indianapolis, IN, 2009; Elected Board Director of CORRIM, 2012 – present; etc.