Economic Feasibility of Mass Timber Manufacturing in Wisconsin

Ichchha Thapa[1], Dr. Ram Dahal[2], Dr. Raju Pokharel[1]

[1]Department of Forestry, Michigan State University

[2]Wisconsin Department of Natural Resources

October 1, 2025

Department of Forestry
MICHIGAN STATE UNIVERSITY

WISCONSIN DEPT. OF NATURAL RESOURCES

Transforming US building construction

- Mass Timber: new class of engineered wood products
  - Natural and renewable (sustainability)
  - Strength and dimensional stability
  - Health and aesthetic (biophilia) benefits
  - Low carbon alternative to concrete & steel
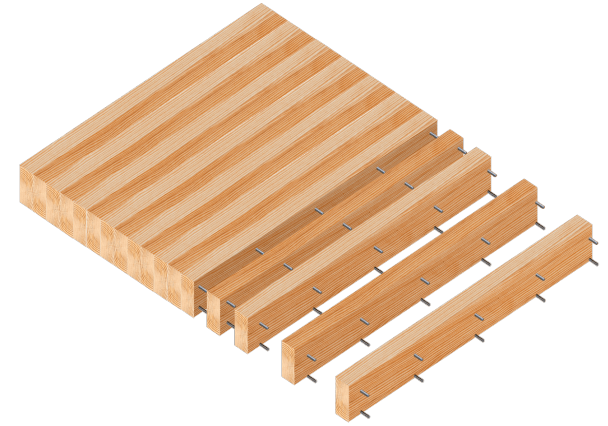 - New jobs, new markets – healthy economy
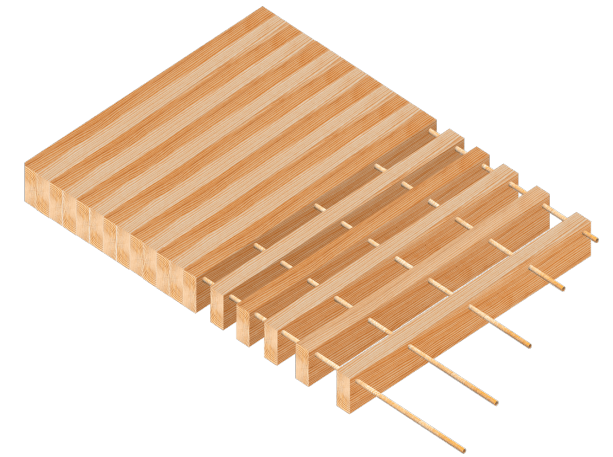

Nail-laminated Timber (NLT)
Source: Think Wood
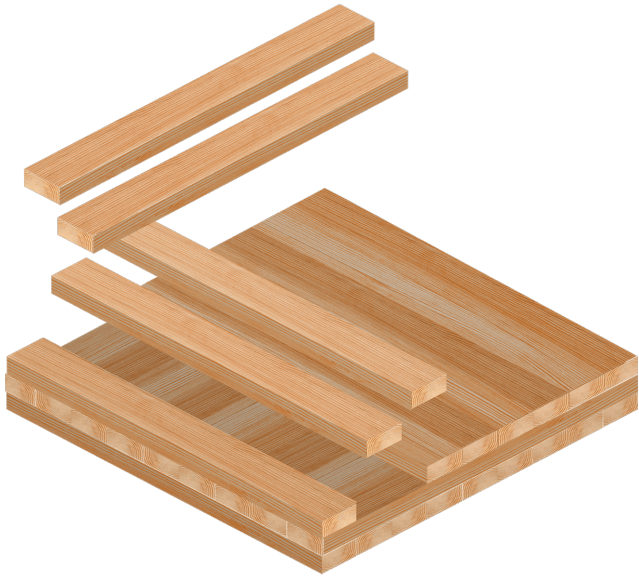
Cross-laminated Timber (CLT)
Source: Think Wood

Glue-laminated Timber (Glulam)
Source: Think Wood

Dowel-laminated Timber (DLT)
Source: Think Wood

Challenges/Barriers

Lack of knowledge and understanding

Perceived risks and uncertainty

Restrictive building codes

Supply constraints (limited domestic production)

Industrialized supply chain (procurement)

Lack of expertise

US MASS TIMBER MILESTONES

Pre-1980s	1980s	Early 2010s	2015	2016		2018		2022

Image: *StructureCraft*

Image: Structurlam

Image: SmartLam NA

Image: WoodWorking Network

Image: International Mass Timber Conference

Image: Hines

Image: Jeremy Bitterman

Image: Kaiser + Path

Image: Wisconsin Public Radio

Glulam, nail-laminated timber in code and in use for many decades

CLT emerged ~40 years ago in Austria and Germany
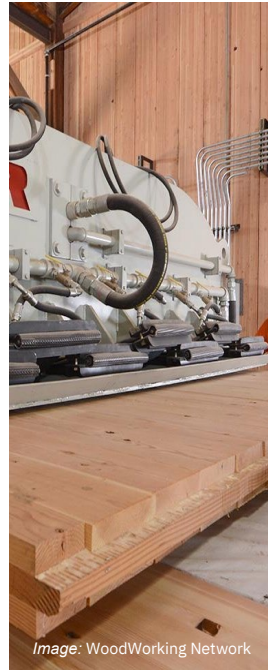
Early 2010s – CLT interest sparks in U.S.A.

First certified CLT panels manufactured in U.S. – D.R. Johnson

First International Mass Timber Conference (~500 attendees; in 2024 3500+ attendees)
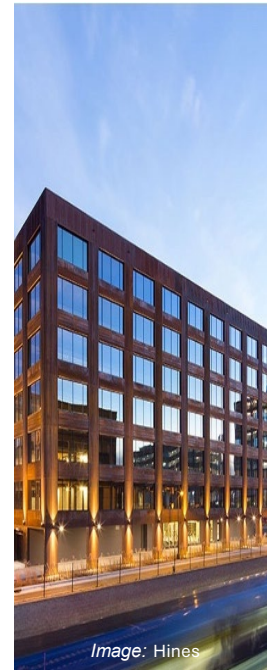
First "tall" mass timber high-rise completed in the U.S.
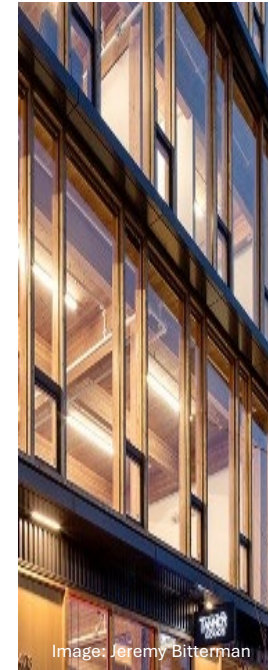
First building completed using U.S.-made CLT

First multi-family mass-timber skyrise completed

Tallest mass timber building in the world completed

ASCENT MKE—MILWAUKEE, WISCONSIN - 2022

TALLEST MASS TIMBER BUILDING IN THE WORLD (FOR NOW)

273,000 sf; 25 floors (7 concrete podium/18 mass timber); Glulam & CLT

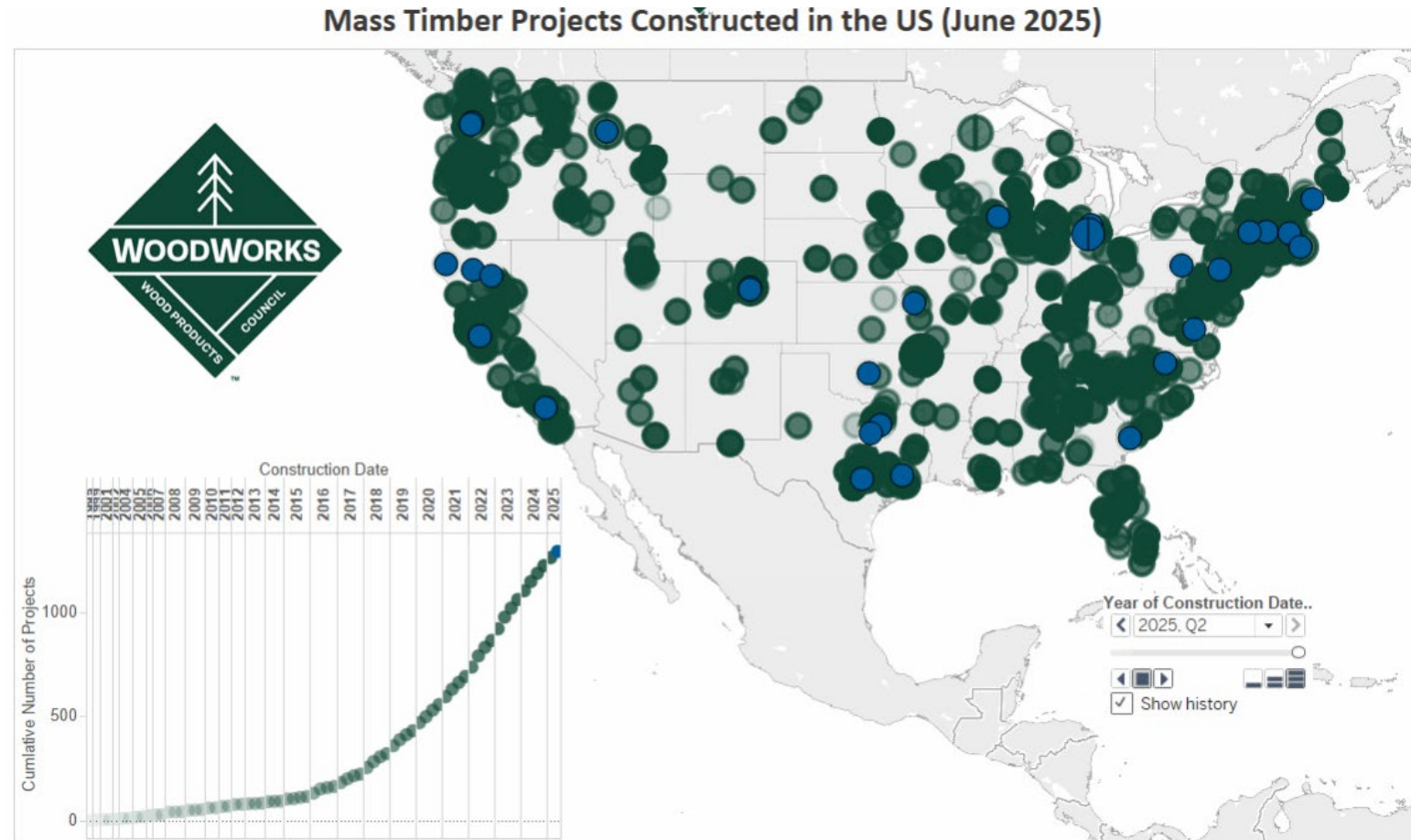Architect: Korb & Associates

US MASS TIMBER TRENDS

June 2025

Total projects: **2524**
(Complete or in Development/Construction)

Projects in 2018: **439**

Increase > 6x

Mass Timber Projects Constructed in the US (June 2025)

WHY MASS TIMBER FOR WISCONSIN?

Heavily Forested

- 40% of the state; 16 million acres
- 70% private ownership
- Annual growth outpaced harvest for decades

Forest Product Industry- among the leading manufacturing sector

- Employs almost 126,000 people
- $42 billion economic output (4% GDP)

Home to tallest mass timber building

- Construction started/built (40)
- In Design (15)

Working to position itself well for growth in the mass timber industry

Objectives

Examine hotspots for softwood availability using transportation logistics model.

Identify potential location for mass timber manufacturing facility, procurement zone, and estimate feedstock availability.
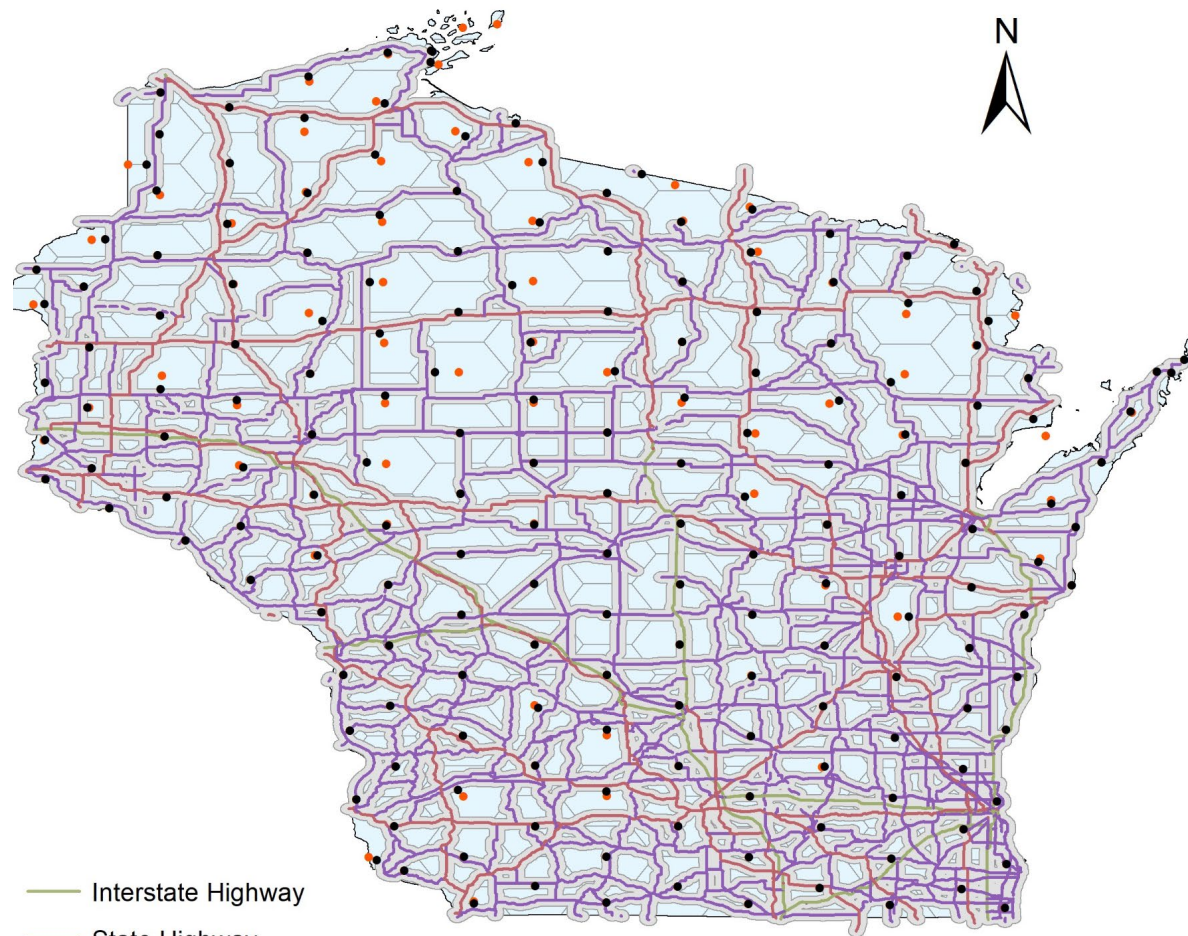
Estimate the economic impact analysis of operating a new mass timber manufacturing facility.

Methods
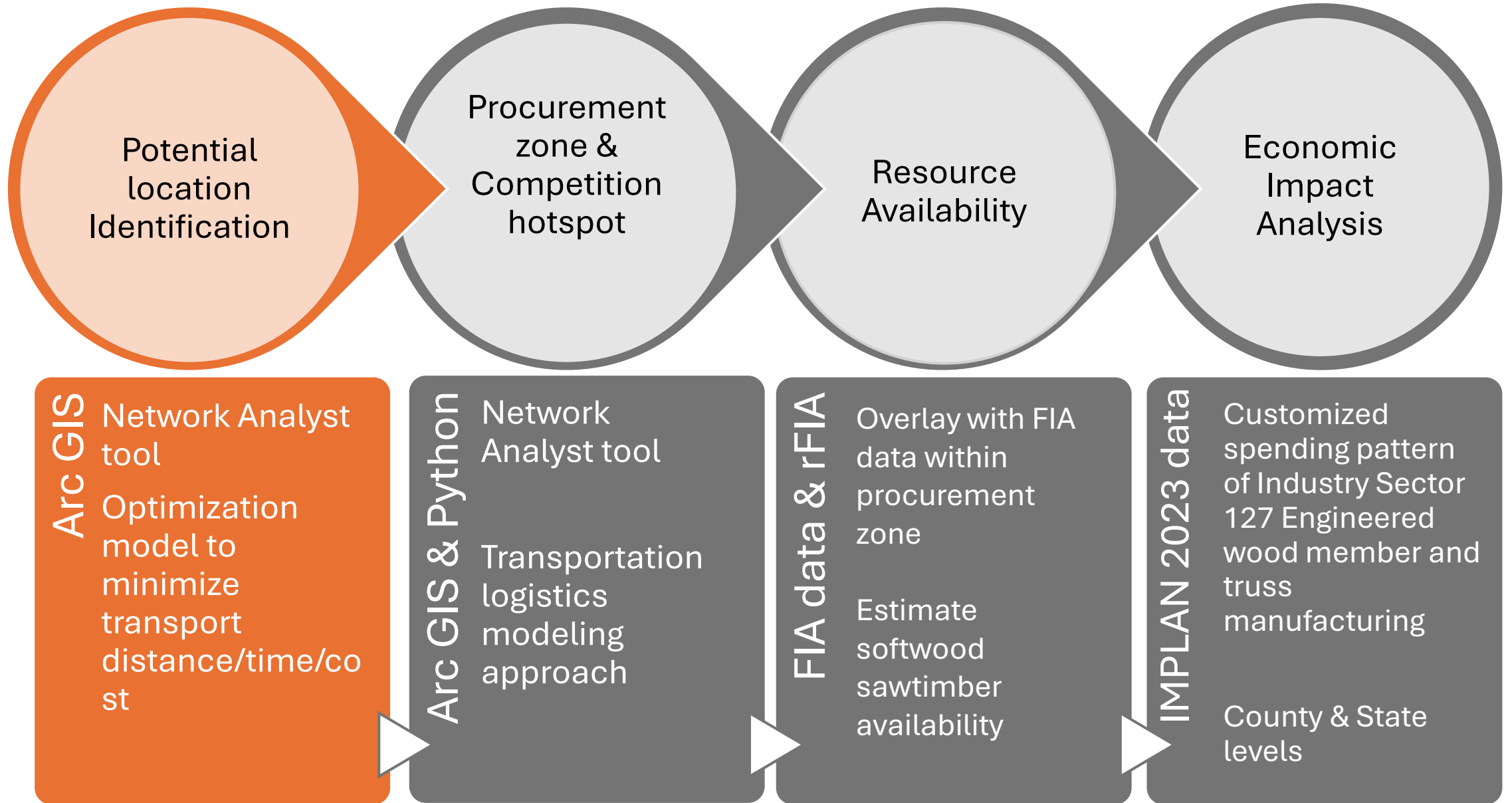
Optimal location identification

170 potential locations

Interstate Highway
State Highway
US Highway
Major roads buffer (2 miles)
● Potential locations
● Snapped potential locations

0 15 30   60   90   120
Miles

Scenarios for optimal location identification

SN	Sub-class	Scenario Name	Demand-Supply weights
1	1a	Balanced Cost model	Equal weightage to demand and supply
	1b	Supply-Weighted Cost model	Only weightage to supply
2*	2a	Balanced Distance model	Equal weightage to demand and supply
	2b	Supply-Weighted Distance model	Only weightage to supply
3*	3a	Balanced Time model	Equal weightage to demand and supply
	3b	Supply-Weighted Time model	Only weightage to supply

Methods
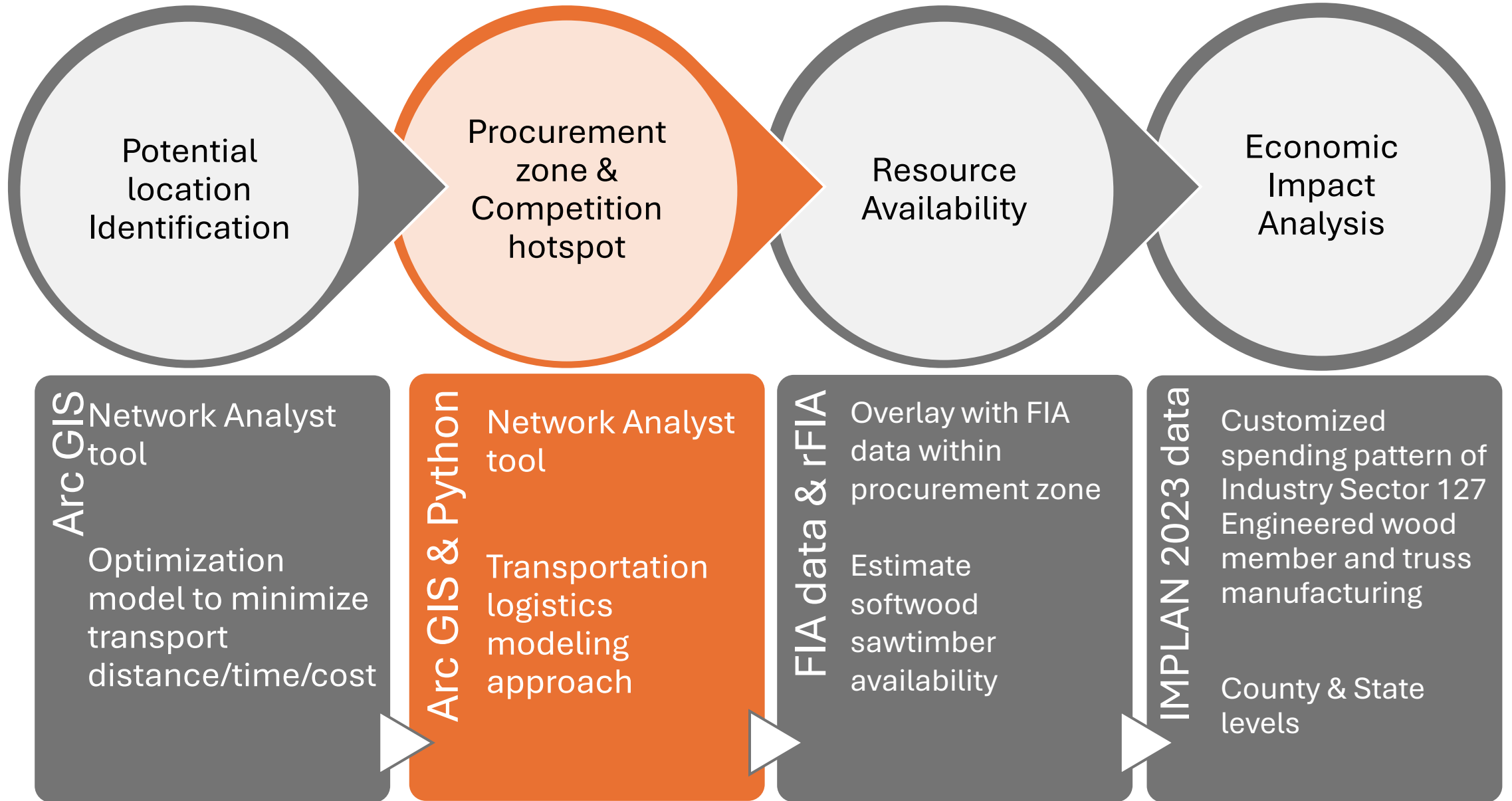
Procurement zone and competition hotspot

Tool: Network analyst in ArcGIS

Data inputs:

- Forest product manufacturing facilities (WDNR)
- Road Network Data (ESRI Data and Maps, 2017)
- Softwood stumpage price ($p_s = \$122.20/MBF$) and delivered log price ($p = \$300/MBF$)
- Softwood species: pine and spruce
- Calculate haul time as a surrogate for transportation costs

$$t = \left[0.5 * \frac{(p - p_h - p_s) * w}{r} * 60 \right] - t_l$$

where,
t is the haul time,
p_h is the cost of harvesting,
w is the weight limit of a truck trailer,
r is the rate per trucking hour,
t_l is the loading and unloading time
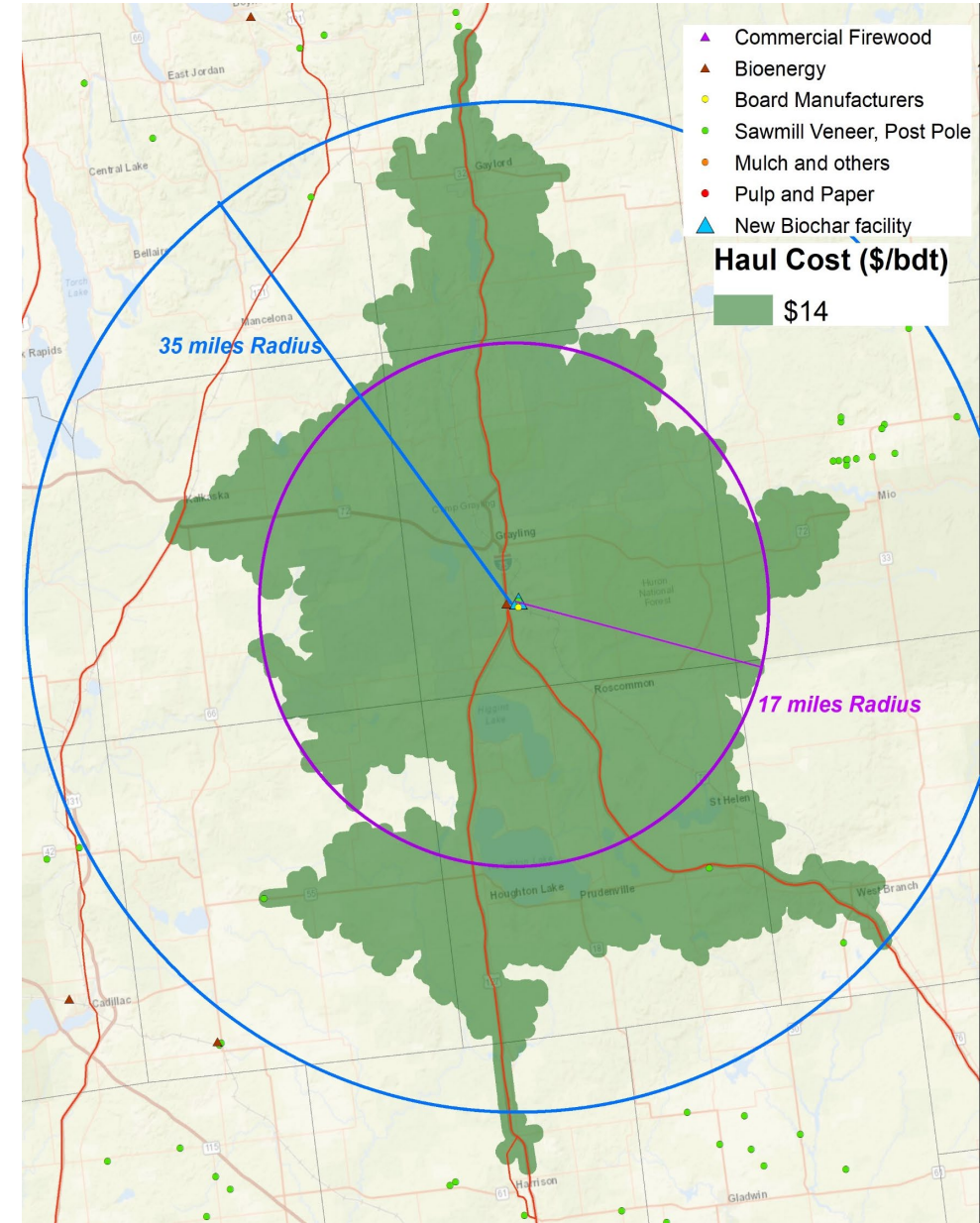
Methods
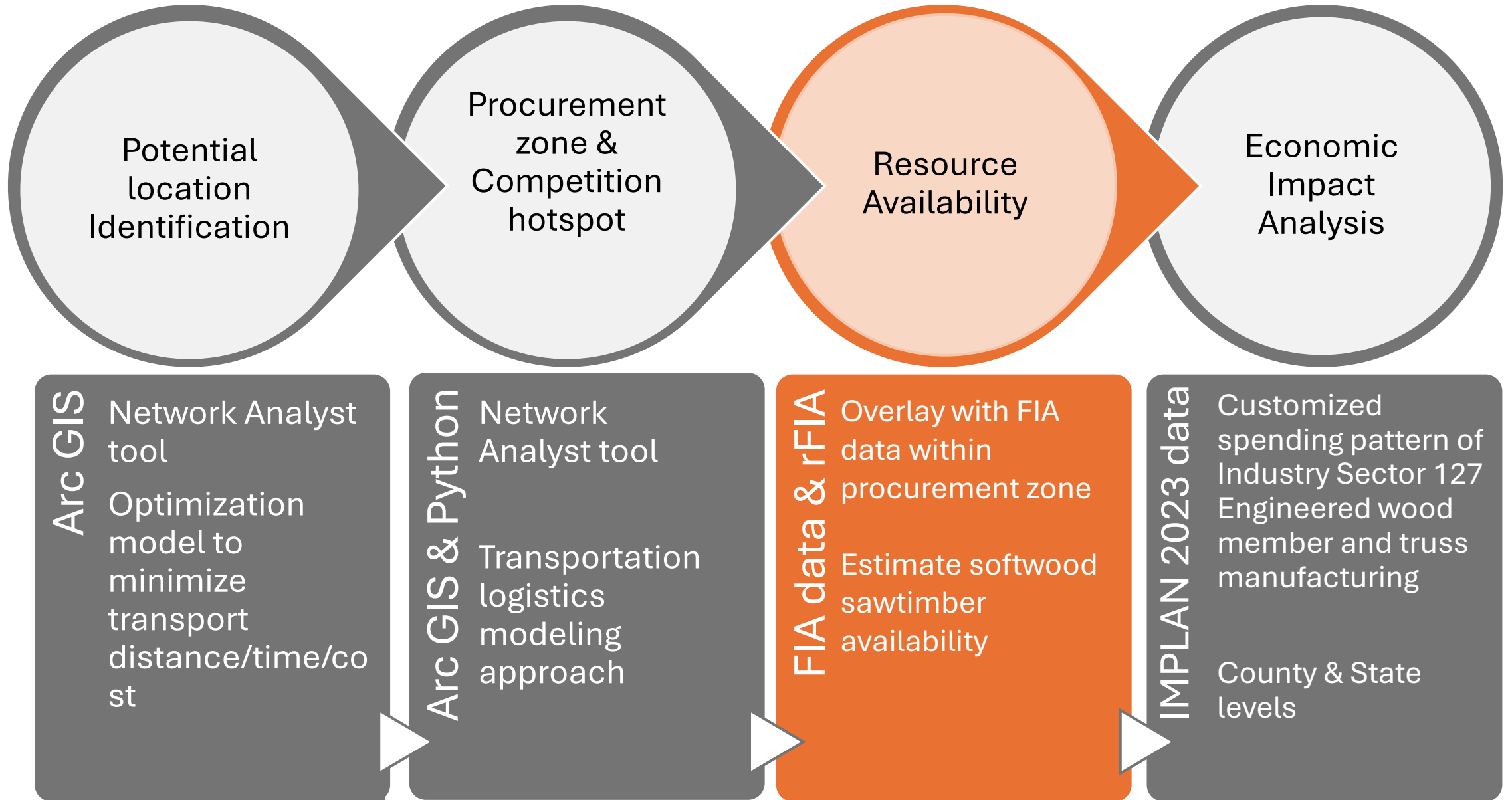
Resource Availability

- Tool: ArcGIS and 'rFIA' package (Stanke et al., 2020)

- Overlay with FIA data within procurement zone for the delivered log price ($300/MBF)

- Estimate total softwood sawtimber availability
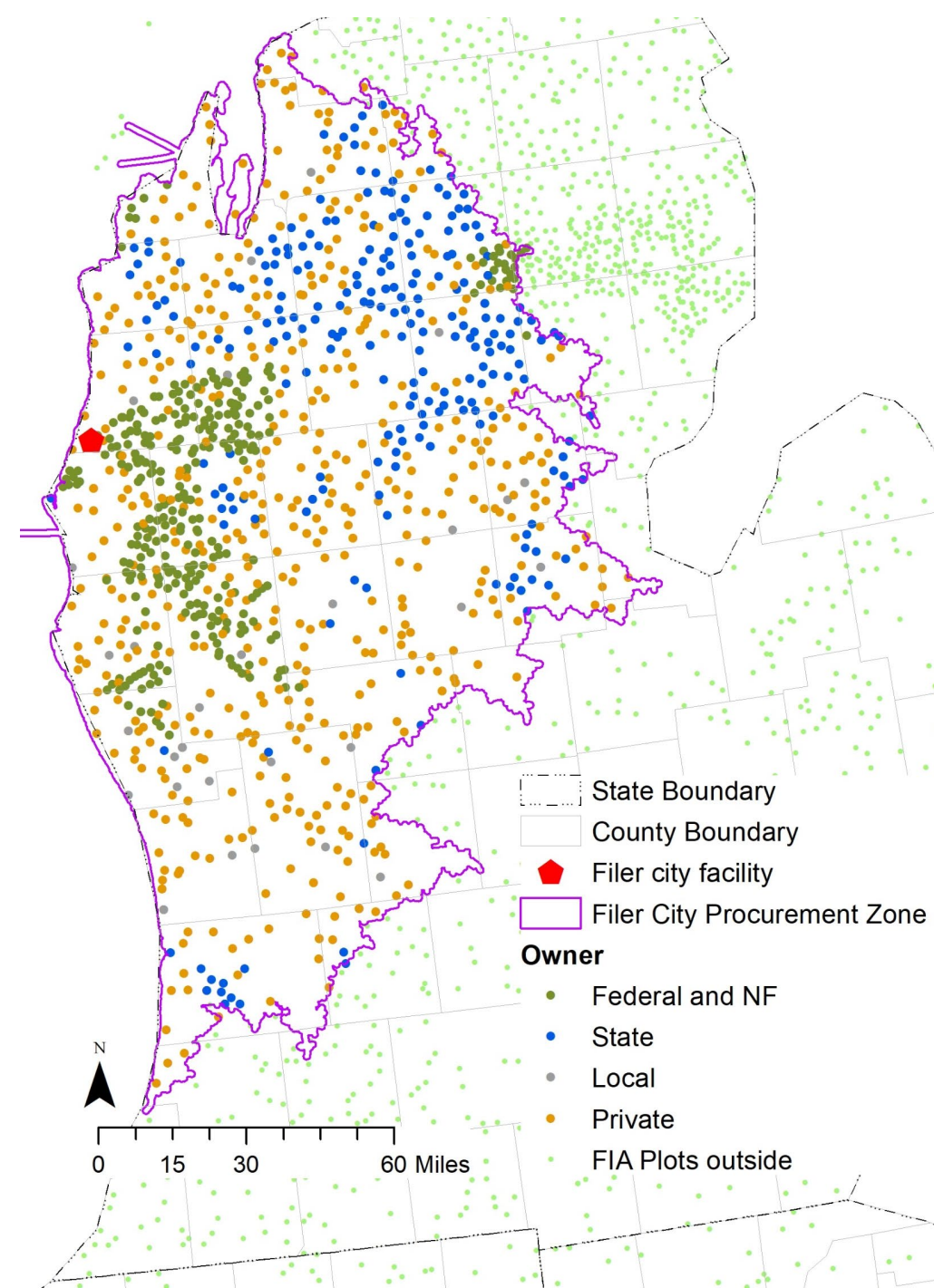
Balanced Cost Model

- Optimal location: Stevens Point in Portage County
- 106 forest plots & 9 softwood sawmills
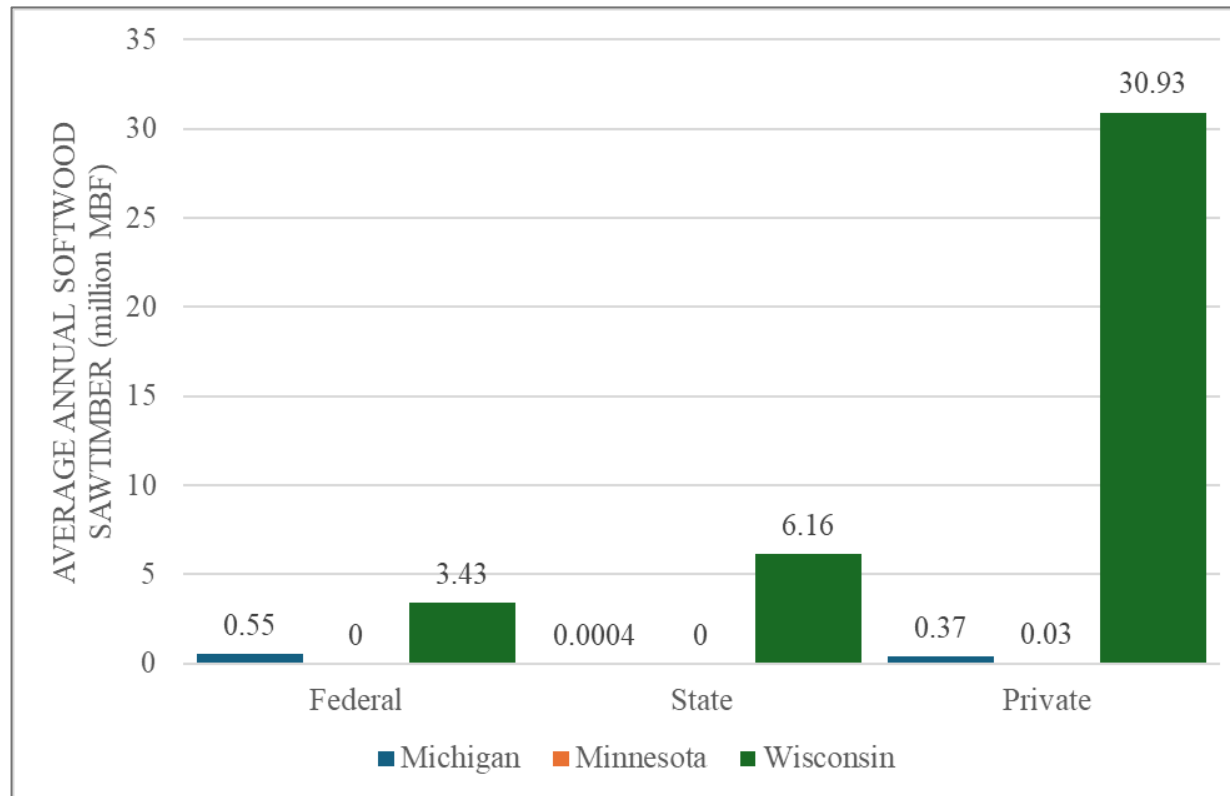
Figure: Total annual softwood sawtimber at the delivered log price of $300/MBF across state and ownerships
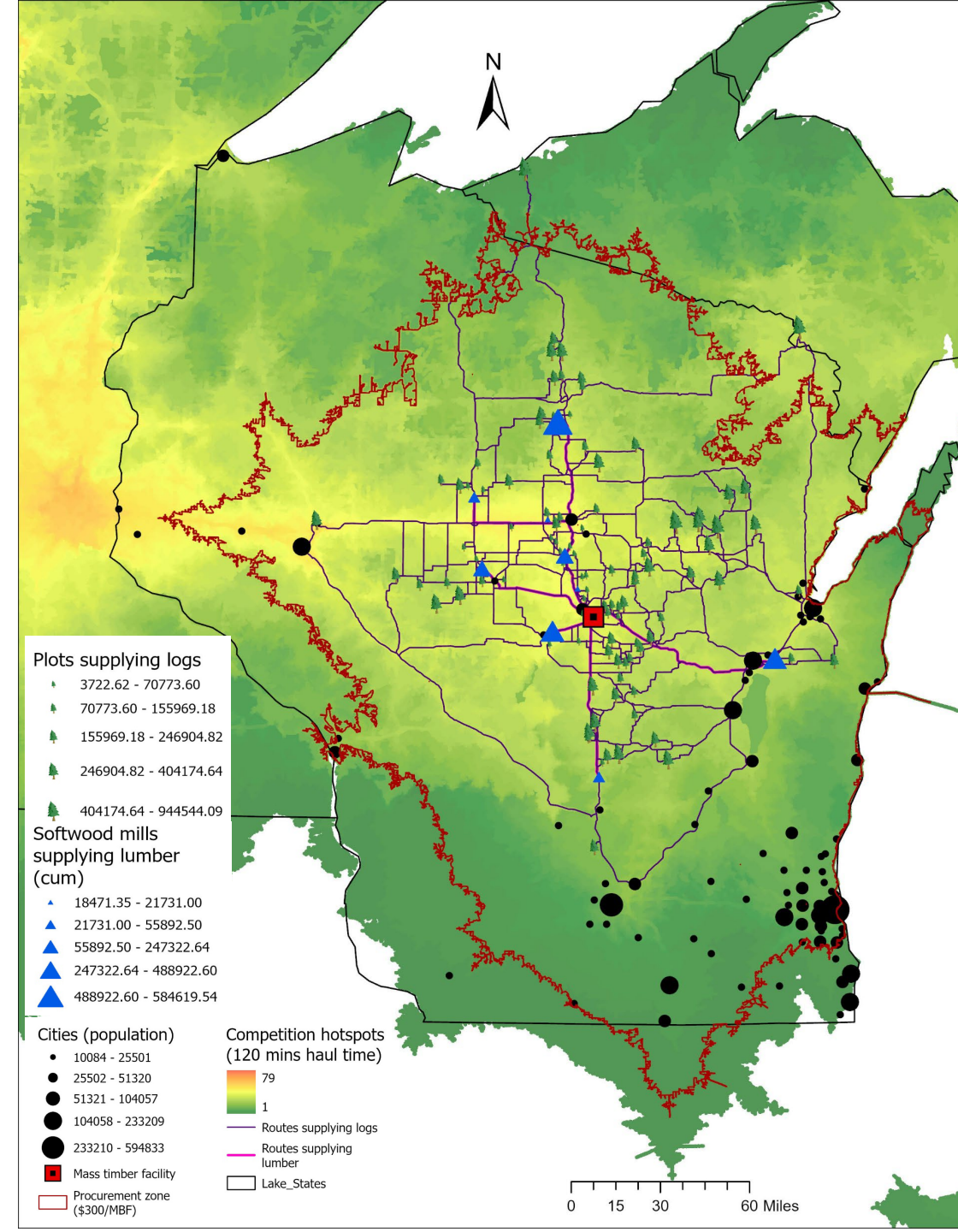
Supply-weighted cost Model

- Optimal location: Gull Lake in Washburn County
- 103 plots & 6 softwood sawmills
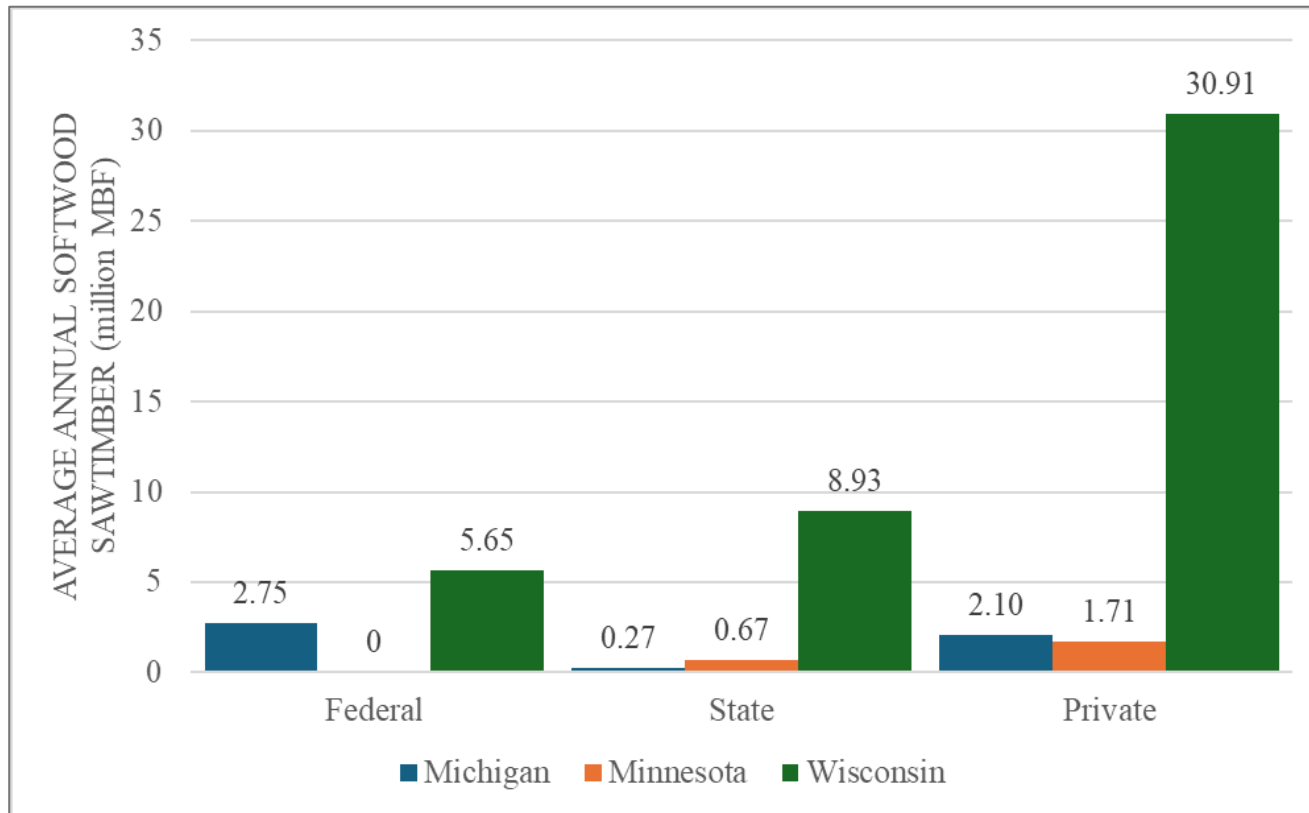
Figure: Total annual softwood sawtimber at the delivered log price of $300/MBF across state and ownerships

Methods

Potential location Identification

Arc GIS
- Network Analyst tool
- Optimization model to minimize transport distance/time/cost

Procurement zone & Competition hotspot

Arc GIS & Python
- Network Analyst tool
- Transportation logistics modeling approach

Resource Availability

FIA data & rFIA
- Overlay with FIA data within procurement zone
- Estimate softwood sawtimber availability

Economic Impact Analysis

IMPLAN 2023 data
- Customized spending pattern of Industry Sector 127 Engineered wood member and truss manufacturing
- County & State levels

Economic Impact Analysis

- Using 2023 IMPLAN (Input-Output Model)

1 Direct Effects 2 Indirect Effects 3 Induced Effects

- Industry Sector 127 Engineered wood member and truss manufacturing as a proxy for mass timber industry
- 25 projects built/in design using CLT (34.49 cubic meters) – Base/Current scale

2023 IMPLAN sector	IMPLAN sector commodity code	%	Source
Electric power transmission & distribution	3042	3.50	(Anderson et al., 2020)
Fabric coating mills	3111	3.70	(Oregon BEST, 2017)
Dimension Lumber and boards	3124	50.00	(Anderson et al., 2020)
Plastics material and resin manufacturing	3156	8.90	(Oregon BEST, 2017)
Paint and coating manufacturing	3167	0.90	(Oregon BEST, 2017)
Adhesive manufacturing	3168	15.00	(Anderson et al., 2020)
Handtool manufacturing	3226	2.20	(Oregon BEST, 2017)
Machine shops	3239	3.00	(Khanal et al., 2024)
Packaging machinery manufacturing	3282	1.70	
Wholesale services - Machinery, equipment, and supplies	3378	2.90	(Oregon BEST, 2017)
Truck transportation	3399	1.50	(Oregon BEST, 2017)
Management of companies and enterprises	3451	6.70	(Oregon BEST, 2017)

Different scenarios for Economic Impact Analysis

S.N.	Scale of mass timber production	No. of employees	Annual production (cubic meters)
1	Small-scale	28	20,000
2	Base - current	48	34,492
3	Medium-scale	86	62,000
4	Large-scale	180	130,000

ECONOMIC IMPACTS AT THE STATE LEVEL
Based on 2023 data
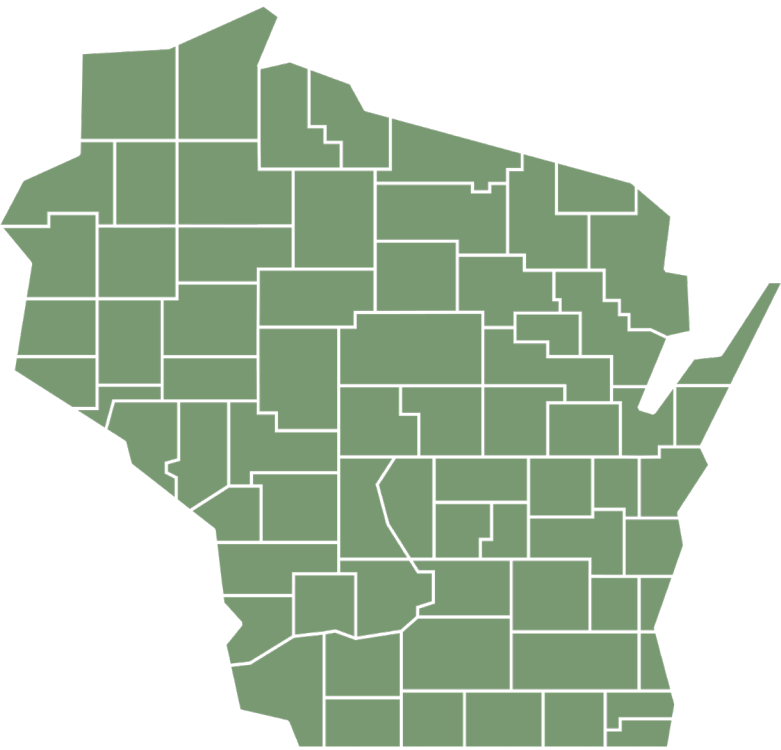
			Mass Timber Manufacture in Wisconsin		
Production scale	**Impact Type**	**Employment No.**	**Labor Income**	**Value Added**	**Output**
			------------million US $ (2023) --------		
Small-scale	Total	115	$8.46	$15.07	$56.99
	Multiplier	*4.09*	*3.95*	*3.04*	*1.61*
Base-current	Total	197	$14.56	$25.96	$98.30
	Multiplier	*4.10*	*3.97*	*3.04*	*1.61*
Medium-scale	Total	354	$26.14	$46.65	$176.69
	Multiplier	*4.12*	*3.98*	*3.05*	*1.61*
Large-scale	Total	743	$54.78	$97.78	$370.46
	Multiplier	*4.13*	*3.98*	*3.05*	*1.61*

ECONOMIC IMPACTS AT THE COUNTY LEVEL
Based on 2023 data
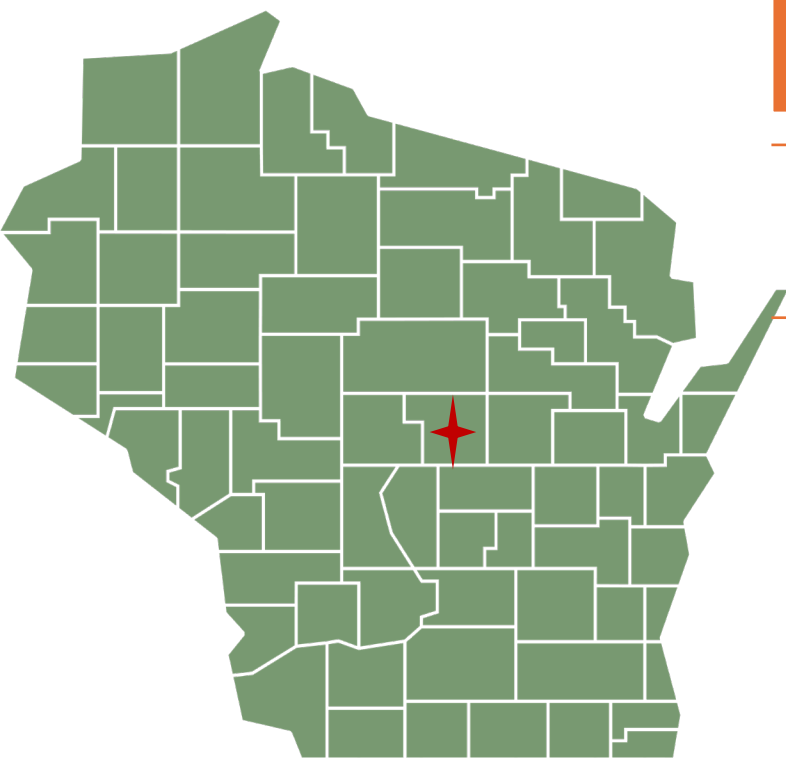
Mass Timber Manufacture in Portage County					
Production scale	**Impact type**	**Employment No.**	**Labor Income**	**Value Added**	**Output**
			----------million US $ (2023) --------		
Small-scale	Total	75	$6.76	$12.39	$47.11
	Multiplier	*2.66*	*1.81*	*1.77*	*1.33*
Base-current	Total	94	$9.27	$17.36	$71.40
	Multiplier	1.96	1.44	1.44	1.17
Medium-scale	Total	230	$20.87	$38.33	$146.07
	Multiplier	2.68	1.82	1.78	1.33
Large-scale	Total	482	$43.71	$80.33	$306.29
	Multiplier	*2.68*	*1.82*	*1.78*	*1.33*

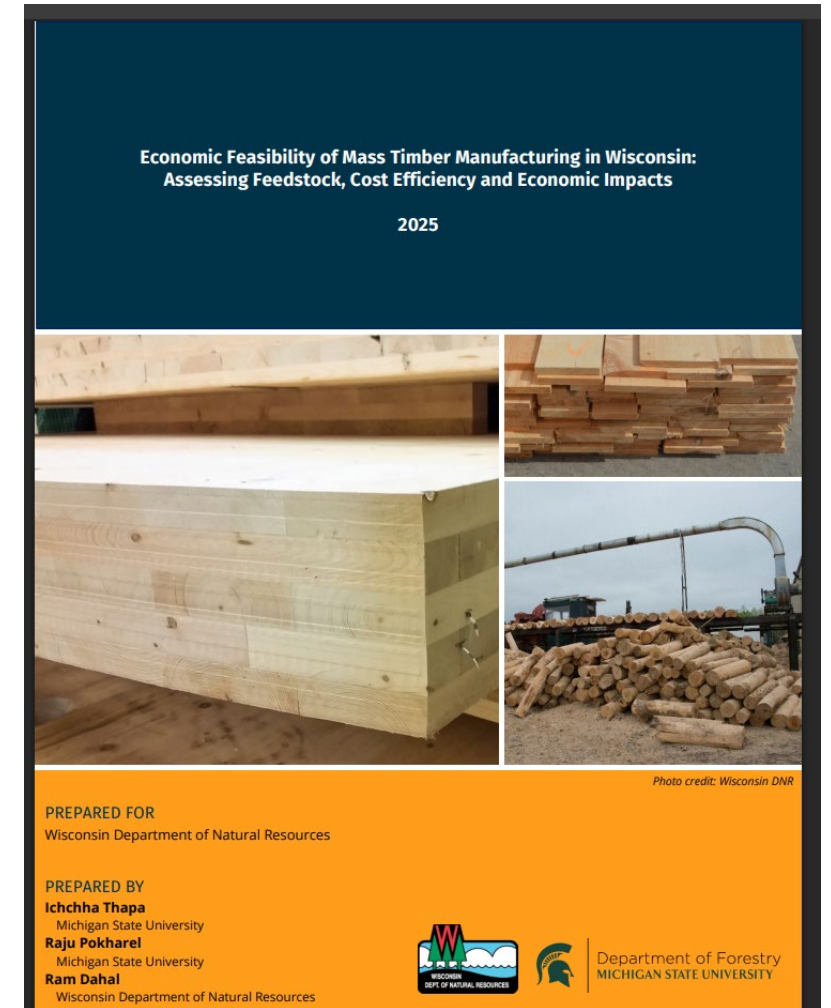# ECONOMIC IMPACTS AT THE COUNTY LEVEL

Based on 2023 data
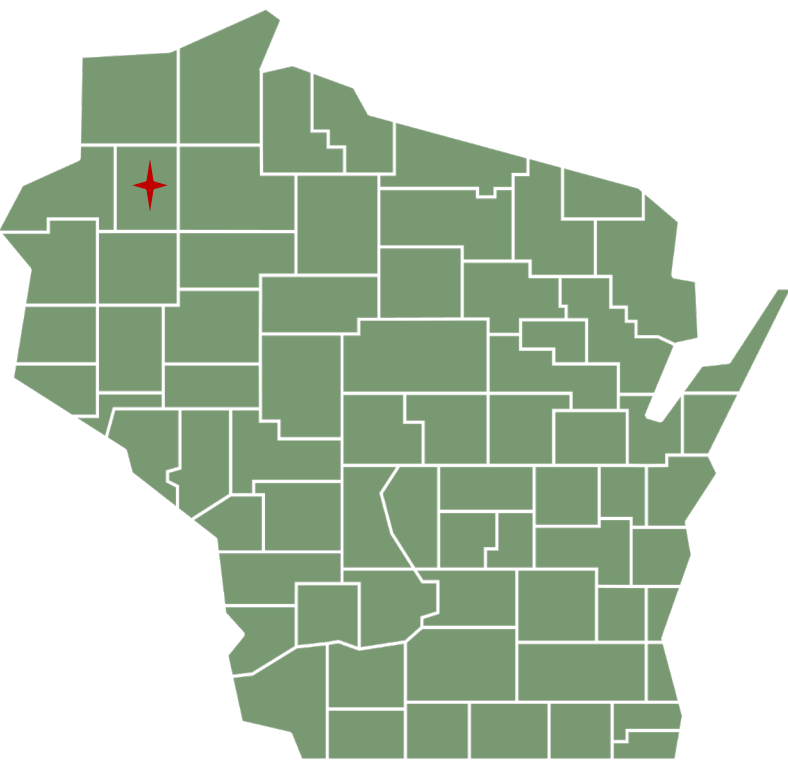
Mass Timber Manufacture in Washburn County

Production scale	Impact type	Employment no.	Labor Income	Value Added	Output
			------------million US $ (2023) ---------		
Small-scale	Total	88	$6.75	$11.90	$48.42
	Multiplier	*3.15*	*1.81*	*1.70*	*1.37*
Base-current	Total	152	$11.61	$20.48	$83.51
	Multiplier	*3.17*	*1.81*	*1.70*	*1.37*
Medium-scale	Total	273	$20.83	$36.78	$150.11
	Multiplier	*3.17*	*1.82*	*1.70*	*1.37*
Large-scale	Total	572	$43.63	$77.08	$314.76
	Multiplier	*3.18*	*1.82*	*1.70*	*1.37*

Key Takeaways

- Two optimal locations – Portage County (Balanced cost) and Washburn County (Supply- weighted cost)

- Other socio-economic factors - workforce, infrastructure, community support, environmental consideration, or related operational preferences can influence prospective investor's location decisions

- Enough availability of feedstock (41.46 to 53.0 MM MBF) across the Lake States

- Wisconsin forests primary supplier of feedstock (~95%)

- Private ownership dominate the supply (>60%)

- Direct output ($35.3 MM to $229.5 MM) & Jobs (28 to 180) for the small- to large-scale facility in the state's economy

- SAM multipliers similar across production scales; higher in Washburn County

- In addition to economic output and jobs, facilities in rural areas can bring knowledge and technology transfer– benefits not fully captured by IMPLAN

Deliverables

- Full report
  - Available at MSU website
  - Available at WI DNR website

- Newsletter
  - Published in Forest Products News
  - Published in WI DNR internal newsletter (ForesTREEporter)

- Presentation
  - *2025 Annual Symposium International Society of Forest Resource Economics Meeting*. Myrtle Beach, South Carolina. March 10-12, 2025

Economic Feasibility of Mass Timber Manufacturing in Wisconsin: Assessing Feedstock, Cost Efficiency and Economic Impacts

2025

Photo credit: Wisconsin DNR

PREPARED FOR
Wisconsin Department of Natural Resources

PREPARED BY
Ichchha Thapa
Michigan State University
Raju Pokharel
Michigan State University
Ram Dahal
Wisconsin Department of Natural Resources

Department of Forestry
MICHIGAN STATE UNIVERSITY

Thank you!

thapaich@msu.edu

ram.dahal@wisconsin.gov

raju2020@msu.edu