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WeARE Research Area

This research compiles different studies and analyzes their methods and models used for biomass supply chain management and is inputted into a state-of-the-art matrix. The main model types that were found in this study are Mixed Integer Linear Programming, Simulation Models, and Geographical Information System (GIS) based Decision Support Systems (DSS). The majority of these studies were found in a review done by L.J.R Nunes in December of 2019.

Motivation or Background

Supply chain management involves collecting biomass, converting it, and detailed coordination between suppliers and customers. With the different studies and their corresponding models used, we will be able to focus on optimization. Optimization is critical to us because the need to cut down on transportation waste due to carbon emission is an increasing problem today. With the optimization of the supply chain, there will also be a decrease in cost, and as a finance major, I can observe how a slight decrease in cost can become increasingly significant over time.

Objectives

1. Read academic papers on the different studies about Biomass Supply Chain Management.
2. Use excel to create a state-of-the-art showing the categorization of the works.

Methodology

Data was collected from a review on Supply Chain Management models that was published in 2020. Then, the state-of-the-art matrix was contrasted by the organization of the articles into model types, transport, and storage requirements.

Biomass Supply Chain						
Categories	Biomass Harvest	Transport	Storage	Biomass SCM Models		
Subgroups				Mixed Integer Linear Programming Model	Simulation Model	Dynamic Programming
Year						
1997					De Mol et al.	
1998						
2000			J. Nagel			
2001				Hall et al.		
2002	Suurs				Gigler et al.	
2003						
2004			Gunnarsson et al.			Freppaz et al.
2006				Sokhansanj et al.		
2007		Bowersox & Closs				Ayoub et al.
2008		Ravula et al.				Panichelli & Edgard
2009	Rentizales et al.		Eksioglu et al.			Frombo et al.
2010			Leduc et al.			Leduc et al.
2011		Zhu & Yao	Zhu et al.	Mobini et al.		
2014			Gomes et al.			

Figure 1
Biomass Supply Chain - State of the Art Matrix

Results

When beginning to analyze the different type of models used, the Mixed Integer Linear Programming Model was used the most often. Following this, the Simulation Model and the GIS based DSS were used second most. Non-linear DSS and Dynamic Programming followed in usage.

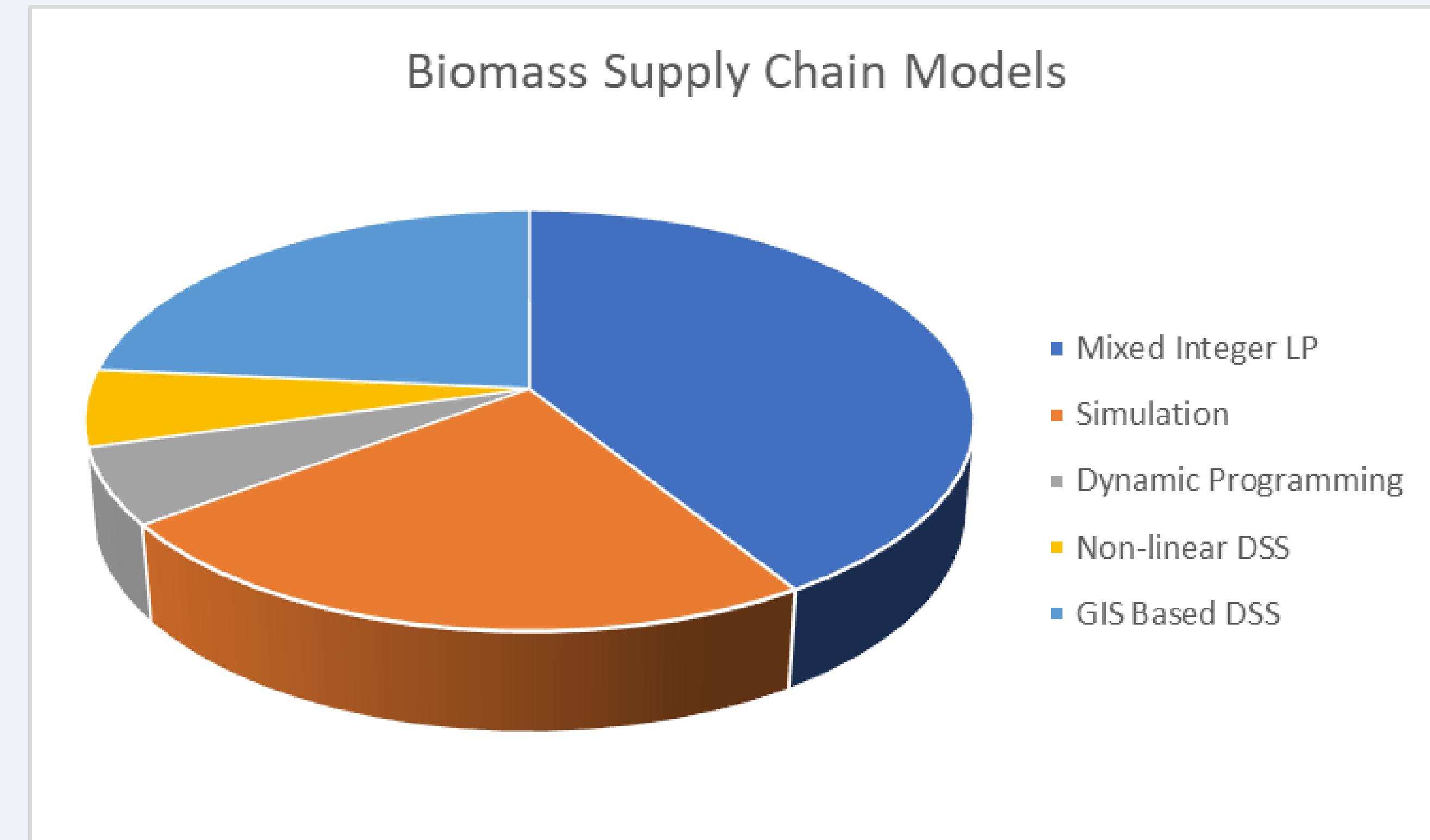


Figure 2
Pie Chart of Model Types

Skills and Experience

- I was able to improve my Excel skills while conducting this research.
- Working with my mentor, Dr. Castillo, helped me improve my communication and coordinating skills.
- Data collecting and analysis is another skill that was practiced during this research.

What I Learned

Strategic level deals with how the system operates as a whole and are always in the long-term, tactical decisions are short term and geared toward logistics of the strategic decisions, and operational decisions are based on the day-to-day operations and deal with the scheduling of transportation and harvesting.

Future Plans

- In the future, I plan to continue gathering data and analyzing data to improve biomass supply chains integrating socioeconomic impact.
- I will also take the skills and knowledge I have gained from this program and apply it to my future work, not only inside the institute, but outside as well, such as my classes and, later, career.

Acknowledgments

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References

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