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OPTIMAL DESIGN AND PLANNING OF BIOMASS-TO-BIOFUEL (BIOETHANOL AND BIODIESEL) SUPPLY CHAIN UNDER SUSTAINABILITY DIMENSIONS: A CASE STUDY IN ETHIOPIA

Conception et planification optimales de la chaîne d'approvisionnement biomasse-biocarburant (bioéthanol et biodiesel) dans une perspective de durabilité : une étude de cas en Éthiopie

Biofuels (biodiesel and bioethanol) derived from biomass on account of being renewable energy sources and having high potential as substitute to fossil fuels, have attracted considerable interest and investment in both developed and developing countries. Because of this, government supportive policies have been established worldwide to accelerate the growth of biomass-to-biofuel industry. Nevertheless, policymakers and other stakeholders of the sector are still lack a decision or planning-support tools, which is dedicated to the sustainable design and planning of the biomass-to-biofuel supply chain (BBSC) systems considering all the relevant sustainability dimensions.

Henceforth, the intention of this research is to develop a novel decision-support optimization model for maximizing the economic, environmental and social benefits of BBSC. In order to achieve this objective, a model will be developed that maximizes the net present value (NPV), minimizes GHG emission and maximizes job creation associated with the supply chain.

Moreover, the study also expands the scope of previous research efforts in the area by simultaneously considering the following additional issues:

Some parameters related to political and technological dimensions (government subsidies, incentives, taxes and technology types) besides the three pillars of sustainability; BBSC with two-product (bioethanol and biodiesel) processing plants those are located at different sites; Both strategic and tactical level scenarios under uncertainties in biomass supply and price, as well as in biofuel demand and price; and Comprehensive supply chain, which incorporates all relevant components from biomass feedstock supply to biofuel end-users, including pre-processing facility.

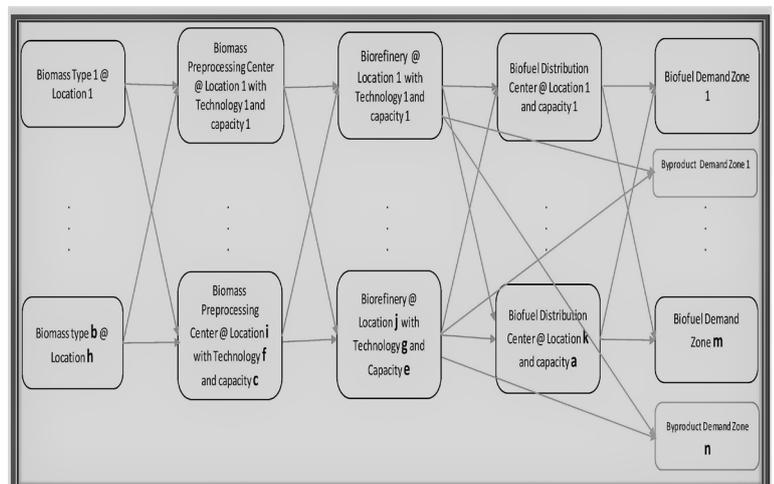


Fig : SUPERSTRUCTURE OF THE MODEL

The proposed approach will be applied for Ethiopia's case to provide decision or planning support tool for policy makers and other interested actors.