ABSTRACT

MUHAMMAD ARIEF BINTORO DIBYOSEPUTRO, System dynamic modeling of complex decision making for the development of sugar cane agroindustry, under supervision of IRAWADI JAMARAN, MACHFUD, MARIMIN, BUNASOR SANIM, and YANDRA ARKEMAN.

The modeling outlined in this research is an initiative to find approaches to the development of sugar cane agroindustry and its related complex decision making processes. The model is expected to be used for optimizing added values and to better evaluating the impact of relevant decisions associated with information available across the components. The entirely model consists of (i) system dynamic model, for mapping entirely system, decision making purposes and learning through simulation process, (ii) interpretive structural modeling to visualize vision, generate ideas, and compose unstructured ideas into structural and operational steps of actions, (iii) analytical network process as an approach to make decisions and policies by accommodating complexity of internal and external criteria, and (iv) Bayesian believe network as an approach to look at the likelihood of realization under specific scenarios. The simulation indicates that demand for sugar is relatively stable and predictable. In the other hand the supply is relatively volatile due to productivity level, land use competition with other crops, climatic factor, market sentiment caused by economic factor, trade and socio-politico factors. The development of sugar cane agroindustry requires multidimensional facets and inter-organizational decision making along the process of adding values to sugar cane plantation, sugar production, trading (export-import), and distribution to final consumers. The simulation shows that the improvement of productivity and manufacturing can be achieved by mainly improving better cane seed, larger cane field, good planting and estate management practice, and betterment of machineries. The trade-distribution management requires timely scheduling and precise calculation for importation of raw sugar, white sugar or refined sugar. The majority of stakeholders suggest in order to develop the performance of sugar cane agroindustry, there should be attempts to innovate product alternatives aside from conventional products, e.g ethanol as alternative energy source, liquefied sugar.

Key words: sugar cane agroindustry, system dynamic model, interpretive structural modeling, analytical network process, Bayesian believe network.