Manufacturing is a crucial element in the global economy. During the last decade, the national manufacturing sector loses nearly 30% of its workforce and investments. Consequently, the quality of the domestic goods, global share, and manufacturing capabilities has been declined. Therefore, innovative ways to optimize the usage of the Smart Manufacturing Systems (SMS) are required to form a new manufacturing era. This research is presenting a framework to optimize the design of SMS. The objective is to configure the SMS. This includes the determination of the suitable machines that can perform the job efficiently and the quantity of those machines.

Multiple reviews are used to form the framework. Expert machine selection matrix identifies the required machines and machine parameter matrix defines the specifications of those machines. While business process modeling and notation (BPMN) captures the process plan. In addition, to agent unified modeling language (AUML) that guides the application of message sequence diagram and statecharts. Finally, the configuration is obtained from a hybrid simulation model. Agent based-modeling is used to capture the behavior of the machines where discrete event simulation mimics the process flow. A case study of a manufacturing system is used to verify the study. As a result, the framework shows positive outcomes in supporting upper management in the planning phase of establishing a SMS or evaluating an existing one.