Highlights

- Proposing optimal management of a local operator under the concept of P2P trading.

- Assessing the performance of the local operator in different uncertainty attitudes.

- Several sources of uncertainty considered such as load, price, and PV generation.

- Risk-averse decision-maker tends to purchase from the grid to reduce potential risks.

- Risk-seeking decision-maker targeting demand supply through the P2P trading scheme.

Abstract   Small-scale smart microgrid is prone to economic consideration of adequate transactive energy sharing and reliable certified power pool hub. Moreover, direct integration of efficient with renewable energy providers in presence of storage such as electric vehicle (EV) aggregation improves the performance of energy systems and guarantees secure trade among the consumers. However, unified modeling of the energy community framework faces the challenge of load management. In this paper, an optimal risk management procedure is proposed for renewable-based prosumers such as photovoltaic (PV), and EV to maximize the horizon of uncertainty parameter. The energy demand in peer-to-peer (P2P) household energy sharing is considered as the uncertain parameter. To this end, in order to study the behavior of a risk-averse and a risk-seeker decision-maker, an information-gap decision theory (IGDT) probability model is applied. In order to demonstrate the performance of the proposed approach, the model is implemented in a test microgrid and the simulation results are presented and discussed.