An ongoing trend in product development is to extend traditional products with appropriate services. This concept of Product-Service Systems (PSS) rises attractive opportunities for customers and companies. Based on literature an introduction into PSS development is given. PSS modeling and the dynamic behavior of PSS are discussed. Three suitable modeling methods are identified: Agent-Based Modeling (ABM), System Dynamics (SD) and Discrete Event (DE) Simulation. In this paper the well-known DE approach is transferred from its traditional applications to PSS development. Characteristics of DE simulation and its benefits and limitations in context of PSS are presented. A major advantage is the forecast and evaluation of different scenarios. This contribution identifies possible application areas to support PSS development with DE simulation in context of both development process and PSS type. Three examples show the applicability of the DE approach in a wide range, one from literature and two academic ones. The results are discussed and an outlook to future modeling methodology is given.