

## Abstract

The growing demand for fast, secure, and high-quality development cycles has driven the adoption of DevOps, alongside Agile methodology, in information systems development. However, challenges persist due to the impact on technical aspects and organizational culture. The lack of standardized definitions, documented experiences, and mature practices complicates adoption. Despite these hurdles, companies continue to pursue DevOps for its benefits, though achieving its full potential remains difficult due to the lack of a unified strategy. Focusing on this research gap and reported industry challenges for DevOps practices, the study identified critical success factors and capability factors for DevOps adoption and maturity. It followed a structured Design Science Research method, incorporating systematic literature reviews, expert interviews, and questionnaire surveys to develop and validate frameworks. The literature review, conducted using PRISMA guidelines, gathered secondary qualitative data, while semi-structured interviews and a questionnaire survey provided primary qualitative and quantitative data. The survey data was analyzed using Partial Least Squares Structural Equation Modeling with SmartPLS software, combining both qualitative and quantitative methods to enhance the study's contributions. The research problem is confirmed by presenting twelve main challenges for DevOps adoption identified systematically. Moreover, it was reconfirmed by observing only four strategies practiced for overcoming these challenges. The study presents a DevOps adoption framework, grouping critical success factors into four areas: collaborative culture, proficient DevOps team, DevOps practices, and metrics and measurement to enhance DevOps benefits and reduce challenges, while integrating Agile practices. Furthermore, it proposes a new DevOps maturity framework with five levels and six key capability factors: transparency and sharing, continuous DevOps practices, automation, metrics and measurements, effective communication, and a proficient DevOps team, with each factor progressing from beginner to expert levels. Proposed frameworks offer structured guidance for IS development organizations to navigate DevOps challenges, facilitating effective adoption and maturity of DevOps principles. Future researchers can develop an application tool based on these frameworks to assess companies' readiness and maturity in DevOps. Also, studying the impact of Artificial Intelligence and Machine Learning on DevOps can enhance automation and decision-making.

Keywords: DevOps, DevOps challenges, DevOps critical success factors, DevOps capability factors, DevOps adoption, DevOps maturity