

# Micro-Frontend Architecture: A Comparative Study of Startups and Large Established Companies- Suitability, Benefits, Challenges, and Practical Insights

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Micro-frontend architecture is emerging as a transformative approach to web application development, offering modularity, scalability and independent deployment of application components. While widely adopted by large established companies, its application in startups remains underexplored due to challenges such as limited resources, smaller teams and architectural complexity. This study evaluates the adoption and effectiveness of micro-frontends in startups by combining insights from a systematic literature review, surveys of 200 professionals and interviews with 15 stakeholders. The survey revealed that 71% of startup respondents were familiar with micro-frontends and 39% had implemented the architecture in their projects. Among adopters, 66% reported improved scalability, 61% highlighted enhanced modularity and 74.35% appreciated the ability to conduct parallel development. However, 53.84% identified architectural complexity as a significant barrier, reflecting the challenges of integrating micro-frontends in resource constrained environments. Interviews further underscored the importance of team expertise, centralized design systems and phased implementation strategies to address these challenges. The study highlights that while micro-frontends offer substantial benefits for startups, including faster feature deployment and greater flexibility, successful adoption requires careful planning and investment in technical skills. This research bridges theoretical insights with real-world practices, offering startups actionable recommendations tailored to their unique needs. By addressing critical challenges and emphasizing incremental adoption, the study provides a pathway for startups to adopt micro-frontends effectively. The findings contribute to modern web development, aligning architectural innovations with the operational realities of startups and fostering scalable, efficient and modular frontend solutions.

**Keywords:** *application scope, micro-frontend architecture, modularity, scalability, startups*