

ABSTRACT

The growing dependence on digital infrastructure has made disaster recovery (DR) a critical priority for Small and Medium Enterprises (SMEs). This study presents a comprehensive experimental comparison between Amazon Web Services (AWS) and Microsoft Azure DR solutions, focusing on performance, cost-efficiency, network quality, and business impact. Evaluations were conducted under three standardized failure scenarios: virtual machine crashes, region-wide outages, and network disruptions.

The results demonstrate that AWS consistently delivers faster recovery (average RTO of ~12-13 minutes) and shorter Recovery Point Objectives ($RPO < 40$ seconds), outperforming Azure's recovery metrics (RTO of 18-21 minutes; $RPO > 1$ minute). Network-level Quality of Service (QoS) tests show that AWS maintains lower latency (~134 ms) and higher throughput under stress. Total Cost of Ownership (TCO) analysis indicates AWS is up to 40% more cost-effective, primarily due to lower compute and data transfer fees. Business Impact Analysis (BIA) further reveals significantly reduced downtime-related financial losses on AWS.

Beyond the comparative analysis, this study introduces and validates a warm-standby DR architecture utilizing DNS-based failover mechanisms, applicable across both platforms. A structured risk assessment framework was developed using threat scoring and control mapping specific to SME contexts, particularly for Indonesian industries such as agriculture, logistics, and retail. Case-based evaluations demonstrate that AWS is better suited for geographically distributed and cost-sensitive SMEs, while Azure is preferable for Microsoft-integrated, customer-facing SMEs with simpler DR needs.

By integrating technical metrics, financial modeling, and contextual risk factors, the study offers actionable guidance for SMEs aiming to improve operational resilience and cost control. It also contributes to academic discourse by extending DR evaluation frameworks with scenario-driven experimentation, QoS-performance correlation, and SME-aligned risk modeling that can inform practical cloud strategy decisions in emerging markets.

Keywords: Amazon Web Services (AWS), Microsoft Azure (Azure), Recovery Time Objective (RTO), Recovery Point Objective (RPO), Total Cost of Ownership (TCO), Data Replication, Failover, Cost Efficiency, Disaster Recovery Strategy.