

Digitalization, Service Quality, and Maternal-Child Health Program Performance in East Java

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Abstract

Purpose: This study examined the effects of organizational culture, competence, motivation, and infrastructure on service quality and maternal-child health program performance in East Java. It also investigates the mediating role of service quality and the moderating role of digitalization in the relationship between service quality and program performance.

Methodology: A quantitative cross-sectional survey was conducted involving 400 coordinating and maternal-child health midwives from community health centers across ten high-priority districts in East-Java. Data were collected using a structured Likert-scale questionnaire and analyzed using IBM SPSS Statistics 30.0, JASP 0.95.0.0, and SmartPLS 4.0.

Results: Competence, motivation, and infrastructure significantly enhanced service quality, whereas organizational culture had no significant effect. Organizational culture and infrastructure significantly improved maternal-child health program performance, whereas competence, motivation, and service quality did not exhibit significant direct effects. Digitalization significantly strengthened the relationship between service quality and program performance at moderate- and high-level digitalization.

Conclusions: Service quality contributes to the performance of maternal-child health programs when supported by integrated digital monitoring and alert-response systems.

Limitations: The cross-sectional design and reliance on self-reported data limit the causal inference.

Contributions: This study proposes a digitalized performance dimension for maternal-child health governance, encompassing data completeness, synchronization timeliness, digital early detection accuracy, dashboard utilization, alert response, and user digital satisfaction.

Keywords: *Competence, Digitalization, Infrastructure, Maternal-Child Health, Service Quality*

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1. Introduction

Maternal And Child Health (MCH) remains a central indicator of health system performance because maternal, neonatal, and infant outcomes are strongly affected by the quality, accessibility, and responsiveness of primary health services. Recent global evidence shows that preventable maternal and child deaths remain a major public health challenge, especially where service delivery is

fragmented, referral pathways are weak, and quality improvement is not supported by reliable data ([Hajji Adam & Daba, 2024](#); [Rajagopalan, 2024](#)). Obstetric hemorrhage and other time-sensitive complications further show that performance in MCH programs cannot be separated from the ability of frontline services to detect risks early, coordinate referrals, and respond quickly ([James et al., 2022](#)). At the primary care level, service capacity and service quality are associated with intermediate MCH outputs, making community health centers and their midwifery workforce strategic actors in program performance ([Ramadan et al., 2023](#)).

In Indonesia, the MCH program is implemented through a broad continuum of antenatal care, safe delivery, postnatal care, neonatal care, and complication management. The national health information agenda also emphasizes integrated data and digital transformation to overcome fragmentation and improve program monitoring ([Kementerian Kesehatan Republik Indonesia, 2021, 2024](#)). East Java is a large province with a complex service network across urban, rural, and peripheral districts. Therefore, the province requires management strategies that can link organizational resources to the quality of frontline MCH services. This study focuses on ten districts in East Java with high maternal mortality: Jember, Pamekasan, Banyuwangi, Nganjuk, Probolinggo, Malang, Gresik, Pasuruan, Bondowoso, and Blitar. These districts are important for understanding whether organizational culture, workforce competence, motivation, and infrastructure can improve MCH program performance through service quality and digital monitoring.

The managerial problem addressed by this study is that improvements in service quality do not automatically result in better program performance when data systems are not used for early detection, dashboard monitoring, and timely decision making. Previous studies have examined competence, motivation, organizational culture, and infrastructure as separate determinants of employee performance and public service quality ([Apriyanti, 2023](#); [Helmina et al., 2024](#); [Nengsih et al., 2021](#); [Nesa et al., 2024](#)). However, few studies have integrated these organizational factors into a single MCH performance model and tested digitalization as a moderating condition. Digital transformation studies emphasize that digital systems can improve service quality when they support innovation, mobility, analytical ability, trust, and adaptability ([Khatib et al., 2024](#)). For MCH programs, this means that digitalization should not merely serve administrative reporting; it should become an early warning and program governance mechanism.

Therefore, the research gap is both theoretical and practical. The model links resource-based organizational factors with service quality and MCH program performance while testing digitalization as a moderator. Practically, this study responds to the need for a measurable digitalized performance dimension in MCH management, including the completeness of digital MCH data, timeliness of synchronization, accuracy of digital early detection, dashboard utilization, alert-response monitoring, and user digital satisfaction. These indicators are important because MCH performance is increasingly dependent on the validity and timeliness of the data used by managers and frontline providers. This study aims to analyze the influence of organizational culture, competence, motivation, and infrastructure on service quality and MCH program performance; examine the role of service quality as an intervening variable; and test whether digitalization strengthens the effect of service quality on MCH program performance. Using data from 400 midwives in community health centers, this study seeks to formulate an evidence-based strategy for improving MCH performance in the East Java Provincial Health Office.

2. Literature Review and Hypotheses Development

2.1 Maternal-Child Health Program Performance and Service Quality

The MCH program performance is multidimensional because it reflects both service coverage and the ability of the health system to manage risks across the maternal, neonatal, and child health continuum. A high-performing MCH program requires adequate antenatal contact, skilled delivery support, postpartum and neonatal monitoring, complication management, and data-based coordination. [Rajagopalan \(2024\)](#) emphasized that comprehensive MCH interventions require policy, community engagement, and health system capacity. [Ramadan et al. \(2023\)](#) further show that subnational primary healthcare capacity and quality are related to intermediate MCH outputs. These findings support the

view that program performance cannot be evaluated only through final mortality outcomes; it must also be measured through the quality and reliability of the program processes.

Service quality is a key mechanism through which organizational inputs are converted into the program results. Health service quality includes reliability, responsiveness, assurance, empathy, and tangible aspects; however, in MCH contexts, it must also include safety, continuity, and timely risk detection. Patient satisfaction and service experiences are influenced by technical competence, communication, infrastructure, and consistency of service delivery ([Ishak et al., 2025](#)). Studies in public service contexts show that service quality can connect administrative capacity and community outcomes, although its effect depends on organizational support and service design ([Maslukah et al., 2023](#); [Sibonde & Dassah, 2021](#)). In this study, service quality was positioned as an intervening variable between organizational factors and MCH program performance.

Digitalization has changed the meaning of service quality in MCH programs. When digital systems are integrated into service workflows, quality is not only about interpersonal service delivery but also about the availability of timely, accurate and actionable information. Indonesia's health digital transformation blueprint emphasizes electronic medical records, integrated health data, interoperability, and digital services as the foundations of future health governance ([Kementerian Kesehatan Republik Indonesia, 2021](#)). Therefore, this study conceptualizes digitalization as a moderating condition that determines whether service quality can be translated into measurable program performance.

2.2 Organizational Culture and MCH Service Outcomes

Organizational culture refers to the shared values, rules, norms, and assumptions that guide behavior in an organization. In public health services, culture influences coordination, discipline, problem-solving, and openness to data-driven management. Empirical studies have reported that organizational culture affects employee performance and service behavior by shaping collective expectations and workplace routines ([Hung et al., 2022](#); [Utomo et al., 2024](#)). In Indonesian service organizations, organizational culture has been linked to employee performance and satisfaction ([Imaniar Cahyani & Yunus, 2022](#); [Rosadi & Laksana, 2022](#)). [Kharisma and Supriyono \(2024\)](#) show that culture is also relevant to human resource development strategies, while [Osman et al. \(2023\)](#) highlight the role of innovation and management practices in the culture-performance relationship.

However, culture may not directly improve service quality when dominant routines are not aligned with quality standards or digital workflows. A culture that values hierarchy and reporting may support compliance, but it may not necessarily stimulate responsiveness, empathy, or proactive risk detection. Therefore, this study tests whether organizational culture affects service quality and program performance, both directly and indirectly. The hypotheses are:

H₁: Organizational culture positively affects service quality

H₅: Organizational culture positively affects MCH program performance

H₁₁: Service quality mediates the effect of organizational culture on MCH program performance

2.3 Competence, Motivation, and Infrastructure

Competence is the ability of health workers to perform tasks effectively through knowledge, skills, attitudes, and work-related judgments. MCH services require midwives who can identify risks, communicate with pregnant women and their families, use digital records, coordinate referrals, and implement service standards. Competency-focused curricula are important for maternal, infant, and young child health services because they determine how workers convert knowledge into service practice ([Becker, Cashin, Nguyen, & Zambrano, 2022](#)). Studies across public and private organizations have also shown that competence affects service quality and employee performance ([Apriyanti, 2023](#); [Herdiyana, Budianto, Herman, & Aljamaliah, 2023](#); [Herwina, 2022](#); [Kusumah, Sulfiani, Nurnilasari, & Heriyono, 2024](#); [Lucky, Saefudin, & Afihtul, 2023](#); [Pujiastuti, 2025](#)). [Helmina, Rosadi, and Sucipto \(2024\)](#) specifically connect employee service quality with competence

and the organizational culture. Thus, improving health worker competence is essential to ensure that MCH services are delivered effectively, consistently, and according to established quality standards.

Motivation is equally important because the MCH program depends on consistent frontline efforts, not only formal knowledge. A motivated workforce is needed for quality improvement initiatives to succeed because motivation influences persistence, learning behavior, problem-solving, and willingness to use data for improvement ([Chowdhury, Meena, & Barker, 2023](#)). Health worker motivation has been explained through mechanisms such as supervision, recognition, workload, incentives, and perceived organizational support ([Ebenso, Mbachu, Etiaba, Huss, Manzano, Onwujekwe, Uzochukwu, Ezumah, Ensor, Hicks, & Mirzoev, 2020](#); [Glenn, Moucheraud, Payan, Crook, Stagg, Sarma, Ahmed, Epstein, Luies, Rahman, Kruk, & Bossert, 2021](#)). Studies on employee performance show that motivation has a positive relationship with performance, although the effect may vary depending on resources and organizational context ([Ajirowo, 2024](#); [Bouckennooghe, Naseer, & Syed, 2022](#); [Idrus, Idrus, & Ismail, 2024](#); [Rozi, Widiyanti, Yusuf, & Hadjri, 2024](#); [Supriatna, Narimawati, & Sunarsi, 2024](#)).

Infrastructure provides the physical and technological basis for delivering services. In primary healthcare, infrastructure includes buildings, medical and non-medical equipment, information technology, transport access, utilities, safety, and readiness for referral. Infrastructure can influence performance because it affects both staff ability and patient access to care. Studies have shown that infrastructure and supervision facilities influence public service quality and employee performance ([Nengsih, Syahrudin, Azis, Elyani, Rosmika, Jumali, and Yusriadi \(2021\)](#)), while health-system performance in Africa is associated with infrastructure conditions ([Osakede, 2022](#)). Infrastructure quality also mediates or supports the relationship between quality culture and service quality ([Kartini, Samdin, Ramli, Sinarwati, & Zaludin, 2023](#)). In educational and public service settings, physical facilities improve service or learning processes when they are aligned with service needs ([Hasanuddin, Singgarniari, Faisal, Ritonga, Nasution, Wasesa, & Rahayu, 2023](#); [Jojo, 2022](#); [Yusriadi, 2021](#)).

Based on the literature, competence, motivation, and infrastructure are expected to influence service quality and MCH program performance. The hypotheses are:

H₂: Competence positively affects service quality

H₃: Motivation positively affects service quality

H₄: Infrastructure positively affects service quality

H₆: Competence positively affects MCH program performance

H₇: Motivation positively affects MCH program performance

H₈: Infrastructure positively affects MCH program performance

H₁₂: Service quality mediates the competence-performance relationship

H₁₃: Service quality mediates the motivation-performance relationship

H₁₄: Service quality mediates the infrastructure-performance relationship

2.4 Digitalization as a Moderator

Digitalization is the transformation of health data, service processes, and managerial decisions from manual or fragmented systems into integrated digital workflows that are more efficient. Digital transformation has implications for smart service quality because it can increase innovation, analytical capacity, mobility, and trust when systems are designed for actual use rather than symbolic compliance ([Khatib et al., 2024](#)). For MCH programs, digitalization can improve service quality through real-time data completeness, synchronization timeliness, electronic alerts, and dashboard-based monitoring. This can strengthen the relationship between service quality and program performance because managers can respond to risks before they become adverse.

The Indonesian health digital transformation agenda emphasizes electronic medical records, One Health data, interoperability, and integrated applications ([Kementerian Kesehatan Republik Indonesia, 2021](#)). However, the benefit of digital systems depends on whether users perceive the system as useful and whether digital data are analyzed for decision making. Therefore, this study expects that high digitalization strengthens the effect of service quality on MCH program performance, while low digitalization weakens this effect. The hypotheses are:

H₉: Service quality positively affects MCH program performance

H₁₀: Digitalization moderates the effect of service quality on MCH performance

3. Research Methodology

This study used a quantitative, cross-sectional survey design. This design was selected because the research aimed to test the relationships among organizational culture, competence, motivation, infrastructure, service quality, digitalization, and MCH program performance at one point in time. The study was conducted in the working area of the East Java Provincial Health Office and focused on ten districts with relatively high maternal mortality: Jember, Pamekasan, Banyuwangi, Nganjuk, Probolinggo, Malang, Gresik, Pasuruan, Bondowoso, and Blitar. These districts were selected because they provide a relevant setting for analyzing the performance of MCH programs in complex service conditions.

The population consisted of 10,238 midwives working in community health centers in the ten selected districts. The respondents were coordinating midwives and midwives responsible for the MCH cluster with at least five years of work experience. A purposive sampling strategy was used because the study required respondents who were directly involved in MCH services, program reporting, and coordination. The minimum sample size was calculated using the Slovin formula with a 5% margin of error, resulting in 385 respondents being required. The sample was rounded to 400 respondents to improve the representation across districts.

Primary data were collected using a structured questionnaire distributed through online forms and coordinated through district health offices and community health centers in the province. Items were measured using a five-point Likert scale ranging from strongly disagree to strongly agree. The questionnaire measured seven constructs: organizational culture, competence, motivation, infrastructure, service quality, digitalization, and MCH program performance. Secondary data from government reports, health program documents, and relevant scientific publications were used to support the background and interpretation of the findings.

The measurement model was evaluated through validity and reliability tests. IBM SPSS Statistics 30.0 was used to test the item validity and reliability in the pilot stage. JASP 0.95.0.0 was used for the descriptive analysis and visualization of the respondent characteristics. SmartPLS 4.0 was used to evaluate the construct structure and to test the path model. Confirmatory Factor Analysis (CFA) was applied to assess loading factors, Cronbach's alpha, composite reliability, and average variance extracted. The structural model was tested using bootstrapping in SmartPLS 4.0 to estimate the original sample coefficients, standard deviations, t-statistics, and p-values. The decision rule was t-statistics greater than 1.96 and p-value below 0.05 for statistical significance at the 5% level.

The conceptual model consists of four exogenous variables: organizational culture (X_1), competence (X_2), motivation (X_3), and infrastructure (X_4). Service quality (Z) was modeled as an intervening variable, digitalization (M) as a moderating variable, and MCH program performance (Y) as the dependent variable. Direct, indirect, and conditional effects were tested to answer the research objectives. The operationalization of the variables is presented in Table 1.

Table 1. Operational variables and retained measurement dimensions

Variables	Initial dimensions/items	Retained dimensions/items after CFA
Organizational culture (X_1)	Five dimensions: $X_{1.1}$ - $X_{1.5}$	Three dimensions: $X_{1.2}$ - $X_{1.4}$

Variables	Initial dimensions/items	Retained dimensions/items after CFA
Competence (X_2)	Five dimensions: $X_{2.1}$ - $X_{2.5}$	Four dimensions: $X_{2.2}$ - $X_{2.5}$
Motivation (X_3)	Five dimensions: $X_{3.1}$ - $X_{3.5}$	Four dimensions: $X_{3.2}$ - $X_{3.5}$
Infrastructure (X_4)	Five dimensions: $X_{4.1}$ - $X_{4.5}$	Three dimensions: $X_{4.2}$ - $X_{4.4}$
Service quality (Z)	Five SERVQUAL dimensions: $Z_{1.1}$ - $Z_{1.5}$	Three dimensions: $Z_{1.2}$ - $Z_{1.4}$
Digitalization (M)	Five dimensions: $M_{1.1}$ - $M_{1.5}$	Three dimensions: $M_{1.2}$ - $M_{1.4}$
MCH program performance (Y)	Six program indicators: $Y_{1.1}$ - $Y_{1.6}$	Three dimensions: $Y_{1.2}$ - $Y_{1.4}$

Table 1 summarizes the operationalization of the research variables and the measurement dimensions retained after the Confirmatory Factor Analysis (CFA). Indicators that did not satisfy the validity criteria were excluded, resulting in a refined measurement model comprising only valid and reliable dimensions of the scale. These retained dimensions were subsequently employed in the structural model analysis to examine the relationships among organizational culture, competence, motivation, infrastructure, service quality, digitalization, and maternal-child health program performance.

4. Results and Discussions

The study involved 400 midwives from ten districts in East Java, Indonesia. The district distribution was proportional to the population of midwives in the selected districts: Jember 64 respondents, Pamekasan 31, Banyuwangi 44, Nganjuk 30, Probolinggo 31, Malang 53, Gresik 48, Pasuruan 42, Bondowoso 28, and Blitar 29. Therefore, the final sample reflected the geographic and administrative diversity of the selected MCH service areas. A pilot test with 30 midwives showed that the questionnaire was suitable for broader distribution, and a subsequent CFA refined the measurement structure by eliminating dimensions that did not meet the validity and reliability criteria. The descriptive results indicated that respondents generally perceived organizational culture, competence, motivation, infrastructure, service quality, digitalization, and MCH program performance positively. This pattern suggests that the MCH workforce reported relatively strong organizational resources and service orientations. However, positive descriptive perceptions do not always translate into significant structural relationships.

This distinction is important because a high mean score does not necessarily indicate that a variable is a statistically significant driver of performance after controlling for other variables in the model. The CFA results showed that not all the initial dimensions were retained. Organizational culture, infrastructure, service quality, digitalization, and performance each required the elimination of several indicators, whereas competence and motivation retained four dimensions. This refinement indicates that some theoretical dimensions were not sufficiently strong in the context of MCH services in East Java. The final measurement structure was considered adequate for the structural model because the retained dimensions met the required validity and reliability criteria.

Table 2. Direct, moderated, and indirect effects in the structural model

Hypotheses/path	O	STDEV	t	p	Decision
H_1 : Culture -> Service quality	0.091	0.056	1.622	0.105	Not significant
H_2 : Competence -> Service quality	0.254	0.072	3.509	0.000	Significant
H_3 : Motivation -> Service quality	0.208	0.073	2.844	0.004	Significant
H_4 : Infrastructure -> Service quality	0.397	0.056	7.080	0.000	Significant

Hypotheses/path	O	STDEV	t	p	Decision
<i>H₅</i> : Culture → Performance	-0.202	0.072	2.825	0.005	Significant
<i>H₆</i> : Competence → Performance	0.203	0.160	1.271	0.204	Not significant
<i>H₇</i> : Motivation → Performance	0.171	0.143	1.199	0.231	Not significant
<i>H₈</i> : Infrastructure → Performance	0.326	0.074	4.420	0.000	Significant
<i>H₉</i> : Service quality → Performance	-0.568	0.372	1.525	0.127	Not significant
<i>H₁₀</i> : Service quality → Performance at high digitalization (+1 SD)	0.219	0.078	2.794	0.005	Significant
<i>H₁₀</i> : Service quality → Performance at mean digitalization	0.164	0.074	2.203	0.028	Significant
<i>H₁₀</i> : Service quality → Performance at low digitalization (-1 SD)	0.109	0.080	1.361	0.173	Not significant
<i>H₁₁</i> : Culture → Service quality → Performance	-0.052	0.052	0.992	0.321	Not significant
<i>H₁₂</i> : Competence → Service quality → Performance	-0.144	0.109	1.317	0.188	Not significant
<i>H₁₃</i> : Motivation → Service quality → Performance	-0.118	0.090	1.309	0.191	Not significant
<i>H₁₄</i> : Infrastructure → Service quality → Performance	-0.225	0.150	1.502	0.133	Not significant

Table 2 presents the results of the structural model, including the direct, moderated, and indirect effects. The findings indicate that competence, motivation, and infrastructure significantly improved service quality, whereas organizational culture did not. Program performance was significantly influenced by organizational culture and infrastructure, whereas competence, motivation, and service quality did not exhibit significant direct effects. Furthermore, digitalization significantly strengthened the relationship between service quality and program performance at moderate and high levels of digitalization, but not at low levels. The indirect effects of service quality on the relationships between the exogenous variables and program performance were not statistically significant, indicating that service quality did not mediate these relationships.

4.1 Direct effects on Service Quality

The first set of findings concerns the determinants of the service quality. Organizational culture did not significantly affect service quality ($O = 0.091$, $t = 1.622$, $p = 0.105$), indicating that shared norms and values were not sufficient to produce better service quality in the MCH program. This finding

does not deny the importance of culture, but suggests that culture must be operationalized into concrete service routines, supervision, and data-use practices before it can improve the quality experienced at the frontline. This differs from studies that found stronger culture-service relationships in general public service settings ([Helmina et al., 2024](#); [Situnite et al., 2023](#)). But is plausible in an MCH context where technical standards and infrastructure are more immediate determinants.

Competence positively and significantly affected service quality ($O = 0.254$, $t = 3.509$, $p = 0.000$). This result confirms that knowledge, skills, and managerial ability enable midwives to provide better MCH. This finding is consistent with those of [Apriyanti \(2023\)](#), [Herwina \(2022\)](#), and [Sugiharti et al. \(2023\)](#), who found that competence contributes to service or performance outcomes. In MCH services, competence is particularly important because quality depends on risk identification, counseling, documentation, and referral coordination. Competence also supports digital adoption because workers must understand how data entry, dashboard interpretation, and early warning alerts relate to clinical and program decisions.

Motivation also significantly improved the service quality ($O = 0.208$, $t = 2.844$, $p = 0.004$). This result supports the argument that motivated health workers are more willing to maintain service standards, communicate with clients and respond to operational challenges. This finding is consistent with evidence that workforce motivation is essential for quality improvement in health systems ([Chowdhury et al., 2023](#); [Ebenso et al., 2020](#)). This result also aligns with studies showing the relationship between motivation and service quality or performance in public organizations ([Ajirowo, 2024](#); [Nesa et al., 2024](#); [Sibonde & Dassah, 2021](#)).

Infrastructure has the strongest positive effect on service quality ($O = 0.397$, $t = 7.080$, $p = 0.000$). This means that buildings, equipment, information technology, transportation access, utilities, and safety arrangements are highly relevant to the quality of MCH services in East Java. This result is consistent with the findings of [Kartini et al. \(2023\)](#), [Nengsih et al. \(2021\)](#), [Osakede \(2022\)](#), and [Yusriadi \(2021\)](#), who reported that infrastructure supports service quality and health system performance. In MCH services, infrastructure is not merely physical support; it determines whether midwives can conduct examinations, record data accurately, communicate referrals, and reach clients with risk factors to ensure their safety.

4.2 Direct Effects on MCH Program Performance

Organizational culture had a significant effect on MCH program performance ($O = -0.202$, $t = 2.825$, $p = 0.005$), although the coefficient was negative. The significance indicates that culture matters for performance, but the negative direction suggests that some aspects of the existing culture may not align with performance-oriented digital governance. For example, a culture that emphasizes formal reporting may maintain administrative compliance while limiting adaptive learning and data-driven actions. This result highlights the need to transform the culture toward openness, timely feedback, and accountability for MCH outcomes. It extends prior studies on organizational culture and performance ([Hung et al., 2022](#); [Imaniar Cahyani & Yunus, 2022](#); [Osman et al., 2023](#); [Utomo et al., 2024](#)) by showing that culture can have complex effects on a public health program.

Competence did not significantly affect MCH program performance ($O = 0.203$, $t = 1.271$, $p = 0.204$). This suggests that individual competence alone is insufficient to improve program-level outcomes when the system lacks the enabling conditions. In MCH programs, performance depends not only on the competence of individual midwives but also on infrastructure, workload, referral systems, supervisory feedback, and data integration. Although studies such as [Herdiyana et al. \(2023\)](#), [Kusumah et al. \(2024\)](#), and [Pujiastuti \(2025\)](#) show that competence can improve performance, the present finding indicates that competence must be embedded in supportive program governance to affect MCH indicators.

Motivation did not significantly affect program performance ($O = 0.171$, $t = 1.199$, $p = 0.231$). This does not mean that motivation is unimportant; rather, motivation improves service quality but does not directly change program performance when systemic bottlenecks are present. Motivation may be

diluted by workloads, data fragmentation, resource constraints, and limited feedback from digital systems. This interpretation is supported by studies showing that motivation interacts with feedback, incentives, resources, and organizational support ([Bouckennooghe et al., 2022](#); [Glenn et al., 2021](#); [Idrus et al., 2024](#); [Rozi et al., 2024](#); [Supriatna et al., 2024](#)).

Infrastructure had a significant positive effect on MCH program performance ($O = 0.326$, $t = 4.420$, $p = 0.000$). This finding confirms the strategic role of infrastructure in the implementation of programs. In MCH services, adequate infrastructure allows community health centers to provide antenatal care, conduct examinations, manage data, coordinate referrals, and respond to complications. This result supports [Hasanuddin et al. \(2023\)](#) and [Jojo \(2022\)](#), who argued that facilities and equipment create conditions for better performance. It also confirms the relevance of infrastructure to health system outcomes in resource-constrained settings ([Osakede, 2022](#)).

4.3 Service Quality, Digitalization, and Indirect Effects

Service quality did not significantly affect the MCH program performance directly ($O = -0.568$, $t = 1.525$, $p = 0.127$). This result is notable because service quality is often assumed to be a direct pathway to better performance. In this study, however, service quality was effective only when supported by digitalization. A possible explanation is that program performance requires more than perceived quality at the service point; it also requires reliable data, timely synchronization, early detection, and effective managerial action. Similar arguments appear in the digital-service literature, which emphasizes that quality is strengthened by analytical capability, trust, and adaptability ([Khatib et al., 2024](#)).

Digitalization significantly moderates the relationship between service quality and performance. At a high level of digitalization (+1 SD), the conditional effect of service quality on performance was significant ($O = 0.219$, $t = 2.794$, $p = 0.005$). At the mean level of digitalization, the effect remained significant ($O = 0.164$, $t = 2.203$, $p = 0.028$). At a low level of digitalization (-1 SD), the effect was insignificant ($O = 0.109$, $t = 1.361$, $p = 0.173$). These findings indicate that digitalization functions as an enabling condition: service quality contributes to program performance when digital systems provide timely, accurate and actionable information. Without sufficient digitalization, quality improvements may remain localized and not be captured or transformed into program-level outcomes.

The indirect effects of service quality on organizational culture, competence, motivation, and infrastructure were not significant. This implies that service quality did not mediate the effect of these organizational factors on performance. This result is consistent with the non-significant direct effect of service quality on performance. This implies that service quality alone cannot serve as the central bridge between organizational inputs and MCH performance unless it is connected to digital monitoring and decision-making. This finding is also consistent with that of [Saputra et al. \(2024\)](#), who emphasized that hospital and health service performance depends on the combined influence of leadership, service quality, and job satisfaction rather than a single service quality pathway.

The novelty of this study is the empirical evidence that digitalization can transform service quality into program performance. The digitalized performance dimension proposed in this study includes MCH digital data completeness, synchronization timeliness, digital early detection accuracy, dashboard monitoring utilization, alert-response systems, and user satisfaction. These indicators expand conventional MCH performance measurements beyond coverage and output. They also align with Indonesia's digital health transformation agenda, which promotes interoperable electronic health records and integrated data for improved health governance ([Kementerian Kesehatan Republik Indonesia, 2021](#)).

From a managerial perspective, the findings suggest four strategies: First, institutionalization is needed to ensure that digital MCH data are part of routine governance and not viewed as a separate administrative burden. Second, technical and interoperability policies should connect community health centers, district health offices, referral hospitals, and provincial monitoring systems. Third, clinical policies should integrate early warning systems so that digital alerts are linked to referrals and

emergency responses. Fourth, management policies should promote data-driven decision-making, where dashboards are used for supervision, feedback and resource allocation. These strategies are consistent with evidence that service quality and performance improve when organizational resources, infrastructure, and data systems are aligned ([Kartini et al., 2023](#); [Nengsih et al., 2021](#); [Ramadan et al., 2023](#); [Siswanto et al., 2023](#); [Sitorus et al., 2024](#)).

5. Conclusions

5.1 Conclusion

This study achieved its objectives by testing the effects of organizational culture, competence, motivation, and infrastructure on service quality and MCH program performance while examining service quality as an intervening variable and digitalization as a moderating variable. The findings show that competence, motivation, and infrastructure significantly improved service quality, with infrastructure having the strongest influence. Organizational culture does not significantly affect service quality. For MCH program performance, organizational culture and infrastructure were significant predictors, while competence, motivation, and service quality were not direct significant predictors. The negative coefficient of organizational culture suggests that cultural alignment with digital governance is an important managerial issue.

The most important conclusion is that digitalization significantly strengthens the relationship between service quality and MCH program performance. Service quality became a significant predictor of performance only when digitalization was at the mean or high levels. Therefore, improving MCH performance in East Java requires more than improving frontline service behavior; it requires integrated digital monitoring, timely data synchronization, early warning systems, dashboard utilization, alert-response mechanisms, and user satisfaction with digital tools. Service quality must be connected to data-driven governance so that quality improvements can be translated into measurable, program outcomes.

5.2 Research Limitations

This study had several limitations. First, the cross-sectional design limits causal interpretation because all variables are measured at one point in time. Second, the data were collected from midwives through self-reported questionnaires; therefore, the findings may have been influenced by perception bias. Third, the study focused on ten districts with high maternal mortality in East Java; therefore, generalization to all districts or other provinces should be made with caution. Fourth, this study measured digitalization through user perceptions and program indicators, whereas future studies should also include system log data, dashboard usage statistics, response time records, and clinical outcome data.

5.3 Suggestions and Directions for Future Research

Policymakers should prioritize infrastructure improvement and digital system integration because these variables have direct and moderating roles in program performance. The East Java Provincial Health Office should strengthen institutionalization policies for digital MCH data, technical policies for interoperability, clinical policies for early warning and referral responses, and management policies for data-driven decision-making. Community health centers should use dashboards not only for reporting but also for supervision, feedback, and the rapid identification of high-risk pregnancies and neonatal conditions.

Future research should use longitudinal designs to examine whether digitalization results in sustained improvements in MCH outcomes. Researchers should combine survey data with objective digital trace data, referral records and district-level performance indicators. Comparative studies across provinces would also be useful to examine whether the moderating role of digitalization differs according to infrastructure readiness, workforce capacity, and governance culture. Qualitative research with midwives, district managers, and pregnant women could deepen the understanding of why digital systems are sometimes experienced as administrative burdens rather than decision-support tools.

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Author Contributions

TI contributed to the conceptualization, study design, data collection, data analysis, interpretation, and manuscript drafting. EY contributed to the conceptualization, supervision, methodological direction, manuscript review, and final approval. SR contributed to the supervision, model refinement, manuscript review, and final approval. All the authors approved the final manuscript.

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