Cross Sector Collaboration to Enhance the Effectiveness of Digital Transformation in Public Service

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Abstract – This research aims to analyse the impact of cross-sector collaboration on the effectiveness of digital transformation in public services, focusing on the role of the Communication and Information Office of Serang City. Digital transformation in public services is expected to enhance speed, efficiency, and user satisfaction, and encourage technology adoption among employees. This study uses a quantitative approach with Partial Least Square (PLS) analysis method through SmartPLS 4 software, examining the relationship between Cross-Sector Collaboration variables (interaction frequency, engagement level, inter-agency communication, and resource support) and Digital Transformation Effectiveness. The research results show that cross-sector collaboration has a positive and significant impact on the effectiveness of digital transformation. Specific, consistent interactions, active engagement between agencies, effective communication, and adequate resource support have been proven to enhance the efficacy of digitalisation implementation. The effectiveness of digital transformation significantly impacts user satisfaction, service speed, process efficiency, and technology adoption among employees. These findings underscore the importance of cross-sector collaboration in supporting the success of digital transformation in the public sector. This research provides practical implications for government agencies, particularly the Department of Communication and Information, to strengthen inter-agency synergy to maximise the benefits of digitalization in public services. With the successful implementation of effective digital transformation, public institutions can realize services that are more responsive, efficient, and sustainable for the community.

Keywords: Effectiveness, Department of Communication and Information; Cross-Sector Collaboration; Digital Transformation; Public Services.

1. INTRODUCTION

Building transparent, efficient and effective governance is one of the government's main priorities to improve the quality of public services. (Ikmal & Indriastuti, 2022; Susila Wibawa, 2019; Syaprianto, 2017). In today's technological era, digital transformation is seen as a strategic step to achieve certain goals; this will make public services faster, and easier, and by the needs of the community. (Curtis, 2023; Lindgren & van Veenstra, 2018; Mergel et al., 2018; Sahur & Amiruddin, 2023; Shin & Rakhmatullayev, 2019) . With digital transformation in public services, the government can reduce excessive bureaucracy, increase responsiveness, and provide more integrated services. (Mergel et al., 2018). However, in practice, the implementation of digital transformation faces various challenges that hinder the optimization of public services. (Jonathan et al., 2021)

One approach that is believed to be able to overcome these obstacles is through *cross-sector collaboration. (Anderson et al., 2023; Fisk et al., 2024; Madden, 2017; Stone et al., 2023).* Cross-sector collaboration, involving cooperation between government, the private sector, and the community, is important in implementing digital transformation because it allows Diskominfo to share the resources, expertise, and technology needed. (Carlsson et al., 2023). *Collaborative Governance* Theory emphasizes that regular interaction, effective communication and active participation of the various parties involved are essential in achieving common goals. (Hoffmann et al., 2023; Seo et al., 2023; Wiechman et al., 2024). In addition, the *Resource Dependence theory*

suggests that collaboration can help government agencies overcome resource constraints through access to external support.

Several studies support the application of Resource Dependence Theory (RDT) in the context of government collaboration to address resource constraints. This theory suggests that organizations can obtain external resources through strategic partnerships, which in turn help them manage dependencies and strengthen operational capacity. In the context of inter-agency collaboration ((Elston et al., 2018) describe how inter-agency collaboration in the public sector enables local governments to reduce costs and address budget constraints through increased productive efficiency. In addition, this collaboration allows for more comprehensive and effective public service objectives. (Abdurakhmonov et al., 2021) explores how dependence on government contracts affects firm investment and market performance, contributing to resource dependency theory. (Berardo, 2014)highlights government collaboration with external policy actors to produce needed goods and services, relevant to resource dependency theory. Collaboration between organizations to create value in digital government projects (van der Hoorn & Killen, 2021).

Another study by (Picazo-Vela et al., 2018)emphasizes that inter-organizational collaboration in the public and private sectors not only addresses resource constraints but also improves service processes through collaborative management, which adds value to digital government projects. Furthermore, (Tenakwah & Otchere-Ankrah, 2020)showed that in developing countries, collaboration between local government institutions is a solution to budget constraints and public service problems, although its implementation is still in its early stages.

Digital transformation in the public service sector is very important to improve service efficiency and user satisfaction. Research shows that digitalization simplifies the service process by reducing the time required to access services, as well as improving government transparency and accountability. For example, a study in Indonesia by (Gustiana & Pohan, 2023)on digital identity services shows that digital innovations that are well-received by users significantly increase positive perceptions of public services. The implementation of digital technology also accelerates licensing services and increases user satisfaction, as shown in a study (Rahman & Megah Sari, 2023) in Majene Regency, which uses the SiCantik Cloud and OSS applications in public services. This technology makes it easier for residents to access services from anywhere, especially during the COVID-19 pandemic, when direct access to public services is very limited.

Serang City, as a developing city, faces the need for a responsive and efficient public service system amidst the increasing population and the need for transparency. (Ambarak et al., 2023; Silwal, 2023). In this context, cross-sector collaboration is key for Diskominfo to increase the effectiveness of the digital transformation being pursued. However, the extent to which this collaboration contributes to increasing the effectiveness of digital transformation in Diskominfo of Serang City is still unknown. (Arifidianto, 2023). Therefore, research to understand the extent to which cross-sector collaboration can support the effectiveness of digital transformation in public services (Buyannemekh et al., 2023; Rahman & Megah Sari, 2023; Wiyati, 2023)

Several studies have shown that effective cross-sector collaboration can improve inter-agency communication, strengthen resource sharing, and optimize stakeholder engagement in digital transformation (Lee et al., 2019). In developed countries, various cross-sector collaboration models have been implemented to accelerate digitalization, with results showing improvements in service speed and user satisfaction.

While there have been many studies on cross-sector collaboration in developed countries, more in-depth research is needed in developing countries such as Indonesia. Factors such as the frequency of inter-agency interactions, the level of involvement in decision-making, effective communication, and resource support have not been widely explored in the Indonesian context. In addition, more robust research is needed to understand the specific role of Diskominfo in facilitating cross-sector collaboration to support the effectiveness of digital transformation.

This study aims to examine the relationship between *Cross-Sector Collaboration variables* (frequency of interaction, level of involvement, inter-agency communication, and resource support) with *Digital Transformation Effectiveness* (user satisfaction, speed of service, process efficiency, and level of technology adoption). This study is expected to obtain an empirical understanding of how cross-sector collaboration can support improving the quality of public services and how the role of Diskominfo can be strengthened in digitalization efforts. The hypotheses proposed are:

H1: The frequency of interaction between agencies has a positive influence on the effectiveness of digital transformation.

H2: The level of involvement between agencies has a positive influence on the effectiveness of digital transformation.

H3: Inter-agency communication has a positive influence on the effectiveness of digital transformation.

H4: Resource support from related agencies has a positive influence on the effectiveness of digital transformation.

2. LITERATURE REVIEW

a. Cross-Sector Collaboration in Government

Cross-sector collaboration refers to cooperation between organizations or institutions from the public, private, and community sectors to achieve common goals (Hrelja et al., 2016; Rogers, 2023). In the context of government, cross-sector collaboration is important to address complex problems and requires a multi-dimensional approach. This collaboration includes information exchange, coordination of activities, and more efficient resource allocation to improve public service performance. (Boruvka & Amsler, 2021; Bradley, 2020; Nurhayati & Rahman, 2023).

Cross-sector collaboration in public services can improve the effectiveness of government policies by integrating the knowledge and resources of various actors (Prayugo, 2017; Vuori et al., 2018). Collaboration between government agencies can accelerate decision-making and improve the policy implementation process, which is often hampered by unclear separation of duties between agencies. The more often these agencies interact, the better the results achieved in implementing public policies, including in terms of digitalization of public services (Carter, 2016; Fuster Morell & Senabre Hidalgo, 2022; Herrera-Medina & Riera Font, 2023).

Key factors influencing the success of cross-sector collaboration include the frequency of interaction between institutions, the level of active involvement of related parties, effective communication, and the availability of sufficient resource support to ensure smooth collaboration. Thus emphasizing the importance of the role of leaders who can direct and coordinate cross-sector collaboration, which is a determining factor in achieving the desired goals. (Abouelfetouh, 2022; Lu & Misener, 2023).

For example, cross-sector collaboration in several large cities undergoing digital transformation shows that effective collaboration can accelerate technology adoption and encourage the implementation of more efficient digital systems, reduce bureaucratic barriers, and improve the quality of services to the public. This emphasizes that open and transparent communication between government agencies is essential to avoid misunderstandings that can hinder the implementation of new technologies (Annette, 2022; Ziozias & Anthopoulos, 2022).

b. The Role of Cross-Sector Collaboration in Digital Transformation

Digital transformation in public services involves not only the adoption of technology but also changes in the way government agencies operate (Carlsson et al., 2023). Cross-sector collaboration plays a major role in facilitating change (Bell et al., 2023; Moreno-Serna et al., 2020). Collaboration between government agencies can accelerate the implementation of digital technology because these agencies can share knowledge and experience in using new technologies (Fadwa & Mohamed, 2023; Han, 2023). With good collaboration, the government can minimize overlapping functions and increase efficiency in public services (Yang, 2023; Zhou et al., 2023).

In the context of digital transformation, factors such as frequency of interaction, effective communication between agencies, and active involvement greatly influence the effectiveness of digitalization (Hendra Halim et al., 2023). How communication and coordination between agencies affect the success rate of digitalization in the public sector, it was found that poor coordination can hinder the progress of digital transformation, while good coordination can accelerate technology implementation and increase the satisfaction of public service users (Wang et al., 2023).

In addition, sufficient resources, whether in the form of budget, training, or infrastructure, are needed to ensure that digital transformation runs smoothly. Cross-sector collaboration can help in this regard by providing the necessary resources, whether in the form of technical, financial, or

human resource support. (Andronic, 2023; Nouwen et al., 2023; Pang & Maceira, 2019; Soliz et al., 2023; Wang, C., Zhang, Y., Ding, H., 2023)

c. The Influence of Cross-Sector Collaboration on the Effectiveness of Digital Transformation

Several studies have shown that cross-sector collaboration has a significant positive impact on the effectiveness of digital transformation in the public sector (Dzhengiz & Patala, 2024; Nguyen et al., 2023)revealed that consistent collaboration between government agencies, reflected in the frequency of interaction and the level of active involvement, can increase the effectiveness of digitalization by accelerating decision-making and minimizing resistance to change, it was found that agencies with strong collaborative relationships managed to implement digital systems faster and more effectively than isolated agencies.

The effectiveness of digital transformation can be measured by several indicators, such as user satisfaction, speed of service, process efficiency, and technology adoption by employees (Alshammari et al., 2024; Hendra Halim et al., 2023; Huang et al., 2023). Stating that effective cross-sector collaboration can create conditions that support success in all four aspects. Collaboration formed between various sectors can reduce barriers faced in implementing new technologies and increase efficiency in government business processes.

d. Digital Transformation in Public Services

Digital transformation in the public sector refers to the use of digital technologies to change the way governments deliver services to citizens. This includes the application of information and communication technologies (ICT) to improve the quality, efficiency, and transparency of public services (Almohaimeed & Adam, 2024; Galdino de Magalhães Santos, 2024; Hakeem & Sulphey, 2024; Lecturer & Marketing, 2024; Nkgapele & Mokgolobotho, 2024). With the advancement of digital technology, governments in various countries are trying to adopt digital systems to speed up bureaucratic processes, improve interaction with citizens, and drive operational efficiency in various service sectors.

In the public sector, digital transformation is not only about introducing new technologies, but also about changes in the way government works, interactions between government and citizens, and integration between various public services. One real example of digital transformation is the development of e-government applications that allow people to access public services online, such as applying for permits, paying taxes, and managing other documents. This not only makes things easier for the public but also increases the internal efficiency of the government in managing data and resources (Carlsson et al., 2023; Sergiy & Vitalii, 2023).

In general, three main pillars support the success of digital transformation in public services, namely technology adoption**,** data and information management**.** And human resources (Nielsen et al., 2024). The importance of technological readiness and other supporting infrastructure, such as cloud computing and big data, to encourage the efficiency and effectiveness of public services. By adopting technology, the government can increase the speed, accuracy, and quality of services provided to the public, as well as increase the level of transparency and accountability in public budget management (Indriati & Supardal, 2023).

On the other hand, *the* challenges in digital transformation in the public sector note that although technology can accelerate public services, the adoption of technology in the government sector is often hampered by issues such as resistance to change, interoperability issues between systems, and budget constraints for implementing new technologies. Therefore, the government needs to have a clear and structured digital strategy, which involves relevant stakeholders and supports collaboration between institutions (Carlsson et al., 2023).

As part of the adoption of technology in the public sector, the implementation of digital-based systems in public services focuses on interactions between the government and the community. Digital technology increases user satisfaction through easy access to services, reduced waiting times, and reduced bureaucracy which often hinders the service process (Akida & Kandiri, 2024; Kniazieva et al., 2023; Qonita, 2024). The results of this study are in line with previous findings showing that improving public services through digital technology can have a positive impact on the speed, transparency, and responsiveness of the government.

Technology adoption is also closely related to the adoption of technology by government employees (Thomas et al., 2024)**.** One of the challenges in implementing digital transformation is how to convince government employees to adopt new technologies, the success of digital transformation, it is important to provide training and socialization about digital technology to employees so that they do not feel threatened by the changes, but instead see the benefits of implementing the new system.

e. The Relationship between Cross-Sector Collaboration and Digital Transformation Effectiveness

Cross-sector collaboration, namely cooperation between various government agencies, the private sector, and the community, has long been identified as one of the factors that determine the success of implementing various public policies (Daymond, 2015). In the context of digital transformation, cross-sector collaboration has a very important role because the success of implementing new technologies in the public sector often depends on the synergy between the various parties involved.

Cross-sector collaboration can increase the effectiveness of digital transformation by leveraging existing resources across sectors, accelerating decision-making, and reducing redundancy and emphasizes that well-organized collaboration between government agencies can help accelerate the implementation of digitalization, reduce resistance to change, and increase innovation in public services. In addition, they note that the more intensive the interaction between government agencies and other sectors, the greater the chances of success of the resulting digital transformation (Klemin et al., 2023).

A more in-depth study revealed that effective communication between sectors involved in digital transformation is essential to ensure that all parties have a clear understanding of the goals and benefits of digitalization. This collaboration also allows for greater sharing of information and experiences, which can reduce technical and administrative barriers that often arise in the implementation of digital systems. Singh et al. found that transparent communication and high frequency of interaction between institutions involved in digital transformation projects have a positive impact on accelerating technology adoption and implementing more efficient systems. (Sergiy & Vitalii, 2023).

Technology adoption in the public sector, driven by cross-sector collaboration, also has a direct impact on service speed**,** service quality**,** and user satisfaction, (Hartanti et al., 2022; Noor, 2022; Sawe & Cheluget, 2020). *Collaboration* between the technology sector, education sector, and public sector has a significant impact on the success of the digitalization of public service systems. This kind of collaboration not only accelerates technology adoption but also increases the level of public satisfaction with public services (Meshu & G, 2016; Suryanto et al., 2023).

In addition, cross-sector collaboration improves system integration, which in turn encourages the creation of more efficient processes in the implementation of public services. The higher the level of collaboration between institutions involved in digital transformation, the greater the ability to optimize operational processes, including integration between various digital platforms and applications used in public services. This allows for faster and more responsive public services, which directly affect user satisfaction and service efficiency (Qaedi Aqsa & Nugroho, 2023; Zhang et al., 2017)

3. METHODOLOGY

This study uses a quantitative approach with the Partial Least Squares (PLS) analysis method carried out using SmartPLS 4 software. The PLS method was chosen because of its ability to handle non-normal data and model complex relationships between variables, such as the relationship between cross-sector collaboration and the effectiveness of digital transformation in public services. In addition, PLS allows simultaneous modelling to test measurement and structural models simultaneously, which is by the purpose of this study is to determine the effect of cross-sector collaboration on the effectiveness of digitalization in public services (Hair et al., 2019).

The population in this study consisted of government employees and policymakers at the Serang City Communication and Informatics Office, as well as related agencies involved in the digital transformation process of public services. Using purposive sampling techniques, respondents

were selected based on certain criteria, namely those who have direct involvement in the digitalization process and collaboration between institutions. The sample used was 96 respondents, consisting of employees in related services and other agencies involved in the implementation of digitalization. The determination of the number of samples refers to the recommendations (Hair et al., 2019)who suggested a minimum sample size of between 100 and 200 respondents for PLS analysis.

This study examines two main variables: cross-sector collaboration and digital transformation effectiveness. Cross-sector collaboration is measured by four main dimensions, namely frequency of interaction, level of involvement, communication between agencies, and resource support. Meanwhile, the effectiveness of digital transformation is measured based on three main indicators: speed of service, user satisfaction, and process efficiency. All variables in this study are measured using a 5-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree", with a total of 20 questionnaire items consisting of 10 items for cross-sector collaboration and 10 items for digital transformation effectiveness (Table 1).

Data were collected through questionnaires distributed to respondents who were directly involved in the digital transformation process in Serang City. The validity and reliability of the questionnaire were tested using construct validity and composite reliability. Construct validity was tested by measuring convergent validity and discriminant validity, which ensure that each construct is measured with relevant indicators and distinguishes one construct from another. Reliability was measured using Cronbach's Alpha and Composite Reliability, with a minimum value of 0.7 to ensure the internal consistency of the instrument used.

Data analysis was performed using Smart PLS 4, which allows the analysis of complex structural models. This research model consists of two main parts: measurement modelling and structural modelling. At the measurement modelling stage, the validity and reliability of the indicators used to measure the existing constructs were tested. Construct validity was tested by measuring convergent validity and discriminant validity. Reliability was tested with Cronbach's Alpha and Composite Reliability, with values above 0.7 to indicate good internal consistency (*Hair et al., 2023*). At the structural modelling stage, the relationship between variables was tested using path coefficients and R-squared values to see how much variation in the effectiveness of digital transformation can be explained by cross-sector collaboration. Path significance testing was performed by bootstrapping, with 5000 subsamples to obtain t-statistics and p-values, where a p-value less than 0.05 indicates a significant relationship between variables (Sarstedt et al., 2020).

This study also tests four main hypotheses: (1) The frequency of interaction between institutions has a positive effect on the effectiveness of digital transformation, (2) The level of involvement between institutions has a positive effect on the effectiveness of digital transformation, (3) Communication between institutions has a positive effect on the effectiveness of digital transformation, and (4) Resource support between institutions affects the effectiveness of digital transformation. The results of the analysis will determine whether these hypotheses are supported by the data obtained.

Table 1. Description of Research Variables

Variables	Indicator	Reference
Interaction Frequency (x1)	S regularly holds meetings with other agencies to discuss the implementation of digitalization.	(Criado & Guevara-Gómez, 2021)
	Our agency frequently coordinates with other agencies to ensure smooth digital transformation.	
	The frequency of interaction between agencies in digitalization projects is quite high.	
Engagement Rate (x2)	All parties involved in the digital transformation process are actively involved in planning and implementation.	(Majumdarr et al., 2024)
	The involvement of agencies in digital collaboration is very high.	
	Every agency involved has the same commitment to implementing digitalization.	
Inter-Agency Communication (x3)	Communication between related agencies in digital transformation is running effectively.	(Buyannemekh et al., 2023)
	Each party has a clear understanding of their role and goals in the digitalization project.	

	Obstacles or misunderstandings between agencies can be overcome through good communication.	
Resource Support (x4)	Our agency gets sufficient resources (financial, technical, and human resources) to support the digital transformation process.	(Lee et al., 2019)
	Inter-agency resource support is sufficient to facilitate the digitalization process.	
	Each agency contributes to providing resources for the digitalization project.	
Service Speed (y1)	The implementation of digitalization has accelerated the public service process in our agency.	(Cardoso et al., 2024)
	The time required to complete public services is reduced with digitalization.	
	Public services are provided more responsively after the implementation of digital technology.	
User Satisfaction (y2)	Public service users feel more satisfied with the services provided through digital systems.	(Ait Lhassan et al., 2022)
	Digitalization has improved the user experience in accessing public services.	
	Service users feel more comfortable and at ease with the digital service system.	
Process Efficiency (y3)	Digitalization has increased the efficiency of administrative processes	(Kitsios et al., 2023)
	The use of digital technology reduces errors in the public service process.	
	The service process becomes simpler and faster thanks to the implementation of digital technology.	

As a final step, the reliability and validity test of the instrument was conducted to ensure that the measurement instrument in this study was valid and reliable. The validity test was conducted by measuring convergent validity and discriminant validity, while the reliability test was conducted using Cronbach's Alpha and Composite Reliability. This study also identified several limitations, such as the limited sample size that only included employees in Serang City, which may limit the generalization of the research results, as well as the use of purposive sampling techniques that may affect the diversity of views obtained.

4. RESULTS AND DISCUSSION
a. Measurement Model Test Results

Before testing the proposed hypothesis, construct validity and reliability tests were first carried out on the measurement model.

Table 2. Construct reliability and validity

Construction	Cronbach's alpha	(rho_a)	(rho_c)	(AVE)
Digital Transformation Effectiveness	0.845	0.871	0.875	0.645
Engagement Level	0.829	0.867	0.894	0.739
Inter-Agency Communication	0.733	0.765	0.752	0,609
Interaction Frequency	0.705	0.798	0.832	0.625
Resource Support	0.837	0.776	0.805	0.584

Based on the results of the analysis, all indicators used in this study showed good convergent validity, with the loading values factor for each indicator item above 0.7, which means that each indicator has a significant contribution to the measured construct. Furthermore, the composite reliability for each construct of cross-sector collaboration and digital transformation effectiveness also meets the recommended limits, which are more than 0.7, which indicates that the measurement instrument used is reliable. (Sarstedt et al., 2014)Likewise, Cronbach's Alpha for each construct was greater than 0.7, which indicates that all constructs in this study have high internal consistency.

In addition, the results of the discriminant validity test also show that the Average Variance Extracted (AVE) value for each construct is more than 0.5, which indicates that each construct has good discrimination against other constructs.

Furthermore, discriminant validity can ensure that each construct measures different aspects so that the research results can provide more specific insights into the factors that influence the effectiveness of digital transformation (see Table 3).

Table 3. Discriminant validity with the Fornell-Larcker criterionFornell-Larcker criterion

Construction	Digital Transformation Effectiveness	Engagement Level	Inter-Agency Communication	Interaction Frequency	Resource Support
Digital Transformation Effectiveness	0.667				
Engagement Level	0.332	0.859			
Inter-Agency Communication	0.468	0.593	0.713		
Interaction Frequency	0.409	0.418	0.535	0.791	
Resource Support	0.703	0.191	0.455	0.339	0.764

Validity uses the Fornell-Larcker Criterion, which serves to ensure that each construct in the model is measured uniquely by its indicators and does not have significant overlap with other constructs. The diagonal value in the table shows the square root of AVE for each construct, which is compared with the correlation value between other constructs. The results of the analysis show that all constructs meet the criteria for discriminant validity because the square root value of AVE for each construct is greater than its correlation with other constructs (Hair, Jr. et al., 2022).
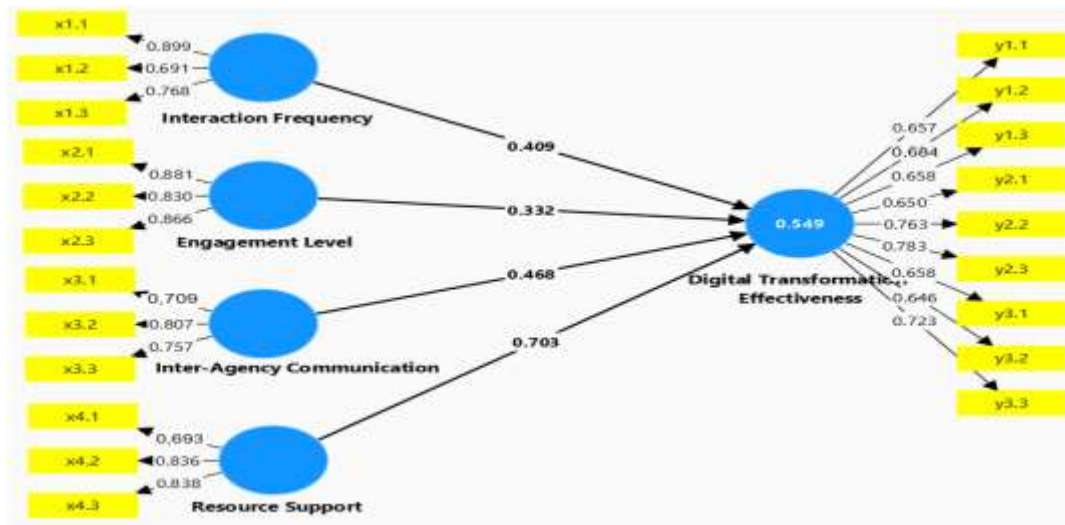

Figure 1. Hypothesised Model of the Study

In this model, each dimension of cross-sector collaboration has a positive influence on the effectiveness of digital transformation. The resource support dimension emerged as the most dominant factor, emphasizing the importance of providing adequate resources, such as technology, finance, and manpower, to support the implementation of digital transformation. Inter-agency communication also has a significant contribution, reflecting that effective communication between government agencies is essential to aligning goals, reducing barriers, and accelerating the digitalization process. In addition, the frequency of interaction and the level of involvement provide positive contributions by showing that routine interaction and active involvement between agencies can support the smoothness of digital transformation.

The effectiveness variables of digital transformation include aspects of speed, user satisfaction, and process efficiency, which reflect the success of implementing digitalization in public services. Digital transformation helps accelerate service completion, improve the quality of user experience, and simplify administrative processes. This model shows that synergy between agencies through cross-sector collaboration plays an important role in ensuring the success of digital transformation. The government needs to pay attention to the synergy between these dimensions to maximize the benefits of digital transformation in providing better services to the public.

b. Structural Model Testing Results

After the measurement model was tested and declared valid, a structural model test was carried out to determine the influence of cross-sector collaboration and the effectiveness of digital transformation.

Table 4. R-square

Construction	R-square	R-square adjusted
Digital Transformation Effectiveness	0.549	0.488

The results of the R-square and R-square adjusted analysis for the construct of digital transformation effectiveness in this study. The R-square value of 0.549 indicates that 54.9% of the variance in digital transformation effectiveness can be explained by the four dimensions of cross-sector collaboration including engagement level, agency communication, interaction frequency, and resource support. This value indicates that the model has a moderate to strong ability to explain the relationship between cross-sector collaboration and digital transformation effectiveness.

Meanwhile, the adjusted R-square value of 0.488 reflects the adjusted results by considering the number of predictors in the model. This value provides a more conservative estimate and shows that around 48.8% of the variance in the effectiveness of digital transformation can still be explained by the dimensions of cross-sector collaboration even with adjustment corrections. The rest, around 45.1% (for R-square) or 51.2% (for R-square adjusted), is influenced by other factors outside the model, such as organizational factors, work culture, or technological infrastructure that are not included in this study.

Table 5. The Structural Model

Path Coefficient	Standard deviation (STDEV)	T statistics	P values	Hypothesis	Decision
Engagement Level -> Digital Transformation Effectiveness	0.1 17	3,295	0.001	H1	Accepted
Inter-Agency Communication -> Digital Transformation Effectiveness	0, 107	2 , 399	0.016	H2	Accepted
Interaction Frequency -> Digital Transformation Effectiveness	0.1 04	5 ,766	0, 000	H3	Accepted
Resource Support -> Digital Transformation Effectiveness	0.131	4,708	0,000	H4	Accepted

The results of the path coefficient analysis measure the influence of cross-sector collaboration dimensions on the effectiveness of digital transformation. This analysis includes standard deviation (STDEV) values, t-t-statistics, and p-values, which are used to test the proposed hypotheses. Based on the test results, all hypotheses (H1, H2, H3, and H4) are accepted because they have a p-value <0.05, which means the relationship between variables is significant.

Based on the results of the path coefficient analysis, all dimensions of cross-sector collaboration (engagement level, inter-agency communication, interaction frequency, and resource support) have a significant influence on the effectiveness of digital transformation. The engagement level dimension shows that active involvement between agencies, such as participation in the planning and implementation of digital transformation, has a significant positive influence on the success of digitalization. This underlines the importance of the active role of all related parties in

creating synergies that support the transformation process. Furthermore, inter-agency communication also has a significant positive influence, confirming that effective communication between agencies helps align goals, accelerate decision-making, and reduce administrative barriers that often arise in the implementation of digitalization.

The interaction frequency dimension shows the strongest influence compared to other dimensions, indicating that frequent and consistent interaction between agencies is very important in supporting the success of digital transformation. Structured and routine interactions allow for better coordination, increase collaboration efficiency, and minimize potential errors in the digitalization process. In addition, resource support also makes a significant contribution and is one of the dominant factors in supporting the Effectiveness of Digital Transformation. Resource support including technology, funding, and a competent workforce has proven to be very influential in ensuring the success of digital technology implementation in public services.

Overall, these findings confirm that the four dimensions of cross-sector collaboration contribute significantly to the effectiveness of digital transformation. The dimensions of interaction frequency and resource support emerged as the main factors, while engagement level and inter-agency communication also had a significant positive effect. These results emphasize the importance of structured collaboration, supported by effective communication, active involvement, and adequate resources, in driving the success of digital transformation. This is in line with previous studies showing that the success of digital transformation in the public sector is greatly influenced by synergy and coordination across agencies. (Wang et al., 2023).

5. CONCLUSION

The results of this study reveal that a consistent frequency of interaction between agencies supports better coordination and accelerates decision-making in digitalization projects. The level of engagement shows that the active participation of all stakeholders is essential to create synergy in implementing digital transformation. Effective and transparent communication between agencies helps align common goals and minimizes misunderstandings that can hinder the technology implementation process. In addition, resource support, whether in the form of budget, infrastructure, or workforce, has proven to be one of the key factors driving the success of digital transformation implementation.

This study also underlines the importance of strategic collaboration management to improve service speed, process efficiency, and user satisfaction. These findings are in line with the theories of Collaborative Governance and Resource Dependence which emphasize the importance of synergy and utilization of shared resources in achieving common goals. In practice, these results provide recommendations to government agencies, especially the Serang City Communication and Information Service, to continue to strengthen cross-sector communication, increase engagement, and ensure adequate resource support in efforts to digitize public services.

However, this study has limitations in the limited sample size and specific geographic focus, so the results may not be fully generalizable to other regions. Future research can expand the geographic scope and consider other variables, such as organizational culture or technology readiness, to provide more comprehensive insights.

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