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# Digital Transformation For Inclusive Education In Rural Indonesia: Realizing Equity And Sdgs

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## Abstract

***Purpose:*** *The objective of this research is to discuss the implementation of digital transformation in inclusive education in rural Indonesia to achieve digital equity. Since 2020, the government has initiated a series of changes in the field of education with the Free Learning policy. In the academic year 2022/2023, as part of this policy, the Free Curriculum program was officially launched and gradually adopted by schools. In line with this, the year 2023 serves as a crucial moment and milestone for the government to seriously accelerate digital economic development, as directed by the President. Digitalization has become one of the pillars needed to withstand global uncertainties (Luhut Binsar Pandjaitan, Coordinating Minister for Maritime Affairs and Investment of the Republic of Indonesia). This means that digital equity is essential for the implementation of inclusive education in rural areas, not only focusing on major cities or tier 1 locations. Therefore, digital equity is the right of all Indonesian citizens. This digital equity has a strong relevance to the Sustainable Development Goals (SDGs) as it encompasses several goals included in the SDGs, particularly in education and technology access. The following is a more detailed explanation of the relevance between digital equity and SDGs: SDG 4: Quality Education, SDG 9: Industry, Innovation, and Infrastructure, and SDG 10: Reduced Inequalities.*

***Methodology/approach:*** *The method used was an online survey conducted among teachers teaching in rural Indonesia. Random sampling was utilized to select respondents, with a sample size of 297 individuals. The respondents were teachers who teach and serve in rural Indonesia. To analyze the collected data, the research employed the Structural Equation Modeling (SEM) technique, specifically using the Partial Least Squares (PLS) approach. The variables in this study included technology infrastructure, teacher readiness, digital literacy, sharing knowledge, awareness, and the effectiveness of interventions.*

***Results/findings:*** *The results of this research are expected to provide concrete and strategic recommendations on how digital equity can be implemented in the context of inclusive education in rural Indonesia. This includes enhancing accessibility, strengthening teacher competencies, providing relevant educational content, and fostering community participation and en[1]gagement.*

***Limitations:*** *This research is limited to the results of an online survey conducted among teachers who could only be reached through online surveys.*

***Contribution:*** *This research is expected to provide input and recommendations for stakeholders in the form of a conceptual framework or building blocks to achieve digital equity for the entire Indonesian population, particularly in inclusive education.*

***Novelty:*** *This research involves the variables of "awareness."*

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***Keywords:*** *Digital Equity, rural, Education, Inclusive, Teachers*

## 1. Introduction

Since 2020, the government has been making changes in education through the Merdeka Belajar (Freedom to Learn) policy. In the academic year 2022/2023, the Merdeka Curriculum program for primary and secondary schools was officially introduced and gradually adopted by schools. Minister of Education and Culture Nadiem Makarim said, "The Merdeka Belajar policy provides freedom for every educational unit to innovate. School teachers can enhance the quality of learning independently. Independence means not only following the process of educational bureaucracy but also innovating according to the conditions in which the teaching and learning process takes place, considering cultural aspects, local wisdom, socio-economic factors, and infrastructure".

Therefore, digitalization in education is essential, starting from technology infrastructure to the use of digital applications and learning platforms. Modern technology now permeates every aspect of life, thus it is essential for teachers of learners to be proficient in 21st-century skills to stay up with the speed of change (Baron, 2023). It has become one of the pillars needed to withstand global uncertainties (Luhut Binsar Pandjaitan), Coordinating Minister for Maritime Affairs and Investment of the Republic of Indonesia). Therefore, digital equity is the right of all Indonesian citizens because it is essential for the implementation of inclusive education in rural areas, not just in big cities or tier 1 locations. Digital equity has a strong relevance to the Sustainable Development Goals (SDGs) because it encompasses several goals included in the SDGs, particularly in education and technology access. The following is a more detailed explanation relevance between digital equity and SDGs: SDG 4: Quality Education, SDG 9: Industry, Innovation, and Infrastructure, and SDG 10: Reduced Inequalities.

Digitalization in education can take the form of internet access, e-learning dan distance learning, learning applications, collaborative platforms, digital administrative management, digital evaluation and tracking of student progress. Big Data and Analytic tools are also provided to understand trends and patterns in learning, including simulation tools and the use of Virtual Reality (VR), as well as the implementation of game media that offer interactivity with students. This digitalization must be inclusive, as inclusive education is a principle that promotes accessibility and equality in education for all individuals, regardless of their social, economic, or geographic background. However, in Indonesia, inclusive education remains a challenge in rural areas. Limitations in infrastructure, low accessibility, and lack of resources often hinder the provision of quality education to children in rural areas. Rural areas in Indonesia still face significant challenges in providing quality education for all children. Geographic distance, infrastructure limitations, and lack of resources are the main obstacles for children in rural areas to access education equal to their urban counterparts. This can widen the social and economic disparities between urban and rural areas. However, advancements in information and communication technology have provided new hope for the provision of inclusive education in rural areas. Digital transformation through the use of technologies such as the internet, computers, tablets, or smartphones can facilitate access to interactive learning content online and offline. The advancement of technology and information has a positive effect on society and makes it simpler for people to get information (Khaneghahi, Sefatgol, & Siyasar, 2022; Novanda, 2023; Sulistiobudi, Merizka, Syawie, & Paramitha, 2023).

In efforts to overcome these challenges, digital transformation has emerged as a potential solution. The utilization of digital technology, such as mobile devices, computers, the internet, and educational applications, has the potential to improve accessibility and quality of education in rural areas. Digital transformation in the context of education can help overcome existing geographic and infrastructural limitations, thereby providing greater opportunities for children in rural areas to access inclusive and quality education. Several previous studies have also highlighted the benefits of digital transformation in the context of inclusive education in Indonesia. For example, research by (Suryani & Sunyoto,

2020) showed that the use of digital technology in learning can help reduce the education gap between urban and rural areas. They found that by adopting technology-based learning approaches, such as e-learning and the utilization of mobile devices, rural students can have access to educational resources similar to urban students. Furthermore, another study by (Wahyuni & Sutawidjaja, 2019) revealed that digital transformation can enhance the participation and learning motivation of students in rural areas. With access to interactive and diverse educational content through digital technology, students become more engaged and enthusiastic in the learning process. This has the potential to improve their learning achievements and promote educational equality in rural areas. Studies such as those conducted by (Putri & Wardoyo, 2018) on the influence of information technology usage on the improvement of inclusive education in rural areas, (Suprapto & Kuswandi, 2017) researching the influence of information technology usage on the improvement of inclusive education in rural areas, (Nursasongko & Nurjannah, 2016) investigating the impact of digital technology applications in inclusive education in remote areas, (Smith & Peters, 2019) analyzing the digital readiness of teachers in adopting digital technology in the classroom, (Kucirkova, 2017) comparing digital literacy with print literacy and highlighting the importance of digital literacy skills in today's society,(Sharma & Gaur, n.d.) conducting a literature review on knowledge sharing and providing directions for further research, and (S. H. Hsu et al., 2016) analyzing the determinants of intervention effectiveness on social networking platforms.

These studies demonstrate that digital transformation can be key to achieving inclusive education and the Sustainable Development Goals (SDGs) in rural areas of Indonesia. However, despite some research supporting the benefits of digital transformation in inclusive education in rural areas, more in-depth research and studies are still needed to understand the broader impacts and strengthen these evidences. The novelty in this research lies in including the "awareness" variable, which refers to the level of understanding and knowledge of the community, especially regarding the importance of digital transformation in achieving inclusive education and SDGs. This variable includes awareness of the benefits of digital technology in education, understanding of digital access disparities in rural areas, and awareness of the importance of equal access and opportunities in digital transformation. The higher the awareness, the faster the support for realizing digital transformation. Therefore, this research aims to examine the influence of technology infrastructure, teacher readiness, digital literacy, knowledge sharing, awareness, and intervention effectiveness on digital transformation.

## 2. Literature Review And Hypothesis/Es Development

(Yu & Zheng, 2021), (Bawane & Spector, 2020), (Lee & Wu, 2020), (You & Kang, 2020), (Voogt & Knezek, 2018), ( Hsu et al., 2018), (Wang, 2017), (Selwyn, 2016), (Warschauer, 2016), and (Means et al., 2014) have all conducted studies on digital transformation in the field of education.

### 2.1. Tranformation Digital

The use of digital technology in education is referred to as "digital transformation," and it involves radically altering how we teach and learn. It entails utilising technology to improve the accessibility, quality, and relevance of education. This technology includes computers, mobile devices, the internet, applications, and digital platforms. Changes in the learning process, instructional techniques, data management, evaluation, and curriculum development are also included in the digital transformation. Its purpose is to develop a learning environment that is more interactive, collaborative, personalised, and adaptive, enabling students to be ready for the challenges of an ever-evolving digital world. In order to increase the accessibility, quality, and relevance of education, (UNESCO, 2011) defines digital transformation in education as the use of digital technology to alter and enhance the processes of learning, teaching, and educational management.

### 2.2. Technology Infrastructure

Technology infrastructure, as defined by (UNESCO, 2011), is the digital infrastructure, including hardware, software, networks, and other components, required to support the use of technology in an educational setting. Technology infrastructure, as defined by (Bawane & Spector, 2020), is the underlying hardware, software, networks, and digital infrastructure needed to enable and support the use of technology in education. It encompasses the physical elements—such as computers, servers, networks, and storage units—as well as the digital platforms, software programmes, and operating systems that make it easier to integrate and use digital technology in educational settings.(Voogt & Knezek, 2018) make a similar claim, stating that "technology infrastructure encompasses the physical and digital resources, including hardware, software, networking, and internet connectivity, that are necessary to support and enable the use of digital technologies in primary and secondary education. It covers the technological tools, resources, and systems that make it easier to administer and offer educational services and to integrate digital learning environments. According to studies by (Voogt & Roblin, 2012) and (Sun et al., 2008), a good technological infrastructure enhances the use of technology in education and contributes to the digital transformation of schools.

**Hypothesis 1: Technology Infrastructure will have a positive influence on digital transformation.**

### 2.3. Teacher Readiness

Teacher readiness refers to the knowledge, skills, attitudes, and beliefs that enable instructors to successfully integrate and utilise digital technology in their teaching practises, according to(Ertmer, Ottenbreit-Leftwich, Sadik, et al., 2012). In order to improve their digital competence, it necessitates not only technical competency but also a commitment to research and experiment with new technologies, adapt teaching methodologies, and engage in ongoing professional development. The personal and professional attributes that enable instructors to successfully integrate digital technologies into their educational practises are referred to as "teacher ready," according to (Gurol & Daloglu, 2014) It entails having a positive attitude towards technology, being adaptable, having a growth mentality, and having the technical know-how needed to use digital tools and resources efficiently. Teachers that are pedagogically and technologically prepared are better able to integrate and incorporate technology into their teaching methods. In their 2012 study, Mouza and Lavigne looked into the topic of teacher readiness for utilising educational technology and observed how it affected student learning achievement. The results of this study can provide light on how much instructor readiness for implementing educational technology affects students' ability to learn.

**Hypothesis 2: Teacher Readiness will have a positive influence on digital transformation.**

### 2.4. Digital Literacy

"Digital literacy refers to the competences and skills needed to effectively navigate, assess, create, and communicate utilising digital technology," say (Bawane & Spector, 2020). It includes the capacity for information retrieval, analytical thinking, collaborative problem-solving, and digital citizenship. According to research, the ability of teachers, students, and other educational stakeholders to adapt and use technology in the context of learning is strongly correlated with high levels of digital literacy. Teachers that are proficient in using digital tools, software, and online learning resources are better able to improve students' educational experiences. Students who have excellent digital literacy skills are also more equipped to use digital technology for independent learning. In the context of digital transformation, research also demonstrates that good digital literacy helps to increase the accessibility, quality, and relevance of education. People who have strong digital literacy are more likely to use digital resources, engage in online networks, and work virtually with others. The critical knowledge of digital information, digital ethics, online safety, and collaboration abilities are all part of what is meant by digital literacy, which goes beyond

technological competence. Therefore, a successful digital transition depends on initiatives to increase digital literacy among educators, including teachers, students, and other educational stakeholders. According to (Voogt & Knezek, 2018), increasing students' and instructors' digital literacy facilitates more inventive and effective use of technology in the classroom. Teachers can broaden their use of instructional strategies, encourage student cooperation, and raise learning engagement among their students by developing their digital literacy. The ability to search, analyse, and critically evaluate material in the information-rich digital age is another benefit of digital literacy for pupils. The development of curriculums that incorporate digital literacy and the creation of policies that promote the use of technology in schools are among the challenges and strategies for enhancing digital literacy in the educational environment.

**Hypothesis 3. Digital Literacy will have a positive influence on digital transformation.**

### 2.5. Knowledge Sharing

Knowledge sharing is the process of communicating and transferring knowledge across people, communities, or organisations, according to (Bawane & Spector, 2020). In addition to supporting the spread of tacit knowledge through collaboration, social networks, and online communities, it also involves sharing explicit knowledge via documents, databases, or digital platforms. To develop new knowledge or improve on current information, (Dalkir, 2013) states that "knowledge sharing is the process of transferring tacit and explicit knowledge among individuals, groups, or organisations." According to research done in 2013 by Leiva, Leiva, and Rodriguez-Ardura, knowledge sharing facilitated by digital technology can quicken the transition of education. In this study, it was discovered that teachers and other educational professionals can benefit from one another's knowledge sharing, adopt best practises, and gain new skills for utilising technology in teaching and learning. The use of technology in education is changing as a result, becoming more integrated, creative, and pertinent to students' needs. Further proof that knowledge sharing can assist schools in managing and optimising the use of technology for educational transformation is provided by a research by Lim & Hang from 2003. Teachers and school personnel may better utilise technology, create lesson plans that include it, and improve teamwork by exchanging expertise. The relationship between knowledge sharing and digital transformation in education thus shows that the presence of communities of practitioners who share knowledge and experiences via digital technology can speed up and broaden the implementation of technology in learning, enhance the calibre of teaching, and foster innovation in education.

**Hypothesis 4. Knowledge Sharing will have a positive influence on digital transformation.**

### 2.6. Awareness

In the context of the digital transformation, "awareness" refers to a person's comprehension and realisation of the need for change as well as the possible advantages and challenges connected with adopting and integrating digital technologies in education, according to (Bawane & Spector, 2020). (Teo et al., 2019) emphasises the significance of teachers' knowledge of technological pedagogical content knowledge (TPACK) and its impact on how technology is used in teaching and learning. The results of the study show that teachers who are well aware of TPACK are more adept at incorporating technology into their lessons and provide higher learning outcomes. Furthermore, the study by (Ertmer, Ottenbreit-Leftwich, & Tondeur, 2012) shows that teachers' attitudes, beliefs, and practises about the use of technology in the classroom can be influenced by their understanding of the significance of technology in the learning context. Teachers who have a strong understanding of technology advancements and how they might improve student learning are more willing to adopt new technologies, give them a try, and take the initiative to innovate their teaching methods. As a result, the connection between awareness and the digital transformation of education suggests that a strong understanding of technology and

its educational benefits might have an impact on how it is used and implemented. This understanding can speed up the adoption of useful and efficient technology in teaching and learning while also assisting educators in overcoming obstacles and difficulties that may develop during the digital transformation process.

**Hypothesis 5: Awareness will have a positive influence on digital transformation.**

### 2.7. Intervention Effectiveness

The impact and results of digital interventions in education, including how much they enhance student engagement, learning outcomes, instructional strategies, and overall educational quality, are referred to as intervention effectiveness, according to (Bawane & Spector, 2020). Given the relationship between intervention effectiveness and digital transformation in the context of education, it is possible to accelerate and drive the process of digital transformation in educational institutions by using effective digital interventions. According to (Tondeur et al., 2012) study, the success of digital interventions like technical assistance, training, and curriculum development that incorporates technology can have an impact on how much technology is adopted and used in education. The findings of this study indicate that successful interventions are essential for modifying teachers' attitudes towards technology and their instructional practises. The relevance of intervention efficacy is also highlighted in the study by (Ertmer et al., 2011) when adopting technology in education. This study shows that instructors are better able to successfully integrate technology into their teaching practises when they get appropriate interventions, such as training that is suited to their requirements and continuing support. As a result, the correlation between intervention effectiveness and digital transformation in education points to the importance of using effective digital interventions to promote change and technology adoption in the learning context. To meet the challenges of the digital transition and ensure successful technology use to support higher learning outcomes, teachers and educational institutions can benefit from appropriate and targeted interventions (Putra & Hariri, 2023).

**Hypothesis 6: Intervention Effectiveness will have a positive influence on digital transformation.**

## 3. Methodology

The method employed in this study involved conducting an online survey among teachers who teach in rural areas of Indonesia. A random sampling technique was used to select 200 respondents from this population. The respondents consisted of teachers who are actively serving in rural Indonesia. To analyze the gathered data, the research utilized the PLS technique, specifically employing the SmartPLS 3.3 application. The variables considered in this study encompassed technology infrastructure (MAP), teacher readiness (MKGP), digital literacy (LDP), knowledge sharing (BPP), awareness (KP), and intervention effectiveness (EIP) and tansformation digital (TDP) .

The author also conducted mapping of respondents' answers with the help of NVivo for open-ended questions related to: 1. How should the creation of inclusive education in rural areas be in line with current needs and conditions?, 2. What are the obstacles or challenges encountered in teaching in rural areas?, 3. How and what are your expectations as a teacher to create digital equity in the short term?, 4. What needs to be incorporated in the planning of digital equity for rural areas, such as where you teach?, 5. This was done with the aim of providing recommendations related to the implementation of digital transformation that realize equity and Sustainable Development Goals (SDGs).

## 4. Results and discussion

Table 1. Descriptive Statistics

| Variabel | Median | Maximum | Minimum | Mean | Standard Deviasi |
|---|---|---|---|---|---|
| MAP | 4 | 5 | 1 | 3.890 | 1.044 |
| MKGP | 4 | 5 | 1 | 4.207 | 0.698 |
| LDP | 4 | 5 | 1 | 4.078 | 0.682 |
| BPP | 4 | 5 | 1 | 3.897 | 0.752 |
| KP | 4 | 5 | 1 | 4.325 | 0.609 |
| EIP | 4 | 5 | 1 | 3.811 | 0.789 |
| TDP | 4 | 5 | 1 | 3.709 | 0.955 |

Source: Data processed in 2023

The data shows that the average responses of the respondents for each research variable fall between Agree (3) and Strongly Agree (SS). The distribution of respondents based on provinces indicates that the highest number of respondents, 26%, comes from North Sumatra Province. This means that the overall responses from the respondents are uneven or not yet at their maximum level.

Table 2. Distribution of Respondents by Province

| Province | amount | Pracentage | Province | amount | Pracentage |
|---|---|---|---|---|---|
| Aceh | 1 | 0,003% | Kepulauan Riau | 24 | 8% |
| Bali | 12 | 4% | Lampung | 1 | 0% |
| Bangka Belitung | 3 | 1% | Maluku | 24 | 8% |
| Yogyakarta | 3 | 1% | NTT | 27 | 9% |
| Jakarta | 9 | 3% | Papua | 8 | 3% |
| Jambi | 2 | 1% | Papua Barat Daya | 5 | 2% |
| Jawa Tengah | 14 | 5% | Papua Pegunungan | 5 | 2% |
| Jawa Barat | 3 | 1% | Papua Selatan | 1 | 0,003% |
| Jawa Timur | 1 | 0% | Papua Tengah | 2 | 1% |
| Kalimantan Barat | 16 | 5% | Sulawesi Barat | 1 | 0% |
| Kalimantan Selatan | 1 | 0,003% | Sulawesi Selatan | 11 | 4% |
| Kalimantan Utara | 6 | 2% | Sulawesi Tengah | 8 | 3% |
| Kalimantan Timur | 10 | 3% | Sulawesi Utara | 11 | 4% |
| Kalimantan Tengah | 10 | 3% | Sumatera Utara | 76 | 26% |
| | | | Sumatra Selatan | 2 | 1% |
| | | | Total | 297 | 100% |

Source: Data processed in 2023

Table 3 shows that the highest level of education among the respondents is a bachelor's degree (S1) with a total of 272 respondents, accounting for 92%. Meanwhile, those with a master's degree (S2) amounted to 23 respondents, or 8%.

Table 3. Distribution of Respondents by Education Level

| Education Level | amount | Pracentage |
|---|---|---|
| S1 | 272 | 92% |
| S2 | 23 | 8% |
| S3 | 0 | 0 |
| Diploma | 2 | 1% |

| | | |
|---|---|---|
| SMA | 0 | 0 |
| Lainnya | 0 | 0 |

Source: Data processed in 2023

Table 4 shows that the number of female respondents is more dominant, with a total of 183 respondents, accounting for 62%.

Table 4. Distribution of Respondents by Gender

| Gender | amount | Pracentage |
|---|---|---|
| Male | 114 | 38% |
| Female | 183 | 62% |

Source: Data processed in 2023

Table 5 displays the distribution of respondents based on age, where the majority fall between the ages of 31 and 40 years, accounting for 54%. There are also respondents who are actively teaching or dedicating themselves above the age of 50 years, amounting to 5%.

Table 5. Distribution of Respondents by Age

| Age | amount | Pracentage |
|---|---|---|
| a) Less than 20 years | 0 | 0% |
| b) 20-30 years | 14 | 5% |
| c) 31-40 years | 161 | 54% |
| d) 41-50 years | 106 | 36% |
| e) More than 50 years | 16 | 5% |

Source: Data processed in 2023

Table 6 shows that the majority of respondents' teacher status serves in elementary schools (SD), amounting to 42%.

Table 6. Distribution of Respondents by Teacher Status

| Teacher Status | amount | Pracentage |
|---|---|---|
| SD | 125 | 42% |
| SMP | 108 | 36% |
| SMA | 64 | 22% |

Source: Data processed in 2023

Table 7 shows that 65% or 192 respondents have been serving as teachers in rural areas for more than 10 years.

Table 7. Based on Years of Teaching Experience

| Years of Teaching Experience | amount | Pracentage |
|---|---|---|
| < 1 year | 4 | 1% |
| 1-5 years | 14 | 5% |
| 6-10 years | 87 | 29% |
| > 10 years | 192 | 65% |

Source: Data processed in 2023

Figure 1. PLS Test Results

### 4.1. Model Estimation

The PLS-Algorithm in the SmartPLS program is the parameter estimate technique employed in this study. Convergent validity is used to evaluate the requirements for testing each construct's unidimensionality. The loading factor should be more than 0.7 for confirmatory assessment, according to the general rule of thumb used to determine convergent validity (Ghozali, 2014). This indicates that a reflective measurement's correlation to the measured construct must be larger than 0.7 in order to be called high.

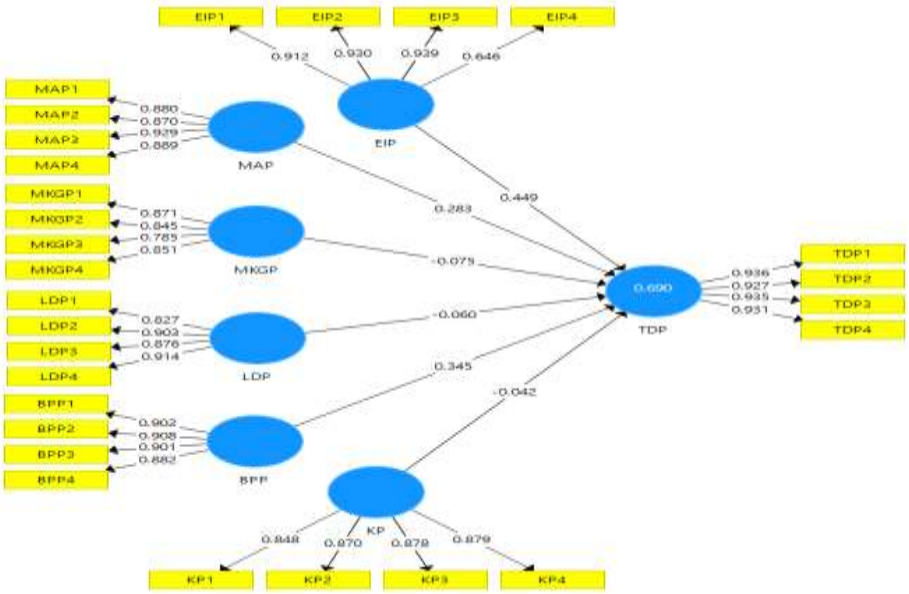


Figure 1. Loading Factor Model
Source: Data processed in 2023

Based on Figure 1, it can be observed that the relationships between each variable and its indicators exceed 0.7, indicating that convergent validity is confirmed for the assessment.

### 4.2. Model Evaluation

The evaluation of the model for the outer model and inner model is then conducted by examining the output results from the PLS-Algorithm.

#### 4.2.1. Outer Model Testing

The outer model is a measurement model used to assess validity and reliability. Through the iteration process of the algorithm, the measurement model parameters of convergent validity, composite reliability, and Cronbach's alpha are evaluated according to three criteria by Abdillah and Hartono (2015). These criteria are as follows:

**1. Convergent Validity**

Convergent validity testing in PLS with reflective indicators is assessed based on the loading factor (the correlation between item/component scores and construct scores) of the indicators that measure the constructs (Abdillah and Hartono, 2015). The loading factor can be observed from the outer loading output. Here is the outer loading output based on the PLS-Algorithm estimation:

Table 8. Output Outer Loading.

| Outer Loading | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **BPP** | **EIP** | **KP** | **LDP** | **MAP** | **MKGP** | **TDP** |
| **BPP1** | **0.902** | | | | | | |
| **BPP2** | **0.908** | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **BPP3** | **0.901** | | | | | | |
| **BPP4** | **0.882** | | | | | | |
| **EIP1** | | **0.912** | | | | | |
| **EIP2** | | **0.930** | | | | | |
| **EIP3** | | **0.939** | | | | | |
| **EIP4** | | **0.646** | | | | | |
| **KP1** | | | **0.848** | | | | |
| **KP2** | | | **0.870** | | | | |
| **KP3** | | | **0.878** | | | | |
| **KP4** | | | **0.879** | | | | |
| **LDP1** | | | | **0.827** | | | |
| **LDP2** | | | | **0.903** | | | |
| **LDP3** | | | | **0.876** | | | |
| **LDP4** | | | | **0.914** | | | |
| **MAP1** | | | | | **0.880** | | |
| **MAP2** | | | | | **0.870** | | |
| **MAP3** | | | | | **0.929** | | |
| **MAP4** | | | | | **0.889** | | |
| **MKGP1** | | | | | | **0.871** | |
| **MKGP2** | | | | | | **0.845** | |
| **MKGP3** | | | | | | **0.785** | |
| **MKGP4** | | | | | | **0.851** | |
| **TDP1** | | | | | | | **0.936** |
| **TDP2** | | | | | | | **0.927** |
| **TDP3** | | | | | | | **0.935** |
| **TDP4** | | | | | | | **0.931** |

Source: Data processed in 2023

Based on the Outer loading output in Table 8, it can be seen that the loading factor results for all indicators of each construct have met the convergent validity requirement, as all loading factor values for each indicator are above 0.70. The model has a sufficient validity if it has an AVE value greater than 0.50. Here is the AVE output:

Table 9. Average Variance Extracted (AVE)

| **Keterangan** | **AVE** |
|---|---|
| **BPP** | **0.807** |
| **EIP** | **0.749** |
| **KP** | **0.755** |
| **LDP** | **0.775** |
| **MAP** | **0.796** |
| **MKGP** | **0.703** |
| **TDP** | **0.869** |

Source: Data processed in 2023

According to Table 9's AVE (Average Variance Extracted) result, all latent variables satisfy the criteria for convergent validity because the AVE values for each variable are larger than 0.50. This suggests that in order to achieve the required convergent validity, where the AVE

value should be more than 0.50, the latent variables might reflect the indicators inside their respective blocks.

**2. Discriminant Validity**

Based on the cross-loading measurement with its constructs, discriminant validity is evaluated. The cross-loading output is shown below:

Table 10. Cross Loading

| | BPP | EIP | KP | LDP | MAP | MKGP | TDP |
|---|---|---|---|---|---|---|---|
| **BPP1** | **0.902** | 0.579 | 0.669 | 0.765 | 0.435 | 0.686 | 0.567 |
| **BPP2** | **0.908** | 0.553 | 0.642 | 0.739 | 0.515 | 0.677 | 0.562 |
| **BPP3** | **0.901** | 0.593 | 0.583 | 0.739 | 0.527 | 0.662 | 0.590 |
| **BPP4** | **0.882** | 0.616 | 0.598 | 0.681 | 0.544 | 0.625 | 0.656 |
| **EIP1** | 0.544 | **0.912** | 0.378 | 0.403 | 0.706 | 0.449 | 0.770 |
| **EIP2** | 0.621 | **0.930** | 0.468 | 0.478 | 0.623 | 0.511 | 0.703 |
| **EIP3** | 0.583 | **0.939** | 0.445 | 0.459 | 0.660 | 0.457 | 0.726 |
| **EIP4** | 0.554 | **0.646** | 0.668 | 0.623 | 0.314 | 0.574 | 0.406 |
| **KP1** | 0.532 | 0.365 | **0.848** | 0.576 | 0.268 | 0.586 | 0.262 |
| **KP2** | 0.672 | 0.536 | **0.870** | 0.671 | 0.413 | 0.609 | 0.530 |
| **KP3** | 0.542 | 0.423 | **0.878** | 0.608 | 0.309 | 0.616 | 0.317 |
| **KP4** | 0.604 | 0.445 | **0.879** | 0.625 | 0.300 | 0.590 | 0.336 |
| **LDP1** | 0.649 | 0.434 | 0.527 | **0.827** | 0.422 | 0.622 | 0.376 |
| **LDP2** | 0.726 | 0.546 | 0.609 | **0.903** | 0.404 | 0.654 | 0.450 |
| **LDP3** | 0.702 | 0.439 | 0.672 | **0.876** | 0.348 | 0.616 | 0.469 |
| **LDP4** | 0.777 | 0.468 | 0.725 | **0.914** | 0.371 | 0.667 | 0.452 |
| **MAP1** | 0.496 | 0.627 | 0.324 | 0.380 | **0.880** | 0.392 | 0.639 |
| **MAP2** | 0.517 | 0.635 | 0.379 | 0.360 | **0.870** | 0.410 | 0.613 |
| **MAP3** | 0.523 | 0.640 | 0.352 | 0.403 | **0.929** | 0.477 | 0.667 |
| **MAP4** | 0.479 | 0.561 | 0.331 | 0.411 | **0.889** | 0.483 | 0.604 |
| **MKGP1** | 0.619 | 0.480 | 0.677 | 0.641 | 0.469 | **0.871** | 0.427 |
| **MKGP2** | 0.621 | 0.443 | 0.577 | 0.620 | 0.338 | **0.845** | 0.351 |
| **MKGP3** | 0.568 | 0.495 | 0.478 | 0.508 | 0.432 | **0.785** | 0.431 |
| **MKGP4** | 0.660 | 0.428 | 0.587 | 0.664 | 0.402 | **0.851** | 0.433 |
| **TDP1** | 0.600 | 0.744 | 0.351 | 0.431 | 0.689 | 0.437 | **0.936** |
| **TDP2** | 0.627 | 0.656 | 0.445 | 0.504 | 0.644 | 0.498 | **0.927** |
| **TDP3** | 0.655 | 0.731 | 0.498 | 0.528 | 0.620 | 0.503 | **0.935** |
| **TDP4** | 0.597 | 0.748 | 0.381 | 0.402 | 0.683 | 0.406 | **0.931** |

Source: Data processed in 2023

Based on the cross-loading output in Table 10, a variable is considered to have discriminant validity if the cross-loading value is above 0.7. The cross-loading values are indicated in bold and they have met the requirement of being above 0.7.

**3. Composite Reliability**

Cronbach's alpha, which assesses the lower bound of reliability for a construct, and composite reliability, which is thought to be superior for evaluating the internal consistency of a construct, can both be used for reliability testing in PLS (Syarif, Rumengan, & Gunawan, 2021; Yahya & Yani, 2023)(Abdillah and Hartono, 2015). According to the

general rule, Cronbach's alpha and composite reliability values should both be higher than 0.7 (Abdillah and Hartono, 2015). However, values above 0.6 are still acceptable. However, if construct validity has been proved, internal consistency testing is not necessarily necessary because a valid construct is one that is reliable, whereas a reliable construct is not always valid. Following is the output for composite and Cronbach's alpha:

Table 11. Cronbach's Alpha and Composite Reliability

| | **Cronbach's Alpha** | **Reliabilitas Komposit** | **Keterangan** |
|---|---|---|---|
| **BPP** | **0.920** | **0.944** | **Reliable** |
| **EIP** | **0.884** | **0.921** | **Reliable** |
| **KP** | **0.896** | **0.925** | **Reliable** |
| **LDP** | **0.903** | **0.932** | **Reliable** |
| **MAP** | **0.915** | **0.940** | **Reliable** |
| **MKGP** | **0.859** | **0.904** | **Reliable** |
| **TDP** | **0.950** | **0.964** | **Reliable** |

Source: Data processed in 2023

Table 11's Cronbach's alpha and composite reliability results show that each construct has a value over 0.70, which indicates that both the estimated model and the individual constructs have high reliability.

**4. Inner Model Testing**

The structural model (inner model) can be tested further if the estimated model satisfies the requirements for discriminant validity. The predictive capability of the structural model is represented by the R-Square ($R^2$) value for each endogenous latent variable. According to Ghozali (2014), the substantive influence of exogenous latent variables can be explained by changes in the $R^2$ value. The amount that the independent latent variable's variation can be described by the dependent latent variable is indicated by the coefficient of determination ($R^2$). According to Abdillah and Hartono (2015), a higher $R^2$ value denotes a more accurate predictive model from the suggested model. According to Ghozali (2014), a model is regarded strong if the $R^2$ value is 0.75, moderate if it is 0.50, and weak if it is 0.25.

Table 12. R-Square ($R^2$)

| | **R Square** | **Adjusted R Square** |
|---|---|---|
| **TDP** | 0.690 | 0.684 |

Source: Data processed in 2023

The output in Table 12 displays a value of 0.690 based on the test findings. As a result, it may be said that the model's value is moderate. In other words, variable X can account for 69.0% of the variation in variable TDP.

**5. Hypothesis testing and Discussion**

The critical t-value is taken from the table, and the calculated t-value is compared to it. The presence or absence of a relationship between the variables is ascertained through this comparison. Using the SmartPLS program, the bootstrapping results are used to calculate the t-value. The bootstrapping test is also run to reduce problems with data non-normality in the study. In this work, hypothesis testing is done using a one-tailed hypothesis test with a t-value of > 1.65 and the t-statistic value, with = 0.1 (Ghozali, 2014). By looking at the path coefficients generated by the bootstrapping findings, hypotheses are tested. The outcomes of the output path coefficients used to evaluate the impact of the constructions BPP, KP, LDP, MAP, MKGP, and EIP on TDP are shown below.

Table 13. Path coefficients

| | Sampel Asli (O) | Rata-rata Sampel (M) | Standar Deviasi (STDEV) | T Statistik (\|O/STDEV\|) | P Values |
|---|---|---|---|---|---|
| **BPP -> TDP** | 0.345 | 0.336 | 0.107 | 3.214 | **0.001** |
| **KP -> TDP** | -0.042 | -0.037 | 0.051 | 0.830 | **0.407** |
| **LDP -> TDP** | -0.060 | -0.060 | 0.063 | 0.946 | **0.345** |
| **MAP -> TDP** | 0.283 | 0.283 | 0.060 | 4.688 | **0.000** |
| **MKGP -> TDP** | -0.075 | -0.070 | 0.065 | 1.156 | **0.248** |
| **EIP-> TDP** | 0.449 | 0.450 | 0.069 | 6.482 | **0.000** |

Source: Data processed in 2023

On the basis of Table 13, it is evident that BPP significantly positively affects TDP. The findings from the SmartPLS 3.3 program show that the P-Value of 0.001 is less than 0.10 and the T-Statistics value of 3.214 is greater than 1.65 following the bootstrapping process with a one-tailed test at a 10% error level. It follows that Hypothesis H1, which asserts that BPP significantly influences TDP, is supported. Some reasons why knowledge sharing variables significantly influence digital transformation: increased collaboration, accelerated organizational learning, innovation and creativity, responsiveness to change, human resources and leadership development, and enhanced efficiency and effectiveness. This is consistent with the findings of research studies (Li, Zhang, & Guo, 2018; Shen & Wang, 2019; Martins, Rindova, & Greenbaum, 2015; Goh & Lee, 2010; Lin, 2007)(Ebuka, Emmanuel, & Idigo, 2023; Hnaka, Ouassou, & Riad, 2023).

KP does not have a substantial impact on TDP. Based on the outcomes from the SmartPLS 3.3 application, the t-Statistics value of 0.830 is less than 1.65, and the P-Value of 0.407 is more than 0.10 following the bootstrapping process with a one-tailed test at a 10% error level. Hypothesis H2, which asserts that KP significantly positively affects TDP, is therefore unsupported. These findings are consistent with the research by Loc, Vu, Vu, & Chau (2022). Awareness can be an important factor in certain aspects of digital transformation; however, in some cases, awareness alone is not sufficient to significantly influence digital transformation. Here are several reasons why awareness may not always have a significant impact on digital transformation: lack of follow-up actions, ambiguity or lack of understanding, resistance to change, resource constraints, and insufficient commitment and support from leadership.

The LDP has no discernible impact on the TDP. Based on the outcomes from the SmartPLS 3.3 application, the T-Statistics value of 0.946 is less than 1.65 and the P-Value of 0.345 is higher than 0.10 following the bootstrapping process using a one-tailed test at a 10% error level. In light of this, Hypothesis H3, which asserts that LDP significantly positively affects TDP, is not supported. The reasons why digital literacy may not significantly influence digital transformation can include: inadequate implementation, technology mismatch with needs, a culture that is unsupportive of innovation and change, educational limitations, and other dominant factors such as lack of support from top management, resource constraints, or resistance to change that may present more significant barriers in achieving digital transformation. The research findings are consistent with Farias-Gaytan, Aguaded, & Ramirez-Montoya (2022). The study aimed to identify studies related to digital transformation and digital literacy in higher education institutions through a systematic literature review. The results show (a) the interest of educational institutions in empirical studies where technology is used for didactic purposes, (b) challenges and opportunities in training programs to develop digital competencies of teachers and students, (c) limited interest in the development of media literacy, and (d) the methodological aspects of the studies allow exploring new perspectives on digital transformation in higher education.

TDP is significantly impacted favorably by MAP. According to the outcomes from the SmartPLS 3.3 program, the T-Statistics value of 4.688 is larger than 1.65 and the P-Value of 0.000 is less than 0.10 following the bootstrapping process with a one-tailed test at a 10% error level. As a result, Hypothesis H4, which asserts that MAP significantly positively affects TDP, is accepted. Teacher competence significantly influences digital transformation due to: technology implementation in the classroom, use of digital resources, adaptability to technological innovations, critical skills in technology evaluation, and change leadership. These research findings are consistent with Demetriadis, Pombortsis, Pomportsis, & Papakonstantinou (2017), Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur (2012), Handal, Campbell, Cavanagh, & Petocz (2018), Koehler & Mishra (2009), (Suharto, Yuliansyah, & Suwarto, 2021), (Sari, Suharto, & Dacholfany, 2021).

The MKGP has no discernible impact on TDP. Based on the outcomes from the SmartPLS 3.3 application, the T-Statistics value of 0.946 is less than 1.65 and the P-Value of 1.156 is more than 0.10 following the bootstrapping process with a one-tailed test at a 10% error level. Hypothesis H5, which asserts that MKGP significantly positively affects TDP, is therefore unsupported. Several reasons why teacher competence may not significantly influence digital transformation can be attributed to limited training opportunities, low digital literacy levels, resistance to change, infrastructure challenges, lack of resources, and curriculum mismatches.The research findings by Antonietti, Cattaneo, & Amenduni, (2022) state that there is a positive and significant relationship between teachers' beliefs about their digital competence and their beliefs about the ease of using technology and the perceived benefits of technology in teaching. The latter, in turn, positively correlates with the intention to use technology.

EIP significantly has a good impact on TDP. According to the outcomes from the SmartPLS 3.3 program, the T-Statistics value of 6.482 is larger than 1.65 and the P-Value of 0.000 is less than 0.10 following the bootstrapping process with a one-tailed test at a 10% error level. As a result, Hypothesis H6, which asserts that EIP significantly positively affects TDP, is accepted. The effectiveness of interventions influences digital transformation because appropriate interventions can help organizations or individuals overcome barriers, enhance technology-related skills and knowledge, and drive positive changes in the use of digital technology. With effective interventions, digital transformation can proceed more smoothly, quickly, and successfully. Several reasons why the effectiveness of interventions influences digital transformation are: Improving Digital Literacy, Culturally Transforming, Enhancing Technology Adoption, Increasing Awareness and Skills, and Support from Leaders and Management. The results of this research are in synergy with the findings of previous studies (Cabral, Vieira, & Farinha, 2021; Hossain & Dwivedi, 2018; Kloepfer, Back, & von Pape, 2018; and Markkula & Karkkainen, 2018)(Filiantari, Suharto, & Mazni, 2021; Jaya, 2021).

Based on the input from the respondents related to digital transformation, it was mapped using NVivo, and the findings were related to the creation of inclusive education in rural areas. Figure 2 displays the results of mapping the input from respondents processed by NVivo related to the creation of inclusive education in rural areas.

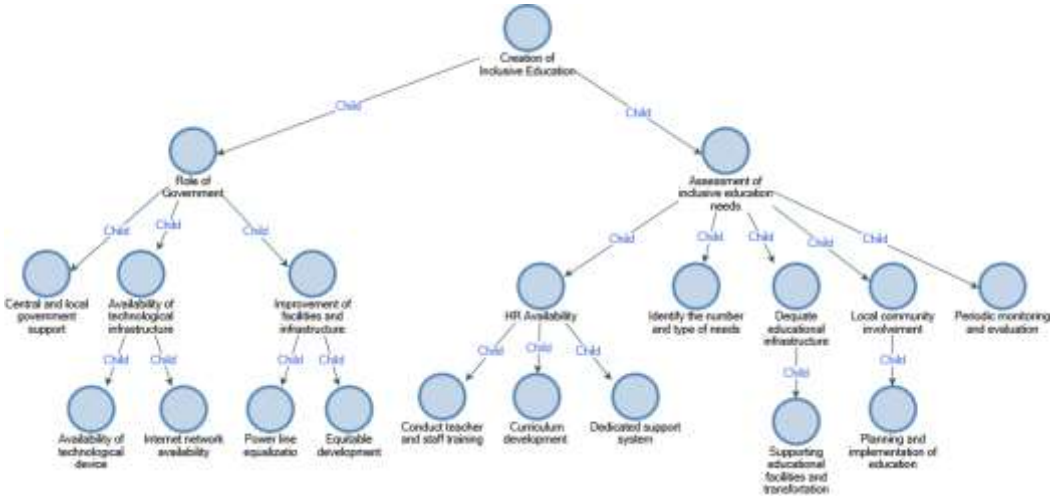


Figure 2. Mapping the creation of inclusive education in rural areas
Source: Data processed in 2023

In the creation of inclusive education, the input from respondents highlighted two key aspects: the role of the government and the assessment of inclusive education needs. The role of the government encompasses crucial factors such as central and local government support, the availability of technological infrastructure, and the improvement of facilities and infrastructure. Specifically, the availability of technological infrastructure includes access to technological devices and internet network availability. Moreover, the improvement of facilities and infrastructure involves power line equalization and equitable development.

To ensure the successful implementation of inclusive education in rural areas, it is essential for the government to provide robust support, allocate resources for technological advancements, and prioritize the development of necessary facilities. Furthermore, bridging the digital divide by enhancing access to technology and internet connectivity can create an inclusive learning environment for all students, regardless of their geographical location. By addressing these factors, the government can play a pivotal role in fostering a conducive and equitable educational landscape in rural communities.

Respondents' input regarding the constraints or obstacles encountered in teaching in rural areas is presented in the following mapping:

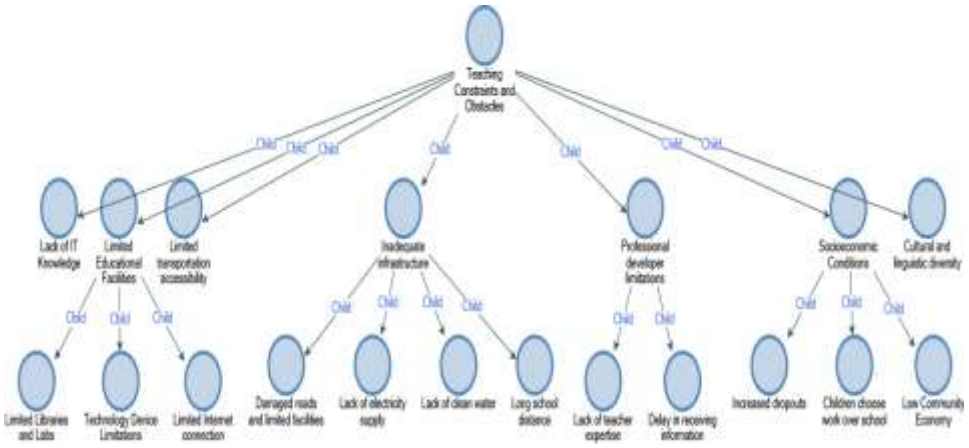


Figure 3. Mapping the constraints or obstacles encountered in teaching in rural areas
Source: Data processed in 2023

In terms of teaching constraints and obstacles, respondents provided valuable input on several challenges, including a lack of IT resources, limited educational facilities, and restricted transportation accessibility. The limited educational facilities encompass issues such as the scarcity of libraries and labs, restrictions on technology device availability, and insufficient internet connectivity. Furthermore, inadequate infrastructure, limitations in professional development opportunities, and diverse socioeconomic, cultural, and linguistic backgrounds were also identified as hindrances to inclusive education. Notably, the socioeconomic conditions present a set of unique challenges, leading to increased dropouts, children opting for work instead of attending school, and a struggling local economy. Addressing these teaching constraints and obstacles requires comprehensive efforts and collaborative initiatives from stakeholders, including policymakers, educators, and community members. By investing in educational infrastructure, providing necessary IT resources, and fostering professional development for teachers, we can create an inclusive learning environment that caters to the diverse needs of students in rural areas. Additionally, community engagement and support are pivotal in creating opportunities for all children to access quality education, thus positively impacting the socioeconomic development of the region.

The next aspect related to Creating Digital Justice Expectations is presented in Figure 4.

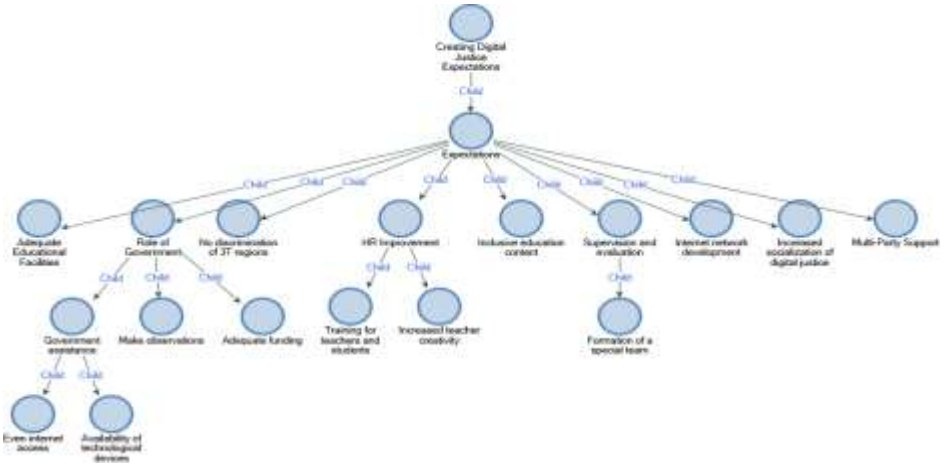


Figure 4. Mapping the Creating Digital Justice Expectations
Source: Data processed in 2023

In the Creating Digital Justice Expectations section, various aspects were identified, encompassing expectations related to adequate educational facilities, the role of the government, non-discrimination of 3T regions, HR improvement, inclusive education content, supervision, and evaluation, internet network development, increased socialization of digital justice, and multi-party support. Under the Role of Government, respondents highlighted the need for government assistance, making observations, and providing adequate funding. Government assistance specifically requires ensuring even internet access and the availability of technological devices. In terms of HR Development, respondents emphasized the importance of training for teachers and students and fostering increased teacher creativity. Additionally, in the supervision and evaluation domain, forming a special team was seen as a crucial step in ensuring effective implementation.

By addressing these expectations and factors, it is possible to foster digital justice and equitable access to education, ultimately creating an inclusive and supportive environment for learners in rural areas. The involvement of multiple stakeholders, including the government, educational institutions, and the broader community, is essential to ensure a holistic and effective approach in realizing digital justice goals.

As for the assessment of inclusive education needs, it includes considerations such as HR availability, identifying the number and type of needs, adequate educational infrastructure,

local community involvement, and periodic monitoring and evaluation. HR availability involves conducting teacher and staff training, curriculum development, and establishing a dedicated support system. Adequate educational infrastructure encompasses supporting educational facilities and transportation. In terms of local community involvement, it involves actively participating in the planning and implementation of education initiatives. By conducting a comprehensive assessment of inclusive education needs, educational stakeholders can better understand the specific requirements and challenges faced in providing equitable education in rural areas. This information allows for the development of tailored strategies and solutions that address the unique needs of students and educators in these communities. Furthermore, active engagement of the local community ensures that education initiatives align with the local context and are more likely to garner widespread support and success. Periodic monitoring and evaluation play a vital role in continuously refining and improving inclusive education efforts, thereby paving the way for transformative and sustainable educational outcomes.

Below are the inputs from respondents regarding what needs to be incorporated in the planning of digital justice for rural areas.

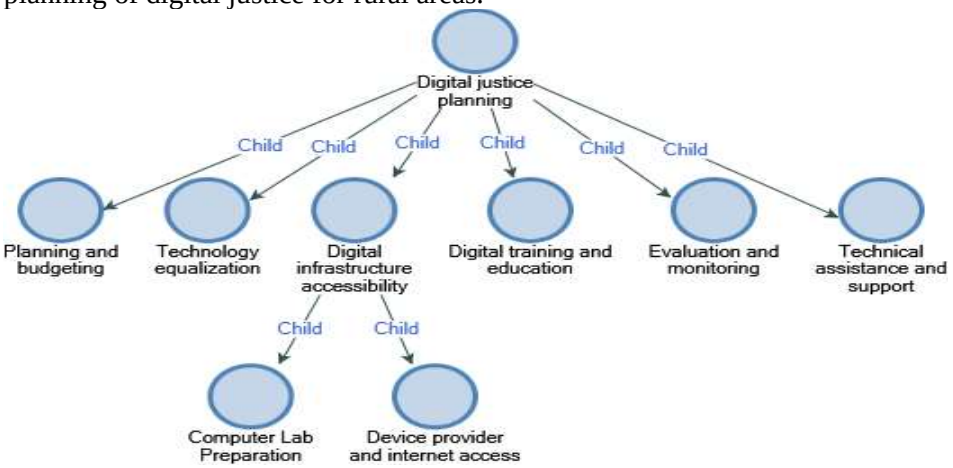


Figure 5. Mapping the Digital Justice Planning
Source: Data processed in 2023

Regarding digital justice, there are several inputs from the respondents, which include the need for planning and budgeting, technology equalization, accessibility to digital infrastructure, digital training and education, evaluation and monitoring, as well as technical assistance and support. To achieve digital justice, comprehensive planning and budgeting are essential to allocate resources efficiently and ensure equitable access to technology and digital resources. Technology equalization aims to bridge the digital divide by providing equal opportunities for all individuals, regardless of their socio-economic background, to access and use digital tools and services. Ensuring accessibility to digital infrastructure is crucial in creating an inclusive digital environment, where everyone can benefit from technological advancements. Additionally, offering digital training and education is vital to enhance digital literacy skills, empowering individuals to effectively use technology for personal and professional growth. Evaluation and monitoring play a significant role in assessing the impact of digital justice initiatives and making necessary adjustments to improve their effectiveness. Technical assistance and support provide valuable guidance and aid in resolving any challenges that may arise during the implementation of digital justice programs. By addressing these key components, stakeholders can work together to create a more equitable digital landscape, fostering equal opportunities and access to technology for all members of society. This contributes to building a digitally empowered community, capable of harnessing the full potential of technology for societal progress and individual empowerment.

## 5. Conclusion

### 5.1. Conclusion

Achieving the SDGs as a universal aspiration is not an easy task without recognizing its interconnectedness with other crucial aspects. The formula for one country may not be the same or applicable to another country. This research reveals that in supporting Digital Transformation for Inclusive Education in Rural Indonesia: Realizing Equity and SDGs, there is still much improvement needed, including raising awareness to achieve such conditions, enhancing digital literacy skills, and improving teacher competencies.

### 5.2. Limitation

This research is limited to the results of an online survey conducted among teachers who could only be reached through online surveys. Penelitian belum memasukkan kebijakan dan pola yang diterapkan oleh pemerintah daerah atau provinsi terkait dengan penerapan transformasi digital.

### 5.3. Suggestion

The subsequent research incorporates the interconnections and roles of various aspects of digital transformation that specifically support Realizing Equity and SDGs, which are believed to have direct or indirect impacts on Digital Inclusivity in Education. These aspects include Economic Empowerment through Digital Entrepreneurship, Digital Healthcare and Access to Health Information, Digital Government Services, Digital Connectivity and Infrastructure Development, Data-driven Decision Making, Digital Financial Inclusion, and Digital Environmental Sustainability.

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