



# The Impact of Digital Innovation in School Admission on the High School Participation of Students from Poor Families: Case Study of Online PPDB

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## ABSTRACT

Digital innovation holds a crucial position in enhancing the quality of the education ecosystem in Indonesia. This study assesses the impact of a specific digital innovation in education—the online school admission process (online PPDB)—on the participation of students from poor families at the high school level in DKI Jakarta and West Java Provinces from 2015 to 2019. Using the Multi-Level Perspective (MLP) framework and Difference-in-Differences (DiD) approach, this study compared the treatment group (regencies/cities that adopt online PPDB) with the control group (regencies/cities that do not adopt online PPDB). The findings reveal that online PPDB implementation at the high school level led to a 3.28% increase in the high school participation of poor students compared to that of the regencies/cities that do not implement online PPDB. Given their significant role in elevating Indonesia's education ecosystem, digital innovations are expected to increase, particularly those that facilitate accessible education for the less privileged students. However, there are still several obstacles experienced by parents or students regarding online PPDB implementation for high school admissions. Future studies on this topic are encouraged to broaden the sample size and encompassing more provinces to yield more comprehensive and robust results.

## I. INTRODUCTION

The rapid development of disruptive technology has successfully influenced business processes in both private and public sectors, making it the new normal. Since the 2010s, Indonesia has experienced significant advancements in

innovation marked by notable improvements in institutional and funding-related policies, which support scientific, technological, and innovation activities through triple helix collaboration among the government, universities, and industry (Simatupang et al., 2022).

This triple helix collaboration plays a significant role in aligning with disruptive technology in the public sector, including the extensive ad-

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vances in education field (Wood et al., 2013). The growth of school admission online applications, initiated by both the government and internal companies in the education technology field, aims to provide convenience for schools, teachers, students, and parents. This significant growth has been observed since 2009 in Indonesia (World Bank, 2020).

In alignment with the Instruction of the President of the Republic of Indonesia Number 3 of 2003 regarding the Policy and National Strategy for E-Government Development, the Ministry of Education and Culture of the Republic of Indonesia has implemented the new student admission (PPDB) through an online application known as education application information system (SIAP). This online adoption of PPDB was intended to replace the conventional school admission method as an effort to address existing challenges, such as accessibility to education, especially for students from poor families (Hillman & Jenkner, 2004).

While public schools are already free, issues related to the costs and time required for the enrollment process still persist, creating a heavy burden on public access to education. For this reason, the implementation of online PPDB is expected to be a new solution for expanding access to education, particularly for the public seeking adequate educational information and facilities (Anissa & Prasetio, 2021). However, children living in poor communities still tend to face difficulties in accessing educational facilities as they have to work to support their families (Pramaharja et al., 2015). This problem is intensified by social disparities, which affect their parents' decisions on which schools to enroll (Gorard et al., 2001).

One of the government's initiatives to broaden educational access is the implementation of online PPDB, which was expected to enable every citizen to swiftly, transparently, effectively, efficiently, and responsibly access the services for the admission of new students (Setiawan, 2016).

Nevertheless, the well-intentioned efforts of the government on this matter encounter several challenges, such as the difficulty in shifting entrenched cultural norms within society, issues related to the stability of internet connections, and

the suboptimal nature of the socialization process (Mutiarin & Junior, 2017).

Data from Statistics Indonesia indicates that the majority of internet users in the country are concentrated in urban areas. Nevertheless, there has been a nearly threefold increase in the proportion of internet users in rural areas in 2019 compared to that of in 2015. The government's efforts to improve the quality of life and the economy in rural areas involve facilitating internet access through the Palapa Ring Satellite Project, which serves as the foundation of national telecommunications connectivity (Antoni & Asvial, 2019).

However, ensuring adequate internet access is not only about expanding network coverage, but also making it affordable, especially for poor and underprivileged communities. Thus, based on this standpoint, the Palapa Ring Satellite Project has not yet brought a significant impact on society as a whole, as many individuals with low incomes still cannot afford adequate internet access. Adults in families belonging to the top decile of income distribution are five times more likely to afford internet connectivity compared to those of in the poorest decile, among whom only 14% can afford internet access (World Bank, 2021).

It is widely known that cellular service providers in Indonesia implement various pricing schemes, with higher rates commonly applied in sparsely populated and geographically challenging areas to offset service provision costs. Besides, there is also a range of cellular data packages available for different budgets and needs. The diversity in cellular services makes mobile data internet relatively affordable for different segments of society. Nonetheless, it has been revealed that 44% of the Indonesia's population perceives internet rates in the country as still being highly unaffordable.

This perception is thought to be attributed to initial installation costs, equipment rental expenses, and monthly fees, which collectively amount to 1.2 times the average monthly income of individuals classified as poor people in Indonesia (World Bank, 2021).

The role of online PPDB implementation in facilitating better access to educational facilities

for poor students seems to face challenges, as net enrollment at the high school level is still low, especially for individuals that occupy the bottom 40% of income distribution. The quantity of high school buildings is fewer than that of junior-high school and elementary school, and the low awareness among underprivileged individuals regarding the significance of education means that the Net Enrollment Ratio (NER) for the bottom 40% of income distribution at the high school level is still very low.

Hence, this study aims to assess the impact of digital innovations on the education sector, specifically regarding the implementation of the New Student Admission (PPDB) system using the SIAP online application on the high school participation rate of students from poor families in DKI Jakarta and West Java Provinces.

Based on the Indonesia World Bank Flagship Report (World Bank, 2021), DKI Jakarta and West Java Provinces stand out as the leading users of educational applications (Edtech) in Indonesia. DKI Jakarta and West Java were selected as the research focus in this study based on data from Statistics Indonesia, which stated that DKI Jakarta boasts the highest percentage of internet users domestically, while West Java has the largest number of individuals living below the poverty line (Statistics Indonesia, 2023).

Furthermore, the decision to focus on these two provinces is based on the consideration that several regencies/cities within the regions have implemented online PPDB using the SIAP application, while others have not. Consequently, the regencies/cities that implement online PPDB are regarded as treatment group, while those who do not implement it are treated as control group.

The inclusion of control group is crucial for discerning the variations stemming from the treatment group, enabling a measurement of the extent of changes. Thus, it is necessary for these two groups to exhibit similarities in terms of geographical and social conditions, ensuring an unbiased assessment aligned with the actual societal context. In this study, the proximity of DKI Jakarta and West Java, both geographically and socioeconomically, is notable.

## II. ANALYTICAL FRAMEWORK

The Multi-Level Perspective (MLP) is an analytical framework utilized to comprehend the dynamics of social change and transition across various levels, ranging from individual to public levels as a whole. Although commonly employed to analyze various transitions in energy and social innovation contexts, this framework can be applied to other fields as well. Geels (2019) identified key elements of the MLP, encompassing three levels of analysis: Regime Level, Landscape Level, and Niche Level.

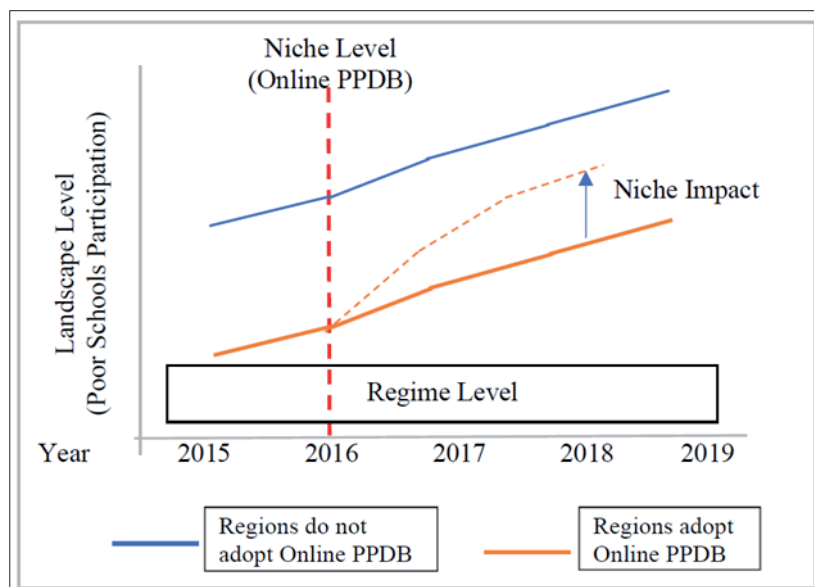


Figure 1. MLP analysis of the impact of online PPDB implementation

- Regime Level pertains to the extent to which rules, norms, and practices are established for operational purpose. The regime represents existing systems composed of both formal and informal rules, as well as structures that influence power and methods by which certain business or act is conducted.
- Landscape Level is more structural and encompasses broader trends in social, economic, political, and technological aspects outside the existing regime. This landscape may cover more extensive factors, such as government policy changes, economic developments, or shifts in social norms.
- Niche Level focuses on innovation and experimentation, where new ideas and technologies emerge and are tested. It includes individuals, groups or organizations involved in the innovation process.

Transitions or changes in a particular field or sector are viewed as outcomes of complex interactions among these three levels. Changes often originate at the micro level, where new and experimental innovations take place within the Niche Level. If the innovation proves successful, a transition can occur through interactions with the Regime Level, eventually penetrating the Landscape Level and altering social dynamics on a broader scale.

The MLP approach is instrumental in understanding how innovation and changes can emerge, develop, and influence social structures on a larger scale. This approach is particularly valuable to comprehend the dynamics of technological innovation or significant societal changes.

Regarding technological innovation, digital literacy skills can also bring significant social change. The better a person's digital literacy skills, the better his/her income level will be, which can narrow society's internal individual income gap (Chen et al., 2024). The digital transformation in both the public and private sectors to promote a sustainable blue economy can significantly affect social lives, such as in relation to the performance of marine biological resources (Ha, 2024).

Implementing technological innovation in urban areas can provide easier access to urban services and increase the level of society's participation and government's administration transparency (Sha et al., 2024). Moreover, hygiene and environmental sustainability point of view also can change society's motivation for using technological innovations in the culinary field, such as drones, to deliver food (Shahzad et al., 2024).

### III. METHODOLOGY

This study employed the MLP framework to assess the impact resulting from the implementation of online high school admission (PPDB) at the Niche Level. This analysis aims to observe how this digital innovation influences the changing social trend for individuals who previously faced difficulties in accessing education information, especially those living in poor communities (Landscape Level). The consequences of the ongoing use of conventional methods in PPDB implementation (Regime Level) exacerbate the challenges faced by poor individuals, given several constraints related to time and costs.

This study investigated the impact of online PPDB implementation on the school participation of poor students at the high school level in DKI Jakarta and West Java Provinces. This analysis utilized the Difference-in-Differences (DiD) approach, which involves recording conditions in two distinct periods, namely before and after the adoption of online PPDB. This approach focuses on discerning differences between the treatment group and the control group regarding the impact of online PPDB implementation. Therefore, the model employed in this study is outlined as follows:

$$SM\_SMA_{i,t} = \alpha + \beta_1 dt + \beta_2 Tz + \beta_3 dt.Tz + \epsilon_{i,t} \quad (1)$$

where  $SM\_SMA_{i,t}$  is the percentage of poor students' high school participation in district/city  $i$  in year  $t$ ,  $dt$  is dummy variable indicating the time of online PPDB implementation in district/city  $i$  in year  $t$ , a value of "0" before online PPDB implementation and a value of "1" during and after online PPDB implementation.  $Tz$  is dummy



variable indicating whether online PPDB is implemented in district/city  $i$  with a value of “0” for regencies/cities that do not implement online PPDB and a value of “1” for regencies/cities that implement online PPDB, and  $\epsilon_{i,t}$  is error term.

The use of the DiD approach in this study is essential to assess whether online PPDB implementation has a discernible impact on the high school participation among poor students in district/city  $i$  in year  $t$ . To assess the effect of online PPDB implementation on the high school participation of poor students, it is imperative to demonstrate the presence of similar trends in their high school participation of both the treatment group and control group prior to online PPDB implementation. Given the similarity in trend observed prior to the adoption, any differences in high school participation rates among poor students after online PPDB implementation between the treatment group and the control group can be attributed to the impact of online PPDB implementation.

In addition, a robustness test was conducted to verify whether online PPDB implementation indeed affected the school participation of poor students. In this test, the post-implementation years of online PPDB was excluded, aiming to yield statistically insignificant results. However, suppose the robustness test produces significant outcomes, it can be concluded that online PPDB policy is still considered inadequate in gauging the magnitude of the school participation of poor students in DKI Jakarta and West Java Provinces.

The data employed to support this study consist of secondary data obtained from Statistics Indonesia and the Ministry of Education and Culture as follows:

- 1) The number of Poor Population (thousand people) according to Regencies/Cities in DKI Jakarta and West Java Provinces from 2015 to 2019.
- 2) The number of Schools, Teachers, and Upper Middle School Students in DKI Jakarta and West Java Provinces from 2015 to 2019.
- 3) The number of residents based on age group and gender in DKI Jakarta and West Java Provinces from 2015 to 2019.

- 4) The Percentage of Poor Population in DKI Jakarta and West Java Provinces from 2015 to 2019.
- 5) The Net Enrolment Ratio (NER) of households' expenditure for the bottom 40% of income distribution in DKI Jakarta and West Java Provinces from 2015 to 2019.
- 6) District Codes in Indonesia.

Data of poor students enrolled at the high school level were calculated using the data of residents based on age group and gender, the percentage of the Poor Population, and the Net Enrollment Ratio (NER) for the bottom 40% of income distribution, all within DKI Jakarta and West Java Provinces from 2015 to 2019. Then, the percentage of poor students' high school participation was calculated by comparing the number of poor students enrolled at the high school level and the total number of students at the high school level in DKI Jakarta and West Java Provinces from 2015 to 2019.

## IV. RESULTS

### A. Descriptive Analysis

At first, a descriptive analysis was performed on several variables using statistical data from [www.jabar.bps.go.id](http://www.jabar.bps.go.id), [www.jakarta.bps.go.id](http://www.jakarta.bps.go.id), and the Ministry of Education and Culture from 2015 to 2019. Table 1 presents the number of observations used for the primary analysis, mean, standard deviation, minimum, and maximum values for three selected variables, namely poor population, total high school students, and the ratio of high school students from poor families.

As seen in Table 1, the average ratio of high school students from poor families in DKI Jakarta and West Java Provinces is 14.35% compared to all students that attend high school in these provinces. In 2018, approximately 3.65% of students attending high school in Bandung City were classified as poor. In contrast, Indramayu Regency had the highest proportion of poor students' high school participation in 2015, with a ratio of around 31.96%.

The results of this descriptive analysis provide an overview of data from DKI Jakarta and

West Java Provinces. To effectively demonstrate the impact of online PPDB, it is imperative to categorize research focus in this study into treatment group (regencies/cities that adopt online PPDB) and control group (regencies/cities that do not adopt online PPDB).

The selection of regencies/cities as treatment and control groups was based on data from the SIAP-online application (2023). The division includes regencies/cities that implemented online PPDB in DKI Jakarta and West Java from 2015 to 2019, as illustrated in Fig. 2. Notably, administrative cities, such as West Jakarta, Bogor City, East Jakarta, North Jakarta, Central Jakarta, South Jakarta, and Kepulauan Seribu Regency had implemented online PPDB since 2016 to 2019. Meanwhile, Cimahi City, Depok City, Cirebon City, and Bekasi City had implemented online PPDB from 2015 to 2019. Cirebon Regency and Tasikmalaya City initiated online PPDB in 2017. On the other hand, there are still 20 other

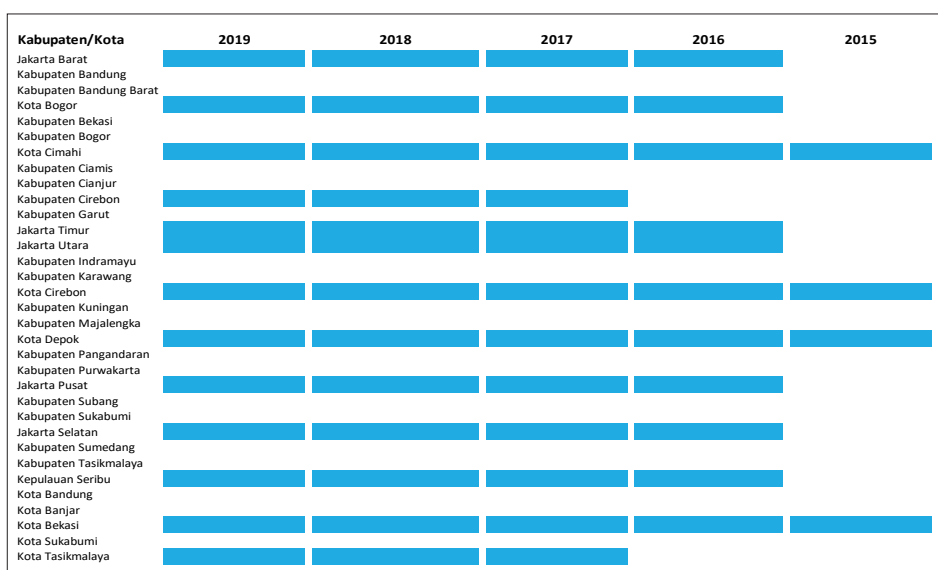
regencies/cities in West Java Province that did not implement online PPDB in 2015 to 2019.

Given that the DiD approach necessitates proving the existence of similar trends in both groups, the treatment group comprises only the regencies/cities that implemented online PPDB from 2016 to 2019. This group comprises seven administrative cities, namely West Jakarta, Bogor City, East Jakarta, North Jakarta, Central Jakarta, South Jakarta, and Kepulauan Seribu Regency. Conversely, the control group comprises the regencies/cities that did not implement online PPDB from 2015 to 2019, namely Bandung Regency, West Bandung Regency, Bekasi Regency, Bogor Regency, Ciamis Regency, Cianjur Regency, Garut Regency, Indramayu Regency, Karawang Regency, Kuningan Regency, Majalengka Regency, Pangandaran Regency, Purwakarta Regency, Subang Regency, Sukabumi Regency, Sumedang Regency, Tasikmalaya Regency, Bandung City, Banjar City, and Sukabumi City.

**Table 1.** Results of Descriptive Analysis regarding High School Students from Poor Families in DKI Jakarta and West Java

Variables	Obs.	Mean	Std. Dev.	Min.	Max.
Poor Population	135	138,816	99,367.069	2,650	490,800
Number of High School Students	135	26,013	16,864.781	480	71,831
The Ratio of High School Students from Poor Families	135	14.35	6.90	3.65	31.96

Source: Author’s data processing (2024)



Source: SIAP-online application (2023), reprocessed

**Figure 2.** Regencies/cities in DKI Jakarta and West Java Provinces that implemented online PPDB from 2015 to 2019

**B. Robustness Test**

1) Pararel Trend

The graphical results, depicted in Fig. 3, illustrate the average percentage of poor students’ high school participation in both the treatment group and the control group, revealing visually parallel trends. However, to ensure the accuracy of the observed parallel trends between these two groups, a robustness test was performed. In addition, the placebo test was also carried out for a more precise assessment of the existence of parallel trends between these two groups.

2) Placebo Test

The model equation for Placebo Test is displayed as follows:

$$SM\_SMA_{i,t} = \alpha + \beta_1 dPt + \beta_2 Tz + \beta_3 dt.Tz + \epsilon_{i,t} \quad (2)$$

Where  $SM\_SMA_{i,t}$  is high school participation of poor students in regencies/cities  $i$  year  $t$ ,  $dPt$  is dummy variable indicating the Placebo time of online PPDB implementation in district/city  $i$  in year  $t$ , a value of “0” before online PPDB implementation or year 2015 and a value of “1” for during online PPDB implementation or year 2016,  $Tz$  is dummy variable indicating whether online PPDB is implemented in district/city  $i$  with a value of “0” for regencies/cities that do not implement online PPDB and a value of “1” for

regencies/cities that implement online PPDB, and  $\epsilon_{i,t}$  is error term.

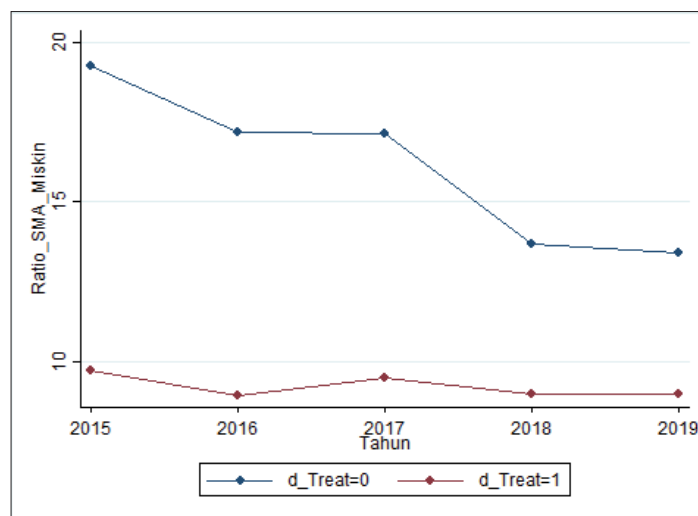
The results of robustness test, as presented in Table 2, indicate that at 90% confidence level, the average percentage of poor students’ high school participation in the regencies/cities in the treatment group and the control group before online PPDB implementation is not statistically significant.

These results demonstrate the equality of trends between these two groups. Therefore, it is appropriate to employ the DiD approach to evaluate the impact of online PPDB implementation in school admission on the high school participation of poor students.

**Table 2.** Results of Robustness Test

	Placebo
1.time_placebo	0.440 (0.21)
1.treated1	-8.249** (-2.59)
1.time_placebo#1.treated1	0 (.)
_cons	16.76*** (12.02)
N	54

*t* statistics in parentheses  
 \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$   
 Source: Author’s data processing (2024)



Source: Author’s data processing (2024)

**Figure 3.** Pararel trend of poor students’ high school participation between the treatment group and the control group

### C. Difference-in-Differences

The analysis results of DiD approach in Table 3 reveal that online PPDB implementation has a significant impact on the average percentage of poor students' high school participation in the treatment group (regencies/cities that implement online PPDB). The results also indicate a statistically significant positive correlation between online PPDB implementation and the average percentage of poor students' high school participation. At 1% significance level, online PPDB implementation is associated with a significant increase of 3.28% in the average percentage of poor students' high school participation compared to that of the regencies/cities that do not implement online PPDB.

**Table 3.** Analysis Results of Difference-in-Difference

	Diff-in-Diff
1.d_Time	-3.864*** (-6.41)
1.d_Treat	-9.513*** (-3.81)
1.d_Time#1.d_Treat	3.275*** (3.78)
_cons	19.23*** (11.35)
N	135

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Source: Author's data processing (2024)

Despite the fact that only a small number of poor individuals in Indonesia use the internet (World Bank, 2020), data on the percentage of individuals' internet usage by area of residence indicates a continuous increase in terms of internet usage in both villages and cities over the years (Statistics Indonesia, 2023). The expansion of internet coverage in Indonesia suggests that with more affordable internet access, individuals from impoverished backgrounds will find it easier to utilize online PPDB application for obtaining information on how to enroll their children in any desired school. The findings of this study generally underscore the positive impact of digital innovation on the education sector, particularly through online PPDB application, in enhancing

the school participation of poor students at the high school level.

Aligned with these findings, advancements in information technology (IT) have demonstrated significant effects on the socio-economic sector. IT facilitates easier access to information for impoverished individuals (Tayo et al., 2015). Likewise, Mushtaq & Bruneau (2019) discovered that people who register mobile phones landlines and subscribe to internet services are more likely to experience an improved standard of living, mainly indicated by a reduction in their poverty and inequality rate.

In the health and education sectors, Graves et al. (2021) revealed that rural communities equipped with a PC, laptop, tablet, or smartphone connected to a stable internet network have the potential to access better health and education services compared to those lacking such resources or facing issues with an unreliable internet network.

Several studies in Indonesia had explored the benefits of online PPDB implementation. This policy, which is considered a facility for new student candidates to easily choose whichever school they want after graduating, has been developed based on IT speed and advancement (Mursyidah et al., 2021).

There are several advantages of online PPDB implementation, namely being more time-effective and transparent, also allowing parents and community to monitor almost every step of the enrollment process. This is possible because the admission results can be delivered to the parents relatively much quicker compared to those of the manual process. Education services become more sophisticated and IT-based (Supendi et al., 2021) as indicated by easy and time-unlimited access to online PPDB due to schools' ability to provide adequate facilities like computers and laptops (Rosalinda, 2019).

Compared to manual processes, online PPDB provide obvious benefits, such as reduces long queues at schools, improves service to the community, and reduces mobility and congestion on the roads (Arum, 2016). Due to this innovation, students can also access their school admission online, either by zone or by other options. Besides, the admission results are also highly possible to



be disseminated through various channels, such as school websites, board announcements, social media, and WhatsApp groups (Mulyani et al., 2022).

However, several studies suggested that the effectiveness of online PPDB is still hindered by several technical challenges, such as internet connection issues, slow networks, and application system problems during login and form filling, leading to failures or non-passing experiences for many new student candidates (Hulantu et al., 2021).

## V. DISCUSSION

Based on 2017 data of ICT Development Index (IDI) released by the International Telecommunication Union (ITU, 2017), Indonesia is ranked 111<sup>th</sup> out of 176 countries worldwide with a value of 4.33 out of 10. The data indicates that Indonesia's ICT development process is relatively lagging behind neighbouring countries, such as Thailand, which is ranked 78<sup>th</sup> on IDI.

Based on the 2020–2024 Strategic Plan established by the Ministry of Communication and Informatics of the Republic of Indonesia (2020), digital transformation is directed to achieve efficient and fast public service delivery, among other fields, in education and health sectors. This plan is expected to encourage equality and inclusivity in society, including among poor families.

Digitalization in the education sector can be a leverage for facilitating equality and ease of access to education, along with the growth of national digital startups. Education digital startups are expected to solve problems in this sector, such as the ease with which the poor can access adequate educational information, especially related to school admission.

Along with the increase in internet usage in the community, online PPDB implementation using the SIAP application is expected to be a connecting bridge for poor students who previously faced difficulty in accessing school admission information more easily.

This study adopts the Multi-Level Perspective (MLP) framework (Geels, 2019). Based on equation (2), the conditions at the Meso Level (Regime) concerning the percentage of poor students before online PPDB implementation

reveal a positive but non-significant coefficient  $\beta_1$  at 1% confidence level and a negative but non-significant coefficient  $\beta_2$  at 10% confidence level.

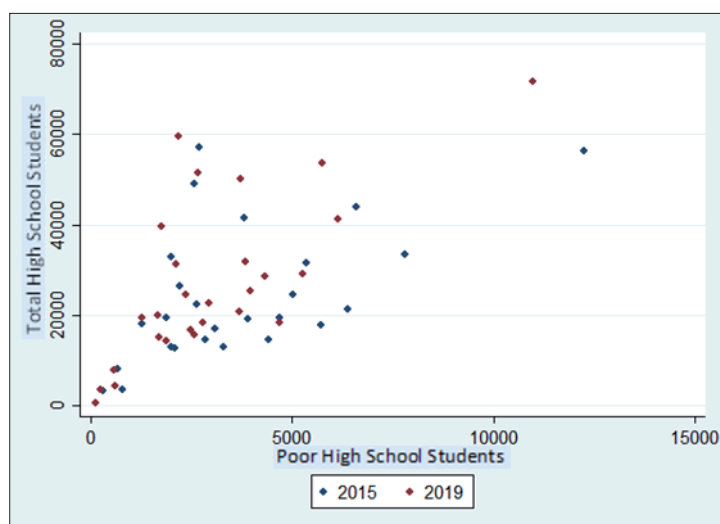
The results at Meso Level imply that the percentage of poor students at the high school level before online PPDB implementation in 2015 did not have significant changes. By that time, school participation still predominantly consisted of students from economically privileged families, as indicated by the negative value of coefficient  $\beta_2$ .

The conventional PPDB process requires parents to come to school and bear transportation costs, which is a common practice for economically privileged families, but poses a challenge for impoverished communities. This is because transportation costs are still considered a burden for poor families from rural and suburb areas to enroll their children in schools located in urban areas.

The findings align with Fig. 4, illustrating changes at the Landscape Level, as evidenced in equation (1). The  $\beta_1$  value in Eq. (1) is -3.864, indicating that the trend in the percentage of poor students' high school participation from 2016 to 2019 was 3.86% lower than that of in 2015.

The same trend is observed in the regencies/cities that implement online PPDB and the ones that do not implement it. The  $\beta_2$  value in equation (1) is -9.513, representing a 9.51% lower trend in the percentage of poor students' high school participation from 2015 to 2019 in the regencies/cities that implement online PPDB compared to those that do not (Fig. 5). To assess the impact of online PPDB implementation on the high school participation of poor students, the DiD approach was employed. In principle, this approach observes changes occurring in the transformation process. In this study, the DiD approach assesses changes in the percentage of poor students' high school participation due to online PPDB implementation, namely by comparing the percentage of poor students' high school participation in the regencies/cities that implement online PPDB (treatment group) with the ones that do not (control group) before and after online PPDB implementation in 2016.

Following the existence of the Niche Level, namely the emergence of digital innovation in the form of online PPDB implementation at the high school level, the Landscape Level also



Source: Author's data processing (2024)

**Figure 4.** Ratio of poor students' high school participation in 2015 and 2019

changes, particularly in terms of the participation of poor communities, as indicated by the results of equation (1).

At the Niche Level, poor communities (Landscape) find it easier to access educational information and school admission, such as by utilizing online PPDB. The increasing proportion of individuals' internet usage, especially in rural areas, and the existence of the Palapa Ring Satellite Project further facilitate public access to the internet and information. Hence, online PPDB implementation process is easier and more accessible to people across all societal strata, including poor families.

At the Niche Level, there is a significant 3.28% increase in the average percentage of poor students' high school participation, revealing that online PPDB implementation, as a form of digital innovation, has successfully increased the school participation of poor students at the high school level compared to that of the regencies/cities that do not implement online PPDB. Therefore, this study has proven that technological innovation can positively impact education sector.

Given Indonesia's ICT current condition, which is still lagging, the citizens are expected to utilize and increase the use of technological innovations, especially in the education sector. Highly adequate technology services can enhance the quality of higher education (Al-Ramahi & Odeh, 2020), and technology, through the collaboration between educational

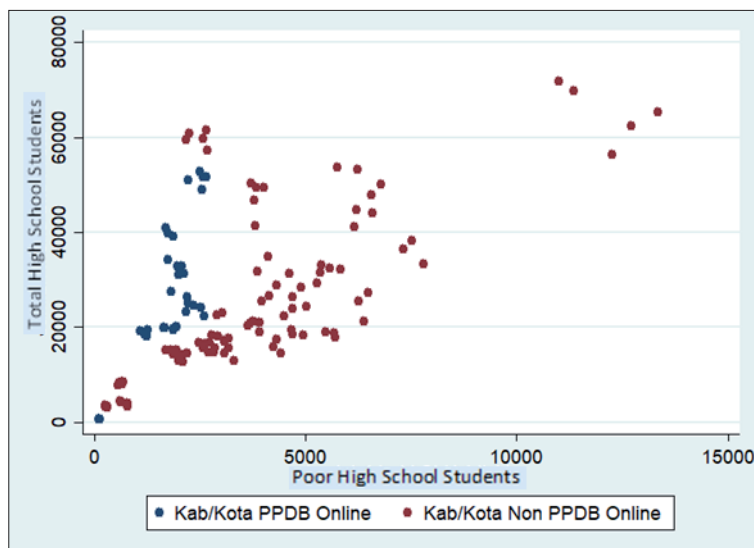
institutions and industry, can also improve the local economy, especially the MSMEs' community (Hailu, 2024).

Although personal internet use in Indonesia has increased, so far only 14% of poor people can access the internet. For this reason, the Indonesian government really needs to make improvements so that technological innovation can reach wider community and bring more significant impact on education. This can be implemented especially by expanding the internet coverage. Along with this, internet facilities and infrastructures in rural areas also need to be improved considering that there are still low number of internet users there.

## VI. CONCLUSION

The findings of this study establish a clear connection between digital innovation, namely online PPDB implementation, and its impact on education sector, which positively contributes to a significant increase in the percentage of poor students' school participation at the high school level. This signifies a transformative shift from the previous manual admission process to a digital one, facilitating easier access to educational facilities for impoverished individuals.

This finding underscores the capability of technological innovation to generate positive changes in socio-economic conditions within society. The Multi-Level Perspective (MLP)



Source: Author’s data processing (2024)

**Figure 5.** Ratio of poor students’ high school participation between the regencies/cities that adopt online PPDB and the ones that do not adopt online PPDB from 2015 to 2019

framework highlights the initial conditions at the Regime Level, where manual registration processes led to high school participation being dominated by students from economically privileged families. In response to this situation, the Indonesian government initiated a breakthrough to provide equal opportunities, especially for the impoverished students, to assess educational information and facilities more easily.

The subsequent innovation at the Niche Level—in the form of online New Student Admission (online PPDB)—aims to generate significant societal changes at the Landscape Level. Along with this, the increased accessibility to the internet and the growing use of gadgets have made information more readily available, contributing to the success of this innovation (online PPDB) in boosting school participation among impoverished students at the high school level.

Nonetheless, the success of online PPDB implementation necessitates improvements in supporting facilities. The proliferation of digital innovations in the public sector, initiated by the Indonesian government, highlights the need for complementary facilities, such as internet networks and affordable gadgets, to ensure widespread access in a long term.

However, it is important to acknowledge certain limitations in this study. The sample selection focuses on areas with existing facilities and infrastructure for internet access and gadget availability. To enhance the accuracy of describing the impact of digital innovation, particularly online PPDB, on school participation among poor communities throughout Indonesia, future studies should expand their coverage to include a more diverse range of regions.

In addition, to assess the deeper impact of digital innovation on education sector at all levels, future studies should employ more extensive data from elementary school to high school. A broader dataset would generate more comprehensive insights and better align the studies with the actual conditions within the population observed.

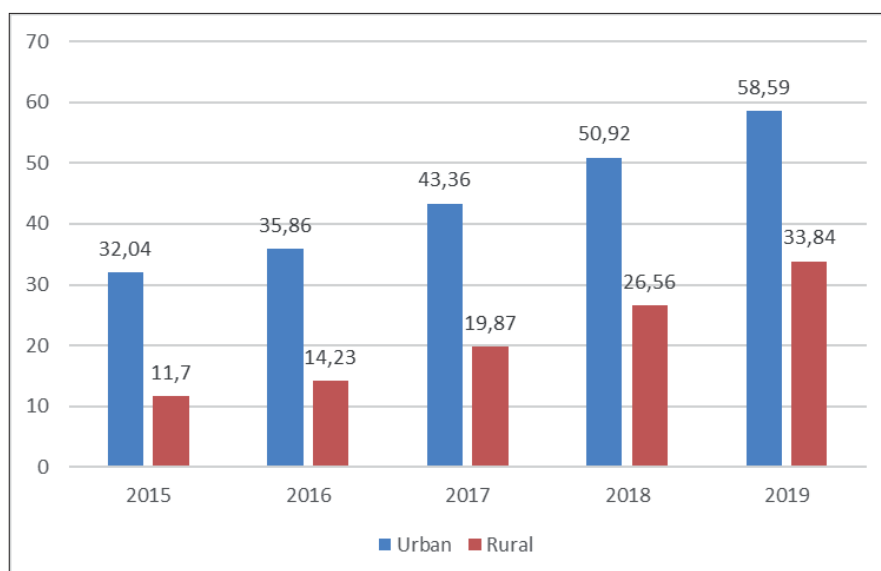
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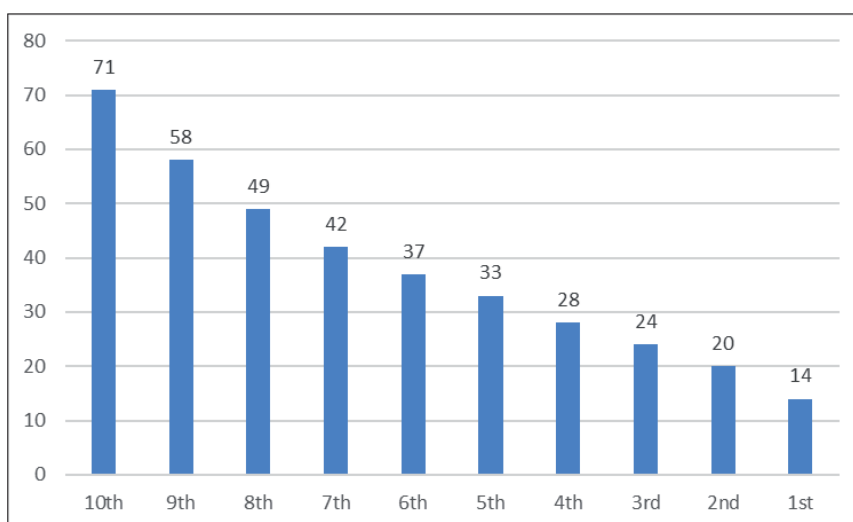
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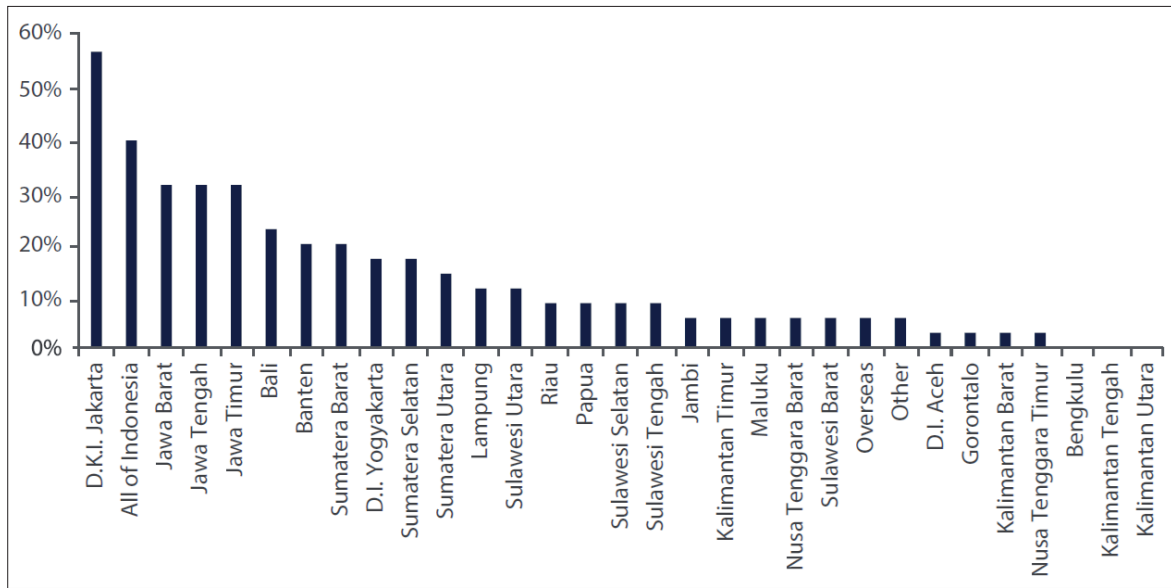
Source: Statistics Indonesia (2023b), reprocessed

**Appendix 1.** Percentage of households who have accessed the internet in the last 3 months based on regional classification from 2015 to 2019



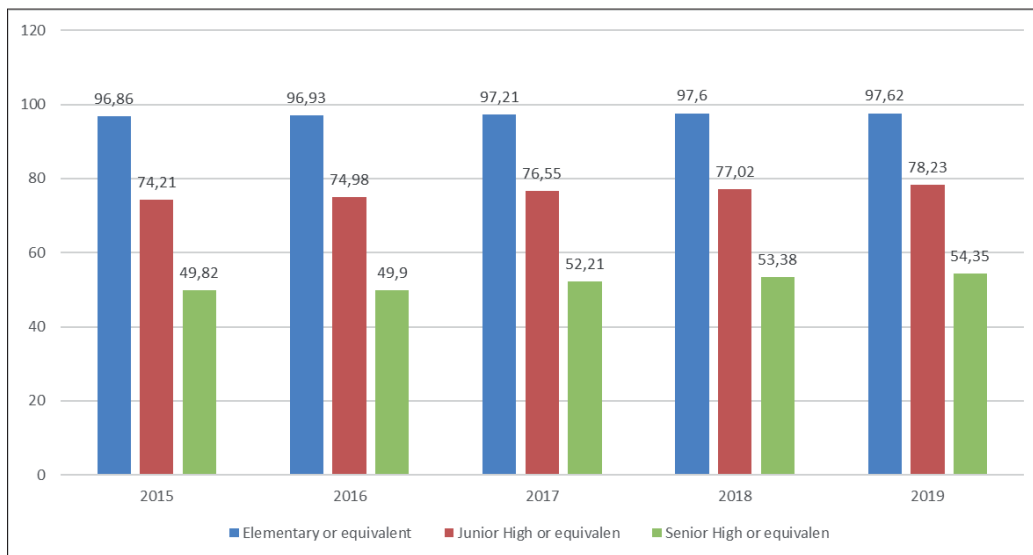
Source: World Bank (2021), reprocessed

**Appendix 2.** The proportion of adults with access to the internet in 2019, by decile of per capita consumption



Source: World Bank (2020)

**Appendix 3.** Distribution of firms by geographic penetration of their products (percent of survey respondents)



Source: Statistics Indonesia (2023), reprocessed

**Appendix 4.** Female/male net enrollment ratio (NER) according to income (expenditure) distribution from 2015 to 2019