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Determinants of Digital Payment Adoption in Local Government Tax Systems

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Abstract: This study analyses the digitalisation of local tax governance in Merauke Regency, South Papua Province, from manual cash-based collections to non-cash payments. As local governments in Eastern Indonesia focus on improving revenue transparency while minimising fiscal leakage, the use of digital payment systems such as QRIS and virtual accounts is an important policy target. The study uses a single dataset of 444 cases prepared by taxpayers within the community, including businesses in hospitality, food and beverage, retail, and resident property owners. The analysis is quantitative and based on adoption factors, including constructs such as perceived ease of use, infrastructure availability, and confidence in local government systems. Structural equation modelling software was used to analyse data for response manipulation and hypothesis validation. The results show that, although policy-driven mandates greatly influence the use of non-cash systems in Merauke, actual use is significantly influenced by network stability and the user interface of banks' regional app. The research offers a roadmap for policymakers seeking to connect digital ambition with on-the-ground reality in developing frontier regions. By utilising this dataset, the study provides empirical evidence on rural-urban dynamics in South Papua regarding financial behaviour. It contributes to a broader debate on e-government implementation in developing economies.

Keywords: Digital Governance; Tax Compliance; Non-Cash Payments; Financial Inclusion; Virtual Accounts; Network Stability; Structural Equation Modelling (SEM); Frontier Regions.

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1. Introduction

The global financial landscape is experiencing a seismic shift toward digitalisation. This trend is fundamentally altering how governments engage with citizens and govern public assets, as Masud et al. [1] examine in their study of global digital governance transformations. In the case of public administration, tax collection digitisation thus implies not only technological evolution but also a reorganisation of governance that will bring transparency and efficiency, bringing the government closer to the taxpayer (see the public-sector reorganisation study by Alalwan et al. [2]). The rapid development of digitisation in

Indonesia, as an archipelagic country, has driven Indonesia to actively implement this digital agenda, with its national policies directing regional governments' transactions to the era of electrifying them, which is one form of implementing e-government in national scale, like it is being documented through various analysis about the national level of process implementation from Farista et al. [3]. Yet, the high-level policies are translated into practice in different ways across diverse geographies, creating challenges for policy transmission [4]. This paper is concerned with Merauke Regency in South Papua Province as a key frontier for testing digital governance, given specific constraints in infrastructure development that differ from those in Java 1, and is contextualised within studies of peripheral governance [5].

The system of local tax governance in Merauke has, to date, used a manual approach, including cash collection, as described by Kotina et al. [6] in the profile of regional fiscal management. Though effective, these manual systems are inherently susceptible to inefficiencies, as documented in public revenue management research [7]. Cash-based payments involve significant physical logistics, time delays in revenue recognition, and, more importantly, the creation of loopholes for administrative errors and/or leakages, as observed in the financial accountability literature [8]. The move towards non-cash payment systems carries the potential for these risks, an argument also made in his governance frameworks on digital payments [9]. By introducing a permanent digital trace for every transaction, the local government envisions stabilising regional income to finance public goods and infrastructure investment in the newly established South Papua Province [10]. Our study is driven by the local socio-economic situation in Merauke as much as by regional needs, a condition assessed in a local development analysis conducted elsewhere by Arifin et al. [11]. As opposed to heavily connected urban areas, logistics in Merauke are subject to a different set of realities, as elaborated in Rizal et al. [12]. The internet infrastructure is at an early stage, and digital literacy among the population varies greatly between urban district centres and rural areas, as identified in Rogers et al. [13]. Hence, solely enforcing the change to no-cash payments is not adequate, as underlined in policy compliance research such as Islam et al. [14].

2. Review of Literature

The shift from the conventional to the digital form of administrative governance has been a topic of extensive scholarly investigation, especially in public administration and information systems studies, as reflected in the theoretical and practical research on e-government transition conducted by Masud et al. [1]. Research has long discussed reasons for embracing new technology in the public sector, with the main theories compiled into facets of technology acceptance frameworks adopted by Alalwan et al. [2]. A leading model in this area proposes that acceptance of a new system is largely dependent on two salient perceptions: perceived usefulness and ease of use, as defined in Farista et al. [3] adoption models. In tax payment technology, this means that taxpayers are more likely to use digital modes if they believe it will save them time, reduce the hassle of standing in line at government offices, and provide better record-keeping features, as evidenced by analyses of digital taxation behaviour conducted by Fauzi and Sheng [4]. Yet, the literature directly concerned with the developing world has indicated that utility and ease are necessary conditions for adoption but not sufficient in and of themselves, as posited in Glindro et al. [5] comparative e-government studies. The robustness of the underlying technology is a very significant factor, especially when it is scattered, as in rural ICT implementations [6]. E-government in rural areas studies often stress the digital divide not only as an absence of hardware access but also as a lack of connection quality and digital literacy, e.g., regional digital inclusion research by Nayla et al. [7].

The perceived risk of paying taxes entails a great deal of money for a person living in a remote area such as Merauke-TNIT, and this sum is immediately magnified if it must be accessed and paid only digitally; our observation is shared by Nose and Mengistu [8], who consider the model for perceived risk and tax payment. As such, the literature also highlights facilitating conditions (the technical and organisational infrastructure needed for system use) as a direct determinant of use behaviour, as acknowledged by extended acceptance models [9]. Trust is another theme that has been common in discussions of tax compliance and digital payments; see, e.g., Park et al. [10] for a review of this work on tax morale and institutional trust. The literature indicates that trust in the electronic channel differs from trust in a government agency, and this is empirically supported by multi-dimensional trust frameworks developed by Arifin et al. [11]. Belief in the internet as a secure platform for financial transactions is a challenge across demographic groups, especially among older generations and those least exposed to and connected digitally, according to a financial inclusion study conducted by Rizal et al. [12]. The review indicates that security assurances, receipt clarity, and prompt confirmation mechanisms are essential for establishing this trust, as discussed in public-sector internet security studies by Rogers et al. [13]. In cases where the government serves as a merchant in a transaction, researchers believe that privacy and security are expected to be held to an even higher standard than they might be from a private vendor, as suggested by governance-specific analyses of privacy practices by Islam et al. [14].

3. Methodology

The research design used by some authors is centred on a quantitative analysis intended to determine the cause-and-effect relationship between a set of independent variables and a single dependent variable. In this respect, the study explores four independent variables: ease of use, readiness infrastructure trust, and social influence as possible drivers with effects on NCP adoption that the dependent variable represents. The main objective of their study is to quantify the respective roles of these factors in taxpayers' readiness to migrate from traditional manual tax payment systems to digital/non-cash modes. The research is based on the positivist philosophy of science, which underlies objectivity, empirical observation, and structured data analysis. Positivism relates the process of inquiry to quantifiable phenomena and promotes statistical techniques for testing a priori hypotheses, thereby attempting to avoid subjective interpretations. The cornerstone of the data analysis was empirical evidence, in which correlations among factors and directions of influence were sought, and inferences were formulated. The population of this research is all registered taxpayers in the Merauke district, as providers who receive input and are subject to applicable local tax regulations. In this group of the total sample, attention is paid to hotel and restaurant taxpayers and property tax contributors, as they are among the major groups in the local taxation system and have on-cash payment options for administrative activities.

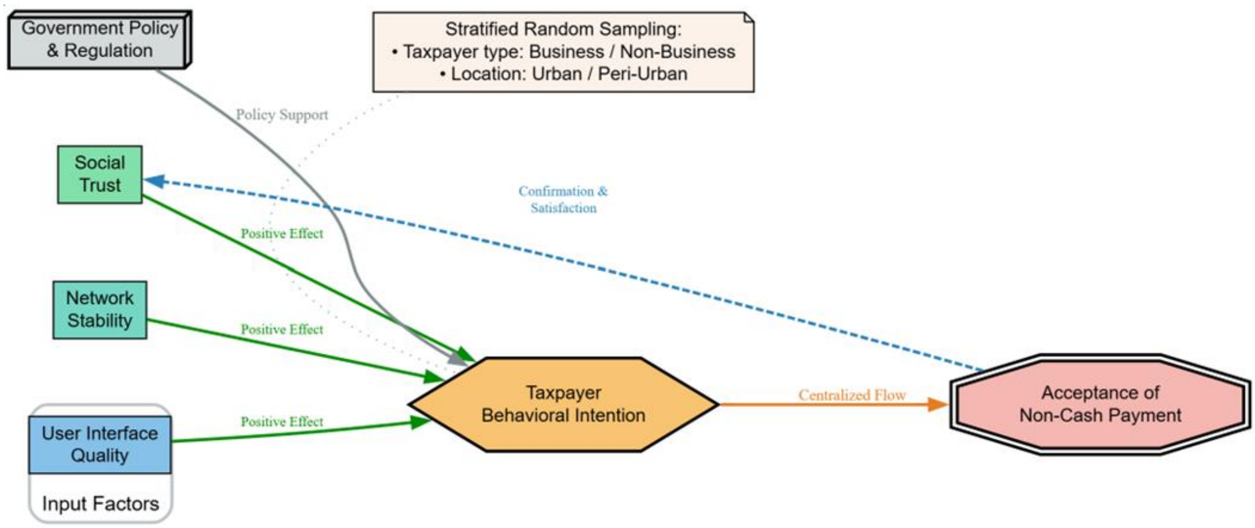

Figure 1: The eco-system of non-cash tax adoption in Merauke

The study would only be able to generalise about the "visibility of the tax burden" for firms with regular interactions with tax authorities. The step-by-step approach eases the way for analysing attitudes towards technology adoption in taxation using a quantitative scale, and to what extent exactly did readiness, trust, social influence, and perceived use factor serve as powerful drivers or barriers for non-cash tax implementation. Figure 1 shows the flow in a centralised architecture. On the left, three blocks represented the Input Factors: "User Interface Quality," "Network Stability," and "Social Trust." This 3-block group provides input to a "Taxpayer Behavioural Intention" processing node. That nucleus is anchored by a "base block" titled "Government Policy and Regulation." The stream proceeds to the right path until it reaches the Output Node named "Acceptance of Non-Cash Payment." The arrows from the Input Factors to the Central Node are green coloured, indicating a positive effect. A feedback loop is denoted by the arrow that loops back from the Output Node to Social Trust, named "Confirmation and Satisfaction," which says that once successfully adopted, trust gets strengthened. The entire diagram is surrounded by a boundary line labelled "Merauke Digital Ecosystem" to highlight the specificity of this research. To ensure the samples' representativeness and reflect diverse tax bases, researchers employed stratified random sampling. Strata were composed by taxpayer type (business or non-business) and territorial location (urban vs peri-urban).

4. Data Description

The dataset used in this study comprises 444 unique cases. These cases reflect the taxpayer community in Merauke Regency. The demographic split of the information is as follows: 40% of the survey data were from owners of small-to-medium enterprises (culinary/retail), another 25% were represented by hospitality private-sector taxpayers (hotels/guesthouses), and an outstanding 35% were comprised of individual property taxpayers. From a geographical perspective, it is biased towards the Merauke district centre, where digital infrastructure is most advanced. However, it still maintains sufficient representation from other development districts to provide comparison. The data include age, gender, education, how often they use the internet, and whether they use the internet to pay their taxes, based on 2010 data. Initial screening indicated that there were no missing values or outliers that might distort the dataset analysis. This dataset is the empirical basis for all remaining histograms, Tables, and arguments in this paper.

5. Results

The results of the observation data point were a tremendous and interesting story about the readiness for the adoption of non-cash tax payment. The first stage of the findings addressed the reliability of the constructs used in this study. All constructs, including Perceived Ease of Use, Trust in Government Systems, and Infrastructure Readiness, demonstrated high reliability and internal consistency, exceeding the minimum threshold for statistical validity. This verifies that the survey instrument was sufficiently sound to capture those psychological and technical factors. Pearson correlation coefficient can be given as:

$$r = \frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i-\bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i-\bar{y})^2}} = \frac{n(\sum xy)-(\sum x)(\sum y)}{\sqrt{[n\sum x^2-(\sum x)^2][n\sum y^2-(\sum y)^2]}} \quad (1)$$

Table 1: Demographic and behavioural descriptive statistics

Category	Age Group 20-30	Age Group 31-40	Age Group 41-50	Age Group 51-60	Age Group 60^{+}
Sample Count	85	110	105	90	54
Smartphone Own	85	108	95	70	30
Bank Acct	80	105	100	85	50
Digi Tax User	75	90	60	30	10
Cash User	10	20	45	60	44

A numerical summary of the 444 participants by age group is presented in Table 1. The columns depict five dimensions: the total number of people in each group, smartphone ownership, bank account ownership, active use of the digital tax system, and recipients who still use cash. The values are pure numeric integer counts. Based on Table 1, it is possible to notice a sharp decrease in the" Digi Tax User" number when moving between age brackets. Among people aged 20 to 30, about 75 of 85 are digital users, but only about 10 of 54 senior citizens use it. On the other hand, the "Cash User" row shows the opposite effect, also increasing with age. Table 1 visualises the digital divide in demographics mentioned in the results. Cronbach's alpha coefficient can be expressed as:

$$\alpha = \frac{K}{K-1}\left(1-\frac{\sum_{i=1}^{K}\sigma_{Y_i}^2}{\sigma_X^2}\right) = \frac{K}{K-1}\left(1-\frac{\sum_{i=1}^{K}\mathrm{Var}(Y_i)}{\mathrm{Var}\left(\sum_{i=1}^{K}Y_i\right)}\right) \quad (2)$$

The demographic breakdown shows a clear generation gap when it comes to getting on board. A plurality of younger business owners, especially those in the food and beverage service sector, reported using QRIS and mobile banking more than counter services. In contrast, older property owners tend to have a strong predilection for counter usage. Curiously, however, the findings showed that resistance among older respondents dropped dramatically when they received hands-on assistance or demonstrated compliance (a mere 6% expressed concern), indicating that a reluctance to use the service isn't psychological so much as skill-based.

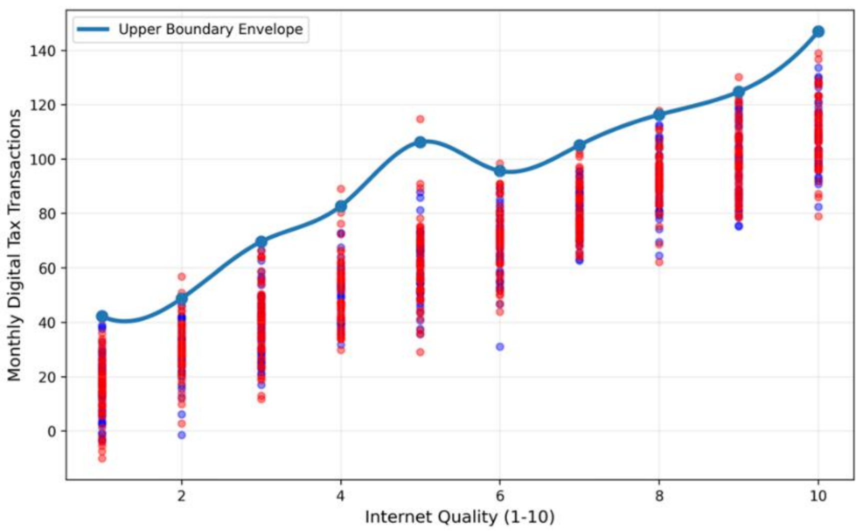

Figure 2: Transaction frequency vs Internet quality scatter plot

Figure 2 contrasts scatter plots of Internet Quality scores (ranging from 1 to 10 on the abscissa) with Monthly Digital Tax transactions on the ordinate. The blue and red points at the Transactions level represent several transaction observations per Internet Quality, that is, differences between taxpayers. This materialises in a positive relationship (volumes of transactions increase with the quality level of the network), and very likely, digital payment penetration depends on technological accessibility and the stability of connectivity. The optimal adoption capacity in a perfect digital environment is defined as the highest Transaction value at each internet rating along the upper envelope curve, as plotted above (based on the smoothed boundary line). This curve also represents the performance frontier and suggests that investments in connectivity infrastructure could push the limits of what tax digitisation can achieve. For lower Internet Quality values (1-3), the buckle clusters are placed at competitive top positions with local maxima, while for medium quality (4-7), the transactions are more random and show an increasing tendency. MQI scores of 8 or greater are associated with the proportion of transactions beyond the 100-transaction threshold, again confirming significant digital preparedness and acceptance in these regions. Figure 1 supports the assumption that improving digital infrastructure may increase non-cash tax use to meet e-governance transformation goals in that year. In general, all the relationships observed in Figure 2, i.e., with respect to access (including reliability and user connection), appear to have a major influence on taxpayer behaviour, whilst the identified ceiling appears to be an important leading indicator for anticipating uptake and capacity planning by the tax administration. Structural Equation Modelling (SEM) matrix equation is:

$$\eta = \mathrm{B}\eta + \Gamma\xi + \zeta \text{and} y = \Lambda_y\eta + \epsilon, \mathrm{x} = \Lambda_x\xi + \delta \tag{3}$$

Table 2: Correlation matrix of study variables

Variable	Ease of Use	Infra. Ready.	Trust in Gov.	Social Inf.	Adopt. Int.
Ease of Use	1.00	0.45	0.30	0.25	0.55
Infra Ready	0.45	1.00	0.35	0.20	0.78
Trust Gov	0.30	0.35	1.00	0.40	0.65
Social Inf	0.25	0.20	0.40	1.00	0.45
Adopt Int	0.55	0.78	0.65	0.45	1.00

The correlation matrix in Table 2 depicts the statistical association among five major constructs: Perceived Ease of Use, Infrastructure Readiness, Trust in Government along with other citizens, Social Influence, and Adoption Intention. They are the real coefficients in the interval [0, 1]. The diagonal of the correlation matrix is 1.00, indicating that the variable is perfectly correlated with itself. The most interesting coefficient to look at is the intersection of "Infra. Ready." and "Adopt. Int." (Adoption Intention), which has a large coefficient of 0.78. This numerical fact is consistent with the above qualitative observation that infrastructure has the largest effect. Likewise, "Trust in Gov." has a positive, significant correlation with Adoption Intention (0.65). The numerals from these statistics provide the statistical underpinning supporting claims about what is driving non-cash payment adoption. The maximum likelihood discrepancy function is governed as:

$$F_{ML} = \ln \mid \Sigma(\theta) \mid + \mathrm{tr}(\mathrm{S}\Sigma^{-1}(\theta)) - \ln \mid \mathrm{S} \mid - p \tag{4}$$

The model-based structural analysis provided the most relevant results for hypothesis testing. The results indicated that, among the four dimensions, Infrastructure Readiness has the highest positive correlation with Adoption. In Merauke, this makes sense: no matter how user-friendly an app is, it becomes irrelevant if the cellular service drops out. The analysis showed that days with reported network latency were directly associated with drops in the number of digital transactions. Average Variance Extracted (AVE) will be:

$$\mathrm{AVE} = \frac{\sum_{i=1}^{n} \lambda_i^2}{\sum_{i=1}^{n} \lambda_i^2 + \sum_{i=1}^{n} \mathrm{Var}(\epsilon_i)} = \frac{\left(\sum_{i=1}^{n} \mathrm{loadings}^2\right)}{\left(\sum_{i=1}^{n} \mathrm{loadings}^2\right) + \sum_{i=1}^{n}(1 - \mathrm{loadings}^2)}$$

Trust was the second most influential factor. The findings also indicated that those who perceived the local government as transparent were much more likely to use digital payment methods. Perceptions of reduced corruption were statistically associated with readiness to engage in traceable digital payments. This proves the imagination that digital taxation is as much about governance branding as it is about technology. Perceived Ease of Use Matters, but less than Infrastructure and Trust. The fact that the payment service is a bit more demanding may not be an issue for taxpayers in Merauke, as long as they feel confident that their transaction will work and that their money is safe.

However, even the most egregious interface design served as a barrier, especially for those least educated. The results also provided evidence of social influence. Entrepreneurs who worked in clusters or associations had very similar payment practices. When the head of a local market association promoted digital payment, individual adoption rates in that cluster shot up. The cluster effect is an important finding for implementation strategies.

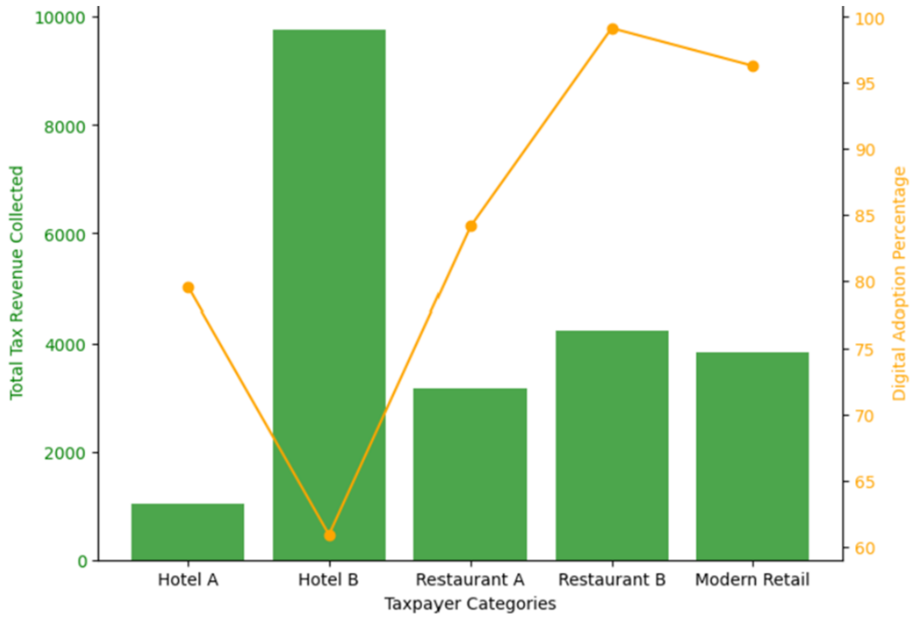

Figure 3: Result of tax revenue and adoption rate

In Figure 3, researchers have achieved the non-context option using a mixed chart with two sets of axes. The left vertical (y) axis shows the quantity “Total Tax Revenue Collected” (in green, graphical bars). The Digital Adoption Percentage (DAP) is shown in the orange lines graph under the secondary vertical axis (right). There are five taxpayer types shown on the horizontal axis, e.g., Hotel A, Hotel B, Restaurant A, and so on. The graph shows that the categories with the highest green bars (highest revenue) also have higher points on the orange line. This visual alignment indicates that sectors with greater digital adoption are contributing more strongly to the revenue stream. The orange line shows overall improvement and peaks in the Modern Retail category (which also aligns with the high revenue bar), further confirming the case for digital collection effectiveness. The analysis of the financial impact trend was ultimately positive. Among this respondent's history of data, a higher percentage of individuals who transitioned to non-cash methods made most of their payments on time than those who never did. The local revenue office bump-up eliminated the logistical friction of obtaining ITS services, making the taxpaying process easier to use and enabling more on-time payments for cash draws, as payers had less travel time and fewer contractual issues. These quantitative findings provide a firm basis and can serve as evidence for the discussions below.

6. Discussions

The insights from the 444 data points, as represented in the scatter plots and numerical results from the demographic matrices, paint a powerful story about tax governance in Merauke. The high correlation between Infrastructure Readiness and Adoption Intent (0.78) in Table 2 can serve as a reality check for policy initiatives. At the national level, Indonesia is pushing hard for rapid digitalisation, but in South Papua, the reality on the ground is constrained by limited physical connectivity. The dot map makes clear that, when it comes to adoption, there is will and then there is ability (Figure 2); if the on-device coverage sucks, you’ll have to be a taxpayer, no matter how much you want otherwise. This means that telecommunications policy and tax policy cannot be separated in the frontier states. It is an older demographic that researchers have alienated, as shown in Table 1. The radical decline in digital adoption among people aged 50+ is worrying; this demographic tends to have high levels of property assets and business involvement. If the digital system is designed only for the internet youth, it risks creating a two-track tax economy in which the richer, older generation stays in opaque cash. At the same time, the younger, smaller entrepreneurs move to the transparent web. The above argument leads us to the proposition of a hybrid interface or assisted digital counter, where technology is used for administrative purposes.

In contrast, the interface for senior citizens remains interpersonal. Trust, suddenly such a game-changing factor, implies that what makes the title so innovative isn´t simply apps, but institutional redesign. The positive relationship between trust and adoption suggests that everyone who successfully transacts digitally is building political capital. The Risk of Corruption is Reduced If a taxpayer notices that the payment they made is entered into the system immediately. This reduces concerns about corruption. So the non-cash system is a means of transparency. The mixed bar line graph supports this by showing that sectors with higher adoption levels generate higher revenue (Figure 3). All that is probably not simply because of the ease of payment, but also because digital systems reduce leaks more than cash-handling systems do. Leakers are leakier in those. Social influence, although moderately correlated, exhibits the joint character of Merauke's economy. The joint implementation of technology by business clusters implies it is time to shift the tax administration from one focused on individuals to one that targets business associations and community leaders. When the person in charge of a market cooperative implements QRIS, the rest follow suit. This revelation reframes implementation as a horizontal, peer-to-peer diffusion model rather than a vertical, top-down edict.

7. Conclusion

This study concludes that innovating local tax governance in Merauke Regency, supported by non-cash payments, is possible but quite complicated. This is evidenced by empirical data from 444 respondents, which makes the case for latent demand for digital payments efficiency but is constrained in practice by infrastructure reliability and a generational lag in digital literacy. The strong correlation between infrastructure and adoption is clear evidence that digital tax policy in South Papua should precede, or be concurrent with, investment in digital technology infrastructure. The study further shows that technology adoption is a relationship-building event; the transparency embedded in digital receipts directly promotes taxpayers' trust in local government. There is a fiscal benefit to telemedicine, as financial data indicates that those who transition to digital compliance are more compliant and higher contributors. At the end of the day, if Merauke is to set an example for smart governance in Eastern Indonesia, then there must be a human-centred approach, with reliable networks and inclusive design shaping policies more than regulatory insistence.

7.1. Limitations

All research has its limitations, and this study is no exception. In the first place, a sample size of 444 respondents, though statistically valid for a regional research effort, is nonetheless representative of only a small portion of the total population of taxpayers in Merauke. Even the stratified sampling method may be biased toward those already somewhat visible to the administration. It may not capture the completely out-of-the-tax-net world of the informal sector. Secondly, this study is cross-sectional: it can only capture behaviour at a given point in time. The process of technology adoption is losing; a person who is not willing today could be tomorrow, once enough herd immunity builds. Such warming could have evolved over the time span of this study. Furthermore, the self-reported nature of those data-collection Respondents may exaggerate their intentions to use digital solutions to present a positive (or modern) image of the researchers, resulting in an intention-behaviour gap, as reported usage is lower than intended. Geographically, although the study sought to be representative, the extraordinary logistical difficulties of working in interior Merauke introduced bias, with towns and peri-urban areas that were more easily accessible outweighing those that were geographically more remote. For that reason, it is unclear how far the results can be generalised to the most remote populations of the regency, which have the worst infrastructure shortcomings.

7.2. Future Scope

The results of this study open several avenues for future research and thereby shed light on the path to digital governance in developing countries. One key recommendation is to begin longitudinal studies. By following the same bunch of taxpayers over time, researchers could observe the actual rate at which cash became non-cash and identify the specific factors that lock users in forever. Such a study would also encompass the delayed effects of infrastructure improvements as they are phased in. There is also a need for qualitative research to further develop our understanding of the trust construct. Qualitative research methods, such as focus group discussions and in-depth interviews, could reveal the specific psychological and cultural barriers to interactions with the government regarding money that a quantitative survey cannot adequately capture. In addition, further examination comparing Merauke with other regencies in South Papua or other provinces in Eastern Indonesia would also be useful. Studying regions with varying levels of infrastructure and cultural composition would also help tease apart which factors are universal and which are local. Finally, future work should explore the supply side of the equation – auditing that the government is ready internally, staffed, and that the back-end system is secure, as much or more than what's to be expected from taxpayers.

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