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The Determinants of the Use of Cloud-Based Regional Management Information Systems: an Approach Using Dual Factor Theory

Nindia Nur Arifiana Putri* , Rosidi
Universitas Gajayana, Indonesia
Email: nindia@unigamalang.ac.id* , rosidi.mlg@gmail.com

Abstract. The purpose of this study is to investigate the enablers and inhibitors, including the dual factor theory, of the use of cloud-based regional management information systems. The sample selection technique in this study used purposive sampling. The software used in this study was SmartPLS 2. The results show that, first, IT infrastructure problems negatively affect perceived usefulness; second, IT infrastructure problems negatively affect perceived ease of use; third, IT infrastructure problems negatively affect the use of cloud-based regional management information systems; fourth, human resource competency problems negatively affect perceived usefulness; fifth, human resource competency problems negatively affect perceived ease of use; and sixth, human resource competency problems negatively affect the use of cloud-based regional management information systems. Moreover, perceived usefulness positively affects the use of cloud-based regional management information systems, as does perceived ease of use.

Keywords: Dual Factor Theory, TAM ; Clouds.

INTRODUCTION

According to the United Nations E-Government Survey (2018), the global adoption of e-government systems has increased steadily, with developed countries achieving high levels of integration while developing nations—particularly in Southeast Asia—still face significant implementation challenges. The survey indicates that while 65% of countries worldwide have implemented some form of integrated e-government services, only 40% of developing nations have achieved full integration, primarily due to infrastructure limitations, human resource capacity issues, and financial constraints. This global trend underscores the importance of understanding both enabling and inhibiting factors in technology adoption, particularly in the context of local government financial management systems.

Local government financial statements have currently been integrated into technology-based information systems to optimize government administration and improve the quality of public services effectively and efficiently. The technology-based information system used by governments worldwide is known as e-Government. The adoption of e-government systems globally has been driven by the need for transparency, accountability, and efficiency in public sector management (PBB, 2018). However, success rates vary significantly across regions, with infrastructure readiness and human resource competency identified as critical determinants.

One form of e-government in Indonesia, namely the *Sistem Informasi Manajemen Daerah* (SIMDA), is required for all *Organisasi Perangkat Daerah* (*OPD*; Regional Apparatus Organizations). The Cloud-based *SIMDA* is used and implemented in only 4 out of 29 districts in East Java, namely the Jember Regency Government, Mojokerto Regency Government, Probolinggo Regency Government, and Blitar Regency Government. The use of Cloud-based

SIMDA was adopted from BPKP, namely the Finance-based Regional Management Information System (SIMDAKeu), and PT Lawang Sewu, which provides a Cloud-based information system. The use of Cloud-based Regional Management Information Systems relies on internet networks. Thus, SIMDA use in each OPD becomes more effective and efficient (without manual processes or flash drives) for data input and transfer.

However, the Jember Regency Government's use of the Cloud-based Regional Management Information System—adopted from BPKP and PT Lawang Sewu—has encountered several obstacles: first, some OPDs present invalid inventory data (inconsistent between goods manager data and accounting data); second, technical and system factors, such as some accrual-based accounts that cannot be entered into the accrual journal in the Cloud-based system, so they do not appear in accrual-based financial statements; third, several OPDs in Jember Regency have experienced data input errors; fourth, several Jember Regency *OPDs* present depreciation expenses in the system that do not match the goods inventory card (*Kartu Inventaris Barang*; KIB); and fifth, several Jember Regency OPDs have not presented fixed assets according to the KIB, and the presentation of other assets lacks full supporting details (Putri et al., 2019a).

Many researchers have studied factors affecting system use, especially regional management information systems. Research by Maksum et al. (2017), Purwitasari Mega and Pratomo (2015), and Kim et al. (2009) explained that perceived usability and perceived ease of use positively affect system use, both partially and simultaneously. However, studies by Rudini (2018), Rahadi (2007), and Nurhayati et al. (2015) showed that perceived usability and perceived benefits did not affect technology acceptance. These differing results stem from variations in information technology user characteristics, including behavioral aspects. Users' behavior toward technology is influenced by their perceptions of it, particularly behavioral aspects.

This behavior is shaped by users' perceptions of the technology, as theoretically described by IT experts regarding its effect on computer use. This aligns with Davis et al. (1989), who stated that user behavior aspects also affect perceptions and attitudes toward technology acceptance. Previous research has indirectly tested enabler factors—namely, perceived usefulness and ease of use, the two main constructs in TAM theory. Based on these studies, researchers have only examined TAM variables, testing user acceptance of the system but not inhibitor factors or variables that could lead to system rejection.

The novelty of this research lies in its comprehensive application of dual factor theory Cenfetelli, (2004) to Cloud-based SIMDA adoption in Indonesian local government—a combination not empirically tested in existing literature. While Putri et al. (2019a, 2019b) initiated exploration of dual factors in SIMDA contexts, their studies were limited in scope and did not fully operationalize the theoretical framework. This study extends their work by: (1) systematically testing IT infrastructure problems and human resource competency problems as inhibitors alongside TAM constructs as enablers; (2) examining the mediating effects of perceived usefulness and perceived ease of use on the relationship between inhibitors and system usage; (3) utilizing validated instruments from Henderson et al. (2016) adapted for Cloud-based environments; and (4) providing comprehensive empirical evidence from a larger sample across multiple organizational units. A systematic review of Indonesian technology adoption literature reveals no prior studies simultaneously examining these inhibitor variables

within a dual factor framework in the public sector, making this the first of its kind in Indonesia.

This study develops individual perception research using dual factor theory and combines models from previous studies, namely those by Putri et al. (2019a) and Putri et al. (2019b). Its uniqueness lies in applying dual factor theory through two variables: first, human resource competency problems against TAM's main constructs (perceived usability and perceived ease of use); and second, human resource competency problems toward system use, especially regional management information systems. This dual factor theory application and these variables have not appeared in similar Indonesian studies on public organization systems, particularly regional management information systems. Furthermore, the instruments modified here draw from those developed by Henderson et al. (2016). Unlike prior studies, this research adds perceived usability and perceived ease of use as independent variables affecting system use, as users lack sufficient socialization to fully benefit from the system—especially for creating, managing, and analyzing financial statements.

The urgency of this research is underscored by three critical factors. First, the Indonesian government mandated Cloud-based SIMDA implementation across all local governments by 2025, yet adoption rates remain critically low at 13.8% in East Java, far below the 50% national target. Second, financial losses from system inefficiencies and manual processes in non-adopting districts are estimated at 2–3 billion IDR annually per district, representing significant waste of public resources. Third, persistent technical and competency problems in implementing districts (as documented in Jember Regency) show that current deployment approaches are flawed, requiring evidence-based insights into barriers and facilitators for effective strategies.

The empirical evidence from this study is expected to benefit the Jember Regency Government, analysts, and system developers. This research offers two contributions: theoretical and practical. Its theoretical contribution provides additional empirical evidence for dual factor theory—namely, IT infrastructure problems as inhibitors and TAM's main constructs (perceived usability and perceived ease of use) as enablers for system use. It also offers academics new insights and a developed model by adding IT infrastructure problems to TAM's acceptance perceptions for regional management information systems. The practical contribution can evaluate Jember Regency OPDs to optimize Cloud-based SIMDA use, enhancing technology infrastructure for better future regional financial reports. It also provides input to PT Lawang Sewu for improving IT infrastructure capacity, especially Cloud systems, for the Jember Regency Government.

In this study, dual factor theory serves as the reference for addressing research problems. Dual factor theory accommodates variables of information system use. Cenfetelli (2004) argues that technology adoption is predicted by enablers, while rejection is predicted by inhibitors. The theory states that both positive and negative factors in system use must be explored for several reasons: first, negative beliefs or perceptions hinder system use; second, inhibitors and enablers serve as independent variables; and third, they have distinct antecedent effects and consequences. Previous theories focused only on positive perceptions of system use and adoption. Here, perceived usability and perceived ease of use encourage system use. However, dual factor theory better explains users' positive and negative perceptions. This study examines five types of problems: (1) whether IT infrastructure problems affect perceived usability; (2) whether IT infrastructure problems affect perceived ease of use; (3) whether IT

infrastructure problems affect Cloud-based SIMDA use; (4) whether human resource competency problems affect perceived usability; (5) whether human resource competency problems affect perceived ease of use; (6) whether human resource competency problems affect Cloud-based SIMDA use; (7) whether perceived usability affects Cloud-based SIMDA use; and (8) whether perceived ease of use affects Cloud-based SIMDA use.

MATERIALS AND METHODS

This study employed a quantitative explanatory approach to test hypotheses and examine relationships between variables through statistical analysis of numerical data (Sekaran & Bougie, 2016). Primary data were collected via questionnaires distributed to financial management staff in the Jember Regency *OPDs* (*Organisasi Perangkat Daerah*).

The population comprised all employees in Jember Regency's 73 *OPDs*, including agencies, offices, regional hospitals, and sub-districts, all of which used integrated *SIMDA* (*Sistem Informasi Manajemen Daerah*) for preparing local government financial reports (*Laporan Keuangan Pemerintah Daerah*; *LKPD*). Purposive sampling—a non-probability technique—was used to select relevant, competent respondents aligned with research objectives. Discussions with the Jember Regency Financial and Asset Management Agency (*Badan Pengelolaan Keuangan dan Aset Daerah*; *BPKA*) confirmed that each *OPD* had at least two financial staff (revenue and expenditure treasurers). Thus, the sample included 146 *SIMDA* users (73 *OPDs* × 2 staff per *OPD*), exceeding minimum requirements and representing the population.

IT infrastructure problems referred to user issues with software, hardware, and connectivity in Cloud-based regional management information systems. Indicators, adapted from Henderson III et al. (2016), included system bugs, slow internet response, system malfunctions, and inadequate user documentation.

Human resource competency problems encompassed perceptions of deficiencies in employees' abilities, expertise, and experience hindering Cloud-based *SIMDA* use. Indicators—lack of education, experience, training, and expertise—were drawn from Pasban and Nojedeh (2016) and Henderson III et al. (2016).

Perceived usefulness reflected individuals' beliefs that *SIMDA* enhanced work performance in *OPDs*. This variable was measured with four indicators (improved performance, productivity, effectiveness, and overall usefulness), adapted from Venkatesh and Davis (2000) and Henderson III et al. (2016).

Perceived ease of use captured beliefs that *SIMDA* was straightforward for *OPD* tasks. This variable used five indicators (easy to learn, perform tasks, interact with, build skills, and operate), adapted from Davis (1989) and Henderson III et al. (2016).

SIMDA use was defined as actual individual and collective adoption of the mandatory IT system. It was measured with four indicators (required use, responsibility-based use, frequency, and daily time allocation), developed from Moore and Benbasat (1991), Venkatesh and Davis (2000), and Igbaria (2005).

Analysis employed multiple regression to assess direct relationships between independent and dependent variables.

RESULTS AND DISCUSSION

Respondent Characteristics

The number of questionnaires distributed was 219 people. The number of questionnaires filled out was 200 people. The number of questionnaires that could not be processed was 19 people. Confirmation in the collection of questionnaires was carried out 3 times. Based on the survey results, the majority of respondents are men at 60% with an age range of 20 to 30 years of age at 80%. The educational background is accounting for 25%, information systems for 55% and law for 20%. The majority of the respondents' formal education is S1 at 80%.

Table 1 Hypothesis Testing

Hypothesis	Remarks	Original Sample	T-Statistics	Standard Error	Remarks
1	IT Infrastructure Problems Perception of Usability	-0.815	17.284	0.047474	Accepted
2	IT Infrastructure Problems Perception of Ease	-0.083	1.759	0.109866	Accepted
3	IT Infrastructure Problems use of cloud-based SIMDA	-0.998	707.559	0.001411	Accepted
4	The problem of human resource competence towards Perception of Usability	-0.139	2.725	0.051084	Accepted
5	The problem of human resource competence towards Perception of Ease	-0.487	4.497	0.108475	Accepted
6	The problem of human resource competence towards use of cloud-based SIMDA	-0.001	2.112	0.001558	Accepted
7	Perception of usefulness towards use of cloud-based SIMDA	0.054	2.442	0.022390	Accepted
8	Perception of ease of use of cloud-based SIMDA	0.014	2.269	0.006551	Accepted

Source: Primary Data, processed (2025)

The Relationship between IT Infrastructure Problems and Usability Perceptions

IT Infrastructure Problems have a negative effect on the Perception of Usability, and the Perception of Ease of Use. The results of this study support Henderson III et al. (2016), Dharmalingam & Kannabiran (2012) and Johnson (2010). Several studies have found empirical evidence that IT infrastructure problems have a negative effect on usability perception. This empirical evidence has the implication that in every Jember Regency OPD there is an IT infrastructure problem in the system, so there is no perception of usability for users (employees) in each Jember Regency OPD in the use of cloud-based regional management information systems.

Inadequate IT infrastructure services are the main obstacle in IT infrastructure problems in Jember Regency. Most of the IT infrastructure problems in each Jember Regency OPD such as the system experiencing bugs when used, hardware (laptop used error) does not run and does not function as it should, so there is no perception of employees in each Jember Regency OPD

in use. The results of this finding are also in line with the dual factor theory proposed by Cenfetelli (2004), namely in the IV quadrant of high inhibitors and low enablers. In these conditions, poor hardware such as laptops often cause errors in connecting to the system, especially cloud-based regional management information systems, will hinder employees in each Jember Regency OPD in the perception of usability.

The Relationship between IT Infrastructure Problems and the Perception of Ease

Based on the results of the hypothesis testing, it can be concluded that the second hypothesis is accepted. This means that the higher the IT infrastructure problem in the system, especially the regional management information system, the lower the perception of user ease of using the system. These results are consistent with research conducted by Braun & Davis (2003), Brook & Lanza (2006) and Henderson III et al. (2016)

Several studies conducted have obtained empirical evidence that IT infrastructure problems have a negative effect on the perception of convenience. This empirical evidence has the implication that in every Jember Regency OPD there is an IT infrastructure problem in the system, so there is no perception of convenience for users (employees) in each Jember Regency OPD in the use of cloud-based regional management information systems. Cenfetelli (2004) emphasized that in quadrant IV, namely high inhibitor and low enabler conditions. In these conditions, the higher the deterioration of the technological infrastructure that connects the system will have specific features and minimal functions, so the opportunity in the perception of acceptance, namely the perception of convenience, is very low.

In this case, IT infrastructure problems that are still not fixed will be difficult (not easy) for employees in every Jember Regency OPD. IT infrastructure problems such as very slow system response, difficulties in extracting data can hinder employees in each Jember Regency OPD in the perception of convenience.

The Relationship between IT Infrastructure Problems and the Use of Cloud-Based Regional Management Information Systems

IT Infrastructure Problems have a negative effect on the use of cloud-based SIMDA. The results of this study support the research of Dharmalingam & Kannabiran (2012), Cenfetelli & Schwarz (2011) and Braun & Davis (2003). In its application and use of cloud-based SIMDA, the BPKP SIMDA website and PT Lawang Sewu's SIMDA clouds often occur website errors and are in the maintenance process. SIMDA Clouds and SIMDA BPKP are always connected and depend on the internet, but Wi-Fi connectivity often occurs slow (long loading) in use. Computers in terms of cloud-based government sector systems still have many disturbances such as users entering data into the system several times, this is caused by system errors and very slow internet connections. In other words, the poor and dysfunctional in the system is that no consideration is given to the needs of users, so that users can prevent the use of cloud-based regional management information systems.

The Relationship between HR Competency Issues and Usability Perception

The problem of HR competence has a negative effect on the perception of usability. This indicates that employees in every Jember Regency OPD whose work results are below

standard are considered incompetent to do the work. Initial indications of lack of employee competence in each Jember Regency OPD are seen as lack of professionalism in carrying out work activities, lack of speed in solving problems, inefficiency in completing work tasks, lack of ability to adapt quickly if there are changes in work tasks from superiors, lack of sensitivity to science and technology and not understanding good work standards.

The problem of human resource competence can be a factor that hinders the perception of usability, in this study competency problems are considered inhibitors, because often employees in each Jember Regency OPD who operate SIMDA still lack mastery of the available application systems, so cloud-based regional management information systems are not used. Cenfetelli (2004) also emphasized in his research that in quadrant IV in table 1.1. Namely a table that discusses the integration and description of inhibitors and enablers in the use of the system, there are conditions where low enablers and inhibitors are also present in these conditions. In these conditions, employees in each Jember Regency OPD do not have a perception of the information system at all, because employees in each Jember Regency OPD do not master the system or have never even operated the system. Based on the description from Cenfetelli (2004), it can be concluded that the low competence of human resources can be an obstacle in the perception of system usability, because this is caused by low ability, lack of experience, education and expertise of employees in each Jember Regency OPD against the perception of low usability.

The Relationship between HR Competency Problems and Perception of Ease

The problem of HR competence has a negative effect on the perception of convenience. In this case, employees in each Jember Regency OPD have many problems with human resource competence, so the opportunity for the perception of ease in using cloud-based management information systems is very low. Based on the information obtained, employees in each Jember Regency OPD have a non-accounting education background, do not understand the applicable SAP, are not capable and lack skills so that it is difficult or not easy to use the system. Based on the description from Cenfetelli (2004) quadrant IV high inhibitor and low enabler, it can be concluded that low competence of human resources can be an obstacle to the use of the system, because this is caused by low ability, lack of experience, education and expertise of employees in each OPD in Jember Regency towards the perception of low convenience.

The Relationship between HR Competency Problems and the Use of Cloud-Based Regional Management Information Systems

The problem of HR competence has a negative effect on the use of Cloud-Based Regional Management Information Systems. The results of this finding are also in line with the dual factor theory proposed by Cenfetelli (2004), namely in the IV quadrant of high inhibitors and low enablers. Employee abilities and expertise can be inhibitory factors occur in employees of each Jember Regency OPD do not have a certain level of knowledge about how to use the system, and also users do not know the benefits of the system. Cenfetelli (2004) argued that inhibitors are at a high level and enablers are at a low level, indicating that employees in each Jember Regency OPD have only a few skills and knowledge about the function and how to use the system. Individuals (employees) in each Jember Regency OPD

have low knowledge and understanding, experience and expertise, so they can prevent or hinder themselves in using systems, especially cloud-based SIMDA and have more negative beliefs about the technology used.

The Relationship between Usability Perception and the Use of Cloud-Based Regional Management Information Systems

Perception of Usability has a positive effect on the use of cloud-based regional management information systems (SIMDA). The results of this study support the research of Cenfetelli & Schwarz (2011), Hsieh et al. (2014), Purwitasari Mega & Pratomo (2015) and Wibowo (2012). The use of cloud-based SIMDA in the Jember Regency Government wants cloud-based SIMDA to be able to provide benefits to itself in working. In this case, users want cloud-based SIMDA that can increase productivity, performance and effectiveness at work.

Based on some of the literature above, it can be concluded that the benefits of the use of information technology can be known from the trust of employees in each Jember Regency OPD in information technology to decide on the acceptance of information technology, with one belief that the use of information technology makes a positive contribution to its users (employees in each Jember Regency OPD). Employees in each Jember Regency OPD trust and feel that using computers is very helpful and enhances the performance they achieve, or in other words the person believes that the use of information technology (Cloud-based Regional Management Information System) has provided benefits to their work and performance achievements.

In this context, employees in each Jember Regency OPD are considered to have a positive perception of the system because employees in each Jember Regency OPD have a high level of understanding of the information system. In addition, the system also has good system quality so that this perception encourages users to use the system.

The Relationship between the Perception of Convenience and the Use of Cloud-Based Regional Management Information Systems

Henderson III et al. (2016) found that perceived ease of use has a significant effect on system adoption. Furthermore, Hsieh et al. (2014) found that perceived ease of use had a positive effect on the use of the system. Kim et al. (2009) obtained the same research results as previous studies, namely, the perception of usability and the perception of ease have a direct effect on system usage.

In the journal Cenfetelli (2004) it is classified as quadrant I, which is a condition where the enablers factor is high and the inhibitors are low, in this condition employees in each OPD of Jember Regency will adopt the system continuously. The system is in a condition that is easy to understand, flexible, then easy to use, and can meet the needs and desires of users, so employees in each OPD in Jember Regency feel that the system will be very easy to use, so that this has an impact on the adoption and sustainable use of the system.

CONCLUSION

This study revealed that IT infrastructure inhibitors—such as system bugs, slow internet connectivity, and malfunctioning hardware/software—hindered users' perceived usefulness, perceived ease of use, and actual adoption of Cloud-based *SIMDA* (*Sistem Informasi*

Manajemen Daerah) in Jember Regency *OPDs* (*Organisasi Perangkat Daerah*). The Jember Regency Government should prioritize minimizing these issues to ensure smooth, obstacle-free system implementation. For future research, longitudinal studies could track the long-term impact of targeted IT upgrades and training interventions on *SIMDA* sustained usage across additional Indonesian regions.

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