# Exploring Success Factor for Mobile based Smart Regency Service using TRUTAUT Model Approach

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***Abstract*— Currently, almost every country struggles to apply city management to the concept of intelligent cities. Several previous studies have modelled the success, maturity, and success of information systems to use smart city principles. However, there are significant differences between city and district definition in terms of governance frameworks, regional size, livelihood differences, population, socio-economic, and socio-cultural dimensions. Therefore, work on the Smart District IT assessment requires new and unique studies that can differ substantially from smart cities. This study aims to explore the determinants of the success of Smart Regency services with mobile technology. The model and approach are the TRUTAUT model, which combines the concepts for the TRI and the UTAUT model. Two hundred eighty-nine participants could collect data with a smart cellular district service system – data processing using the SmartPLS v.3.2.8 software. Recent findings indicate that the variables proposed in the TRUTAUT model are a positive and essential relation. This study helps to determine the success of the application of intelligent mobile regional services applications. This study confirms that policymakers pay more considerable attention to critical questions that affect the district's smart cellular services' success.**

***Keywords-smart city, smart regency, TRUTAUT, success factor, mobile-based application***

## I. Introduction

The Smart City architecture is an integrated ICT-based urban planning and management system. This system should respond to an ever more diverse range of urban problems by efficiently exploiting community capital[1],[2],[3],[4]. Smart City promotes the management of human wealth, economic growth, prosperity, and sustainability of society in the city's life and progress [5]. The principles of intelligent cities are widely applied to civil government in many cities worldwide and Indonesia, including Madura Island[6], [7].

An assessment of the smart city framework information system's quality is an essential and essential factor in the development of smart cities. Several previous studies have carried out models and frameworks to determine the efficiency of intelligent cities. Krisna Adiyarta et all(2020) are among those trying to summarize smart cities' performance indicators through the prism process[8]. Bonar et al. (2020) studied the implementation of intelligent cities in Asahan[9] and E-government assessment of end-user machine satisfaction strategies in smart cities by Sorongan et all (2020)[10]. The concept of Smart City is outlined in several studies[11]–[13], Intelligent city design[6], [7], and UTAUT model implementation in the smart city [14]–[16].

There are major significant problems in applying the Smart Sustainable City concept, including lack of a suitable framework[17], a simple structure and not complex city issues and needs[18], Sporadically done[19], and lack of awareness and learning to boost rational, the sustainable city thought[20]. Other major issues include the lack of participation and coordination of intelligent city stakeholders[21] and lack of engagement by the society[22]

However, there are significant differences between cities and districts in Broad aspects of the area, Population aspects, Aspects of people's livelihood, Aspects of government structure, Socio-cultural aspects, Economic aspects, Regulations, Typology of geographical conditions, Based on function, Settlement problems and Environmental problems[23],[24], [25]. Consequently, the Smart District IT evaluation requires new and unique studies that are significantly different from smart cities.

Within the past, the fourth regency was prepared to develop intelligent cities, particularly in Madura, Pamekasan, and Sumenep. One study aims to create smart reconstruction for mobile applications. This framework provides a detailed overview of the communities and stakeholders essential to the implementation of smart regency programs. Some earlier studies explored key functional factors[7] and Intelligent urban planning[6].

This study aims to explore the critical success factors of Smart Regency services with mobile technology. The model and approach is the TRUTAUT model, a model that combines concepts for TRI and UTAUT models. This model was developed by Darmawan Napitupulu to assess the adoption of technology for LAPOR applications by combining constructs in the Technology Readiness Index and UTAUT models[26]. This study contributes to the successful deployment of practical regional mobile services applications. This study confirms that policymakers pay more attention to critical issues affecting smart mobile services in the district.

## II. Literature Review

### A. The framework of Smart City

A smart city's philosophy is to establish civil authority through an integrated, interconnected, and well-integrated ICT-based resource management model. Every town on the world stage is currently competing to incorporate a smart and sustainable city. The Internet of Things ( IoT) approach is used by sensors to collect efficiently, control, investigate, and retrieve data using extensive data technology. The data collected is then managed and analyzed to become valuable in the critical decision-making process. This knowledge is gathered from equipment and the public and explained to control modes of transportation, crime, waste management, housing, provision of clean water supplies, libraries, power generation, and transmission, education, and school infrastructure information systems, clinics and hospitals, and other public services[27][28].

Using an IoT network, synchronization, and functional connections between ICT and physical equipment in Smart Sustainable City can be linked to practical and operational services in the city, connected to civil and community members[29]. Several primary and essential factors affect smart cities' successful implementation, including technology, organization, governance, government policy, economy, work climate, and infrastructure. Smart city management must consider six essential and central dimensions: explicit government, creative economy, intelligent life, intelligent citizens, and smart mobility[30]. The Garuda Smart City model is between the famous smart city[31][32][4], the Boyd Cohen Wheel[20][33][34][35], and Telkom Smart City Framework Model. The six key points of view and smart cities' measures include intelligent government, intelligent infrastructure, brilliant economy, bright citizens, a smart climate, and intelligent mobility.


Fig. 1. Telkom Smart City Framework Model[36]

### B. TRUTAUT Model Approach

The TRUTAUT model and approach evaluate the readiness and adoption of information systems proposed by Darmawan Napitupulu[26]. This model combines concepts and best practices from the TRI (Technology Readiness Index) model and the UTAUT Model. Based on previous studies, there are 13 hypotheses and ten constructs of the proposed combination model. All constructs are optimism, innovation, discomfort, insecurity, performance expectations, business expectations, social influence, facilitation conditions, behavioural intentions, and usage behaviour. In the TRUTAUT combination model, aspects of TRI personality traits become antecedents from the cognitive aspects of the UTAUT model. This research implies that government institutions can better understand what factors influence the use of technology.

The TRUTAUT model is a comprehensive model for evaluating the success of a system consisting of 10 constructor variables and 13 hypotheses, which are presented in the table below:

TABLE I. Instrument Of Variables And Indicators Of Trutaut Model[26][37], [38][39], [40]

| No | Variables | Descriptions & References | Indicators | Symbols |
|---|---|---|---|---|
| 1 | Optimism (O) | Positive technology view and belief that it offers people greater control, flexibility, and efficiency in their lives[39], [40] | Technology gives more power over their daily lives | O1 |
| | | | Technology gives you more mobility | O2 |
| | | | Technology makes the work more effective | O3 |
| 2 | Innovativeness (In) | A desire to be a leader and thinker in technology[39], [40] | Others come for advice on emerging technology | In1 |
| | | | You track the latest technical advances in your areas of interest | In2 |
| | | | You have fewer problems than others in making technology work for you | In3 |
| 3 | Discomfort (D) | a perceived loss of power and a feeling of being overwhelmed by technology[39], [40] | Technical support lines aren't helpful because they don't explain things to you | D1 |
| | | | Often you think development systems aren't built for ordinary people. | D2 |
| | | | There's no manual for a high-tech product or service written in plain language | D3 |
| 4 | Insecurity (I) | Distrust of technology, based on scepticism about its ability to function correctly and its possible damaging consequences[39], [40] | Giving a credit card number over a computer is not considered safe. | I1 |
| | | | You don't think it's safe to do financial business online | I2 |
| | | | You are not comfortable with a position that can only be reached online | I3 |
| 5 | Social Influence (SI) | the extent to which a person perceives essential others that he or she should use the new system[37], [38], [41] | People who control my conduct think I should use the program | SI1 |
| | | | I think people who are important to me | SI2 |

| | | | | |
|---|---|---|---|---|
| | | | should use the system | |
| | | | This company's senior management helped use the system | SI3 |
| | | | Overall, the company endorsed program use | SI4 |
| 6 | Performance Expectancy (PE) | To what extent a person believes that using the system will help him achieve job performance gains[37], [38], [41] | I'd find the device useful in my work | PE1 |
| | | | The system allows me to accomplish tasks faster | PE2 |
| | | | I increase my productivity with the system | PE3 |
| | | | If I use the system, I will increase my chances | PE4 |
| 7 | Effort Expectancy (EE) | the level of facility associated with machine use[37], [38], [41] | My system interaction would be clear and understandable | EE1 |
| | | | It'd be quick for me to use the device skillfully | EE2 |
| | | | I could easily use the system | EE3 |
| | | | Easy learning to operate the system | EE4 |
| 8 | Facilitating Condition (FC) | the extent to which an individual believes that the system user has an organizational and technical infrastructure[37], [38], [41] | I have the means to use the system | FC1 |
| | | | I have the expertise to use the program | FC2 |
| | | | The system is not supported by other methods I use | FC3 |
| | | | A single individual (or group) may help with system problems | FC4 |
| 9 | Behavioural Intention (BI) | the degree to which the user intends to use the system[37], [38], [41] | I'm preparing to use the device in the following month | BI1 |
| | | | I predict that in the next few months, I will use the system | BI2 |
| | | | In the following month, I intend to use the program | BI3 |
| 10 | Use Behavior (UB) | The degree of the consumer to use as conduct[37], [38], [41] | I will make it as use behaviour | UB1 |

### C. *Mobile Smart Regency in Madura Island*

In Madura's residence, four districts have begun and established the idea of sustainable smart cities. Among them is the development of mobile smart regency services. These include launching two mobile-based, intelligent city service applications, namely the Sumekar Online Application and Pamekasan Smart. This mobile application service is predictable for the expansion of smart cities on Madura Island.

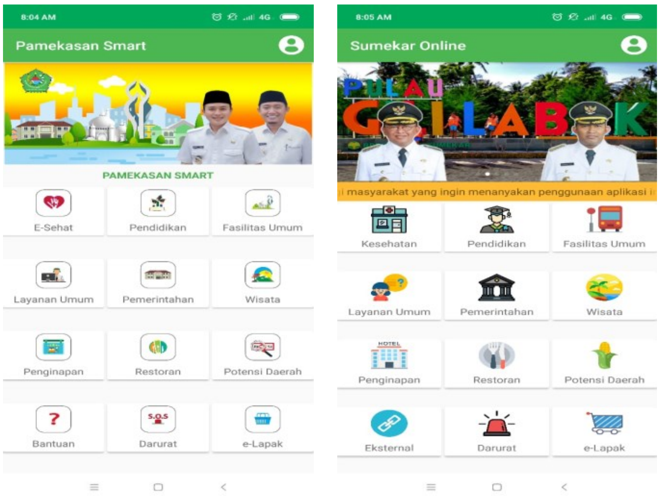


Fig. 2. Mobile-based Smart Regency Application Services, such as Pamekasan Smart and Sumekar Online

## III. METHODOLOGY

This study is a concise quantitative analysis using the model calculation method TRUTAUT. Data collection took place by compiling a questionnaire TRUTAUT model consisting of 10 construct variables and 13 hypotheses. The stratified random data sample was conducted on 289 respondents in the Madura Island region using smart district services. A mobile smart agency application for medical services, education, public utilities, administration, tourism, lodging, licensing, restaurants, regional capability, and e-commerce services is the study unit of this research. The questionnaires were distributed online and offline via direct interviews with respondents. The questionnaires were distributed. The response scale "1" = Far from One is the question's shape, "2" = uncertainty, "3" = unclear, "4" = agreement, and "5" = agreement strongly. The collected data will then be evaluated using the SmartPLS v.3.2.8 tool.

Through this analysis, 13 research hypotheses using data from data collection tests are explained and empirically tested by the research methodology. The following is shown in the study framework, centred on the TRUTAUT model approach:

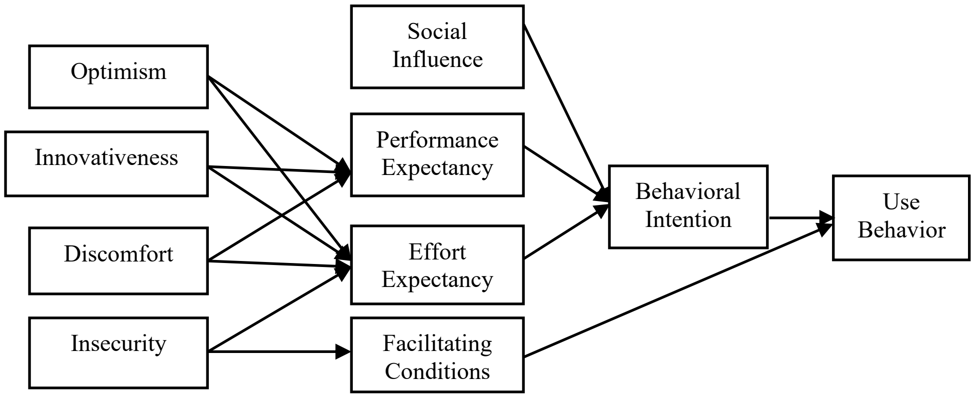


Fig. 3. Research Framework based on TRUTAUT [26]

## IV. RESULT AND DISCUSSION

The next step is to investigate the data previously obtained from the smart service stakeholders and to test their reliability and validity. Validity assessments are performed to clarify the problems before prepared based on good definitions to proceed. To understand whether the questionnaire developed in advance can be calculated, reliability testing is used. The Questionnaire Instrument is said to be of high quality and assess similar organizations when its immediate consequences occur. Convergent validity is carried out to determine the importance of the scores in the TRUTAUT Model method indicators.

### A. Common Method Bias

In a study using a single data source, the conventional bias approach could pose a risk-based on Podsakoff, (1986) [42]. Therefore, the Harman single factor test was performed to determine whether such a risk is present in the collection of data. All objects from all structures were entered and confined to one element for review. The results show that only 22.3 percent of the total variance was the only factor, less than just 50%. With these results, we can conclude with confidence that the data collected are free of the risk of widespread bias.

### B. Measurement Model

Measurement model Convergence Validity Evaluation results are described in Table II. The criteria for determining convergent validity are factor loading, composite reliability ( CR), and average derived variance (AVE). The literature indicates that the load factor is above 0.700, but the 0.4, 0.5, and 0.6 values are appropriate under some conditions based on Ramayah et al., (2018)[43].

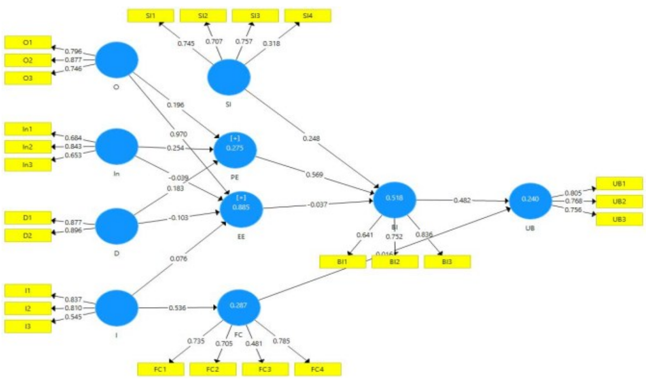

Fig. 4. Measurement output model using SmartPLS

TABLE II. CONVERGENT VALIDITY MEASUREMENT

| Construct Variables | Items | Factor loading | Composite Reliability (CR) | Average Variance Extracted (AVE) |
|---|---|---|---|---|
| Optimism | O1 | 0.749 | 0.849 | 0.654 |
| | O2 | 0.871 | | |
| | O3 | 0.801 | | |
| Innovativeness | In1 | 0.755 | 0.774 | 0.539 |
| | In2 | 0.848 | | |
| | In3 | 0.574 | | |
| Discomfort | D1 | 0.885 | 0.880 | 0.786 |
| | D2 | 0.889 | | |
| | D3 | 0.882 | | |
| Insecurity | I1 | 0.865 | 0.774 | 0.543 |
| | I2 | 0.786 | | |
| | I3 | 0.513 | | |
| Social Influence | SI1 | 0.745 | 0.749 | 0.390 |
| | SI2 | 0.702 | | |
| | SI3 | 0.741 | | |
| | SI4 | 0.327 | | |
| Performance Expectancy | PE1 | 0.559 | 0.736 | 0.368 |
| | PE2 | 0.490 | | |
| | PE3 | 0.448 | | |
| | PE4 | 0.735 | | |
| Effort Expectancy | EE1 | 0.554 | 0.823 | 0.487 |
| | EE2 | 0.582 | | |
| | EE3 | 0.704 | | |
| | EE4 | 0.788 | | |
| Facilitating Condition | FC1 | 0.690 | 0.812 | 0.475 |
| | FC2 | 0.671 | | |
| | FC3 | 0.403 | | |
| | FC4 | 0.795 | | |
| Behavioural Intention | BI1 | 0.625 | 0.787 | 0.556 |
| | BI2 | 0.748 | | |
| | BI3 | 0.847 | | |
| Use Behavior | UB1 | 0.804 | 0.820 | 0.604 |

The findings for the validity assessment of discrimination based on the Fornell and Larker Guidelines (1981)[44] are presented in Table III[45]. Discriminatory validity could be concluded if the AVE square root exceeds the extent of its correlation. The need is fulfilled as the AVE square root's dark, and italicized figures are above the correlation values.

TABLE III. DISCRIMINANT VALIDITY TESTING I

| | BI | D | EE | FC | In |
|---|---|---|---|---|---|
| BI | 0.746 | | | | |
| D | 0.348 | 0.887 | | | |
| EE | 0.354 | 0.459 | 0.698 | | |

| | | | | | |
|---|---|---|---|---|---|
| FC | 0.427 | 0.903 | 0.571 | 0.689 | |
| In | 0.386 | 0.492 | 0.550 | 0.816 | 0.734 |

TABLE IV. DISCRIMINANT VALIDITY TESTING II

| | BI | D | EE | FC | In | I | O | PE | SI | UB |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 0.888 | 0.502 | 0.483 | 0.556 | 0.440 | 0.737 | | | | |
| O | 0.318 | 0.474 | 0.958 | 0.614 | 0.613 | 0.473 | 0.808 | | | |
| PE | 0.743 | 0.428 | 0.432 | 0.468 | 0.373 | 0.577 | 0.358 | 0.606 | | |
| SI | 0.540 | 0.366 | 0.462 | 0.285 | 0.089 | 0.434 | 0.266 | 0.724 | 0.625 | |
| UB | 0.492 | 0.355 | 0.493 | 0.280 | 0.099 | 0.366 | 0.287 | 0.716 | 0.938 | 0.777 |

### C. *Structural Model & Hypothesis Testing*

The VIF score is determined to determine whether the internal model is free from the problem of multi-colinearity. Diamantopoulos & Siguaw (2006 ) reported that 3.3 or above VIF shows a possible colinearity problem[45]. The results showed that none of the VIF values exceeded 3.0 or 5.0 indicate that the multi-linearity problem is not included in the data. Table V displays the effects of the test hypotheses. All the paths between separate and dependent variables were critical, ranging from T-values between 0.160 and 4.312 (p<0.001). R2 benefits for the relationship between indigenous and dependent variables have reached the suggested value of 0.10 by Falk & Miller (1992)[45]. Cohen ( 1988) recorded a known range of 0.004 to 0.721 for high, medium, and low f2. In this analysis, f2 for all pathways is either low or moderate. The structural model's predictive validity should also be evaluated with Stone and Geisser's Q2, as shown in the literature. The results show that the Q2 scores for all dependent variables are far above zero, which indicates the model's predictive validity. Figure 5 shows the SmartPLS structural model performance

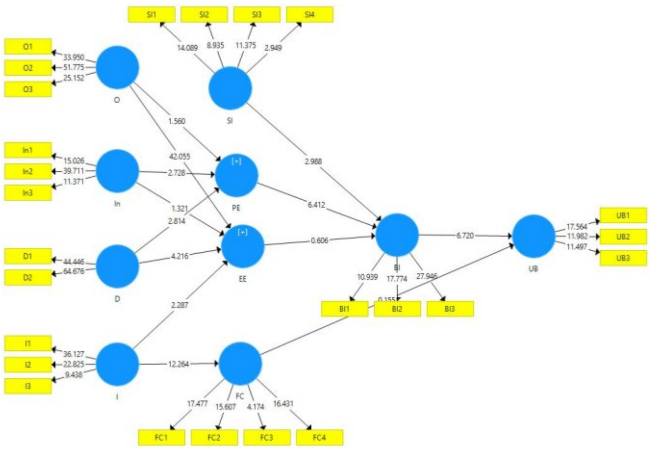


Fig. 5. The output of the Structural Model using SmartPLS

TABLE V. PATH COEFFICIENT & HYPOTHESIS TEST RESULTS

| Hypotheses | R2 | Std Errors | T value | P-value | $F^2$ | Decision |
|---|---|---|---|---|---|---|
| O→PE | 0.456 | 0.060 | 0.999 | 0.000 | 0.461 | *Rejected* |
| O→EE | 0.008 | 0.025 | 55.492 | 0.742 | 0.009 | Accepted |
| In→PE | 0.294 | 0.071 | 1.496 | 0.000 | 0.292 | Accepted |
| In→EE | 0.042 | 0.062 | 2.738 | 0.494 | 0.058 | Accepted |
| D→PE | 0.075 | 0.027 | 4.162 | 0.006 | 0.074 | Accepted |
| D→EE | 0.152 | 0.101 | 0.329 | 0.135 | 0.145 | *Rejected* |
| I→EE | 0.051 | 0.027 | 1.849 | 0.065 | 0.052 | Accepted |
| I→FC | 0.556 | 0.039 | 14.098 | 0.000 | 0.562 | Accepted |
| SI→BI | 0.976 | 0.018 | 0.083 | 0.000 | 0.973 | *Rejected* |
| PE→BI | 0.125 | 0.125 | 6.346 | 0.318 | 0.119 | Accepted |
| EE→BI | 0.732 | 0.115 | 0.684 | 0.000 | 0.747 | *Rejected* |
| FC→UB | 0.009 | 0.115 | 1.024 | 0.934 | 0.023 | *Rejected* |
| BI→UB | 0.456 | 0.060 | 7.574 | 0.000 | 0.461 | Accepted |

The results of data analysis that have been done show that of the thirteen hypotheses based on the TRUTAUT model, eight predictions were accepted, and five hypotheses were rejected, which can be seen in table 4 above. From the eight premises in this research framework, it is found that three construct variables influence positively and significantly on the Effort Expectancy (EE) variable, namely Optimism (O), Innovativeness (In), and Insecurity (I). Two construct variables affect positively on the Performance Expectancy (PE) variable, namely the Innovativeness (In) and Discomfort (D) variables. In this study, it was also found that the Insecurity (I) variable had a positive effect on the Facilitating Condition (FC) variable, Performance Expectancy (PE) had a positive impact on the Behavioral Intention (BI) variable and the Behavioral Intention (BI) variable positively influenced the Use variable Behavior (UB).

There are five hypotheses rejected in this study, namely the Optimism (O) variable does not have a significant effect on the Performance Expectancy (PE) variable, Discomfort (D) does not have a significant impact on the Effort Expectancy (EE) variable, the Social Influence (SI) variable and Effort Expectancy (EE) did not have a significant effect on the Behavioral Intention (BI) variable, and finally the Facilitating Condition (FC) variable did not have a significant impact on the Use Behavior (UB) variable. This phenomenon shows that only a few variables in the TRUTAUT model have a good influence on evaluating the readiness and acceptance of cellular-based smart regency services' performance.

## V. CONCLUSION & IMPLICATION

This study contributes to two aspects: theory and management. The model was theoretically developed to research variables that influence the usage of mobile smart city services. Researchers interested in this research subject in other contexts may further test this model. This survey provides management and realistic messages and suggestions that indicate that policymakers and politicians pay more attention to important issues that impact their purpose of using smart city mobile services.

While the study has achieved its aims, there are still some drawbacks to this research. Furthermore, samples with various attributes provided to respondents are still scarce. Secondly, only ten build variables are present in the output valuation model. Future work can extend the structure by adding to these variables more dimensions. Weaknesses in the three studies contributed to the intersection collection period. At some stage, data collection may not be so reliable as longitudinal data collection to explain the situation more accurately and luxuriously.

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