



## DESIGN OF DECISION SUPPORT SYSTEM FOR INTERNET BANKING TECHNOLOGY SERVICE DEVELOPMENT : CASE STUDY IN PT BANK RAKYAT INDONESIA (BRI PERSERO) TBK

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### Abstract

*This research was aimed to design a decision support system of internet banking technology services development in PT. Bank Rakyat Indonesia (BRI Persero) Tbk. SWOT (strength, weakness, opportunities, threat) analysis is used to identify determinant criteria in the development of bank services. The conceptual design of Decision Support System (DSS) is comprised of three models consist internal and external environmental analysis of service development, customer acquisition strategy priority analysis and area priority analysis of service development. The system prototype was designed in a web environment using hypertext preprocessing (PHP) as an application development platform and MySQL as a database management system (DBMS) platform.*

**Keywords: Internet Banking, Decision Support System (DSS), Prototype, Customer Perception**

### INTRODCUTION

Rapid development of information system influences nearly all human activities, both in daily life as well as business world. This rapid development of technology and information is also directly related to internet development and the growth of internet users in the past decade. In Indonesia there is an sharp increase of internet users from 2 million users in 2000 to 55 million users in 2012 with 22,1% growth per year (internetworldstats.com). Indonesian Internet Service Providers Association (APJII) predicts an increase of internet users in Indonesia to reach 82 million in 2013, 107 million in 2014, and 139 million in 2015. The development of information system and internet has created significant changes in banking industry, specifically in the decision making pattern in technical operators as well as leaders at every level.

PT Bank Rakyat Indonesia (BRI Persero) Tbk. is one of the biggest bank in Indonesia and has

utilized information technology as a single system in providing services. Currently BRI Persero develops technology-based service system using internet network called t e-banking / electronic banking service. One of the implementations of *e-banking* service which has been used by BRI Persero to optimize and maintain competitiveness is BRI *Internet Banking* (BRI *iBank*) service. The implementation of internet banking gives two-way benefits to the bank as well as the customers. For customers, this service provides ease and speed in performing all kinds of banking transactions regardless of time and place and also considering security risks like theft. Customers can use the service via cell phones, computers, laptops/notebooks.

From various existing *e-banking* channels, the percentage of activation and use of BRI Persero *e-banking* service compared with the number of existing accounts is still very small (1.12% in 2012



and 2.66% in 2013). Ratio of internet banking service use is the smallest compared with the composition of *mobile banking* (15.19% in 2013) of Short Message System (SMS) notification (3.84% in 2013).

*SharingVision* has conducted has survey to discover the number of internet banking users in Indonesia from data of major banks in Indonesia, whether state banks or private banks, which have major potentials in developing internet banking. Bank Central Asia (BCA) which is the biggest national private bank is still the frontrunner in the implementation of internet banking service, with the number of users reaching 2,8 million users in 2011, number of transactions reaches 608 million per year with transaction value reaching Rp 2.600 billion per year (source: BCA annual report 2011). "BRI *iBank*" service to 2011 had 164 thousand users with new transactions reaching 6,9 million transactions per year. Decision making related to the development of this service is a process which determines the success of the service. Decision making process to develop internet banking service in BRI Persero was still performed conventionally with limited capabilities for supporting comprehensive decision making. This research proposes a new tool for supporting comprehensive decision making. By using the supporting application which has massive and comprehensive information, the tasks of managers or decision makers will be easier and could be more effective and efficient.

## LITERATURE REVIEW

The growing popularity of banking technology and internet banking service in the society makes the issue an interesting subject to be studied further in various researches and studies. Topics which are generally studies in researches related to this issue include perception, satisfaction, attitude, to customer loyalty on the usage of the service. Aulia (2010), Butar (2013), Maharsi and Fenny (2006) as well as Mayasari, Kurniawati, and Nugroho (2011) have performed surveys to discover customer assessment from various measurement dimensions. Results of those studies show that measurement dimensions related to service/website quality are main criteria of customers in using internet banking.

Gounaris and Koritos (2008) conducted a study to look at the determinants of Internet banking adoption decision. The results of these studies show the PCI (Perceived Characteristics of the Innovation) method is significantly better to identify and predict

customer adoption of internet banking services compared with TAM (Technology Acceptance Model) and DOI (Diffusion of Innovations) with the main factors that affect the model is customer demographic and psychographic. The research conducted by Hosein (2009) showed that perceived services usefulness and perceived services ease of use become the main indicator that significantly influence the customer's decision to adopt internet banking services. Minjoon and Shoahan (2001) found the factor of reliability, responsibility, accessibility and accuracy become the dimensions that most affect the customer satisfaction of internet banking. The use of variables by using SERVQUAL (Service-Quality) can be an indicator of customer satisfaction on the success of the development of Internet banking services is performed.

The information related to the customer's decision determinants is crucial for banks in order to improve services in the future. The bank should be aware that the customer needs to banking services are directly influenced by the level of adoption of internet usage. The success of accommodating the needs is depends on four factors, i.e. management commitment, defining good strategic planning and development budgeting, appropriate marketing programs and services supporting (Davidson, 2000).

Durkin (2004) specifically describes the importance of bank companies to identify customers by grouping customers into several clusters. The customers grouping method allows the bank to identify potential clients in accordance with the development criteria established by management. In this case, the correct marketing strategy and factor of intensity of Internet usage in the office for a customer has positively strong affects into the adoption of the use of the service.

Suhari, Sukur, and Eniyati (2009) have conducted a study related to designing special DSS for assessment of credit provision to customer loan bank. The output of that study is an application system of provision of credit where the process has been determined in accordance with the standard operating procedures (SOP) of credit provision in the research object. The designed system can give consideration and input to the bank starting from initializing credit to ending credit in decisions of provision of credit.

The main difference between previous studies and our research is that our proposed DSS provides wide spectrum of integrated function for banking services analysis and development

### RESEARCH METHODOLOGY

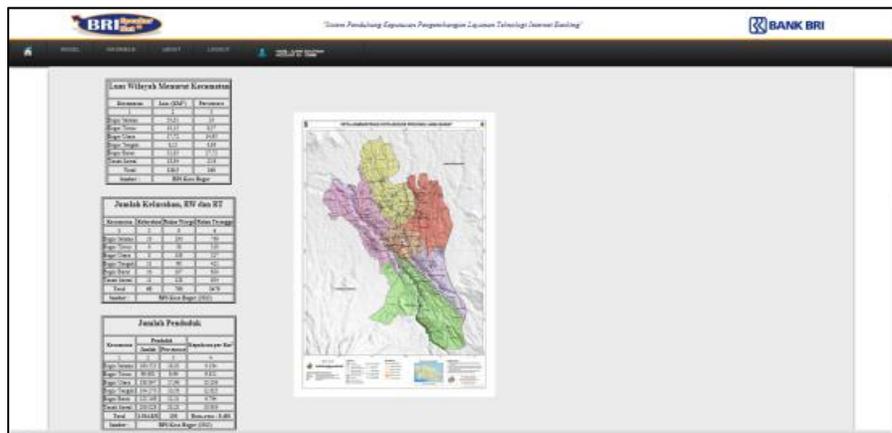
The method used in designing system was Rapid Application Development (RAD) approach and referred to System Development Life Cycle (SDLC) and prototype method. This study used primary and secondary data. Primary data was collected from in-depth interviews with internal, external respondents and customers. The primary data includes perception variable of customers' knowledge, incentive, security, organization support, and website navigation (by customers). Service variable explains the existing condition of current service penetration (by management). Strategy variable consists of data of internal and external strategic factors (by management) and policy alternative (by experts). The internal respondents consisted of people with capacity and good understanding on all aspects related to internet banking services. There were two internal respondents involved, i.e. head of internet banking section from electronic banking division of BRI Persero main office and operational manager from Bogor branch office. There was one external respondent, an expert with competence in the field of banking and internet banking. Information from customers was also collected to enrich information and knowledge.

reports. The secondary data used was related to population, general infrastructures and industry of the development area. The DSS developed in this paper consists of three models. The first model is to analyze internal and external environments of service development using internal factor evaluation – external factor evaluation (IFE-EFE) method. The second model is to analyze the best strategy priority using quantitative strategic planning matrix (QSPM) methods based SWOT analysis. The third model is to analyze potential development area using exponential comparison method (ECM) which would meet management needs to expand geographic range of the use of internet banking services. Importance performance analysis (IPA) is to analyze the level of service performance and level of customers' interests. The DSS prototype was implemented using PHP as an application development platform and MySQL as a DBMS platform.

### RESEARCH RESULTS

The functional components of the proposed DSS include:

- a. The system enabled direct access by users by logging in first using *username* and *password*.
- b. The system provided facilities to give supporting information considered important in decision making process such as information of development pilot areas (figure 1), information of customer perception in pilot areas (figure 2), and information of whole industries in pilot areas (figure 3).



The secondary data we and external data of the c includes journals, books, previous studies, and

Figure 1. Information of development pilot areas

le to enter weight values, core for each criteria with available score selections.

- d. The system enabled adding data input of critical factors of service development.
- e. The system enabled adding data input of the result of expert analysis on alternative policy of service development using SWOT method analysis results.

method (Figure 4), QSPM method (Figure 5), and ECM method (Figure 6).



Figure 2. Information of perception of bank customers in pilot areas



Figure 3. Information of whole industries in pilot areas

- f. The system provided forms to be filled by users to provide supporting facilities of service development decision making using management science tools such as IFE-EFE

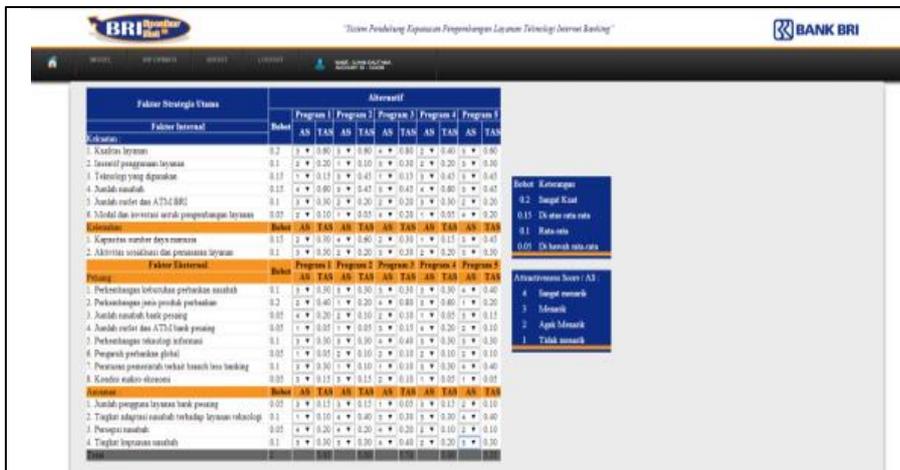


Figure 4. IFE-EFE model used for analyzing internal and external environments of service development



Figure 5. QSPM model for showing the best strategy priority

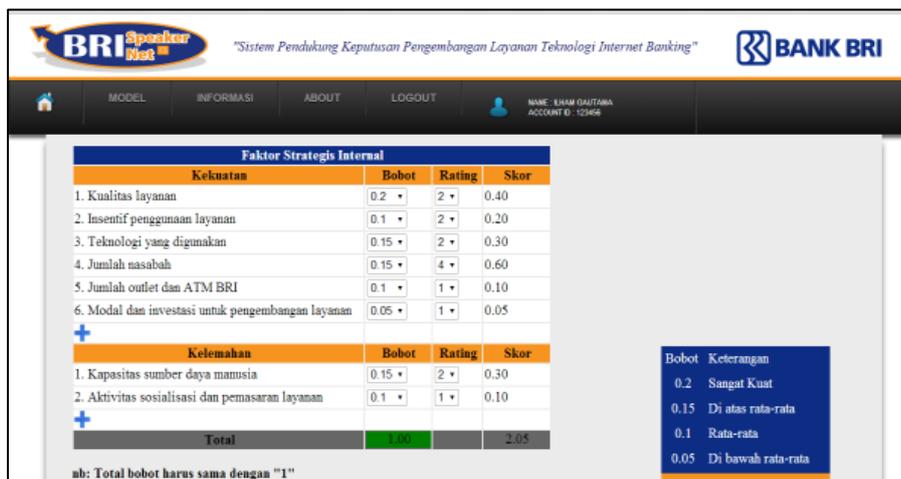


Figure 6. ECM model used for analyzing potential development area



- g. The system enables adding data input of survey results on users' perception on the service in accordance with the number of respondent sample needed using analysis results of IPA method (Figure 7).
- h. The system could give notifications in case of wrong input.
- i. The system provided information on final recommendation of service development. Recommendations issued is the result of analysis of the model analysis which are internal-external condition, the best alternative to the proposed development strategy and the best area of the proposed alternatives (Figure 8).

Detailed non-functional requirements to developed DSS includes :

- a. The system could be operated easily by users.
- b. Time to analyze data of service using customers' perception and section of alternative criteria of policy of service development could be performed quickly / in real time.
- c. The developed system is a basic concept using web technology platform as the basis which in the future was expected to be integrated to the entire BRI Persero intranet network.

Kategori	Variabel	Kategori					Tahapan	Tingkat	Total	Tingkat
		1	2	3	4	5				
Kemudahan	Kemudahan untuk belajar menggunakan website	1	2	3	4	5	0.0468	10	38	3.80
	Situs website mudah dimengerti dan jelas	1	2	3	4	5	0.0288	10	38	3.80
	Kemudahan melakukan transaksi dengan situs website	1	2	3	4	5	0.0820	10	32	3.20
	Situs website mudah digunakan	1	2	3	4	5	0.0384	10	40	4.00
Kejelasan	Tampilan dan desain situs website yang menarik	1	2	3	4	5	0.0918	10	31	3.10
	Situs website menggunakan tampilan yang profesional	1	2	3	4	5	0.0378	10	37	3.70
	Situs website menggunakan pengalihan yang cepat	1	2	3	4	5	0.0442	10	38	3.80
	Situs website menyediakan informasi yang akurat	1	2	3	4	5	0.0664	10	44	4.40
Kepercayaan	Situs website menyediakan informasi secara terpercaya	1	2	3	4	5	0.0372	10	41	4.10
	Situs website menyediakan informasi secara tepat waktu	1	2	3	4	5	0.0392	10	42	4.20
	Kualitas informasi situs website menyediakan informasi yang akurat	1	2	3	4	5	0.0322	10	39	3.90
	Situs website menyediakan informasi yang benar secara detail	1	2	3	4	5	0.0222	10	35	3.50
Kepercayaan	Situs website menyediakan informasi yang mudah dipahami	1	2	3	4	5	0.0648	10	34	3.40
	Situs website menyediakan informasi dalam format yang rapi	1	2	3	4	5	0.0442	10	38	3.80
	Situs website menggunakan tampilan yang menarik	1	2	3	4	5	0.0372	10	41	4.10
	Akses dalam melakukan transaksi	1	2	3	4	5	0.0342	10	38	3.80
Kepercayaan	Data pribadi terlindungi secara aman	1	2	3	4	5	0.0252	10	42	4.20
	Intuitif Layanan Situs website menggunakan cara perintah yang terintegrasi	1	2	3	4	5	0.0378	10	37	3.70
	Situs website menggunakan cara komunikasi yang menarik	1	2	3	4	5	0.0322	10	42	4.20
	Situs website membuat mudah untuk bertransaksi dengan menggunakan	1	2	3	4	5	0.0322	10	34	3.40
Kepercayaan	Ketersediaan helpline layanan atau disampaikan seperti yang diperlukan	1	2	3	4	5	0.0272	10	41	4.10

Figure 7. Data input of customer perception

Model 1-IE Model 2-QSPM Model 3-MPE DOWNLOAD MODEL ULANG

**Hasil Perhitungan Model 1 :**

**Hasil Matrik** -----

Posisi internal |

**Hasil Matriks EFE : 2.80**

Posisi eksternal pengembangan rata-rata.

Figure 8. Recommendation



The first sub-goal was customer acquisition and activation strategy priority which had four criteria which were descriptions of SWOT method, which are strength, weakness, opportunity and threat. The results of the analysis using SWOT method consisted special strategies consist of addition of new varying applications in the service site, giving special offer such as direct rewards related to the use of internet banking, mapping customers based on supporting criteria and special segments, holding routine programs such as weekly or monthly programs to educate customers to try to use the service (experience day) in main operational office as well as events outside, opening more special outlets and car of internet banking service not in the same office as main operational office and placed in strategic locations of in various events, then working together with telecommunication providers to place BRI Persero staffs in cellular operator outlets which had been appointed to handle problems related to the use of internet banking services.

The second sub-purpose is development location priority with six criteria which included population, social economy, transportation facilities/access, communication facility/network, industrial climate and banking credit position. The alternative used in pilot area of the development included six sub-districts in Bogor by implementing the priorities of results of analysis using ECM method.

Database component of DSS consists of thirteen data tables consisting of data of admin, *user*, internal strategic factors, internal strategic factors (*user*), external strategic factors, external strategic factors (*user*), program, location criteria, location criteria (*user*), questionnaires of service users' perception, respondent questionnaire 1 (interest), respondent questionnaire 2 (performance) and questionnaire average. In particular managers/decision makers are given a picture or additional information, i.e. critical factors described in SWOT analysis. Moreover the company could also discover main indicators which should be considered and continuously developed to create positive customer perception on the service from assessment of perception from various dimensions such as utility, information quality and service interaction dimensions.

## CONCLUSION

The DSS for internet Banking Technology has been designed, implemented and tested in BRI Persero as a sample case. Determinant criteria (factors) in the success of the development of internet banking technology service were divided into four parts i.e. strengths (service quality, service use incentive, technology used, number of customers, number of outlets and BRI Persero ATM (Automatic Teller Machine) and capital and investment for service development), weaknesses (human resources capacity and socialization activities and service marketing), opportunities (development of customers' banking needs, development of types of banking products, number of customers of competing banks, number of outlets and ATMs of competing banks, development of information technology, influence of global banking and macro economy), threats (number of users of competing banks, level of customers' adaptation to service, customer perception and customer satisfaction).

Conceptual design of the proposed DSS called "SpeakerNet" consists of three models. The first sub main purpose was to determine alternative strategy priority in acquisition and activation of new users using SWOT method. The second sub main purpose was development location priority with six criteria which included population, social economy, transportation facilities/access, communication facilities/network, industrial climate and banking credit position. Prototype of the system has been implemented and tested to demonstrate the applicability in banking business process in BRI Persero.

## FUTURE WORK

The proposed DSS allows on-line data updating to support decision making. However, this requires on-time update from the people in charge ensuring very minimal or zero update delay. The analysis models used in our DSS and coverage of existing development areas need to be extended to allow more comprehensive decision making and larger coverage of customers.



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