

Designing Application for Determining The Health Level of Village Credit Institutions with The CAMEL Method

I Gede Made Karma
Accounting Department
Politeknik Negeri Bali
Denpasar, Indonesia
igmkarma@pnb.ac.id

Ni Ketut Sukasih
Accounting Department
Politeknik Negeri Bali
Denpasar, Indonesia
ketutsukasih@pnb.ac.id

Abstract—This study aims to design and build an information system that is able to determine the health level of the Village Credit Institution (LPD) which has an important role in supporting the economy of a village community. As a financial institution owned by a traditional village in Bali, LPD management is regulated based on Bali's Level I Regional Regulations. The main activity of the LPD is to collect funds from the community in the form of savings or deposits, and redistribute it to the community in the form of credit. A portion of the profits obtained will be handed over to the traditional village to finance village development. In the midst of intense competition between existing financial institutions and news of several LPD cases that have problems, monitoring the LPD's health level becomes something important and mandatory. The resulting information system is expected to assist and facilitate the Supervisory Agency in conducting an assessment of the health level of LPDs. The method used to assess the health level of LPD in this system is the CAMEL method which has 5 (five) aspects, namely capital, assets, management, earnings, and liquidity.

Keywords—LPD, traditional village, supervisory board, health level, CAMEL

I. INTRODUCTION

The Village Credit Institution (LPD) is a financial institution owned by a Pakraman village whose operational area is limited to the territory of an indigenous village [1]. The establishment and management of this LPD is regulated through a Level 1 Regional Regulation of Bali. The main activity of the LPD is to raise funds from traditional village communities through various types of savings products and distribute them back to the community through credit disbursement. Of the two main activities, the LPD is expected to benefit, and the remainder of the proceeds is then channeled to traditional villages, as village development funds. As a traditional village-owned business unit, LPD institutional arrangements are strongly influenced by customary regulations that include social norms, sanctions, and involvement of traditional village heads in determining operational policies [2]. Based on performance indicators that include financial indicators (such as portfolio quality, leverage, capital adequacy ratio, productivity, efficiency, profitability and financial feasibility) and outreach, LPDs generally have achieved good and sustainable performance indicators [3].

Recently, there have been widespread reports of a number of LPDs having problems, some of which have

finally closed or have not resumed operations. News like this turned out to cause unrest for some other villagers. There is fear and worry that perhaps the LPD in their village will suffer the same fate. This certainly has an impact on the level of public trust in the LPD itself. Apart from the problems it faces, most of the problems faced by the LPD are very closely related to the governance and monitoring patterns that occur in the LPD. In accordance with Governor Regulation number 44 of 2017, the management of an LPD must be based on the principle of prudence. Many things are related to the management of LPDs that have been regulated and stipulated in this regulation. Including supervision problems. So it is very unlikely that an LPD will experience difficulties if they have applied everything according to the provisions.

Checking the health of a financial institution is a must. In addition to having an impact on its survival, it can also affect the economic activities of the community in general. The health of a financial institution will have an impact on the ability of the institution to compete with other financial institutions. Competitiveness is determined by its efficient and effective financial performance. Therefore, the assessment of financial performance is very important for all organizations. This is very important for financial institutions such as banks, because it helps identify the main strengths and weaknesses of a business. Financial analysis also helps to predict bank performance in the future. Information obtained from financial analysis shows the financial position of the organization, which will be needed by various internal and external stakeholders such as managers, employees, customers, financial institutions, and government [4]. To maintain a sound financial system, it is mandatory to periodically analyze banks to find out their strengths and eliminate potential vulnerabilities [5]. There are a number of indicators that are commonly used in assessing the health of a financial institution. These indicators are determined by various approaches such as CAMEL, RGEC, Takagi-Sugeno-Kang (TSK) fuzzy zero-order and Risk Based Bank Rating.

The CAMEL approach can be used to evaluate the performance and financial health of banks [6-8], the level of bank profitability [9], test the impact of independent variables on the CAMEL model which includes capital adequacy, asset quality, management, income and liquidity towards bank performance [10-11], to investigate the financial performance of public and private sector banks

[12], compare the performance of a bank before and after the implementation of a policy [13], to find important relative weights in all factors in CAMEL and to inform the best ratio to always be adopted by bank regulators in evaluating bank efficiency [14], identifying performance determinants exposed to bank financial ratios [15], assessing customer satisfaction and perceptions of bank services [16] and the efficiency of bank management [17].

The implementation of RGEG which covers risk, good corporate governance, income, and capital, is more implemented to measure and determine the determinants of the profit growth rate of a bank [18]. The Takagi-Sugeno-Kang (TSK) fuzzy zero-order model is applied to construct a fuzzy rule. This fuzzy rule is then applied to improve the accuracy of the RGEG model in analyzing bank performance levels [19]. While the Risk Based Bank Rating is applied to measure the level of uncertainty (risk) associated with assets, loans and trading assets of a bank [20].

Knowing the health level of the LPD is very important for the management and supervisory team. To find out the level of health this requires the ability and time to calculate it. Information in the form of indicators should be known at all times and are up to date. To help LPDs to improve their performance, this study was conducted. This research is intended to be able to produce an information system that can be used by the LPD to assess its level of health in real time and up to date. LPD health indicators are calculated using the CAMEL ratio.

II. LITERATURE REVIEW

Financial analysis is an analytical technique that connects between one post and another in either the balance sheet or profit or loss or a combination of the two reports. The results of this financial analysis are in the form of financial ratios. There are various kinds of ratios that can be calculated from available financial statement data. The ratio chosen for analysis depends on the type of analysis (e.g. credit worthiness) and type of company [21]. This ratio can be used to assess the financial health of a company. Financial ratios can provide financial warning signals such as very high expenditures, high debt levels or poor collection billing records [22]. Ratios can also be used as a basis by management in future decision-making and policy processes [23].

CAMEL is basically a ratio-based model to evaluate bank performance. This is a model for bank ratings. CAMEL is an acronym for five factors of bank safety and health, namely capital adequacy, asset quality, management quality, productive ability, and liquidity [24]. The five factors that are used as indicators of this bank's health can be interpreted as follows [25-30]:

Capital Adequacy: The financial health of banks appears in the capital adequacy needed to deal with risks such as credit, market and operational risks. Banks must be able to measure their capacity and ability to fulfill their obligations to customers and to handle losses without interfering with their normal functions.

Asset Quality: Asset quality will help banks to assess / understand the level of risk they will face when disclosing it

to customers. This parameter will allow banks to assess the performance of their assets.

Quality Management: Management efficiency is a determining component of the CAMEL model that measures the strength of a bank. It refers to compliance with established standards, ability to respond to changing environments and managerial capabilities and bank leadership.

Income Capability: This parameter underlines current and future bank activities in relation to increasing income capacity.

Liquidity: The liquidity ratio measures a bank's ability to meet its direct obligations. Liquidity is very important for the bank and its customer trust mainly lies in the bank's ability to fulfill its direct commitments. This emphasizes that banks must always maintain adequate levels of liquidity.

III. RESEARCH METHODS

The approach used in research and development of this system is the Waterfall development method, which divides work activities into a gradual and continuous process with one another [31]. The system was developed using an object oriented approach. The process of research and development of this system is divided into 3 (three) stages, namely the stages of object-oriented analysis (OOA), object-oriented design (OOD) and object-oriented programming (OOP) [32, 33]. The activity begins with the OOA stage which is focused on determining what information is needed by the system or determining the needs of the system to be built. The results of this stage will be presented in the form of several object-oriented models using UML (Unified Modeling Language). Then proceed with the OOD stage, namely the determination of system components. In this design the components that will build the system and their interactions with others will be described. Based on the results of this design, OOP is then carried out, namely the stage of system development or program writing by translating the system design using the programming language used [34][35][36]. In this study the VB.Net programming language is used in 2012 and MySQL is the data collection database of the system.

IV. RESULTS AND DISCUSSION

Assessing the health of an LPD with the CAMEL method can actually be done at any time, provided that the financial data used as the basis of the calculation is available. Financial data in the form of income statement, balance sheet and credit development, which are used in determining this ratio can actually be easily obtained. Especially if the LPD has recorded computerized information systems. Referring to this financial data, various ratios determined by the CAMEL method can then be calculated. Assessment of the health of LPDs is determined based on factors, components and determinant weights, as presented in Table I.

TABLE I. FACTORS, COMPONENTS AND WEIGHT DETERMINANTS OF LPD HEALTH

Factor	Components		Weight
Capital	Capital Adequacy (CAR)	Percentage of comparison between LPD Capital to risk weighted assets (ATMR)	25%
Earning Assets	Productive Asset Quality (KAP)	Percentage of comparison between earning assets classified against total earning assets.	25%
	Loan Reserves Doubtful (CPRR)	The percentage of comparisons between CPRR formed against CPRR that must be formed.	10%
Management	Consisting of 25 management questions, each question is given a value between 0 to 4.		10%
Earning/ Rentability	ROA	Percentage of comparison between earnings to total assets	10%
	BOPO	Percentage of comparison between costs and income	10%
Liquidity	Liquid tool	Percentage of comparison between liquid assets and current liabilities	5%
	LDR	Percentage of comparison between loans given to funds received	5%
Total			100%

Based on these descriptions, finally the system requirements can be described as presented in Fig. 1. The system will be operated by the user, with the category of ordinary and assessor users. Ordinary users are users who are responsible for providing data to the system, while assessor users are users who entitled to do and know the assessment of LPD health level. The assessor user is the LPD management and supervisor team.

There are 2 (two) types of data that the user must provide in the system, namely financial statements and management opinions. Financial reports include income statement and balance sheet. The LPD health assessment will be carried out by calculating various types of ratios, according to the components described in Table I.

Based on the results of the system analysis that has been described above, the design of the system to be built can then be arranged. The system design is in the form of a Design Class Diagram, as presented in Fig. 2.

In Fig. 2 it appears, according to the results of the analysis, the system will be operated by the user who will be differentiated based on the value of the level, which is 0 or 1. Level 0 is intended for ordinary users, while level 1 is for assessor users. To be able to operate the system, the user must log in, and to end it by logout or exit. Each user will have a password that can be changed at any time. Users can input data needed by the system. Assessor users, besides being able to input data, can also conduct LPD health assessments.

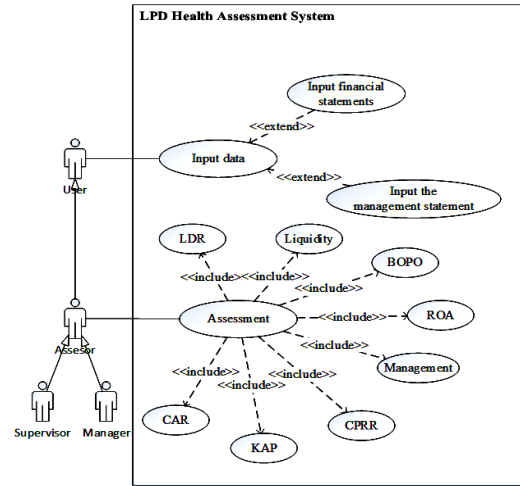


Fig. 1. Use case of LPD health assessment system.

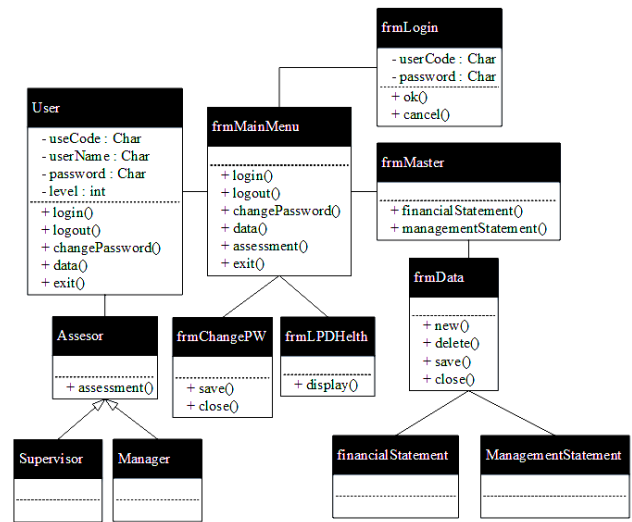


Fig. 2. Design class diagram of LPD health assessment system.

To serve the needs of users, the system will be equipped with a menu that is handled by the frmMainMenu class. The menu that is prepared is Login, Logout, Master, Assessment and Exit. Specifically, the Assessment menu will only be available to assessors. When logging into the system, the user must enter the username and password. Moreover, this data is valid, so the user is allowed to enter the system. This login process is handled by the frmLogin class. Password change can be done by the user by filling in the old password and new password. Changing this user password will be handled by the frmChangePW class. The data that must be provided by the user into the system consists of 2 (two) types of data, namely financial report data and management statement data, which are handled by the frmMaster class, and the frmData class used to manipulate data.

The data used to determine the health of the LPD will be accommodated in a database. The data includes data on profit loss statement, balance sheet, credit growth and management opinion. Each data will be stored in financial Statement and management Statement Table. This stored data can still be manipulated (added, edited or deleted), to match the current conditions.

The system design is then implemented into a program using the VB.Net 2012 programming language, with the support of MySQL as the database system.



LPD HEALTH LEVEL ASSESSMENT SYSTEM USING THE CAMEL METHOD

Fig. 3. User interface with login dialog box.

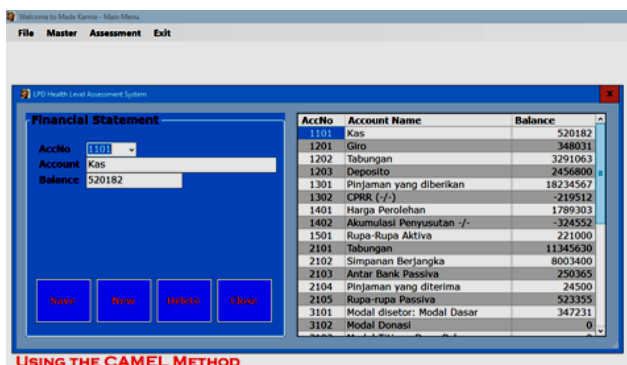


Fig. 4. Financial statement data manipulation dialog box.

When this information system is run, as explained earlier, the system will display a user interface that is equipped with a number of menus. To start the operation, the user must select the Login submenu from the File menu, and then must fill in the usercode and password, as shown in Fig. 3. If successful, the system will activate the menu according to the user category.

Inputting financial statement data and management statements can be done by selecting the Master menu. Manipulation of financial statement data is done through the Financial submenu, and dialog boxes such as Fig. 4 will appear. Manipulation of data (edit or delete) is done in 2 (two) ways, namely selecting one of the data from the Table on the right side of the dialog box, or directly selecting AccNo on the left side of the dialog box. The selected data will be displayed on the left. This dialog box has 4 (four) menu buttons: Save, New, Delete and Close. Save menu is used to save data changes made on the left, and then displayed on the right. New menu to add new data. The Delete menu deletes the data displayed on the left, and the Close menu is used to end the data manipulation process.

Grading values on management statements is done through the Master menu, submenu Management. The system will display a dialog box like Fig. 5. Grading is done directly in the Score column in the Table, by selecting the number 0 (not at all), 1 (still planned), 2 (still a little fulfilled), 3 (most have already been fulfilled), and 4 (already

fulfilled and complete). To close the dialog box, do by clicking on the cross in the upper right corner of the dialog box.

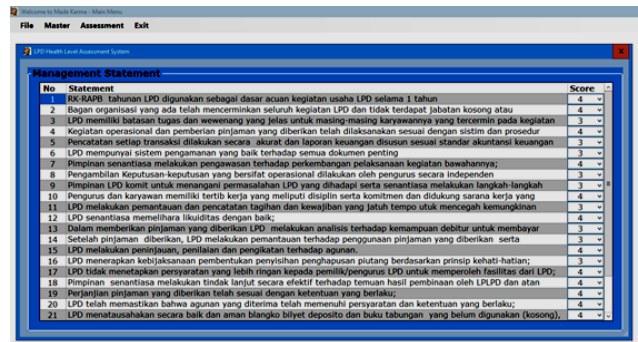


Fig. 5. Management statement data manipulation dialog box.

Determination of LPD health level is done by selecting the Assessment menu in the Main Menu of the system. The system will automatically display the results of the calculation of ratios and values related to each component that determines the level of health of the LPD based on financial statement data and the value of management statements that have been inputted. The calculation results of each component are then added together and used to determine the criteria for the health level of the LPD. Based on the total value, the LPD health criteria will be determined: Healthy (81 to 100), Healthy enough (66 to <81), Unhealthy (51 to <66), and Not health (0 to <51). The results of determining the LPD health level are shown in Fig. 6. Closing the dialog box is done by clicking on the cross in the upper right corner of the dialog box.

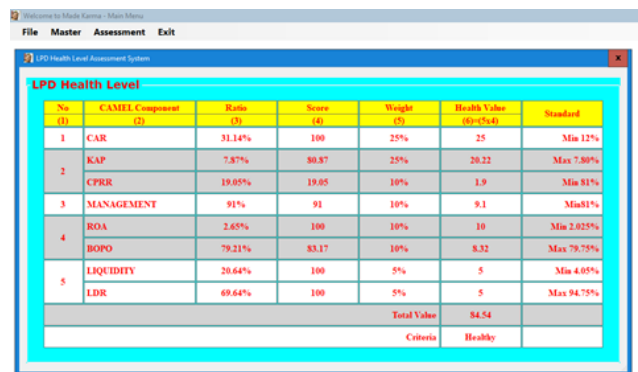


Fig. 6. LPD health level dialog box.

To end the system operation can be done by selecting the Logout sub menu on the File Menu, or the Exit menu. If it is ended via Logout, the system is still active, but cannot be operated. To operate it, the user must log in again. If it ends with Exit, the system will automatically be closed.

V. CONCLUSION

The system built was able to assess the level of health of the LPD using the CAMEL method. The health level of the LPD is determined based on the calculation of the ratio according to the components in the CAMEL method, with their respective weighting. With this system, the level of LPD health can be known at any time, according to the data in the system. To get the latest and most real-time LPD health, this system should be connected directly to the LPD

financial system that handles all financial transactions that occur in the LPD.

ACKNOWLEDGMENT

On this occasion the author expressed his gratitude to the Director of the Politeknik Negeri Bali and Chairperson of the P3M of Politeknik Negeri Bali for granting grants to finance this research. Thank you and highest appreciation to all supporters of this research, especially to Mr. I Made Ariana, SE., M.Sc, Ak and Mr. I Ketut Suwintana, S.Kom, MT. who have provided a lot of input and direction.

REFERENCES

- [1] H. D. Seibel, "Culture and governance in microfinance: Desa pakraman and lembaga perkreditan desa in Bali," in *Microfinance in Developing Countries: Issues, Policies and Performance Evaluation*, 2013.
- [2] L. Arsyad, "Assessing Factors affecting the repayment rate of microfinance institutions: A Case study of village credit institutions of Gianyar, Bali," *Gadjah Mada Int. J. Bus.*, 2013.
- [3] L. Arsyad, "An Assessment of microfinance institution performance: the importance of institutional environment," *Gadjah Mada Int. J. Bus.*, 2005.
- [4] A. Lebbe and A. Rauf, "Towards Increasing the financial performance: An application of CAMEL Model in banking sector in the context of Sri Lanka," *Res. J. Financ. AccountingOnline*, 2016.
- [5] S. Sahota and B. Dhiman, "Relative performance analysis of scheduled commercial banks in India: A camel model approach," *Indian J. Financ.*, 2017.
- [6] T. Varghese, "Evaluating performance of a service cooperative bank: An application of camel model," *Indian J. Financ.*, 2016.
- [7] M. T. H. Majumder and M. M. Rahman, "A CAMEL Model Analysis of Selected Banks in Bangladesh," 2017.
- [8] R. Bansal and A. Mohanty, "A Study on financial performance of commercial banks in India: Application of Camel model," *Al-Barkaat J. Financ. Manag.*, 2013.
- [9] M. binti B. Munir and U. S. A. Bustamam, "Camel Ratio on profitability banking performance (Malaysia Versus Indonesia)," *Int. J. Manag. Innov. Entrep. Res.*, 2017.
- [10] J. Liu and W. Pariyaprasert, "Determinants of Bank performance: The application of the CAMEL model to banks listed in China's Stock Exchanges from 2008 to 2011," *AU-GSB e-journal*, 2011.
- [11] D. Tripathi, K. Meghani, and S. Mahajan, "Financial Performance of Axis Bank and Kotak Mahindra Bank in the Post Reform Era: Analysis on CAMEL Model." 2014.
- [12] A. Khan, "Financial performance analysis of public and private sector banks through camel model," *asian j. appl. sci. technol. (open)*, 2018.
- [13] A. N. Anwar, "Analysis of Indonesian islamic and conventional banking before and after 2008," *Int. J. Econ. Financ.*, 2016.
- [14] W. A. Dzeawuni and P. M. Tanko, "Camels And Banks Performance Evaluation: The Way Forward." 2008.
- [15] Suvita Jha, "A comparison of financial performance of commercial banks: A case study of Nepal," *AFRICAN J. Bus. Manag.*, 2012.
- [16] T. S. Desta, "Financial performance of the best african banks: A comparative analysis through CAMEL Rating," *J. Account. Manag.*, 2016.
- [17] M. N. Hosen and S. Muhari, "Efficiency of the sharia rural bank in Indonesia lead to modified camel," *Int. J. Acad. Res. Econ. Manag. Sci.*, 2013.
- [18] C. Akhyar and G. Syamni, "Profit growth in Indonesian sharia bank: The impact of RGEC," *Int. J. Eng. Technol.*, 2018.
- [19] A. Abadi, "A new method to analyze bank performance level in Indonesia using fuzzy model," *Int. Math. Forum*, 2016.
- [20] D. P. Morgan, "Rating banks: Risk and uncertainty in an opaque industry," *Am. Econ. Rev.*, 2002.
- [21] G. Gibbons, R. D. Hisrich, and C. M. DaSilva, "Financial Ratio analysis," in *Entrepreneurial Finance: A Global Perspective*, 2016.
- [22] P. A. Griffin, *Financial Statement analysis in Finding Alphas: A Quantitative Approach to Building Trading Strategies*, 2015.
- [23] P. P. Drake, *Financial Analysis. Institutional Investment Management: Equity and Bond Portfolio Strategies and Applications*, 2012.
- [24] U. Dang, "The CAMEL Rating system in banking supervision: a case study," *Arcada Univ. Appl. Sci. Int. Business*, 2011.
- [25] C. R. Sathyamoorthi, M. Mapharing, S. Ndzinge, G. Tobedza, and L. W. Dima, "Performance evaluation of listed commercial banks in Botswana: The Camel model," *Arch. Bus. Res.*, 2018.
- [26] M. K. Ahsan, "Measuring Financial performance based on camel: A study on selected islamic banks in Bangladesh," *Asian Bus. Rev.*, 2016.
- [27] P. K. Aspal and S. Dhawan, "Camels rating model for evaluating financial performance of banking sector: A theoretical perspective," *Int. J. Syst. Model. Simul.*, 2016.
- [28] K. J. Baral, "Health check-up of commercial banks in the framework of CAMEL: A case study of joint venture banks in Nepal," *J. Nepal. Bus. Stud.*, 2007.
- [29] C. R. Gupta, "An analysis of indian public sector banks using Camel approach," *IOSR J. Bus. Manag.*, 2014.
- [30] P. Keovongvichith, "An analysis of the recent financial performance of the laotian banking sector during 2005-2010," *Int. J. Econ. Financ.*, 2012.
- [31] R. S. Pressman, *Software Quality Engineering: A Practitioner's Approach*. 2014.
- [32] C. Larman, *Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified Process (2nd Edition)*. 2001.
- [33] J. Whitten and L. D. Bentley, *Systems Analysis and Design Methods*. McGraw-Hill Education, 2007.
- [34] M. Boggs and W. Boggs, *Mastering UML with Rational Rose 2002*. Alameda, CA, USA: SYBEX Inc., 2002.
- [35] E. Kindler and I. Krivy, "Object-oriented simulation of systems with sophisticated control," *Int. J. Gen. Syst.*, vol. 40, no. 3, pp. 313–343, 2011.
- [36] J. Rumbaugh, I. Jacobson, and G. Booch, *Unified Modeling Language Reference Manual*. Pearson Higher Education, 2004.