



Research Article

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Financial Analytics System for a Credit Cooperative

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ABSTRACT

Cooperatives though may be fast-growing in terms of profitability but are more financially vulnerable and risky because of their nature as an organization. The financial analytics system developed in this paper aids the management of the cooperative in this study with the analysis of information helpful in making economic decisions. The system provided sufficient support to the executives of the cooperative so they can be efficient and guided with what are alternatives and their potential consequences in financially managing their economic resources. The developed system was assessed to have high compliance with ISO 25010 quality standards.

Keywords - Financial Analytics, Financial Analytics System, Credit Cooperative, Decision-Support System

Introduction

Cooperatives play very significant roles in building the economy of developing countries like the Philippines. Cooperatives allow the “masa” or ordinary Filipinos to invest and generate income from activities that they do as consumers. The members of the cooperative elevate themselves from being mere consumers of products and services into being proprietors or providers of products and services. Thereby, allowing them to profit from their transactions instead of the big capitalists profiting from them.

Credit Cooperative is viewed as a provider of financial support to touch a significant number of unfortunate people of which most are not able to access financial services because of the lack of paper requirements and properties for collateral. Access to financial services is vital for the development of the informal sector and also helps to mop up excess

liquidity through savings that can be made available as venture capital for national development [1]

Cooperative as a sector can reduce poverty by providing support for the financial needs of the poor and increasing their financial capability to help activate the local economy. Other than this, a cooperative can empower its members and develop a well-functioning financial system. This is one of the keys to economic growth and development because it is the financial sector that supports and directs funds to the various productive sectors of the economy. This accounts for cooperatives to become one of the drivers of the country's economy as they can embark on initiatives for reformation in the grassroots.

There has been a growing emphasis on developing cooperatives as a tool for improving financial inclusion, reducing poverty, and maintaining sustainable development of societies. The basic assumption is that micro-finance has the potential to improve production in different sectors such as

education, environment, health-care, agriculture, and small-scale revenue-generating activities [7].

Many members of society lack access to funds due to high transaction and monitoring costs, lengthy documentation, high defaults, collateralized lending, and leakage of subsidized resources [5]. As a result, different natures of microfinance institutions (MFIs) such as credit cooperatives are becoming highly involved in the provision of micro-finance services.

Despite the variation of the micro-finance services provided by each establishment, the list of the most widely cited services includes saving services, micro-credit, micro-insurance, money transfers, and small loans and technical assistance. The basic aim behind the provision of such services is to assist financially-excluded, economically active, and capable members of society to increase their financial competencies.

The developments exhibited across the landscape of credit cooperative and its entire industry have been accompanied by vast and dramatic technological developments (hardware, software, telecommunications, etc.) that reshape the context of data storage, retrieval, processing, presentation, sharing, and utilization. From organizational points of view, there has been a growing tendency among MFIs to benefit from the emerging computing paradigms in accessing computing resources [5].

Cooperatives though may be fast-growing and profitable but are also more vulnerable and risky financially. This is due to the structure and nature of the cooperative. Unlike other enterprises where the technical and managerial competencies in the business of the top management could grow through the years because they stay in the positions based on their controlling interest. The cooperatives elect their top management from the members who may not have sufficient background in business management. By the time they have improved on their business skills, they may already be replaced because they have ended their office term.

In this study, the adopted Cooperative used a manual system in the recording and processing of their transactions which resulted to delay and piling of backlogs. There were limited reports that could be generated that could support the analysis of operations and serve as a basis for economic decisions.

The use of financial analytics in a cooperative can provide support to the management for the

improvement in making economic decisions. The use of financial analytics to the credit cooperatives gives a deeper analysis of the status and performance of the members and the cooperatives. It provides an analysis of the financial risk of the borrowers and cooperative, and give indicators of good and bad performances. In this way, financial analytics for credit cooperatives can help even the neophyte managers to make good economic decisions. Thus, this study is conducted.

Conceptual Framework



Figure 1. Financial Analytics Conceptual Framework

The conceptual model of the proposed system: Financial Analytics for Credit Cooperative as shown in Figure 1 was developed by the researcher based on the model of financial analytics by Jade Global Analytics (2017). The first part of the model was the Members Profile, Savings and Deposits, and Loan. These parts were the main module of the system wherein the management of member's profile, Savings and Deposits, and Loan System. In the savings and Deposits, it has a feature of Share Capital Category, Type of Savings Account, Share Capital Account, Savings Account, Time Deposit Account and Savings Interest while on the Loan it has the features of Loan Application, Loan Evaluation, Loan Releasing, Loan Charges, Loan Types, Loan Payments, Loan Fines and Penalties, Loan Ageing and Loan Reconstruction.

From the Module of the Members Profile, Savings and Deposits and Loan, there were two financial analytics, the financial analytics for members and financial analytics for cooperative. In financial analytics for members, it identifies and shows the capability of members to pay, these features of the system determine the percentage/capacity of the

members to pay the loan amortization. The system generates an excel report and computes the capability of a member to pay based on the member's assets, members' income, savings accounts, share capital, and previous loan payment status. The risk credit score and suggested credit limit are to be generated. The results are based on the member's assets, member's income, savings accounts, share capital, and previous loan payment status. The system can provide a guide if the application of the loan by the member is to be approved or not approved.

The developed Financial Analytics in this study could generate a cash flow report for credit cooperatives for savings and withdrawal Transactions, Time Deposits Accounts, Share Capital, and Loan Releases and Payments. Trend analysis could be generated from the Savings and Deposits Modules of the system and Loan System. With this, the top-level management could monitor the cash in and cash-out transactions of the Savings and Deposits module and Loan Module. These allow the Board of Directors and executives of the Cooperative to have a basis for planning, utilization, and decision-making process of economic resources.

Statement of the Problem

This study generally aimed to develop financial analytics system for credit cooperative, specifically; it intended to answer the following:

1. What are the practices and problems of the credit cooperative in terms of the ff.?

- 1.1. Credit Risk;
- 1.2. Monitoring of Collections;
- 1.3. Saving and Loan Pricing
- 1.4. Saving and Loan Reporting

2. What are the needs of the stakeholders of the credit cooperative?

3. What financial analytics system can be developed for the credit cooperatives?

4. What is the extent of compliance of the developed application to ISO 25010 Software Quality Standards in terms of:

- a. Functional Sustainability
- b. Performance Efficiency
- c. Compatibility
- d. Usability
- e. Reliability
- f. Security
- g. Maintainability
- h. Portability

Methods

Research Design

This study employed a descriptive research design and system development methods. The descriptive method was used to determine the present status and condition of the cooperative to describe and understand the present environment. Environment analysis and need analysis were done on the adopted credit cooperative in this study. The existing credit and loan policies and practices were analyzed to determine areas of computerization and financial analytics that can be performed.

. For the development of the system, the Software Development Life Cycle (SDLC) methodology was used. This is to ensure that the phases in system development are done in the software building process. The Agile methodology of SDLC was adapted from the business understanding and requirements elicitation phase to testing of the developed Financial Analytics System

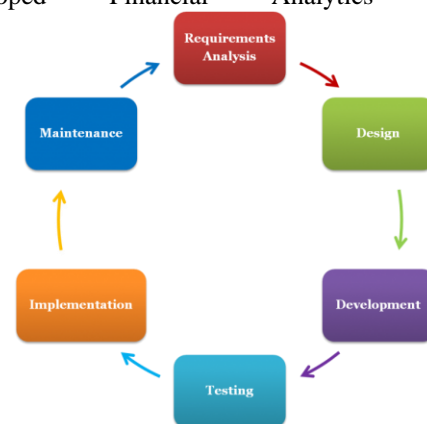


Figure 2. Agile Iterative Model

Agile Iterative Model was adopted to guide the development of the credit cooperative financial analytics ^[17]. Every iteration in system development involves the following process:

Requirement Analysis. In this procedure, the researcher accompanied a series of interviews with the Chief Executive Officer/General Manager and staff who typically administered and monitored the whole actions of the Credit Cooperative. All the collected information was studied by the researcher to come up with sufficient inputs in designing and developing the developed Financial Analytics for Credit Cooperative.

Design. The researcher chose the appropriate programming software, database, and hardware with which the developed system could be compatible. The

logical and physical design of the system was done in this phase. The researcher constantly coordinated with the users and top management on the features that are suitable for their needs.

Development. The activities involved here the designing and coding of the user interface. During the development, there were a series of laboratory testing that was conducted in the different modules of the system. Compatibility testing was done and constant coordination with the users was made to align the users' specifications with the developed system.

Testing. In this procedure, the parallel testing of the developed system was done. The researcher collected comments from the testing teams which served as the basis for the modification and redesign of the system.

Implementation. The researcher executed the system in the office of Wigan Multi-Purpose Cooperative at Wigan, Cordon Isabela. The system was installed and used. During the implementation phase, a series of training was made for the CEO and staff. Calibration and alignment of expectations of the users with the developed system were done.

Maintenance. In this process, the monitoring of the implementation and documentation of the use of the system was done. The problems and challenges encountered by the users were closely recorded and reported. The errors and bugs encountered by the users including suggestions on better features were documented and fixed.

System Architecture

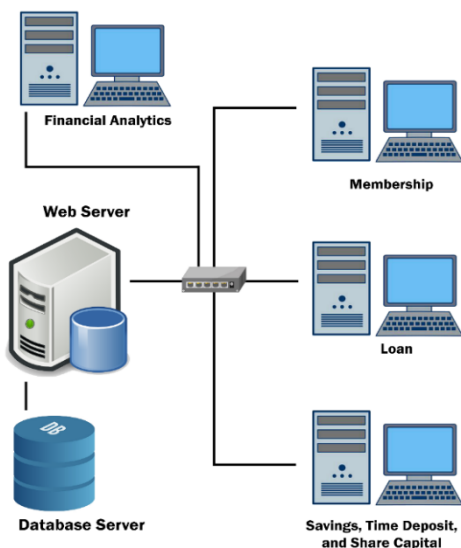


Figure 2. System Architecture

Fig. 2 shows the Financial Analytics Credit Cooperative system architecture design. The system was implemented using a centralized web-based system. The system was installed into a server including the database server. The data and inputs from different system modules are were processed on the webserver incorporated in the central database server. In the Membership Module, the application of new members is done and member's data are stored in a central database server. The Loan Module is where the processing of loan application, loan approval, loan releasing, and loan monitoring could be done. While the module on Savings, Time Deposit, and Share capital is where the deposit and withdrawal transactions of members could be made. The best feature of the developed system is its financial analytics module. This module could monitor the different transactions from the different modules integrated with the systems. The system was designed and could be accessed via a local area network.

Respondents

There were 20 respondents of the study selected using purposive sampling to determine the practices and policies of the Cooperative. They provided inputs on the Users' specifications such as their needs and challenges. They were the ones directly involved in the operations of the Credit Cooperative and the best personnel to get the needed inputs for consideration in the design process of the developed system.

Table 1. Respondents of the Study

Nature of Work	No. of Respondents
Board of Directors	5
Manager	1
Credit Committee	2
Savings Committee	2
Members	10
IT Experts & Industry Practitioners	5

The Board of Directors provided top management perspectives on how financial analytics can play a role to them. The Credit and Saving committee members provided sufficient inputs on the relevant factors that should be considered in providing credit score and credit limit computations. They also identified the reports that they needed from the developed system. As users, they have expressed their report requirements and help in the evaluation of the developed system.

Instrument

This study made use of a focus group discussion, observation checklist, interview guide, and documentary analysis.

Data Gathering Procedure

The researcher secured approval from Wigan Settlers Multi-Purpose Cooperative, Wigan, Cordon, Isabela. The study also underwent an ethics review to ensure that there would be no violation of the Privacy Act. The researcher collected data through a series of interviews. Focus Group Discussion (FGD) was conducted with the Board of Directors, and Committee Members. The results were the basis of the researchers in the design and development of the system. The researchers also conducted observation as part of the data gathering procedure to have a deeper understanding of the existing credit and savings processes. The developed system was tried out by the users of the system and they were also involved in the evaluation of the interface of the system. Their recommendations were considered in the final revision of the financial analytics system.

Statistical Treatment of Data

In the evaluation of the developed system, five IT experts were topped. The ISO 25010 Software Quality Standards was used as a tool for evaluating the developed system. The results gathered were analyzed employing the 5-point Likert.

Results

1. The practices and problems of the credit cooperative

Before the development of the system, the credit cooperative encountered difficulty determining the past due to accounts and how long was the account past due. There was also difficulty in determining the capability of the members to pay the loan. Credit reports were not easy to generate and it took some days for them to get the reports which usually were not available for decision-making purposes.

The Credit Cooperative encountered difficulty in monitoring the credit collections. Monitoring was difficult because the recording and updating of individual ledgers of members were done manually. The computation of penalties, surcharges, and charges was time-consuming. The updating of the individual payment ledger and records of members took so much time. The collection's files, ledgers, and individual member's ledger accounts were not

updated. These resulted in the inability of the cooperative to monitor the loan releases, identify who should be given demand letters, and collections letters.

The credit cooperative has a procedure in the maintenance of records of the collection, monitoring of loan collections, loan releases, and savings account ledgers. It has experienced difficulty and problems in terms of saving and loan pricing. Computation of quarterly savings interest was also a major problem of the cooperative. It has experienced difficulty in managing the records of the individual ledger of Regular Coop Savers and Laboratory Coop Savers. There were problems in identifying and applying charges to dormant saving accounts both Regular and Laboratory Coop Members. There were difficulties in managing the time deposit ledgers due. It had a different rate per number of months and the number of payment terms. There was difficulty in monitoring the total share capital of every member.

The credit cooperative encountered difficulties and problems in saving and loan reporting. The savings officers have a difficulty in preparing the daily, monthly, annually, and deposit and withdrawal transactions. The cooperative had difficulty submitting the annual reports to the CDA.

2. The needs of the stakeholders of the credit cooperative

From the existing problems and challenges of the Cooperative in this study, the researchers considered the development of a Financial Analytics System other than developing the Accounting System. As the study of Financial Analytics System for a Credit Cooperative determined that managers should embrace and incorporate up-to-date information technology system in their efforts to gain a competitive advantage over their other rivals in the market, impose strict measures on loan borrowers who fail to repay on the due date, and engage their employees when making changes in their system for smooth operations and also stated that using of a computerized system for daily their transactions can now be processed a lot easier and quicker since client information can be accessed very easily and it is no longer necessary to pick out the corresponding ledger card. Therefore, the staff is now capable to deal with a lot more clients per day than before. This is also true for the preparation of financial reports, which can easily be printed whenever necessary as the data is now always be updated daily and can no longer on a weekly or even monthly basis. Thus, staff members have a better overview of customer structure, Loan and savings portfolios [14], [12]

3. The Developed Financial Analytics System for Credit Cooperative

The developed system was intended to support the middle and top-level management of credit cooperatives. The developed system is web-based designed to operate on a computer system unit, laptop computers, and Android devices. The web-based application uses AdminLTE CSS, JQuery, and PHP for the front-end and MSSQL for the back-end. The PHPMaker as the IDE and XAMPP for local development.

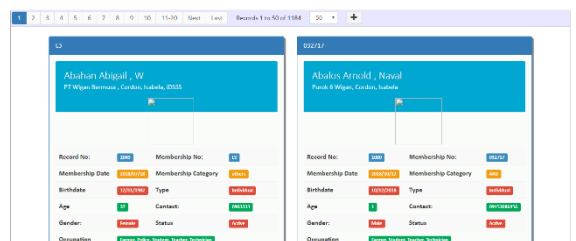


Figure 3 List of Members

In Fig. 3 list of members, this page will display all the registered members of the cooperatives, which includes their beneficiaries and the list of assets. In the list pages, it will only show some basic information which the system has been displayed, but the loan officer/manager can view the full details by clicking the view button

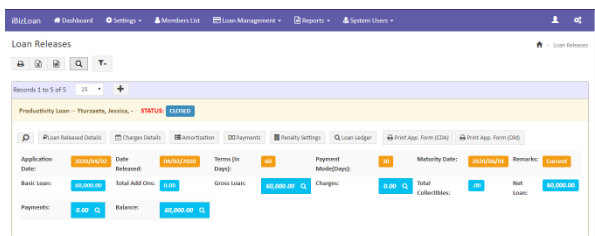


Figure 4. Loan Application, Loan Releases, and Loan List

In Fig. 4, these pages will display all the loan applications, loan releases, and approved loans. These pages will display the loan application date, date of release, terms, payment mode, maturity date, basic loan, add-ons, gross loan, charges, total collectibles, net loan, payments/total payment, and balances. The system will automatically compute the charges based on the settings that have been set on the Loan charges, compute the monthly amortization based on the terms of payment, and compute the net of the loan. And these features answer the problem in it should have

been easier if there is a system that all their basic information or data of a member is stored and when they apply for a loan, the application is faster and easier. These features of the system answered the problem processing and releasing of the loan were very slow

Amortization	Payment Date	Amortization Payment	Balance	Surcharge Payment	Penalty Payment	Collector	Ref No	Remarks
Due: 11,666.00	2020/01/16	11,666.00	0.00	4,121.99	0.00	Cashier	888	
Due Date: 07/31/2018								
Due: 11,666.00	2020/01/16	1,000.00	10,666.00	0.00	0.00	Cashier	888	
Due Date: 08/30/2018								
Due: 10,666.00	2020/01/23	5,000.00	5,666.00	1,605.11	36,693.76	Juan	nnn	
Due Date: 08/30/2018								
Due: 5,666.00	2020/01/16	0.00	5,666.00	-3,605.11	0.00	Juan	nn	
Due Date: 08/30/2018								
Due: 5,666.00	2020/01/09	-1,000.00	6,666.00	0.00	0.00	Juan	888	
Due Date: 08/30/2018								
Due: 6,666.00	2020/01/01	6,666.00	0.00	0.00	0.00	Cashier	KKKKKK	
Due Date: 08/30/2018								
Total: 23,332.00		Total: 4,121.99		Total: 36,693.76				

Figure 5. Loan Ledger

In Fig. 5 this page will show the ledger of every loan. It also displays the Monthly Amortizations, Payment Due Date, Amortization Payment, and Balance, surcharge, penalty, and the collector. This feature was used to monitor the ledger of each loan release. These features of the system answer the problem credit Records were hard to monitor because the cooperative was using a manual system. All the member's records were kept in paper and folders which were stored in a cabinet. All the credit records will easily find and search through the use of the system. Collections files, ledgers, and individual member's ledger accounts were not updated. Not All loans released were monitored due to the heavy work of schedule.

Transaction Date	Released	Payment	Balance
07/01/2018	70,000.00	0.00	70,000.00
01/01/2020	0.00	6,666.00	63,334.00
01/09/2020	0.00	-1,000.00	64,334.00
01/16/2020	0.00	11,666.00	52,668.00
01/16/2020	0.00	1,000.00	51,668.00

Figure 6. Members Savings Accounts Ledger

In Fig. 6 this page will display the savings ledger accounts. In this page's transactions entering the beginning balance, deposit transactions, withdrawal transactions, and adjustment of the ledger,

dormant charges, and interest applied. On this part will be also the printing of passbook, updating of the ledger, balance forwarding, validation, and printing of deposit and withdrawal slip. The savings staff will also verify the transactions before validation and closing it. These pages will also display the different information of the ledger, on the top, the account number and account type, account name, and the balance. The ledger displays in a form of a table wherein the transaction type, ref number, date and time of the transaction, the debit and credit of amount, the running balance, status, and remarks. These features answered the problem the staff needs to compute individual ledgers for all these savings interest manually and sometimes savings interest was not accurate due to human error.

Date	Type	Category	Ref No	Date	Credit	Debit	Remarks	Status	Date Log
2019/01/01	Share Capital	Share Capital	1000	2019/01/01 12:00:00	100.00	0.00	Share Capital	Open	2019/01/01 12:00:00
2019/01/01	Share Capital	Share Capital	1000	2019/01/01 12:00:00	100.00	0.00	Share Capital	Open	2019/01/01 12:00:00

Figure 7. Members Share Capital Accounts Ledger

In Fig. 7 this page will display the members' share capital accounts ledger. These pages use to enter transactions like a deposit of share capital and withdrawal of share capital. The share capital ledger was group into a different category. The members need to identify where the share capital need to be deposited. The ledger displays the Transaction type, Loan Category, ref no, Date of transactions, credit, debit, remarks, and status.

Date	Type	Category	Ref No	Date	Credit	Debit	Remarks	Status	Date Log
2019/01/01	Share Capital	Share Capital	1000	2019/01/01 12:00:00	100.00	0.00	Share Capital	Open	2019/01/01 12:00:00
2019/01/01	Share Capital	Share Capital	1000	2019/01/01 12:00:00	100.00	0.00	Share Capital	Open	2019/01/01 12:00:00

Figure 8. List of Quarter Interest Application and Transactions

In Fig. 8 this will display the list of quarter interest that has been applied. From date range for every quarter and used for what particular quarter the records will apply. The system will only apply the quarterly interest once the transaction status is closed.

The system will identify the accounts above maintaining balance and the system will compute the running balance for every account because this will be the basis in computing the average daily balance. Following the standard computation in average daily balance and computation of interest. These features of the system answer the problem in a savings account which were the It takes 2-3 months before a member's savings interest will be posted in his/her ledger. The cooperative has 1,900 members and some members have 3-7 savings accounts in different savings windows (e.g. Regular Savings, Calamity Savings, Health Savings, Educational Savings, etc.) and the staff needs to compute individual ledgers for all this savings interest manually and sometimes savings interest were not accurate due to human error.

Date	Type	Category	Ref No	Date	Credit	Debit	Remarks	Status	Date Log
2019/01/01	Share Capital	Share Capital	1000	2019/01/01 12:00:00	100.00	0.00	Share Capital	Open	2019/01/01 12:00:00
2019/01/01	Share Capital	Share Capital	1000	2019/01/01 12:00:00	100.00	0.00	Share Capital	Open	2019/01/01 12:00:00

Figure 9. Accounts Monitoring

The page shown in Fig. 9 displays the status of the financial movement of the credit cooperative. This table shows the 5 years' progress in terms of member's applications, Loan Accounts(Released), Savings Account (Savings and Withdrawal transactions, the Time Deposits Accounts, Share Capital Subscription and Deposits of share capital, Loan Payment, Loan Charges, Loan Penalties, Savings Interest, Savings Charges, and Time Deposit Interest applied. This Accounts Monitoring can help the BOD and CEO to monitor the financial movement's status of the cooperative. The management can compare the financial movement's status of the present year from the previous years.

Date	Type	Category	Ref No	Date	Credit	Debit	Remarks	Status	Date Log
2019/01/01	Share Capital	Share Capital	1000	2019/01/01 12:00:00	100.00	0.00	Share Capital	Open	2019/01/01 12:00:00
2019/01/01	Share Capital	Share Capital	1000	2019/01/01 12:00:00	100.00	0.00	Share Capital	Open	2019/01/01 12:00:00

Figure 10. Cash In (Savings Deposits)

In Fig. 10 this page displays the Cash In for Savings Deposits transactions in different types of

savings account. It gives information on the movement of savings deposit transactions for 5 years.

Share Capital Category	2020	2019	2018	2017	2016
Loan Credit	493,988.08	1,495,216.56	2,412,156.55	2,747,454.31	8,185,212.39
Merchandise Credit	13,237.10	29,821.78	41,242.06	271,122.10	2,128.41
Micro Finance	490.00	490.00	1,000.00	0.00	0.00
Total	495,075.18	1,525,518.70	2,454,418.61	3,018,576.47	8,185,340.81

Figure 11. Cash-in (Share Capital Deposits)

In Fig.11, Cash in (Share Capital Deposits) page displays the deposit transaction per year, the total deposit transactions according to different types of share capital category (Loan Credit, Merchandise Credit, and Micro Finance).

Loan Type	Loan Term	Mode Payment	2020	2019	2018	2017	2016
Agricultural Loan	180	180	2,076,761.41	3,495,611.00	4,046,233.40	15,145,003	158,759,320
Agricultural Loan	180	180	0.00	0.00	0.00	0.00	0.00
Appliance Loan	120	120	12,336.79	38,446.00	55,790.00	1,200.00	0.00
Appliance Loan	180	180	8,115.00	8,205.00	16,876.00	0.00	0.00
Appliance Loan	240	240	0.00	485.00	37,822.50	0.00	0.00
Appliance Loan	360	360	0.00	20,280.00	14,798.00	0.00	0.00
Back to Back Loan A	180	180	234,551.83	515,048.48	257,333.37	0.00	0.00
Back to Back Loan B	180	180	0.00	40,000.00	10,000.00	0.00	0.00
Back to Back Loan C	180	180	0.00	0.00	10,000.00	0.00	0.00
Business Loan	180	180	75,000.00	0.00	40,000.00	0.00	0.00
Business Loan	360	360	20,000.00	207,446.00	5,500.00	0.00	0.00
Business Loan	540	540	0.00	30,622.00	0.00	0.00	0.00
Business Loan	720	720	0.00	0.00	0.00	0.00	0.00
Business Loan	900	900	0.00	0.00	0.00	0.00	0.00
Educational Loan	120	120	0.00	10,000.00	0.00	0.00	0.00
Educational Loan	180	180	75,000.00	15,000.00	30,000.00	0.00	0.00
Educational Loan	240	240	0.00	0.00	10,000.00	0.00	0.00

Figure 12. Cash in (Loan Payment)

In Fig. 12, this page displays the different loan types, loan terms, and mode of payment. This report displays the type of loan and the total payment for 5 years. This page helps the BOD/CEO in loan pricing and on what particular loan types that the members can easily pay the amortization schedule

Loan Type	Loan Term	Mode Payment	2020	2019	2018	2017	2016
Agricultural Loan	180	180	18,723.01	12,769.96	3,420.83	0.00	0.00
Agricultural Loan	360	360	0.00	0.00	0.00	0.00	0.00
Appliance Loan	180	180	75,897	14,497	0.00	0.00	0.00
Appliance Loan	360	360	0.00	0.00	0.00	0.00	0.00
Appliance Loan	540	540	0.00	0.00	0.00	0.00	0.00
Appliance Loan	720	720	0.00	0.00	0.00	0.00	0.00
Back to Back Loan A	180	180	108.64	0.00	0.00	0.00	0.00
Back to Back Loan B	180	180	0.00	0.00	0.00	0.00	0.00
Back to Back Loan C	180	180	0.00	0.00	0.00	0.00	0.00
Business Loan	180	180	750.00	0.00	0.00	0.00	0.00
Business Loan	360	360	0.00	0.00	0.00	0.00	0.00
Business Loan	540	540	0.00	0.00	0.00	0.00	0.00
Business Loan	720	720	0.00	0.00	0.00	0.00	0.00
Educational Loan	120	120	0.00	0.00	0.00	0.00	0.00
Educational Loan	180	180	0.00	0.00	0.00	0.00	0.00

Figure 13. Cash In (Loan Penalties)

The cash in the Loan Penalties report is shown in Fig. 13. This page displays the loan penalties being collected in every loan type, loan term, and mode of payment. The records display the five years total collected penalties for every type of loan, loan term, and mode of payment. This feature helps the management to monitor what particular loan has the highest collection of penalties.

Loan Type	Loan Term	Mode Payment	2020	2019	2018	2017	2016
Agricultural Loan	180	180	1,170,302.84	7,339,709.59	2,381,189.20	5,589,211.56	1,249,119.00
Agricultural Loan	360	360	0.00	0.00	0.00	0.00	0.00
Appliance Loan	120	120	0.00	28,509.70	72,700.00	95,167.30	5,000.00
Appliance Loan	180	180	6,440.00	18,200.00	11,000.00	0.00	0.00
Appliance Loan	240	240	0.00	20,000.00	0.00	133,389.50	0.00
Appliance Loan	360	360	0.00	0.00	16,800.00	4,000.00	0.00
Back to Back Loan A	180	180	220,200.00	717,972.50	148,800.00	220,485.00	0.00
Back to Back Loan B	180	180	0.00	76,800.00	10,000.00	0.00	0.00
Back to Back Loan C	180	180	0.00	0.00	0.00	12,000.00	0.00
Business Loan	180	180	0.00	75,000.00	13,000.00	510,000.00	180,000.00
Business Loan	360	360	0.00	190,000.00	180,000.00	0.00	0.00
Business Loan	540	540	0.00	0.00	180,000.00	0.00	0.00
Business Loan	720	720	0.00	0.00	0.00	0.00	0.00
Educational Loan	120	120	0.00	10,000.00	0.00	0.00	0.00
Educational Loan	180	180	20,000.00	20,000.00	0.00	0.00	0.00
Educational Loan	240	240	30,000.00	45,000.00	30,000.00	88,000.00	0.00

Figure 14. Cash Out (Loan Released)

Fig. 14 presents the cash-out transaction of the released loan. This page displays different types of loans. The system generates a total amount of loans released every year. This list of records helps the BOD/CEO to monitor what particular loan type, loan term, and mode of payment are mostly applied by the members. This report also helps the management in terms of loan pricing

No of Months	Int Rate(%)	2020	2019	2018	2017	2016
3	2.25	0.00	773,381.90	221,293.70	0.00	0.00
3	2.50	0.00	779,878.11	140,875.00	0.00	0.00
3	2.75	0.00	0.00	322,781.22	0.00	0.00
3	3.00	0.00	0.00	481,000.00	0.00	0.00
3	3.50	0.00	0.00	1,118,528.39	0.00	0.00
6	3.00	0.00	7,611,185.09	7,797,448.79	193,451.41	0.00
6	3.50	0.00	0.00	0.00	220,099.82	0.00
6	3.75	0.00	1,048,960.41	637,714.88	0.00	0.00
6	5.00	0.00	0.00	0.00	188,711.29	0.00
6	4.50	0.00	785,126.70	714,475.34	715,045.81	0.00
6	4.25	0.00	1,078,388.62	1,039,388.00	0.00	0.00
6	6.00	0.00	84,033.43	518,000.00	1,048,028.88	0.00
6	6.75	0.00	3,225,272.51	5,795,728.70	0.00	0.00
6	8.00	0.00	0.00	0.00	0.00	0.00

Figure 15. Cash Out (Time Deposit Withdrawal)

In Fig. 15, Cash out or Time Deposit withdrawal is shown. This page displays the different number of months and interest rates for every time deposit accounts. It displays the total amount being withdrawn by the members.

Code	AccountType	2020	2019	Difference	Increased/Decreased
CS	Current Savings	16,798.71	199,684.43	(181,975.72)	Decreased
ES	Educational Savings	45,521.00	79,088.95	(33,567.95)	Decreased
HS	Health Savings	37,381.88	135,836.11	(98,454.23)	Decreased
MS	Micro Finance Savings	906.90	25,054.10	(24,147.20)	Decreased
OS	Other Savings	3,314.08	1,888.00	1,426.08	Increased
PS	Pay-Off Savings	2,614.41	1,291.00	1,323.41	Increased
SS	Savings	70,194.76	539,176.41	(468,981.65)	Decreased

Figure 16. Cash Flow (Savings Deposits)

Fig. 16 cash flow for savings deposits shown. This page displays the two years total amount of savings deposit transactions. The system computes the difference between the two records. It identifies the deposit transaction accounts either it is increased or decrease. These features of the developed system help the management to monitor the cash flow of savings accounts.

Time Deposit Interest						
No of Months	Int Rate(%)	2020	2019	2018	2017	2016
3	2.25	0.00	2,099.72	1,292.72	0.00	0.00
3	3.50	1,666.37	1,176.11	875.00	0.00	0.00
3	2.75	0.00	0.00	2,781.22	0.00	0.00
3	3.00	0.00	0.00	1,010.36	0.00	0.00
3	3.50	0.00	0.00	12,252.59	0.00	0.00
6	3.00	17,117.04	10,148.17	10,585.00	5,319.10	0.00
6	3.50	0.00	0.00	0.00	7,797.79	0.00
6	3.75	0.00	71,763.08	5,443.03	0.00	0.00
6	4.00	0.00	0.00	0.00	2,274.28	0.00
6	4.50	0.00	10,484.38	16,730.14	4,840.13	0.00
6	5.25	0.00	15,722.22	52,111.22	0.00	0.00

Figure 17. Cash Out (Time Deposit Interest)

Fig. 17 the cash out for time deposit interest. This page displays the total amount of interest being applied for every time deposit accounts according to the number of months or term and interest rate. These features of the system will help the management to monitor the expenses of the cooperative.

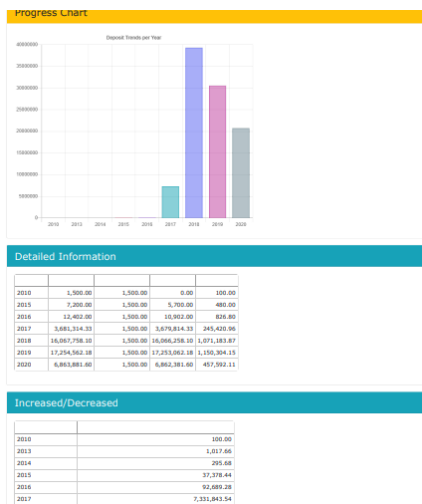


Figure 18. Deposit Trends Analysis

In Fig. 18, this page displays the deposit trend analysis. This page shows detailed information on deposit trends and the increased/decreased value. The system generates a chart for graphical presentation of the deposit information

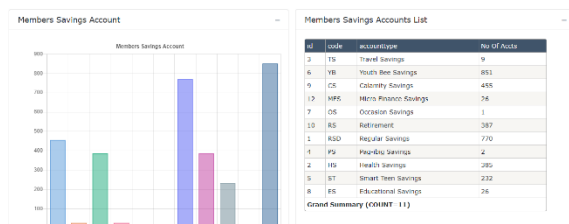


Figure 19. Members Account Chart

Fig. 19 shows the members' account chart. This page displays detailed information on members' savings account. This page shows also the total number of members' accounts per type of savings. The

system generates a bar chart for the graphical presentation of the Members Account Chart.

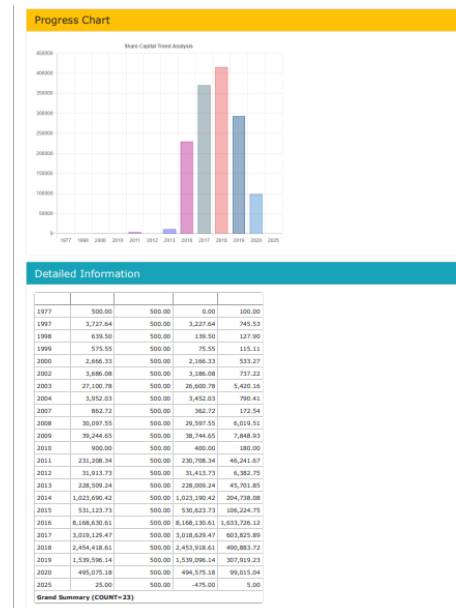


Figure 20. Share Capital Deposit Trends

Fig. 20 shows the share capital deposit trends. This page displays the trends of share capital deposits. This presents the detailed information of share capital including the year of transactions, total share deposits, the base year, the difference, and the percentage. The system provides a table of increased/decreased information. This table displays the percentage in every particular year if this year is increasing/decreasing. The system generates a chart for graphical presentation of the deposits/subscription of share capital transactions.

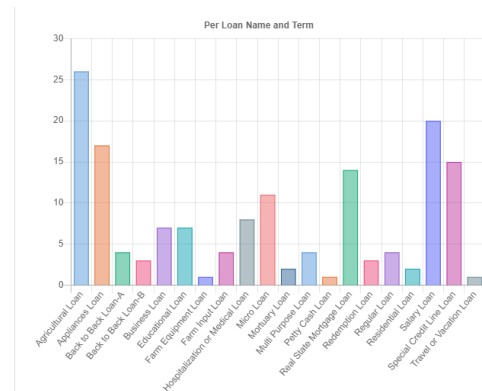


Figure 21. Chart Loan Released for Per Loan Name and Term

Fig. 21 shows the Chart Loan Released for Per Loan Name and Term. The system generates a chart of loans released per loan name and loan term. This chart was a graphical presentation of the number of loan accounts per loan name and loan term.

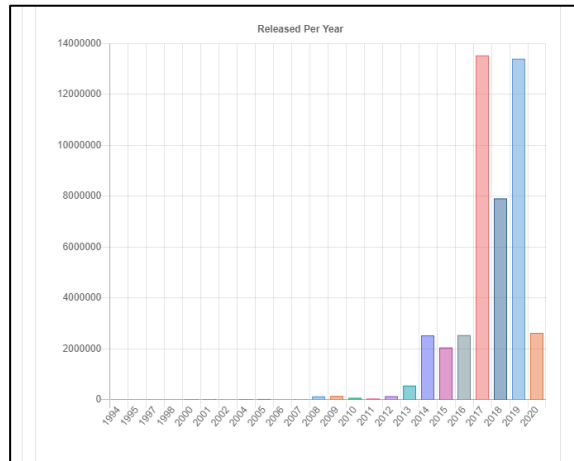


Figure 22. Chart for Loan Released per Year

Fig. 22 shows the chart for loans released per year. This page displays a chart for graphical presentation of the total amount of loans released every year.

4. The extent of compliance of the developed application to ISO 25010 Software Quality Standards as assessed by the IT Experts and Users

Table 2. Extent compliance of the developed application to ISO 25010 Software Quality Standards concerning Functional Sustainability

Indicators	Weighted Mean	Descriptive Rating
1. <i>Functional Completeness</i> - the degree to which the set of functions covers all the specified tasks and user objectives.	4.40	Compliant to a great extent
2. <i>Functional Correctness</i> - the degree to which the functions provides the correct results with the needed degree of precision	4.60	Compliant to the great high extent
3. <i>Functional Appropriateness</i> - the degree to which the functions facilitate the	4.60	Compliant to the very great extent

accomplishment of specified tasks and objectives.		
Category Mean	4.53	Compliant to the very great extent

Table 2 displays the assessment of the IT Experts-participants on the compliance of the developed web-based application in terms of functional sustainability. The system's functional suitability attained with a category means of 4.53 descriptively interpreted as compliant to a very great extent. Subcategories of functional sustainability such as Functional Correctness, Functional Appropriateness, and functional completeness obtained the descriptive rating of compliance to the very extent. With this, the result implies that the IT-Experts participants found that the system function provides correct results, covers all the identified tasks and user objectives, and facilitates the accomplishment of specified tasks.

Table 3. Extent compliance of the developed application to ISO 25010 Software Quality Standards concerning Performance Efficiency

Indicators	Weighted Mean	Descriptive Rating
1. <i>Time-behavior</i> - the degree to which the response and processing times and throughput rates of a product or system, when performing its functions, meet requirements.	4.60	Compliant to the very great extent
2. <i>Resource Utilization</i> - the degree to which the amounts and types of resources used by a product or system, when performing its functions,	4.80	Compliant to the very great extent

meet requirements .		
3. <i>Capacity</i> - the degree to which the maximum perimeters of the product or system, parameter meet requirements .	4.40	Compliant to the very great extent
Category Mean	4.60	Compliant to the very great extent

Table 3 displays the assessment of the participants on the compliance of the developed web-based application in terms of Performance Efficiency. The system's performance efficiency gained a category means of 4.60 descriptively interpreted as compliant to a very great extent. Performance efficiency sub-indicators such as time-behavior, resource utilization, and capacity got the descriptive rating of compliant to a great extent. The participants found out that the system has efficiently performed the expected tasks within the usual factors.

Table 4. Extent compliance of the developed application to ISO 25010 Software Quality Standards concerning Compatibility

Indicators	Weighted Mean	Descriptive Rating
1. <i>Co-existence</i> - Degree to which a product can implement its required functions efficiently while sharing a common setting and resources with other products, without a negative impact on any other product.	4.40	Compliant to a great extent
2. <i>Interoperability</i> - Degree to which two or more systems or components can exchange information and use the information that	4.40	Compliant to a great extent

has been exchanged.		
Category Mean	4.40	Compliant to a great extent

Table 4 displays the assessment of the participants on the compliance of the developed web-based application in terms of Compatibility. The system's compatibility got a category means of 4.40 descriptively interpreted as compliant to a great extent. All sub-indicators such as Co-existence and Interoperability attained the same descriptive rating of compliance to a great extent. The participants found that the system compatibility can interchange information with other system modules, systems or components, and/or perform its required functions while sharing the same hardware and software environment.

Table 5. Extent compliance of the developed application to ISO 25010 Software Quality Standards concerning Usability

Indicators	Weighted Mean	Descriptive Rating
1. <i>Appropriateness Recognizability</i> - Degree to which users can recognize whether a product or system is appropriate for their needs.	4.80	Compliant to the very great extent
2. <i>Learnability</i> -the degree to which a product or system can be used by specified users to achieve specified goals of learning to use the product or system with effectiveness, efficiency, freedom from risk, and satisfaction in a specified context of use.	5.00	Compliant to the very great extent

3. <i>Operability</i> - Degree to which a product or system has attributes that make it easy to operate and control.	4.60	Compliant to a great extent
4. <i>User error protection</i> - Degree to which a system protects users against making errors.	4.80	Compliant to a great extent
5. <i>User interface aesthetics</i> - Degree to which a user interface enables pleasing and satisfying interaction for the user.	4.80	Compliant to a great extent
6. <i>Accessibility</i> - Degree to which a product or system can be used by people with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use.	4.60	Compliant to the very great extent
Category Mean	4.77	Compliant to the very great extent

Table 5 displays the assessment of the participants on the compliance of the developed web-based application in terms of its Usability. The system's usability acquired a category means of 4.77 descriptively interpreted as compliant to a very great extent. All Sub-indicators also got the descriptive rating of compliant to a very great extent. Indicates that the participants found that the system usability can be used by specified users to complete specified goals with effectiveness, efficiency, and fulfillment in a specified event of use.

Table 6. Extent compliance of the developed application to ISO 25010 Software Quality Standards concerning Reliability

Indicators	Weighted Mean	Descriptive Rating
1. <i>Maturity</i> - Degree to which a developed system, or component modules meets the needs for reliability under normal operation.	4.40	Compliant to the very great extent
2. <i>Availability</i> - Degree to which a system, product, or component is operational and accessible when required for use.	4.20	Compliant to the very great extent
3. <i>Fault tolerance</i> - Degree to which a system, product, or component operates as intended despite the presence of hardware or software faults.	4.40	Compliant to a great extent
4. <i>Recoverability</i> - Degree to which, in the event of an interruption or a failure, a product or system can recover the data directly affected and re-establish the desired state of the system.	4.40	Compliant to a great extent
Category Mean	4.35	Compliant to the very great extent

Table 6 displays the results of the assessment by the participants on the compliance of the developed web-based application in terms of Reliability. The system's reliability attained a category means of 4.235 descriptively interpreted as compliant to a very great extent. All sub-indicators attained the descriptive rating of compliant to a very great extent. That the

participants found that system reliability can complete specified tasks in specified conditions for a definite period.

Table 7. Extent compliance of the developed application to ISO 25010 Software Quality Standards concerning Security

Indicators	Weighted Mean	Descriptive Rating
1. <i>Confidentiality</i> - Degree to which a product or system ensures that data are accessible only to those authorized to have access.	4.60	Compliant to the very great extent
2. <i>Integrity</i> - Degree to which a system, product, or component prevents unauthorized access to, or modification of, computer programs or data.	4.40	Compliant to the very great extent
3. <i>Non-repudiation</i> - Degree to which actions or events can be proven to have taken place so that the events or actions cannot be repudiated later.	4.60	Compliant to the very great extent
4. <i>Accountability</i> - Degree to which the actions of an entity can be traced uniquely to the entity.	4.40	Compliant to the very great extent
5. <i>Authenticity</i> - Degree to which the identity of a subject or resource can be proved to be the one claimed.	4.80	Compliant to the very great extent
Category Mean	4.56	Compliant to the very great extent

Table 7 displays the assessment of the participants on the compliance of the developed web-based application in terms of its Security. The system's security attained a category means of 4.56 descriptively interpreted as compliant to a very great extent. All sub-indicators such as Confidentiality, Integrity, Non-repudiation, Accountability, and Authenticity attained the same descriptive rating of

compliance to the Very Great Extent. The participants found that the developed system has strong security which brings security on member's information and data kept in the databases, specific persons have data access which appropriates to their level of user access.

Table 8. Extent compliance of the developed application to ISO 25010 Software Quality Standards concerning Maintainability

Indicators	Weighted Mean	Descriptive Rating
1. <i>Modularity</i> - Degree to which a system or computer program is composed of discrete components such that a change to one component has minimal impact on other components.	4.60	Compliant to the very great extent
2. <i>Reusability</i> - Degree to which an asset can be used in more than one system, or in building other assets.	4.60	Compliant to the very great extent
3. <i>Analyzability</i> - Degree of effectiveness and efficiency with which it is possible to assess the impact on a product or system of an intended change to one or more of its parts, or to diagnose a product for deficiencies or causes of failures, or to identify parts to be modified.	4.40	Compliant to the very great extent

4. <i>Modifiability</i> - Degree to which a product or system can be effectively and efficiently modified without introducing defects or degrading existing product quality.	4.60	Compliant to the very great extent
5. <i>Testability</i> - Degree of effectiveness and efficiency with which test the criteria can be established for a developed system, product, or component, and tests can be performed to determine whether those criteria have been met.	4.80	Compliant to the very great extent
Category Mean	4.60	Compliant to the very great extent

Table 8 displays the assessment of the participants on the compliance of the developed web-based application in terms of its Maintainability. The system's maintainability attained a category means of 4.60 descriptively interpreted as compliant to a very great extent. All sub-indicators such as Modularity, Reusability, Analyzability, Modifiability, and Testability also attained the same descriptive rating of Compliant to the very great Extent. The participants found out that the system maintainability can be improved to develop it, correct it, or adapt it to the changes in the setting, and in the requests.

Table 9. Extent compliance of the developed application to ISO 25010 Software Quality Standards concerning Portability

Indicators	Weighted Mean	Descriptive Rating
1. <i>Adaptability</i> - Degree to which a product or system can effectively and efficiently be adapted for different or evolving hardware, software, or other	4.80	Compliant to the very great extent

operational or usage environments.		
2. <i>Installability</i> - Degree of effectiveness and efficiency with which a product or system can be successfully installed and/or uninstalled in a specified environment.	5.00	Compliant to the very great extent
3. <i>Replaceability</i> - Degree to which a product can replace another specified software product for the same purpose in the same environment.	5.00	Compliant to the very great extent
Category Mean	4.93	Compliant to the very great extent

Table 9 shows the assessment of the participants on the compliance of the developed application in terms of its Portability. The system's portability obtained a category means of 4.93 descriptively interpreted as compliant to a very great extent. All sub-indicators such as Adaptability, Installability, and Replaceability got the same descriptive rating of Compliant to the very great Extent. The participants found that the system's portability can be transferred from one hardware, software, or other operational or usage environment to another.

Table 10: Extent of compliance of the developed application to ISO 25010 Software Quality Standards

ISO 25010 Software Quality Standards.	Weighted Mean	Descriptive Rating
1) Functional Suitability	4.53	Compliant to the very great extent
2) Performance Efficiency	4.60	Compliant to the very great extent
3) Compatibility	4.40	Compliant to a great extent
4) Usability	4.77	Compliant to the very great extent
5) Reliability	4.35	Compliant to the very great extent
6) Security	4.56	Compliant to the very great extent

7) Maintainability	4.60	Compliant to the very great extent
8) Portability	4.93	Compliant to the very great extent
GRAND MEAN	4.59	Compliant to the very great extent

Table 10 displays the results of the extent of compliance of the developed web-based application to ISO 25010 Software Quality Standards as assessed by the IT Expert that attained the Grand mean of 4.59 with the descriptive rating of Compliant to the very great extent. The indicator of ISO 25010 Software Quality Standards such as functional sustainability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability attained the descriptive rating of compliant to a very great extent. Therefore, it can be concluded that the developed web-based application was greatly approved by IT experts.

Conclusion and Future Works

From the above findings, the researcher concluded that from the existing manual system for the Cooperative can be improved through the adoption of the developed system. The developed Financial Analytics System for Credit Cooperative is compliant with ISO 25010 quality standards. The financial analytics and reporting features of the developed system can provide support for the cooperative in mitigating risks in its operations and making economic decisions.

And from the findings and conclusions in this study, the researchers recommend the following:

1. The Credit Cooperative may consider using the developed system on its operations;
2. The Board of Director can consider conducting training for its users on how to use the system;
3. The Cooperative may consider acquiring hardware and better equipment capabilities that are necessary to improve the usability and functionality of the developed system;
4. Future researchers and system developers may consider the development of general ledger system to be integrated into the Financial Analytics System.

Ethical Considerations

The researcher considered ethical standards in this study to avoid the fabrication or falsification of data. The participants of the study were not subjected to any harm in any way whatsoever. Full agreement

was attained from the participants before the study. The security of the privacy of research participants and the data provided was secured, safeguarding an adequate level of confidentiality.

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