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# LIFE CYCLE OF BRAZILIAN CREDIT UNIONS: A STUDY BASED ON FINANCIAL VARIABLES

## *CICLO DE VIDA DE COOPERATIVAS DE CRÉDITO BRASILEIRAS: UM ESTUDO COM BASE EM VARIÁVEIS FINANCEIRAS*

## *CICLO DE VIDA DE LAS COOPERATIVAS DE CRÉDITO BRASILEÑAS: UN ESTUDIO BASADO EN VARIABLES FINANCIERAS*

**RAMON RODRIGUES DOS SANTOS**

Doutor pelo Programa de Pós-Graduação em Administração da Universidade Federal de Pernambuco. Mestre pelo Programa de Pós-Graduação em Administração da Universidade Federal da Paraíba. Graduado em Administração pelo Centro Universitário Cidade Verde e em Ciências Contábeis pelo Centro Universitário de João Pessoa. Tem experiência em Contabilidade de Instituições Financeiras, com ênfase em Cooperativas de Crédito.

**JOSÉTE FLORENCIO DOS SANTOS**

Professora Titular da Universidade Federal de Pernambuco. Coordenadora do Programa de Pós-Graduação em Gestão - PROPAD da UFPE. Membro do Conselho Fiscal da ANPAD. Membro suplente do Conselho Fiscal da Sociedade Brasileira de Finanças (SBFin). Membro do Comitê Interno do PIBIC / UFPE / CNPq. Doutora em Administração (Finanças) pela COPPEAD / UFRJ. Mestre, Graduada em Engenharia Elétrica (modalidade Eletrônica) e em Administração pela Universidade Federal de Pernambuco.


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**ABSTRACT:** This paper seeks to contribute to the debate on the use of financial variables as predictors for the classification of credit unions into stages of the life cycle. For this purpose, the relationship between the proposed stages is analyzed by means of the signs of cash flows and financial indicators based on the literature, namely operational efficiency, financial intermediation revenues, adjusted net equity, variation in capital stock, and portfolio of overdue credit operations, by means of a multinomial logistic regression in Brazilian credit unions in the period between 2015 and 2019. The results of this study indicate that the relationship between the stages of the life cycle of Brazilian credit unions through financial variables is significant, especially those proposed in the turbulence stage. Based on the results, it is understood that the knowledge and use of this matrix by credit union managers and members can prove to be a promising method for identifying the stage of the life cycle of the union in which it is applied.

**Keywords**: Stages; Life Cycle; Financial Variables; Brazilian Credit Unions.

***RESUMO:*** *Este trabalho busca contribuir para o debate sobre a utilização de variáveis financeiras como preditoras para a classificação de cooperativas de crédito em estágios do ciclo de vida. Para o propósito, analisa-se a relação entre os estágios propostos por meio dos sinais dos fluxos de caixa e indicadores financeiros baseados na literatura, quais sejam a eficiência operacional, receitas de intermediação financeira, patrimônio líquido ajustado, variação do capital social e carteira de operações de crédito vencidas, por meio de uma regressão logística multinomial em cooperativas de crédito brasileiras no período entre 2015 e 2019. Os resultados deste estudo indicam que a relação entre os estágios do ciclo de vida de cooperativas de crédito brasileiras por meio de variáveis financeiras é significativa, com destaque para aquelas propostas no estágio de turbulência. Entende-se, a partir dos resultados encontrados, que o conhecimento e o uso dessa matriz por administradores de cooperativas e por cooperados pode se provar um método promissor para a identificação do estágio do ciclo de vida da cooperativa em que se aplica.*

***Palavras-chave****: Estágios; Ciclo de Vida; Variáveis Financeiras; Cooperativas de Crédito Brasileiras.*

***RESUMEN:*** *Este trabajo busca contribuir al debate sobre el uso de variables financieras como predictores para la clasificación de las cooperativas de ahorro y crédito en etapas del ciclo de vida. Para ello, se analiza la relación entre las etapas propuestas a través de las señales de flujos de caja e indicadores financieros basados en la literatura, a saber, la eficiencia operativa, los ingresos por intermediación financiera, el patrimonio ajustado, la variación del capital social y la cartera de créditos vencidos, a través de una regresión logística multinomial en cooperativas de ahorro y crédito brasileñas en el período comprendido entre 2015 y 2019. Los resultados de este estudio indican que la relación entre las etapas del ciclo de vida de las cooperativas de ahorro y crédito brasileñas a través de variables financieras es significativa, con énfasis en aquellas propuestas en el etapa de turbulencia. Se entiende, a partir de los resultados encontrados, que el conocimiento y uso de esta*


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*matriz por los administradores de cooperativas y por los cooperativistas puede resultar un método promisorio para identificar la etapa del ciclo de vida de la cooperativa en la que se aplica.*

***Palabras clave:*** *Pasantías; Ciclo de vida; Variables Financieras; cooperativas de ahorro y crédito brasileñas.*

## 1 INTRODUCTION

Credit unions develop their risk and return scenarios to better compete and survive. This flow of thinking leads to thinking about the life and death of organizations. In this regard, some insights into the development patterns in credit unions can be discovered through the life cycle theory (MCKILLOP; WILSON, 2014), as from the understanding that the organizational life cycle is a model divided into stages that a company may go through during its existence, directly influencing its financing, investment, and operational performance decisions (ANTHONY; RAMESH, 1992). Therefore, from a theoretical point of view, credit unions are considered organizations that go through a life cycle.

Despite the importance of the concept of the company life cycle, two main problems arise in understanding and employing the concept: firstly, there is no agreement on the operational definition that should be employed to distinguish the stages of the life cycle (JAAFAR; HALIM, 2016), which consequently would result in a large variation in life cycle models and in the amount of life cycle stages of the companies. The authors classify such models in various ways; for instance, there are models with five stages (MILLER; FRIESEN, 1983, 1984), with four stages (PASHLEY; PHILIPPATOS, 1990), and with three stages (ANTHONY; RAMESH, 1992). The second problem refers to the lack of an established methodology to identify each stage of the life cycle, since the various methods proposed would offer inconsistent approaches to the classification procedure of the company's life cycle. In this context, there are several concepts related to life cycle, including product life cycle (KOTLER, 1965; BILIR, 2014), company life cycle (MUELLER; 1972; ARIKAN; STULZ, 2016), and industry life cycle (AUDRETSCH; WOOLF, 1986).


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Based on the seminal review on cooperative theory developed by LeVay (1953), Cook's (1995, 2018) paper proposes a life cycle framework for unions, suggesting that the economic health of these institutions varies over time through indicators such as return on equity or net profit margin, for example.

In general, the papers found in the literature use multiple linear regression or binary logistic regression as an analysis tool, starting from a life cycle proxy associated with the dividend theory, such as dividends payout and capital allocation, or through the organization's cash flows (DICKINSON, 2011), emphasizing the significance of the chosen proxy with the independent variables of interest. However, financial variables may also have predictive and/or explanatory capacity of the stages of the life cycle of companies, and may present different behaviors in each of them (COSTA *et al.*, 2017). In this aspect, this paper seeks to analyze the relationship of variables that, according to the literature, may be directly associated with the ability to explain the classification of Brazilian credit unions according to the respective stage of the life cycle.

The stages of the organizational life cycle should be studied in order to analyze and show the variation in characteristics in organizations over time, enabling managers to solve problems and achieve the expected goals. In Brazilian credit unions, recent studies have sought to investigate potential financial indicators and characteristics that are associated with the stages of the life cycle, such as those related to fundraising and applications, in addition to size (CARVALHO *et al.,* 2015); applications, fundraising, inputs, products, and solvency (CANASSA; COSTA, 2018); technical efficiency (SANTOS; COSTA, 2020); and corporate governance (CANASSA; COSTA; NEVES, 2020). Thus, the objective of this study is to analyze the accounting-financial variables that may be directly related to the ability to explain the classification of companies according to the stage of the life cycle, based on the classification proposal by Dickinson (2011).

Dickinson's paper (2011) aimed to show how combinations of operational cash flows, financing and investment can be used to identify the life cycle stage of companies. Through the created metrics, the author analyzed how the life cycle stages explain various business factors, especially profitability patterns (return on net assets, profit margin, net asset turnover, return variance). However, not all Brazilian credit


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unions are required by the Central Bank of Brazil (BCB) to report their Cash Flow Statements (CFS), being conducted only by those that had, in the immediately preceding year, a net equity of less than two million reais (BRAZIL, 2008). In this aspect, this study seeks to fill a gap regarding the operationalization of the life cycle stages in these institutions by proposing economic-financial variables directly related to the cooperative activity and not necessarily to the union, as from the signs of the cash flows of these institutions, according to the methodology adopted by Dickinson (2011), thus encompassing, in addition to those that make the CFS available, the credit unions that are not required to report the CFS in Brazil.

As from the proposed methodology, the main results of this study have indicated that there are significant relationships between the stages of the life cycle of a Brazilian credit union through the variables of operational efficiency, revenues from financial intermediation, adjusted equity, variation of the capital stock and portfolio of overdue credit operations, especially with regard to the turbulence stage, when all of them proved to be significant. In practice, analyzing which financial variables may reflect the stage of life in which the credit union stands is relevant for the institution managers themselves, for the control organs, and for the community in general, since, besides influencing the existing relationship between members and managers, credit unions reflect and disseminate their results in the regions where they are inserted.

Besides this introductory section, the study is structured as follows: section 2 consists of a literature review on the life cycle, its application in credit unions and related studies in Brazil; section 3 deals with the methodological procedures used to achieve the proposed objectives; section 4 presents the main research evidence and the discussion of the results; finally, section 5 details the conclusions and main implications of the study.

## 2 LITERATURE REVIEW

The organizational life cycle is a model divided into stages that a company may go through during its lifetime, directly influencing its financing, investment, and


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operational performance decisions (ANTHONY; RAMESH, 1992). From a theoretical point of view, credit unions are considered organizations that have an organizational life cycle.

The literature on life cycles suggests three key aspects: the first one is that the stages of the life cycle can explain differences in value attributes in the underlying economy, such as the production and investment opportunity function of companies; secondly, companies at different stages of the life cycle need to manage their business in a customized way to be successful; finally, knowledge of the specific life cycle stage of the company can help understand where the company is and where it intends to go (PARK; CHEN, 2006).

The development of entities between the various stages of the life cycle lies in the interrelation between two primary factors: flexibility and control. Thus, as companies transform their life cycle, these two characteristics change. For example, younger organizations have a strong tendency to be more flexible and less controllable. In the growth stage, this control increases until they tend to have a balance between those two factors at the maturity stage. Finally, in the decline stage, they tend to lose both flexibility and control (ADIZES, 1993).

In general, cooperative life cycle models suggest that these companies go through a process of change over time (BOLAND, 2020). The general idea is that there is not a unidirectional sequence in the life stages of such institutions, that is, following chronologically from birth to decline, but that the companies move through the stages in a non-linear way, without necessarily going through one or another stage (DICKINSON, 2011; COSTA *et al.*, 2017).

In Brazil, Canassa and Costa (2018) identified a recent flow of discontinuity among Brazilian credit unions, justifying that poor performance in certain positions, such as solvency and quality of credit operations arising from problems linked to earlier stages of the life cycle, was enough for managers to see no other option than liquidation. According to the Annual Report of the Credit Cooperativism Guarantee Fund, in the year 2020, despite the decrease in the volume of individual credit unions, there was a growth by 9.27% in the number of members in the last analyzed period compared to the previous year (FUNDO GARANTIDOR DO COOPERATIVISMO DE


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CRÉDITO [FGCOOP], 2021). Table 1 highlights the number of individual credit unions and mergers in the SNCC (National Service of Registration Inquiries - Serviço Nacional de Consultas Cadastrais) in the period between 2016 and 2020.

**Table 1 - Number of individual credit unions and mergers**

| | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Individual credit unions | 1.016 | 967 | 925 | 872 | 847 |
| Mergers in the year | 40 | 47 | 38 | 44 | 21 |

**Source:** Credit Union Guarantee Fund (2021)

From this scenario, this trend can be understood to be ongoing, not necessarily due to demutualization by their members, but due to the fact that many credit unions seek merger and incorporation (M/I) strategies to improve scaling, efficiency and performance expectation, which, on the other hand, would also be problematic, since the organizational growth of these institutions also associates a wide range of negative aspects, resulting from the lack of strategic planning or from the incorporation of the "new" credit union (MCKILLOP; WILSON, 2015).

Recent studies have focused on the processes and conditions that lead unions to maintain their egalitarian democratic operation over time and to avoid degeneration, highlighting their ability to balance conflicting logics and the objectives of the embedded market demand for organizational efficiency (JAUMIER, 2017). Conversely, a smaller but growing line of research emphasizes these institutions' potential for regeneration, highlighting cooperative values and democratically structured forms of decision-making as a reaction to degeneration (NARVAIZA *et al*. 2017). Hence, these studies illustrate how cooperative institutions can recover by mobilizing resources to trigger their organizational changes and strengthening the active participation of their members.

The paper by Carvalho *et al.* (2015) aimed to investigate and identify potential financial indicators that were associated with a higher or lower risk of discontinuity of Brazilian credit unions, as well as to verify if the different types of market exit of individual credit unions are related to information of active credit unions and their


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respective financial statements from January 1995 to the second quarter of 2009. The results suggested that because of the duality inherent in the management of such entities (i.e., the use of cooperative principles and the demands imposed by the market and by the competition), the need for balance between social and economic performance is a reason for concern. For the authors, a possible explanation for this finding is that a credit union may show some financial inefficiency when compared to the non-cooperative banking system, with lower returns from lower fees and lower distribution of surpluses, thus generating a positive social effect that not only justifies and facilitates its operation, but also ensures its continuity as a result of the loyalty of its members and to the volume of transactions in which it is involved.

Canassa and Costa (2018) investigated, from the identification of a wave of discontinuity among Brazilian credit unions, whether they presented lower levels of performance than the others in the three years preceding the ending of their activities, going against the theory of the cooperative life cycle. To do so, the database comprised 1,223 classic credit unions in the period between 2008 and 2016 from an unbalanced panel, excluding those that did not present complete data for the entire year or that presented negative equity. Among the main analyses carried out, considering the life cycle of the credit unions as an attribution of the financial health of the union itself and of its members, in addition to the low performance in relation to the competitors, the discontinued unions could be facing difficulties to offer benefits to their members adequately. This fact became more visible by the frequency of discontinued unions with low performance in the participation of credit operations, one of their main benefits, and in the good performance in the participation of the other services, which were not sufficient to maintain their activities.

Santos and Costa (2020) sought to investigate the degree of technical efficiency of Brazilian credit unions by means of an empirical study of the propositions of the life cycle theory, thus verifying whether inefficiency is something present in the unions that discontinued their operations. The study compared the level of commitment of own resources in relation to third-party capital (Liability over Net Worth Equity - Indebtedness) and the size of the union assets (total assets), as well as the scores of technical efficiency, pure technical efficiency and scale efficiency that are part of the


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proposal of the study. The behavior of the variables that composed the DEA modeling was also compared in order to complement the analysis: gross revenue, total spending on employees to represent the labor factor; non-current assets as a measure for the capital factor and administrative expenses.

The main results indicated that the discontinued credit unions and their subgroup, the liquidated credit unions, had lower levels of gross revenue, payroll, administrative expenses, and non-current assets than the other credit unions. In addition, it was noticed that there are credit unions that have negative net worth equity amongst active and liquidated ones, which was an important point that indicated that they were insolvent. In turn, the incorporated unions were the same size as the others, but more indebted than the discontinued unincorporated unions. Finally, validating the central hypothesis of the study, the discontinued unions proved to be more inefficient. This datum is important as it helps in the evaluation of a company in terms of risk of liquidation, given the relationship of efficiency with the possible extinction of the union.

Finally, Canassa, Costa and Neves (2020) aimed to understand the link between the characteristics of corporate governance and the discontinuity of Brazilian credit unions, investigating whether these characteristics affect their market exit strategy. The results have not yet pointed to the importance of governance in the continuity of credit unions in Brazil. In addition, the cost of compliance imposed by regulatory agencies may influence credit unions in different ways, which suggests possibilities for further research on the role of member heterogeneity in corporate governance structures and in the discontinuity of these institutions.

For the approach of the present study, the moment of turbulence is understood as an intermediary between each of the four stages, either as a transition process, or for the reestablishment of the company's activity, which reinforces, without ignoring the development of previous studies, this stage. Accordingly, the present study adopts the concepts related to the papers by Cook (1995, 2018) that address theoretical aspects of the life cycle applied to cooperative institutions with a focus on the latter, which proposes four stages for life cycle analysis, namely: birth, growth, maturity, and decline.


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## 3 METHODOLOGICAL PROCEDURES

This paper seeks to analyze the relationship between the stages of the life cycle of companies according to the definitions by Dickinson (2011) and financial indicators. For this purpose, a multinomial logistic regression is proposed to be applied to Brazilian credit unions linked to the Sicredi Cooperative System in the period between 2015 and 2019. The Sicredi System is the first cooperative institution in Brazil, with 4.5 million members and present in 22 Brazilian states as well as in the Federal District in more than 1,9 thousand branches distributed in 110 credit unions, with a net worth equity of 18 billion reais (SICREDI, 2021a). This cooperative system was chosen over others given the availability of financial data (CFS and financial indicators) on its website (SICREDI, 2021b).

The data used were secondary, with a yearly frequency, and could be obtained from the "IF. Data - Selected Data from Supervised Entities" (CENTRAL BANK OF BRAZIL [BCB], 2021), being categorized according to the Cosif Plan, the Accounting Plan for Institutions of the National Financial System (BCB, 1987). Through the composition of the sign of cash variation (operational, investment and funding), each company was classified in a certain stage of the life cycle, as shown in Chart 1.

**Chart 1 - Composition of Signals for the Classification of the Life Cycle Stages**

| Classification of Cash Flows | Stages | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Birth | Growth | Maturity | Turbulence | | | Decline | |
| Operational | - | + | + | + | - | + | - | - |
| Investiment | - | - | - | + | - | + | + | + |
| Funding | + | + | - | + | - | - | + | - |

**Source:** Authors' own elaboration, based on Dickinson (2011)

Accordingly, the financial variables proposed to analyze the relationship with the stages of the life cycle of credit unions are related to five proxies, namely: Operational Efficiency (OE); Change in Financial Intermediation Revenues (NR); Adjusted Net Equity (ANE); Change in Capital Stock (CS) and Portfolio of Overdue


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Loan Operations (OVD). The data needed to calculate these variables are highlighted in Chart 2.

It is important to note that, based on the literature, credit unions at an early stage of development tend to have a small asset size, high levels of structural and conduct regulation, a strong common bond, strong reliance on volunteers, and to provide basic savings and loan products. Transitional movements, on the other hand, are characterized by a large asset size, evolving regulatory and supervisory structures, and a greater emphasis on growth and efficiency. Finally, companies in mature life stages have a large asset size and a deposit insurance scheme (FERGUSON; MCKILLOP, 1997, 2000; MCKILLOP; WILSON, 2015).

**Chart 2 - Financial Variables**

| Variables | | Metrics | Theoretical Background |
|---|---|---|---|
| OE | Operational Efficiency | $\mathrm{OE} = \frac{\mathrm{OR}}{\lvert E_{\mathrm{Adm}} \rvert}$; $\Delta\mathrm{OE}_{\mathrm{it}} = \frac{\mathrm{OE}_{\mathrm{it}} - \mathrm{OE}_{\mathrm{it-1}}}{\mathrm{OE}_{\mathrm{it-1}}}$ | Braga *et al.* (2006); Carvalho *et al*. (2015) and Cordeiro *et al.* (2018). |
| CRO | Credit Revenues from Operations | $\Delta\mathrm{CRO} = \frac{\mathrm{CRO}_{\mathrm{it}} - \mathrm{CRO}_{\mathrm{it-1}}}{\mathrm{CRO}_{\mathrm{it-1}}}$ | Ferguson e McKillop (1997, 2000); Costa *et al.* (2017) |
| ANE | Adjusted Net Equity | $\mathrm{ANE} = \frac{\mathrm{ANE}_{\mathrm{it}} - \mathrm{ANE}_{\mathrm{it-1}}}{\mathrm{ANE}_{\mathrm{it-1}}}$ | Costa *et al.* (2017); Canassa and Costa (2018); Maia *et al.* (2019) |
| CS | Capital Stock | $\mathrm{CS} = \frac{\mathrm{CS}_{\mathrm{it}} - \mathrm{CS}_{\mathrm{it-1}}}{\mathrm{CS}_{\mathrm{it-1}}}9$ | Deng e Hendrikse (2014); McKillop and Wilson (2015); Cook (2018) |
| OVD | Portfolio of Overdue Loan Operations | $\mathrm{OVD} = \frac{\text{Overdue Operations}}{\text{Total Portfoliol}}$; $\Delta\mathrm{OVD} = \frac{\mathrm{OVD}_{\mathrm{it}} - \mathrm{OVD}_{\mathrm{it-1}}}{\mathrm{OVD}_{\mathrm{it-1}}}$ | Bressan *et al.* (2010) |

Legend. OR: Operational Result = Operational Revenues + Operational Expenses; $|E_{Adm}|$: Administrative Expenses (in module); CRO: Credit Revenues from Operations; ANE: Adjusted Net Equity = Net Equity + Accounts Receivable + Accounts Payable; CS: Capital Stock; Overdue Operations = Risk Operations Level B + Risk Operations Level C + Risk Operations Level D + Risk Operations Level E + Risk Operations Level F + Risk Operations Level G + Risk Operations Level H; Total Portfolio = Loan Portfolio Classification (Final Balance).


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However, when variables such as the company size and age are used as proxies of the life cycle stages, an implicit assumption is that the company would move linearly through them (DICKINSON, 2011). Nevertheless, a credit union is understood to be composed of a portfolio of financial products and services, which, despite being from the same segment, have different cycles that are independent of the aforementioned variables. Therefore, both proxies were disregarded when classifying the stages of the life cycle of Brazilian credit unions.

In addition, the purpose of working with the featured variables by means of a variation calculation seeks to align whether the union presented evolutions in its variables in a given period, and, concomitantly, to relate this scenario with the respective stage of the life cycle in which the union was framed.

Based on the collected variables, we proceeded to apply a multinomial logistic regression model in order to test the potential determinants of the probability of classification of companies in each stage of the life cycle, namely: birth, growth, maturity, turbulence and decline. When the dependent variable that represents the phenomenon under study is qualitative, but offers more than two possibilities of response (categories), the multinomial logistic regression should be used to estimate the probabilities of occurrence of each alternative.

Multinomial logistic regression is used to analyze categorical dependent variables (of more than two categories), comparing multiple groups from binary logistic regressions between each group and a reference class. Thus, the probabilities of classifying observations into each group are calculated by the odds ratio. For this purpose, the reference category must first be defined (FÁVERO; BELFIORE, 2017). Accordingly, the decline stage was adopted as the referential dependent variable, against which the other categories will be analyzed using the Gretl software. The purpose is to analyze the other stages in relation to the observation of discontinuity of Brazilian credit unions.

Considering the proposal of this paper, the following model was developed:


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$$(\text{life cycle}) = \beta_0 + \beta_1 \Delta \text{OE}_{\text{it}} + \beta_2 \Delta \text{CRO}_{\text{it}} + \beta_3 \Delta \text{ANE}_{\text{it}} + \beta_4 \Delta \text{CS}_{\text{it}} + \beta_5 \Delta \text{OVD}_{\text{it}} + \varepsilon \ ,$$

where: $\text{P (life cycle)}$ is the categorical dependent variable, which can assume the following values: 0: Birth, 1: Growth, 2: Maturity, 3: Turbulence; and 4: Decline; OE: Operating Efficiency; CRO: Credit Revenue from Operations; ANE: Adjusted Net Equity; CS: Capital Stock; OVD: Portfolio of Overdue Loan Operations; and ε: random error.

## 4 RESULTS

Table 2 details the total participation of the sample in each stage of the life cycle in the periods of interest, namely the stages of birth, growth, maturity, turbulence and decline. According to Table 2, it can be seen that most of the observations collected are in the maturity stage, followed by the growth stage; while only one observation was noted for the decline stage, the first three stages of the cycle adding up to just over 80% of the total sample. The number of observations collected per year had a maximum variation of 6.25%, with a minimum of 112 observations in 2015 and a maximum of 119 observations in 2018.

**Table 2 - Classification of the sample credit unions in each stage of the life cycle, by year**

| Life Cycle | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|
| Birth | 2 | 3 | 13 | 13 | 22 |
| Growth | 63 | 40 | 33 | 32 | 16 |
| Maturity | 45 | 66 | 54 | 44 | 20 |
| Turbulence | 2 | 5 | 14 | 30 | 57 |
| Decline | 0 | 0 | 1 | 0 | 0 |
| Total | 112 | 114 | 115 | 119 | 115 |

Table 3 presents the descriptive statistics of the explanatory variables in this study. One can notice that the variable that measures the variation in adjusted net


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equity (ANE) has the largest range (difference between the minimum and maximum values), while the variation in capital stock (CS) has the smallest range; operational efficiency (OE) and the variation in credit revenue from operations (CRO) practically match in terms of highest standard deviation among the variables, while the CS has the smallest standard deviation. Finally, the variation in the portfolio of overdue credit operations (OVD) is the variable that has the greatest gap between the median and the mean, which may indicate the existence of outliers.

**Table 3** - **Descriptive Statistics**

| Variable | Média | Median | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| OE | 0,144 | 0,0781 | 0,53 | -1,5 | 5,48 |
| CRO | 0,203 | 0,155 | 0,284 | -0,534 | 3,43 |
| ANE | 0,224 | 0,195 | 0,528 | -5,73 | 5,79 |
| CS | 0,179 | 0,154 | 0,175 | -1 | 1,53 |
| OVD | 0,081 | -0,00721 | 0,494 | -0,576 | 5,5 |

**Legend. OE**: Operational Efficiency; CRO: Credit Revenues from Operations; ANE: Adjusted Net Equity; CS: Capital Stock; and OVD: Portfolio of Overdue Loan Operations.

Regarding the regression results of the model (Equation 1), the variable that measures the adjusted net equity (ANE) is not significant in the birth and growth stages, and the one measuring revenues from credit operations (CRO) is not significant at the maturity stage. Operational efficiency (OE) is significant at 1% (OE in the growth stage, the adjusted net equity in the maturity and turbulence stage, and the capital stock (CS) and the portfolio of overdue loan operations (OVD), both at the turbulence stage. The others are significant at 5% and at 10%.

The first results presented in Table 4 showed that the operational efficiency has a significant relationship in the analysis with the stages of the life cycle of Brazilian credit unions brought up by Dickinson (2011). In credit unions, where the central objective is not profit, operational efficiency is even more important than in other institutions, since the assumption of profit maximization is not necessarily applicable


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(CARVALHO *et al*., 2015). More efficient credit unions play a better socioeconomic role, which results in the promotion of financial disintermediation, in the ability to generate surplus, and in an increase in the volume of credit granted (BRAGA *et al.*, 2006).

**Table 4 - Model Regression Results**

| | | Coefficient | Standard Error | z | *p-valor* | |
|---|---|---|---|---|---|---|
| Birth | constant | 1,3472 | 0,2426 | 5,553 | <0,0001 | *** |
| | OE | 0,2857 | 0,2404 | 1,189 | 0,0346 | ** |
| | CRO | −0,1588 | 0,7210 | −0,2203 | 0,0257 | ** |
| | ANE | −0,2405 | 0,2484 | −0,9685 | 0,1328 | |
| | CS | 0,5602 | 0,1584 | 0,4836 | 0,0286 | ** |
| | OVD | −0,0544 | 0,0027 | −0,1799 | 0,0572 | * |
| Growth | constant | 1,4620 | 0,2346 | 0,231 | <0,0001 | *** |
| | OE | 0,7041 | 0,2552 | 0,758 | 0,0058 | *** |
| | CRO | 0,3717 | 0,6797 | 0,5469 | 0,0845 | * |
| | ANE | −0,4032 | 0,3185 | −1,266 | 0,2054 | |
| | CS | 0,8644 | 0,1341 | 0,7622 | 0,0607 | * |
| | OVD | 0,2394 | 0,2114 | -0,132 | 0,0074 | ** |
| Maturity | constant | 0,9701 | 0,2613 | 0,713 | 0,0002 | *** |
| | OE | 0,2686 | 0,2129 | 0,262 | 0,007 | ** |
| | CRO | −0,5196 | 0,8245 | −0,6303 | 0,5285 | |
| | ANE | 1,3654 | 0,3933 | 0,472 | 0,0005 | *** |
| | CS | 1,2072 | 1,3186 | 0,9155 | 0,0599 | * |
| | OVD | −0,0799 | 0,2617 | −0,3057 | 0,0518 | * |
| Turbulence | constant | −4,9372 | 1,0207 | −4,837 | <0,0001 | *** |
| | OE | 0,1686 | 0,2180 | 0,7733 | 0,0393 | ** |
| | CRO | −0,7896 | 0,7219 | −1,094 | 0,0741 | * |
| | ANE | 1,7510 | 0,3519 | 0,976 | <0,0001 | *** |
| | CS | 4,6621 | 1,2287 | 0,794 | 0,0001 | *** |
| | OVD | 6,1099 | 0,5772 | 1,59 | <0,0001 | *** |

**Legend: OE:** Operational Efficiency; CRO: Credit Revenues from Operations; ANE: Adjusted Net Equity; CS: Capital Stock; and OVD: Portfolio of Overdue Loan Operations. *Significance***:** ***: 1%, **: 5% *: 10%.


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In the four stages, the variation in operational efficiency has a positive (or direct) relationship with each of the stages: birth, growth, maturity, and turbulence. It is understood that, regardless of the stage in which the credit union is inserted, and even when it is in periods of greater instability, it is necessary to maintain a level of efficiency in its activities, which can be considered a plausible argument from the financial point of view for these institutions, since the main purpose of the credit union is not the profit of its operations, but rather that they are offered in an "optimal" way to its members.

For Carvalho *et al.* (2015), in their early years, most credit unions tend to be unsuccessful, since (i) they are managed by their own members, who would have low levels of professionalism and operational problems; or (ii) due to market competition with banks, especially in large cities. Accordingly, they would *a priori* lose the support and cash flow of their member-associates, producers or small entrepreneurs. Thus, divergent interests expand among members as the union grows in several locations, increasing the number of members and the region served, creating a difficulty in the communication of a credit union's mission after a market failure problem. As a consequence, a decision that may affect organizational survival is made, suggesting that the company is entering its decline (or revitalization, leading to a new life cycle) phase and deciding how to proceed (BOLAND, 2020).

From this scenario, it can be understood that this is an ongoing trend, not necessarily due to demutualizations by their members, but due to the fact that many credit unions seek merger and incorporation (M/I) strategies to improve scale, efficiency and performance expectation, which, on the other hand, would also be problematic, since organizational growth in these institutions also involves a wide range of negative aspects caused by the lack of strategic planning or by the incorporation of the "new" union (MCKILLOP; WILSON, 2015; COOK, 2018; HÖHLER; KÜHL, 2018).

As in other financial institutions, intermediation revenues comprise those related to credit operations, to leasing with bonds and securities, to operations with derivative financial instruments, to foreign exchange operations, and to compulsory investments. According to Anthony and Ramesh (1992), corroborated by Dickinson's paper (2011), the company maximizes revenue growth at the beginning of its life cycle


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to create permanent cost or demand advantages over competitors; however, in the maturity stage, investments bring fewer returns, featuring a conservative and stable phase. In the turbulence and decline stages, companies do not present innovations; instead, they may present stagnation scenarios reflected in their results. At this stage, innovations are required in the turbulence period so that the company does not enter the decline stage.

The results point out that the variable related to the financial intermediation revenues is statistically significant in the periods of birth, growth and turbulence. In the first period, the results indicate that the constitution and "entry" of the company is prioritized, evolving to the inversion of the sign, and, consequently, to a greater expansion of the union's activities and of the entity's revenue up to a moment of turbulence when this relationship becomes negative, demonstrating possible weaknesses of these institutions in terms of their gross revenue and a greater boost of other activities (such as non-cooperative acts) that can maintain the economic and financial situation of the union before an imminent decline in the period. In Brazil, Canassa and Costa (2018) identified a recent flow of discontinuity among Brazilian credit unions, justifying that poor performance in certain positions, such as solvency and quality of credit operations arising from problems linked to earlier stages of the life cycle, was enough for managers to see no other option than liquidation.

Accordingly, it is important to highlight the dynamic relationship between capital stock and credit union. A decrease in capital stock leads to an imbalance in the social and economic attributes of credit unions (DENG; HENDRIKSE, 2014). Although the capital stock is a characteristic of traditional credit unions, the level of social capital in a union is by no means static, given the payouts made by the members over the course of their membership. At the same time, the GANE (Growth in Adjusted Net Equity) reinforces the importance of Net Equity for financial organizations, this parameter being used for operation limits (MAIA *et al*., 2019). According to Vieira (2016), for unions, the GANE variable corresponds to a proxy of the performance of credit unions due to the fact that the growth of adjusted net equity, for these institutions, is related to the leftovers of the fiscal years, to the increase in capital stock, to the increase in reserves and to the payment of quota shares.


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Table 4 shows that the ANE and CS variables have inverted signs between them in the first two stages, although there is no statistical significance. However, in the maturity and turbulence periods, the statistical significance of the ANE and CS variables is observed, which reinforces the importance of the entity's net equity in the last two stages of the life cycle under study, thus increasing the importance of this scenario for entities that focus on the members' participation, that is, in their social policy.

However, the results of this paper corroborate the findings by Canassa and Costa (2020) who pointed out that credit unions with higher membership growth are more likely to close operations at advanced stages of their life cycle as a result of problems arising from the heterogeneity of interests within the membership. Hence, these problems of heterogeneity in membership would bring the union problems such as influence and portfolio costs that may result in a reduction in organizational efficiency. According to the authors, union members dissatisfied as customers may have approved a merger because it is a solution that requires little effort from them as owners, as opposed to adjustments in the union itself.

Finally, the "portfolio of overdue credit operations" indicator is important for determining the probability of insolvency of credit unions because it helps identify risk factors, creating a benchmark for comparing performance and facilitating supervision by regulatory agencies (BRESSAN *et al.*, 2010). The results present a positive sign only in the growth stage, which would denote a greater expansion of the union' s financial products to the detriment of a better quality of its portfolio until maturity, when the relationship is inverse. In the turbulence stage, based on the results presented, there is a positive relationship between the overdue operations and the respective stage. Hence, a greater variation would tend to the union remaining in this stage.

In Brazil, changes in national legislation have been adopted in order to stimulate the development of microcredit and encourage credit unions to participate in the microcredit market. These changes have resulted in an increase in the number of new credit unions (CARVALHO *et al.*, 2015). However, the continuity of these entities may be compromised, or their activities interrupted, when they go into receivership, liquidation or shutdown.


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> Extrajudicial liquidation occurs when a union decides to voluntarily terminate its activities. Judicial liquidation, in relation to a financial institution, refers to the economic intervention of the State in the business activities of a financial institution, which generally occurs when the continuity or discontinuity of the institution represents a risk to society, with negative repercussions in the market. Shutdown occurs when there is discontinuity in the activities of a credit union (CARVALHO *et al.*, 2015, p. 72).

It is worth mentioning that the Central Bank of Brazil also foresees the merger or incorporation by another financial institution. However, this process does not necessarily imply that the union to be incorporated has been operating at low performance levels, since the merger or incorporation can be endorsed by the members in search of scale gains and improvement in performance expectations (MCKILLOP; WILSON, 2015).

Therefore, considering the motivation of this study, which is to discover the financial variables that may be directly associated with the ability to explain the classification of the companies according to the stage of the life cycle, in the birth stage only the variable that measures the adjusted net equity (ANE) is not significant, with the portfolio of overdue loan operations (OVD) being significant at 10% and the others at 5%; in the growth stage, again it is the variable related to the adjusted net equity that is not significant, while the overdue operations do not become significant at 5%, and the operational efficiency (OE) becomes significant at 1%; in the maturity stage, revenue from loan operations (CRO) becomes non-significant, and the adjusted net equity becomes significant at 1%; finally, in the turbulence stage, all variables are significant, with a sharp increase in significance of capital stock (CS), of ANE and OVD to 1%, and with the CRO becoming significant again at 10%.

## 5 FINAL CONSIDERATIONS


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For the company to be in continuity, it needs to evolve, and this evolution is determined by internal factors (strategy adopted, financial resources, and managerial capacity), as well as external factors (competitive environment, macroeconomic factors, for example). Thus, the stages of the life cycle are distinct phases in the life of companies, being associated with different patterns of decision-making, which in turn are distinguished by the different needs of the company at each stage (DICKINSON, 2011). By understanding the accounting-financial statements as indicators of such needs, the value of the information contained in these statements to understand these decision-making patterns becomes evident, establishing a more direct probabilistic relationship between some of this information and the stage of the life cycle to which the organization belongs.

The results of this study indicate that there are significant relationships in the stages of the life cycle of a Brazilian credit union through the variables found in its financial statements, especially when it comes to the turbulence stage, when all variables proposed were significant at least at 1%. In the other stages, there is at least one non-significant variable; however, there are others of sufficient significance to be considered explanatory.

The knowledge and use of this matrix by union managers and members may prove to be a promising method to identify the stage of the life cycle of the union to which it is applied. Its direct and objective application can help those interested to better understand the situation in which the credit union finds itself and to recognize the recommendations for decision-making at a given moment, as well as possibly show which challenges to face and precautions to take since the moment of analysis.

For future studies, the application of the variables presented in this paper to individual credit unions affiliated to other systems within the National Cooperative Credit System (SNCC - *Sistema Nacional de Crédito Cooperativo*) is suggested, as well as others that may contribute to the findings of this paper, including, for instance, the relationship between the stages of the life cycle in the segments presented by the Central Bank of Brazil through Resolution No. 4,557 (BCB, 2017).


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