“Selecting a kind of financial innovation according to the level of a bank’s financial soundness and its life cycle stage”

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Selecting a kind of financial innovation according to the level of a bank's financial soundness and its life cycle stage

Abstract

This paper presents the recommendations for selecting a kind of financial innovation in a bank based on the results of theoretical research regarding its usage as a tool for ensuring bank financial soundness. The study is aimed at developing an approach to selecting a kind of financial innovation depending on the level of bank financial soundness and the stage of bank life cycle. The existing method of identifying a bank's life cycle stage in the framework of the developed approach was improved: it was offered to use the criteria of the growth rates of a bank's market share, total income, staff costs and net cash flow for grouping banks by the stage of their life cycle and conduct two-steps clustering which helps to determine those banks which are on the transitional stages and to refer a bank to a similar group (growth, stabilization and decline). The empirical results of its implementation suggest that there are three groups of Ukrainian banks that vary according to the stage of bank life cycle (growth, stabilization, decline), excepting those institutions which are on the transitional stages. By the example of banks which represent the main characteristics of each cluster, the authors recommend to launch particular kinds of financial innovation in bank operating activity, taking into account the peculiarities of each group. The empirical results confirm the relevance of the developed approach and its value for identifying the current phase of a bank's development and managing its financial soundness.

Keywords: bank financial soundness, bank life cycle stage, cluster analysis, discriminant analysis, Ukraine.
JEL Classification: G21, D91.

Introduction

Under conditions of the volatility of external environment and current state of the market, increasing the level of banks' financial soundness is one of the priorities of Ukrainian banks' strategic development that is aimed at supporting their status of reliable financial organizations and renewing their customers' loyalty. Growing financial stability of the banking system was announced by National Bank of Ukraine (National Bank of Ukraine, 2014) as the main strategic goal in the reform of renewing native banking system which must become a guarantee for successful macroeconomic transformations. A flexible and effective system of bank financial soundness management that implies using new technologies provides ensuring bank financial soundness on the desired level and supports effective functioning of a bank under the circumstances of fierce competition.

Since modern tools for ensuring bank financial soundness appeared to be inefficient in times of global financial crisis, today there is a necessity of searching for new alternative tools for growing the potential of financial soundness which have to be adequate to the existing conditions. One of such tools implies implementing financial innovations into operating activity of native banks in the framework of financial engineering.

The paradigm of modern bank activity requires financial organizations to search for innovations in the field of their activity and generate new bank products on the permanent basis; it may facilitate step-by-step transforming traditional bank business into client-oriented one, enhance bank products' and services' appeal, expand banks' activity and ensure their stable functioning. It is noteworthy that selecting the direction and kind of financial innovation ought to be well-grounded and consider the peculiarities of banks' functioning. Otherwise, the probability of risks' occurrence and destabilization of the situation may rise in the future. Thus, the issues concerned with implementing innovative bank products and services according to peculiarities of their growth, in particular the life cycle stage and the current level of financial soundness, are becoming relevant nowadays.

The research object of this paper is bank life cycle. The main aim of the paper is to improve existing approach to selecting a kind of financial innovation by concerning the stage of bank life cycle and the level of its financial soundness, that will allow to take well-founded decisions while ensuring the latter. The aim necessitated the solution of the following research tasks:

- to analyze scientific literature on bank cyclical development and to define the main stages of bank life cycle;
- to study the existing approaches to identifying the stage of bank life cycle and determine their advantages and disadvantages;
- to develop an approach to identifying a stage of bank life cycle that would take into account the level of a bank's financial soundness and the stage of its life cycle;

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- to identify a life cycle stage of Ukrainian banks by the practical implementation of the developed approach;
- to develop certain recommendations for implementing financial innovations into banks with the different stages of life cycle.

The rest of the paper is organized as follows: section 1 reviews the literature on cyclical development of banks, paying special attention to the theoretical approaches to identifying the stage of bank life cycle. Section 2 presents the authors' methodological approach to selecting a kind of financial innovation according to the level of a bank's financial soundness and the stage of its life cycle. Section 3 describes the data and variables used for clustering and the empirical results which were odtained. Final section presents the main conclusions.

1. Literature review

Reviewing the scientific literature has shown that despite the fact that the issues of cyclical development in the business economics are elaborated enough, the number of studies considering the same problem in banking sector are limited. Most of scholars study only the theoretical component of this issue, paying significant attention to grounding the quantity, succession and features of phases in a bank's development. In this regard, we can admit that the issue of identifying the current stage of bank life cycle practically has been unheeded by learned society and requires further sound research.

Having adapted scientific attainments in management and cyclical theory to the peculiarities of bank activity, specialists offer to understand under the term "bank life cycle" different number of stages (from 4 to 6). The similarity of the following approaches is the thesis about the succession and correlation of the stages of bank life cycle, each of them is characterized by a unique set of features which, as Thain (1969) states, can be useful for identifying every phase of organization development and elaborating its corporate strategy for the future.

The analysis of the theory of life cycle showed that scholars consider a different number of stages of an organization's life cycle. According to Lippitt (1967), Smith (1985), Anthony (1992), there are three stages: birth, youth and maturity. Quinn (1983), Kazanjian (1988), Hanks (1993) distinguish four phases of bank development: creation, commercialization, growth and maturity. However, the majority of scientists, particularly Gao (2010), Miller (1984), Zhipeng (2009), Dickinson (2011), pay attention to the fact that there are five stages of an organization's life cycle: birth, growth, maturity, revival and decline.

Taking into account the peculiarities of the bank as a financial organization, we can state that its life cycle curve includes the following phases: 1) start-up; 2) growth; 3) maturity; 4) decline; 5) liquidation. It is noteworthy that some scholars distinguish an extra stage "birth" that implies practical realization of a new business idea and a bank's entering the market. In our opinion, this stage is really short and continues up to the moment when a bank gets banking license, so it may be included into the next stage – "start-up".

The stage "growth" implies initial formation of the set of active and passive banking operations, organizing retail-banking branch networks and developing corporate culture. Due to the low level of bank efficiency that was caused by considerable financial expenditures on advertising and promotion, the main target on this stage is maximizing profit. The desynchronization between the terms of receiving and using bank recources causes negative bank cash flow (Duvalova, 2012) and poor financial management that leads to the low level of financial soundness (Chmutova, 2014).

According to Shevtsova and Mandziuk (2007), Duvalova (2012), the stage "growth" is characterized by a bank's positioning on the market and creating its own image; forming its own stable client base; expanding a product range by including unique bank products; growing bank market share aggressively and achieving positive results from bank activity. Nevertheless, bank activity on this stage is still risky, a bank's net cash flow may vary with different intensity because of uncertain future perspectives (Lieonov and Oleksich, 2008) and gradually transforms into a market share (Ivashkovskaya, 2007). Duvalova (2012) states that the major problem on this stage may be a disability of satisfying growing demand on bank products and difficulties in keeping positive cash flow. It is noteworthy that some scholars (Duvalova, 2012; Chmutova, 2014) mention periods of intensive and extensive growth which have different patterns of changes in bank activity during these periods. Thus, the stage of intensive growth is characterized by the quick increase in the number of bank products and services. Despite the substantial quantitative changes, there is a probability for serious threats in the further development of a bank. Qualitative changes happen on the stage of extensive growth; a bank occupies a stable niche in the market and builds a stable client base that is accompanied by the minimization of bank operating risks.

The next stage is "stabilization" (maturity, saturation) that implies gradual decreasing of the expansion rate of a bank market share (Lieonov and Oleksich, 2008); strengthening its competitive edge and developing unique bank products (Shevtsova and Mandziuk, 2007); optimizing the level of its expenditures and achieving the balance between profitability, risk and

liquidity (Duvalova, 2012). However, there is a threat of decreasing bank net cash flow due to the market dynamics and probable fluctuations in clients' demand. To prevent the decline, it is necessary to work out support and stability strategies on this stage (Shevtsova and Mandziuk, 2007). In comparison to other stages, this stage is the longest one.

The last stage in the development of a bank called "decline" (fall, death); its main indicators are drop in the growth rates of major bank indices; a lack or a shortage of bank resources (Shevtsova and Mandziuk, 2007); maximization or minimization of bank expenditures (Duvalova, 2012); the loss of a bank market share and its competitiveness (Chmutova, 2014). That makes sense that net cash flow on this stage is negative as well. To avoid liquidation, that terminates a bank's activity, it's radical to take the following measures: searching for a new business idea or reviewing the existing business strategy (Ivashkovskaya, 2007).

The stage "liquidation" is a final phase in a bank's activity and marks the process of its senescence and death.

Having analyzed modern scientific papers, we should mention that the issues on identifying a bank's place on the life cycle curve are not revealed enough. Thus, the methodology on identifying the stage of bank life cycle is presented in a few papers by foreign and native authors.

In Dickinson's (2011) approach, it is suggested to use the dynamics of organization's cash flow in order to divide its life cycle curve into 8 stages. The author uses the character of an organization's cash flows of different kinds (from operational, financial and investment activity) to determine the phase of its development. Though this approach could be considered as a unique one, the fact that there are some transitional stages with an unsteady cash flow makes the identification of the life cycle stage more complicated. Besides, in case of a bank, dividing a cash flow into three components is not appropriate, because, as a matter of fact, its operational, financial and investment activities are the same things according to its peculiarities.

Lieonov and Oleksich (2008) and Hudz' (2011) hold the same opinion; in their point of view, the cumulative cash flow of a bank ought to be the main criterion for estimating a bank's value on each stage of its life cycle, however, the authors do not take into account the dynamics of a bank's cash flow, they only assess its static condition.

Really interesting from the scientific point of view is a method that is presented in the scientific paper by Vasylieva and Chmutova (2015) and used for determining the phase of a bank's development. In this approach, the scientists offer to determine the stage of a bank's development through referring it to a similar group of banks by criteria of the growth rates of a bank's market share, its total income and staff costs. We can agree with the scholars that these very criteria describe the phase of a bank's development in the best way, because they can help to analyze the dynamics of growing or reducing the scope of a bank's activity and its efficiency. However, this approach can't be used widely, because the authors do not use the criterion of the growth rate of a bank's cash flow that is an indicator of its financial success, condition and future perspectives (Vasylieva et al., 2009).

Having analyzed all the above-mentioned approaches, the authors of this paper suggested to improve the existing method of identifying the stage of bank life cycle through using the combination of criteria (the growth rates of a bank's market share, total income, staff costs and net cash flow) and conducting two-steps clustering which helps to determine those banks which are on the transitional stages and to refer a bank to a similar group (growth, stabilization and decline). The adopted approach is presented in detail in the next section of the paper.

2. Selection of a kind of financial innovation for Ukrainian banks according to the level of their financial soundness and life cycle stage

2.1. Research methodology. The implementation of the developed approach should be done through the following steps:

The preliminary stage implies excluding those banks which are on the stage "birth" and "liquidation" from the sampling. The approach presented in the paper must be preceded by the process of determining the banks which are on the transitional stages. It is a necessary step for providing the accuracy of the results of the analysis, because, in general, the financial information of "new" banks (banks, which have only operated for one year) and those, which are under liquidation or which experience temporary administration, is insufficient or obsolete for the aims of the research.

1. The first stage implies calculating indices which can be used as criteria for further bank clustering through the following steps:

1.1. Calculating the growth rate of a bank's market share, its total income, staff costs and net cash flow.

The method proposed in the paper by Vasylieva et al. (2009) was used for computing bank net cash according to the formula:

$$NCF = NII+NFCI+NTI+NOI+NII+IWA-TOE-RAL, \quad (1)$$

where: *NCF* - net cash flow of a bank; *NII* - net interest income; *NCI* - net fee and commission income; *NTI* -

net trading income; *NOI* - net other income; *NII* - net investment income; *IWA* - income from previously written-off assets; *TOE* - total operating expenses decluding depreciation and amortization; *RAL* - revaluation of assets and liabilities; *ITE* - income tax expense.

The proposed method of calculating bank net cash flow, in our opinion, considers the entire bank incoming and outgoing cash flows for a certain period of time and, thus, is informative enough for aims of the research.

1.2. Standardizing the calculated criteria.

In cluster analysis, grouping elements significantly depends on absolute values of input data. This problem can be solved by means of standardization procedure, which adapts all the converted data to a single range of values by expressing these values through the relation to some value that reflects certain properties of a specific variable. There are different ways of standardization, however, in this paper, it is advisable to do it according to the formula (Urban, 2011):

$$z = \frac{X - \mu}{\sigma}, \quad (2)$$

where X - raw score; μ - population mean; σ - population standard deviation.

1.3. Identifying multicollinearity.

Multicollinearity of input data, which characterizes the degree of linear relationship between the predictors, may be one of the reason for inadequate results of cluster analysis. As a result, the condition of the independence of input data is violated and the opportunity of identifying a unique connection between dependent and independent variables might be lost. Strong multicollinearity can be detected with a help of the matrix of pairwise coefficients, which values in modulus exceeds 0.8 according to Cheddok's scale (Smith, 2009).

2. Two-step bank clustering by the stage of their life cycle is done on **the second stage**. This procedure ought to be stepwise:

2.1. Identifying the banks which are on the transitional stages with the help of the method called Single linkage (k-Nearest Neighbors algorithm).

The essence of this method is that it consolidates elements in homogeneous groups according to the rule that implies adding a single item to an existing cluster only in case there is a relation between this very item and at least one element of the cluster (Kim, 1979). Despite the fact that using this method leads to creating large and oblong clusters, it allows to determine monoclusters (clusters which have only or two elements) which represent outliers and anomalies in a sampling.

2.2. Grouping banks by the stage of their life cycle by the means of Ward's method.

The variation of variables (the sum of the squares of the distances between all the elements (objects) and the average in a cluster) plays a role of a target function in each group. The combination of two clusters which lead to the minimal increase of the target function, i.e., the sum of the squares inside each group, is done at every step.

The main advantage of this method is that it helps to create holistic hyperspherical clusters which have almost equal size and reflect real classification in a much better way (Kim, 1979).

3. The third stage implies validating the results of banks' clustering based on discriminant analysis and building discriminant functions for each stage of bank life cycle.

3.1. Identifying and correcting clustering errors is done through building a classification matrix which reflects the percentage of banks that were classified correctly by each stage and calculating Mahalanobis distances for those elements that were referred to the wrong groups.

Mahalanobis distance is the distance between an element and a multivariate space's centroid (overall mean) that is used for identifying outliers and referring the object to the nearest cluster. It is calculated according to the formula (Kim, 1979):

$$D^2(X|G_k) = (n-g)\sum_{i=1}^{p}\sum_{j=1}^{p} a_{ij}(X_i - X_{ik})(X_j - X_{jk}), \quad (3)$$

where $D^2(X|G_k)$ - the squared distance between the point X and the centroid of the cluster k; n - total number of observations; X_i, X_j - the average of the variables i and j in all clusters; X_{ik}, X_{jk} - the average of the variables i and j in k - cluster; p - the number of variables.

Using Mahalanobis distances for classification allows determining the probability of referring an element to a concrete group. Although obtained values are approximate, they show both the probability that an element appears on the definite distance from the cluster's centre and the direction of its appearance. Taking into account ex post probabilities allows achieving 100% correctness in bank clustering.

3.2. Building discriminant functions for classifying new objects.

The main object of discrimination is to obtain such a linear combination of discriminant variables which would allow separating analyzed samplings in an optimal way. A discriminant function is a

linear combination of variables that maximizes the difference between clusters and minimizes internal variance in them. The basic idea of building a discriminant function is to determine if samplings differ by any variable or their linear combination and, then, use these variables to see if new elements belong to a particular group.

A general form of a discriminant function is presented below (Kim, 1979):

$$h_k = b_{k0} + b_{k1}X_1 + b_{k2}X_2 + ... + b_{kp}X_p, \quad (4)$$

where h_k - the value of a function for a class; k and b_{k1} - coefficients which must be determined. The object refers to a class with the largest value (h_k).

Coefficients for discriminant functions are calculated according to the formula (Kim, 1979):

$$b_{k1} = (n-g)\sum_{j=1}^{p} a_{ij}X_{jk}. \quad (5)$$

where b_{k1} - a coefficient for a variable i in the mathematical expression which corresponds to class k; a_{ij} - an element of the matrix which are inverse to the group matrix of pair wise products W_{23}.

The permanent member is calculated according to the formula:

$$b_{k0} = -0.5\sum_{j=1}^{p} b_{kj}X_{jk} \quad (6)$$

4. Selecting objects that are representatives in each cluster through the center of gravity method should be done at **the fourth stage**.

This procedure will help to understand how one should choose a kind of financial innovation according to the level of a bank's financial soundness and its life cycle. The centre of gravity method helps to choose the elements which reflect the qualities that are inherent in the group of these elements.

Selecting these elements ought to be done through the following steps (Klebanova et al., 2006): 1) building the matrix of input data of each group of the indices; 2) standardizing the indices in the system; 3) calculating matrices of indices values in each group; 4) selecting objects that are representatives in the groups according to the concrete rules depending on the number of elements in groups.

2.2. Data. Banks' financial reports as from 01 January 2015 and 01 January 2016 were used as input data for building the model. Calculations of the growth rates were based on the financial indices of a bank's market share, total income, staff costs and net cash flow. Transitional banks which are on the stage "start-up" (PJSC "Crystal bank" and PJSC "RwS bank") were excluded from the sampling, as they were created not long ago as a result of the liquidation of the insolvent banks. Those banks which were under liquidation and which experienced temporary administration as from 01 January 2016 were excluded as well. Among them were PJSC CB "Financial initiative", PJSC "Rodovid Bank", PJSC CB "Khreshatyk bank" and PJSC "Bank "Unison".

2.3. Empirical results. The developed approach to identifying the stage of bank life cycle was realized in the software environment Statistica 10 in modules Basic Statistics, Cluster analysis and Discriminant analysis.

1. The indices which are criteria for classification where calculated and standardized on the first stage. The existence of multicollinearity between them was checked at this stage as well. The results are presented in Table 1, where GR_MS stands for the market share growth rate; GR_TI stands for the total income growth rate; GR_SC stands for the staff costs growth rate; GR_NCF stands for the net cash flow growth rate.

Table 1. Correlations between the criteria for banks' classification

Variable	Means	Std. Dev.	GR_MS	GR_TI	GR_SC	GR_NCF
GR_ Market_ Share	-0.04	0.91	1	-0.02	0.01	0.04
GR_Total_Income	-0.09	0.21	-0.02	1	0.23	0.28
GR_Staff_Costs	0.02	1.02	0.01	0.23	1	0.0001
GR_Net_Cash_Flow	0.15	0.35	0.04	0.28	0.0001	1

Source: calculated by the authors.

As a conclusion, it should be mentioned that there is no strong correlation between chosen criteria for clustering, thus, these criteria could be considered as informatively valuable. The values of means and standard deviations for all variables demonstrate the considerable variety of values in such indices as a bank's market share and staff costs that was caused by inhomogeneous sampling and the high level of concentration in Ukrainian banking system.

2. The method of single linkage which was applied on the second stage of two-step clustering allowed identifying those banks which are on transitional stages through analyzing the dendrogram (Figure 1).

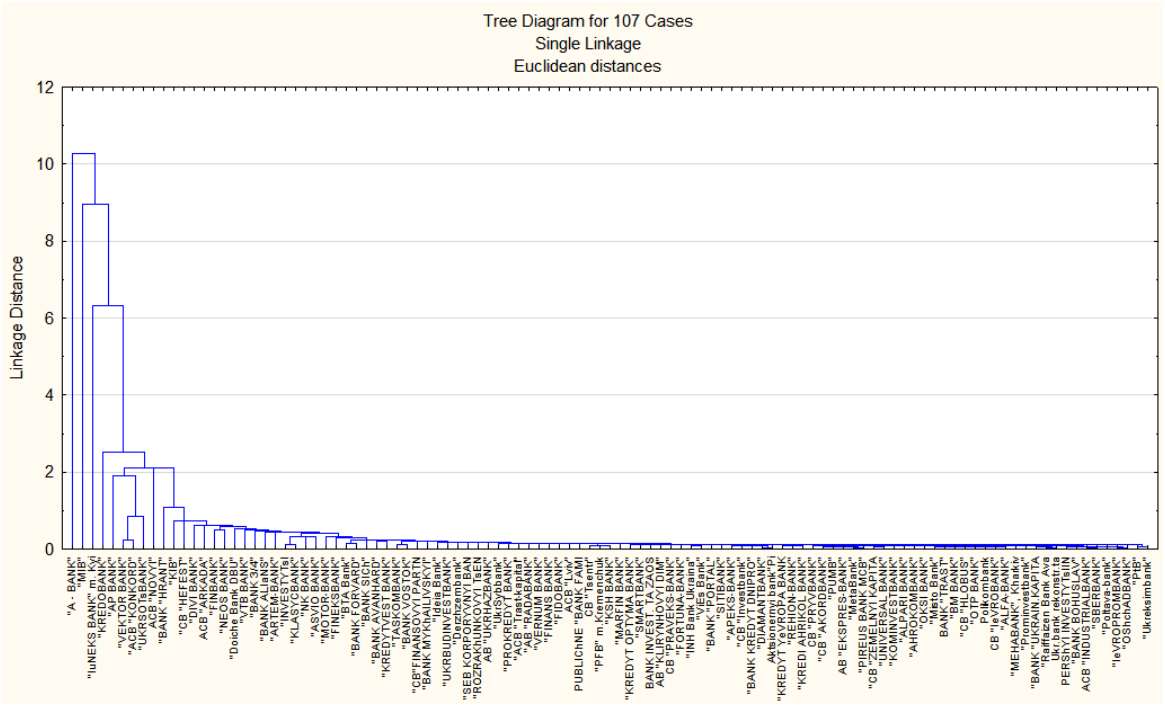


Fig. 1. The results of clustering Ukrainian banks using the Ward's method

Source: elaborated by the authors.

As one can see in Figure 1, there are some monoclusters (groups of banks, which consist of one or two elements, that were added to the main cluster at the final stages of clustering). Excluding such banks as PJSC "A-Bank", PJSC "MIB", PJSC "Kredobank", PJSC "Novy", PJSC "AP Bank" and PJSC "Uneksbank" would allow to increase the quality and accuracy of clustering in further research.

The Ward's method was used to identify the stage of a bank's life cycle, the results of which are presented in Figure 2 in the form of a dendrogram.

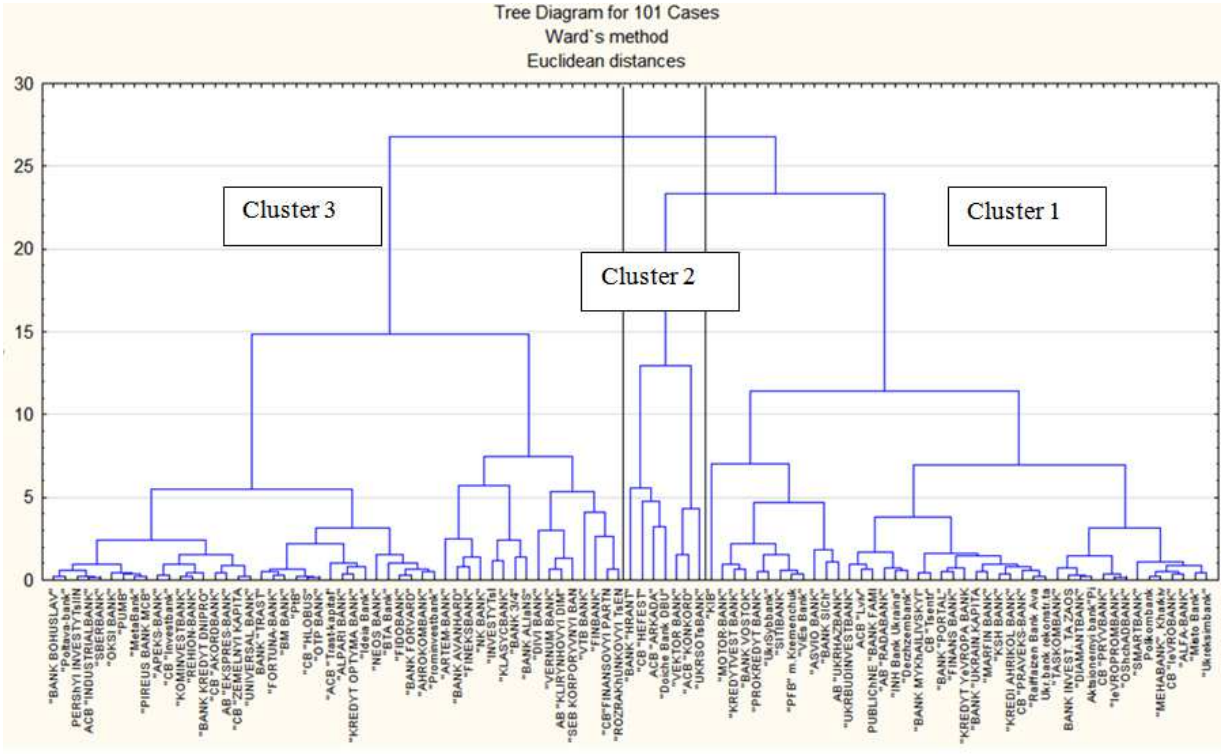


Fig. 2. The results of clustering Ukrainian banks using the Ward's method

Source: elaborated by the authors.

The obtained results give a chance to distinguish three groups of banks (Fig. 2), which differ in the number of elements and the values of the means which are presented in Fig. 3.

The following conclusions should be made:

Cluster 1 involves banks which are on the stage "decline" that can be proved by the negative trend of their financial indices.

Cluster 2 involves banks which are on the stage "growth", as their activity is characterized by the aggressive growth of a bank's market share and huge staff costs which are caused by the development of their branches.

Cluster 3 involves banks which are on the stage "stabilization" that is proved by the stable growth rates of their market share and measured staff policy. The main object of banks at this stage is not getting high profit, but increasing their value. As it was mentioned above, a bank's net cash value at this stage may vary due to the changes in market.

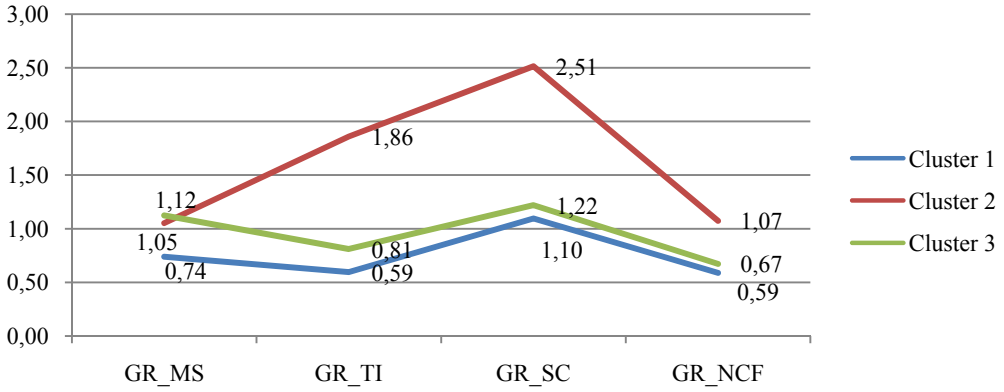


Fig. 3. Cluster means

Source: elaborated by the authors.

3. The validation of the quality of clustering was done with the help of discriminant analysis and the percentage of the banks which were classified incorrectly in each cluster was determined. Those objects which were classified incorrectly were referred to the correct groups by calculating the Mahalanobis distances. The results of primary clustering and clustering after discriminant analysis are presented in Table 2.

Table 2. The results of primary and postprimary clustering

Group	Percent correct	Cluster 1	Cluster 2	Cluster 3
Primary clustering				
Cluster 1	92	46	0	4
Cluster 2	57.14	1	4	2
Cluster 3	84.10	6	1	37
Total	86.14	53	5	43
Postprimary clustering				
Cluster 1	98.15	53	0	1
Cluster 2	100	0	5	0
Cluster 3	90.48	4	0	38
Total	95.05	57	5	39

Source: calculated by the authors.

As one can see from Table 2, the quality of clustering has considerably improved after its validation with the help of discriminant analysis. Thus, the percentage of the banks which were classified correctly in cluster 1 has risen up to 98%, in cluster 2 - up to 100% and in cluster 3 - up to 95%. The total percentage of the banks which were classified correctly is 95%. Thus, it was determined that cluster 1 (decline) involves 54 banks, cluster 2 (growth) has 5 banks and cluster 3 (stabilization) includes 42 banks. Since the biggest group is cluster 1 (decline), it can be mentioned that the level of financial stability of Ukrainian banking system nowadays is very low and requires taking urgent measures for its rehabilitation.

4. Identifying the banks which are representatives in each cluster with the help of the centre of gravity method allowed determining those objects in each group which reflect group peculiarities and are informatively valuable. Thus, it was discovered that the representative in cluster 1 (decline) is PJSC "Meta Bank", in cluster 2 (growth) - PJSC "JSCB Konkord", in cluster 3 (stabilization) - PJSC CB "Centr". According to the scientific paper (Biliaieva, 2015), the above-mentioned representatives have the following level of financial soundness: PJSC "Meta Bank" has got a medium level (0.343), PJSC "JSCB Konkord" has got a high level (0.354), PJSC CB "Centr" has got a medium level (0.350).

According to the obtained results, it is necessary to recommend the particular kinds of financial innovations for each stage of a bank's life cycle and the level of financial soundness that corresponds to it (Fig. 4).

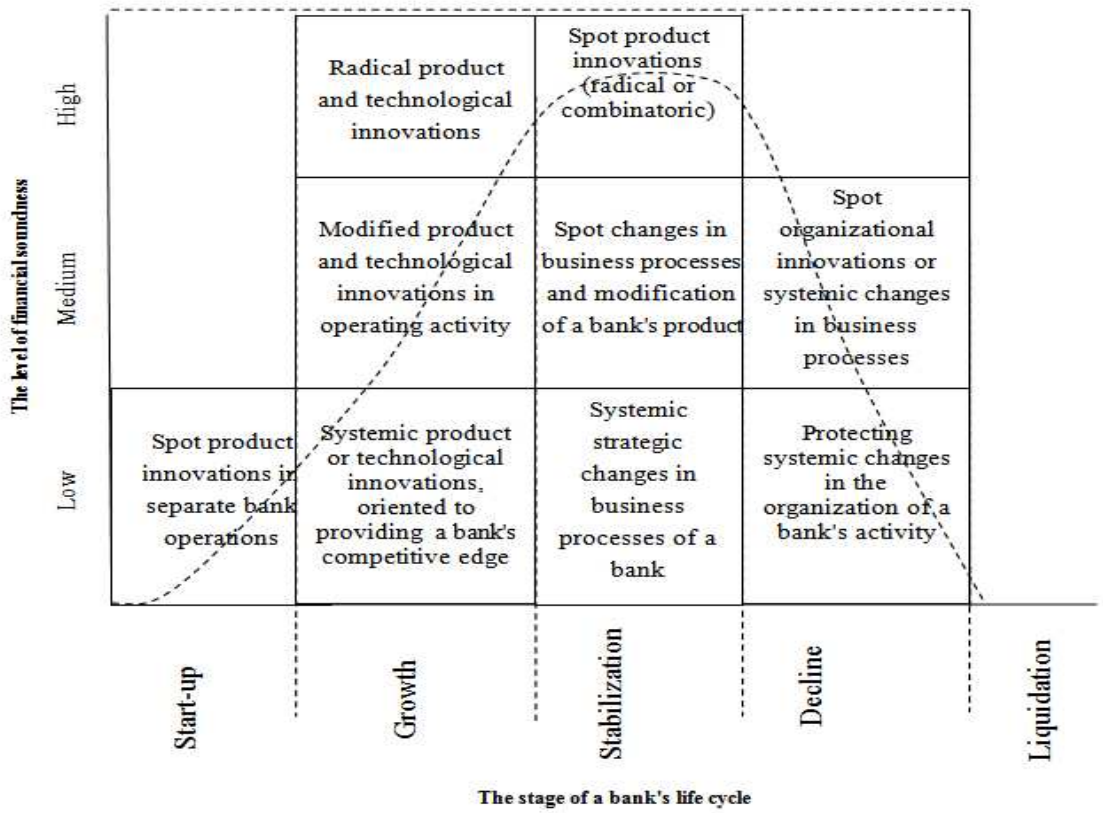


Fig. 4. Types of bank financial innovations depending on the stage of a bank's life cycle and the level of its financial stability

Source: elaborated by the authors.

Therefore, we can recommend to those banks which are at the stage "start-up" to develop particular product innovations and to implement them in separate bank operations. Those banks which are only building up scopes of their activity and are financially unstable should create product or technological innovations to make their competitive edge stronger (Kolodiziev, 2007). If a bank has medium or high level of financial soundness and is on the stage "growth", as, for instance, PJSC "JSCB Konkord", we can advise these banks to construct radical or modified bank products which could attract the attention of new clients and increase their number. Mature banks whose activity and condition are stable should be oriented to stability strategy and realize their innovative potential through implementing spot or systematic changes in their product packages or business processes according to the level of their financial soundness. If a bank starts experiencing deterioration, it should conduct systemic reengineering of existent business processes. Those banks which are on the stage "decline" and have a low level of financial soundness need to make essential organizational changes which are important for renewing their activity and moving to the stage "growth". By the example of PJSC "Meta Bank", it is recommended to those organizations which are on the stage "decline" and have a considerable potential of financial soundness to develop process financial innovations and improve the organizational structure through spot changes.

Conclusions

Basing on the obtained results, the authors drew to the following conclusions:

1. The results of the analysis of scientific literature on the bank cyclical development enable to state that experts, in general, distinguish five stages of bank life cycle (start-up; growth; stabilization; decline; liquidation) that could be characterized by a unique set of characteristics, which could be used for identifying these stages. Thus, the stage "start-up" implies getting banking license and implementing a new business idea; "growth" is characterized by scaling up a bank's operating activity; "stabilization" comes when a bank achieves the balance between profitability, risk and liquidity; "decline" is characterized by the progressive decrease of the main indicators of a bank's activity and sometimes can lead to "liquidation". There is a casual/effect relationship between these stages that can be used for preventing a bank from moving to the nest stage in case it is a "decline" or "liquidity".

2. Studying the existing approaches to identifying the stages of bank life cycle enabled to determine their benefits and limitations and to develop authors' methodic approach to solving this problem. The main feature of the developed approach is using dynamic indices of a bank's efficiency (the growth rates of a bank's market share, total income, staff costs and net cash flow) for indicating the stage of a bank's life

cycle and doing two-step bank's clustering by the stage of their life cycle with the help of the Single Linkage and Ward's methods which allow to group banks with the similar characteristics and determine those ones which are on the transitional stages.

3. The results of practical realization of the developed approach suggest that most of Ukrainian banks (54) are on the stage "decline" especially those which are used to be considered as reliable institutions (PJSC "VTB Bank", PJSC "OTP Bank", PJSC "Sberbank", PJSC "Ukreximbank", etc.) that proves the intensification of bank crises in Ukraine and makes it relevant for these banks to update their strategic polices. 42 banks are financially stable and constitute the potential for improving the current condition of Ukrainian banking system, among them are such giants as PJSC "Privatbank", PJSC "Ukrsibbank", PJSC "Oshadbank". Only 5 banks are on the stage "growth" (PJSC "Gefest", PJSC "KIB", PJSC "Vector Bank", PJSC "Konkord Bank", PJSC "Ukrstozbank"); such a small number is caused by the fierce competition on the market and difficulties in gaining a market share.

4. The authors suggest by the example of banks which are representatives in each cluster to implement certain financial innovations in all the elements of bank clusters according to the level of their financial soundness and the stage of their life cycle. It will facilitate taking more rational decisions while ensuring a bank's financial soundness. Thus, the banks on the stage "growth" should select radical or modified innovations of product or technological kind to gain strong competitive edge; for stable banks, it's recommended to develop spot or systemic financial innovations in bank products or business processes to support their activity on the desirable level, on this stage, it's very important to avoid the beginning of the next stage "decline". On the last phase on the life cycle curve, in our opinion, banks should make spot or systemic organizational changes that will moderate the scheme of a bank's work and encourage minimizing a bank's costs.

The prospective of further research is selecting particular kinds of financial innovation according to the direction of their implementing (product, technological, process) and the kind of bank operations (credit and deposit bank operations) which might be used in the capacity of a tool for ensuring bank financial soundness.

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