THE PROBLEM OF DIGITAL BANK BUSINESS MODEL IDENTIFICATION

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Abstract

The business model concept is becoming increasingly popular with development of digital economy. It is used within many fields of research, including both traditional strategy theory and in the emergent body of literature on e-business. This paper aims to clarify the concept of business models for banks. However, the concept of business models in banking activity is often used for bank business model identification that can be used in future for working out of regulatory measures for different types of banks. The existing researches on the bank business model identification have been analyzed. Dynamic development of information and telecommunication technologies and their applications in banking influence on banking business. Models of digital banking based on new information and telecommunication technologies are becoming the standard performance of banking and other financial institutions in today's market. We see models of electronic banking in particular the Internet and mobile banking taking primacy over traditional banking models that were dominant until the beginning of the twenty-first century. But there is a problem of identification of digital bank business models in countries as there are absent some features that can distinguish digital business model of bank from universal bank business model on the level of banking system research. So, the research of digital bank business model can be worked out only on the level of the bank. On the way of digital bank business model identification, we have to detect countries with formed base for digital banking development. Our research we will spend among 61 countries of Europe and North America. The core of the methodology is a statistical clustering algorithm that allows identifying the groups of countries (clusters) with similar trends of digital bank business model development. The cluster analyses were taken on the base of five chosen indicators: account ownership at a financial institution with a mobile-money-service provider, older adults (% of population ages 25+); automated teller machines (ATMs) (per 100,000 adults); Commercial bank branches (per 100,000 adults); domestic credit to private sector by banks (% of GDP). Recommendations concerning digital bank business model development are given.

Keywords: bank, business model, digital bank business model, banking system.

INTRODUCTION

In the scientific literature last time more attention in the researches was being removed to the term 'business model' that is often used to describe the key components of the business. The business model concept is becoming increasingly popular with development of digital economy. It is used within many fields of research, including both traditional strategy theory and in the emergent body of literature on e-business.

Banks are not the exception, as they follow a new philosophy of banking business that is oriented towards end users, adapting their business to valuable changes that are in the global market. So, banks, accounting new banking business philosophy with new business strategies, start to form new business models based on Internet technologies, distribution systems, mobile computing, that can provide the growth, and development to each bank.

RESEARCH RESULTS AND DISCUSSION

Banks according to their market strategy and balance sheet structure choose to be different from one another. In a competitive pursuit of growth opportunities, banks choose a business model to leverage the strengths of their organization. So, bank business models are not static and evolve over time and under the influence of financial market development. Traditional banking models that have dominated on the banking market more than a century where the bank has been talking central place in the market without taking into account the needs of its client, slowly but surely are losing the battle with new digital banking models. However, there are difficulties in identification of digital bank business models on practice, in the same time modern banks that have started to provide their activity on new business models that are based on electronic banking forget about riskiness of their activity in pursuit of profit. This paper aims to clarify the concept of business models for banks and find way of digital bank business model identification.

The term "business model" is quite new. It was first used by M. Jones in 1960 to reflect the interaction between universities and business, but more attention to business models was paid only after 1995 with the spread of the Internet all over the world in context of identifying the increase reserves of enterprises' profitability through the implementation of Internet technologies in their operating activity to create value for the consumer.

It is important to note that today there is no single accepted definition of the term "business model". Many studies have been conducted to determine the essence of this concept, but there is no single methodological approach to their formation and analysis. The study of the evolution of theoretical approaches to defining the term "business model" have showed that in the period 1998-2001 the term "business model" was associated with the description of the firm activity in order to implement in it the latest technologies that have appeared as a result of the development of the Internet. [9; 11; 2]. Further studies on the substance of this term have been resumed since 2005. There were conducted a number of studies [4; 8] to determine the essence of the term "business model".

We emphasize that these studies have become more in-depth and boil down to the fact that the business model is not a simple description of the firm's activity, but a complete reflection of its activity, which allows to see all opportunities for the development of the firm in order to create possible competitive advantages in a certain market.

The business model Canvas that has been worked out by Osterwalder in 2005 is the most widespread and used [4]. He has suggested to build a business model for any business based on nine blocks that give answer on simple key questions. The traditional bank business model is represented in Table 1.

However, the concept of business models in banking activity is often used for bank business model identification that can be used in future for working out of regulatory measures for different types of banks.

Table 1. The traditional business model of the bank (using Business Model Canvas)

8. Key partners	7. Key Activities	2. Value Propositions	4. Relationships	1. Customer Segments
Investment partners Technology vendors Central Bank Regulatory agencies Credit agency Rating agencies	Department operations Branch operations Bookkeeping Call center operations IT operations	Deposit Products (lower interest rates) Loan Products (higher interest rates) Investment (higher interest rates) Trust management (commission)	Personal assistance Automation (where possible)	Depositors: -*retail customers* -*corporate enterprises* -*financial intermediaries* Borrowers: -*retail customers* -*corporate enterprisers* -*financial intermediaries*
	6. Key resources Physical and IT Infrastructure Loan Assets		**3. Channels** Branches ATMs Call centers Internet Mobile Devices	Issuers of securities
9. Cost Structure Interest expences Channel costs			**5. Revenue Streams** Interest income Fee income	

The existing researches on the bank business model identification have been analyzed (see Table 2).

Table 2. The researches on the bank business model identification

Author	Year	Indicators	Types of bank business model
R. Ferstl, D. Seres Ferst [5]	2012	net interest income; trading income; sncome from fees and commissions; operating income; customer deposits; total loans; total assets	five distinct business models
R. Ayadi W. de Groen [1]	2014	loans to banks (as % of assets); trading assets (as % of assets); bank liabilities (as % of assets); customer deposits (as % of assets); debt liabilities (as % of assets); derivative exposures (as % of assets)	Investment Wholesale Diversified retail Focused retail
R. Roengpitya, N. Tarashev, K. Tsatsaronis [7]	2014	total loans; securities; the size of the trading book; interbank lending; customer deposits; wholesale debt; stable funding; and interbank borrowing	Retail-funded Wholesale funded Trading
V. Rashkovan, D. Pokidin [6]	2016	Assets/Branches; average loan maturity; average loan size variable; equity and subordinated debt; retail loans ratio; retail deposits ratio; loans ratio	Households-to-Corporates, Retail, Universal, Corporate, Investment, Frozen

As we can see the bank business model identification is based on the formation of representation of the main directions of bank operative activity and the bank`s

main clients and can be easily worked out on the base of indicators that are in the bank`s balance sheet.

Dynamic development of information and telecommunication technologies and their applications in banking influence on banking business. Models of digital banking based on new information and telecommunication technologies are becoming the standard performance of banking and other financial institutions in today's market. We see models of electronic banking in particular the Internet and mobile banking taking primacy over traditional banking models that were dominant until the beginning of the twenty-first century.

But there is a problem of identification of digital bank business models in countries as there are absent some features that can distinguish digital business model of bank from universal bank business model on the level of banking system research. So, the research of digital bank business model can be worked out only on the level of the bank.

Recently, there have been distinguished four digital banking models depending on the level of digital technology using in the bank [3]:

– model A is a digital banking brand isolated from a parent classic bank. These digital brands may be marketed as a new bank, but they typically use their parent bank infrastructure when it is possible;

– model B is a bank with digital remote channels. Banks with model B deliver new mobile and online applications to their customers, but they resell the products of the real bank and have to redistribute the clients' funds to the insured accounts of the real bank;

– model C is a digital daughter of a classic bank. It is a synthesis of user experience and new business processes. The banks of this model are created from scratch as a new digital bank;

– model D is a 100 % digital bank. These are high-value banks that are building their core value proposition around digital technologies.

But on our mind such classification can be proved only by quality researches of the banks, but not by quantity analyses that can give real picture of existing digital bank business models.

So, the identification of digital bank business models is a long and complicated process. In our opinion the first step in the digital bank business model identification is the analyses of country preparedness level for digital transformation of banking sector.

On the way of digital bank business model identification, we have to detect countries with formed base for digital banking development. Our research we will spend among 61 countries of Europe and North America.

The core of the methodology is a statistical clustering algorithm that allows identifying the groups of countries (clusters) with similar trends of digital bank banking technology development. The idea is that countries with similar trends of digital banking technology development have similar condition for digital bank business model formation.

Cluster analysis is the task of grouping a set of objects in such a way that objects in the same group (called a cluster) are more similar (in some sense or another) to

each other than to those in other groups (clusters). Cluster analysis itself is not one specific algorithm, but the general task to be solved.

It can be achieved by various algorithms that differ significantly in their notion of what constitutes a cluster and how to efficiently find them. Popular notions of clusters include groups with small distances among the cluster members, dense areas of the data space, intervals or particular statistical distributions.

Among the methods of cluster analysis, the most distribution got the method of k-means clustering. In centroid-based clustering, clusters are represented by a central vector, which may not necessarily be a member of the data set.

When the number of clusters is fixed to k, k-means clustering gives a formal definition as an optimization problem: find the k-cluster centers and assign the objects to the nearest cluster center, such that the squared distances from the cluster are minimized.

Most k-means-type algorithms require the number of clusters - k - to be specified in advance, which is considered to be one of the biggest drawbacks of these algorithms.

The cluster analyses were taken on the base of five chosen indicators, which is formed and saved in the World Bank national accounts data [10]:

– account ownership at a financial institution with a mobile-money-service provider (% of population ages 25+) denotes the percentage of respondents who report having an account at a bank or another type of financial institution or report personally using a mobile money service in the past 12 months. This indicator in our opinion indicates the readiness of the population to use financial technologies (ACC);

– automated teller machines (per 100,000 adults) are computerized telecommunications devices that provide clients of a financial institution with access to financial transactions in a public place. If this indicator tends to decrease, this will indicate an increase in other channels with access to financial transactions (ATM);

– commercial bank branches (per 100,000 adults) are retail locations of resident commercial banks and other resident banks that function as commercial banks that provide financial services to customers and are physically separated from the main office but not organized as legally separated subsidiaries. In condition of information and telecommunication technology development bank branches have tendency to reducing (CBB);

– domestic credit to private sector by banks (% of GDP) refers to financial resources provided to the private sector by other depository corporations (deposit taking corporations except central banks), such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment; for some countries these claims include credit to public enterprises. This indicator characterizes the level of banking system development in the country (DC to PS).

The procedure of objects clustering on the base of k-means method is realized in a calculable application package "STATISTICA" in the module "Cluster analysis". Cluster analysis was carried out on the basis of selected indicators for 51 countries in Europe and North America for three dates: 2011, 2014, and 2017 – with purpose to see dynamics in changing of digital environment in countries.

It is important to highlight that cluster analysis is an inexact science. The assignment of countries to a specific cluster depends crucially on the choice of instruments and procedures, such as the proximity metric, procedures for forming clusters and the stopping rules used.

The clustering analysis identified three groups of countries as the most distinct form of clustering. Table 3 gives the descriptive statistics for the three groups of countries resulting from the cluster analysis based on the four selected indicators.

We have to underline that the fourth indicator (domestic credit to private sector by banks (% of GDP) have been used as an indicator that reflect the level of banking system development.

Table 3. Descriptive statistics for each cluster

Types of cluster		2011				2014				2017			
		ACC*	ATM	CBB	DC to PS	ACC	ATM	CBB	DC to PS	ACC	ATM	CBB	DC to PS
Cluster 1	Mean	85	108	81	158	97	83	33	116	91	41	21	128
	St.dev.	32	41	70	44	3	31	20	45	19	12	16	36
	Var	1040	1695	4950	1963	10,4	965	404	2070	376	147	271	1321
	Quantity	8				17				8			
Cluster 2	Mean	91	95	32	88	92	184	91	104	97	129	54	90
	St.dev.	14,1	36,4	19,0	23,0	13,1	34,9	87,5	32,4	5,8	40,2	46,4	21,6
	Var	199	1323	361	528	172	1221	7657	1047	33	1615	2152	467
	Quantity	20				5				15			
Cluster3	Mean	49	44	22	43	64	62	27	46	72	66	27	41
	St.dev.	26	20	13	18	26	24	20	16	19	23	24	15
	Var	658	379	178	328	656	556	392	268	371	506	554	214
	Quantity	23				29				28			

* ACC – account ownership at a financial institution with a mobile-money-service provider (% of population ages 25+); ATM - automated teller machines (per 100,000 adults); CBB - commercial bank branches (per 100,000 adults); DC to PS - domestic credit to private sector by banks (% of GDP).

As we can see from the table the distribution of countries between clusters are not equal:
– the first cluster includes in 2011 – 8 countries, in 2014 – 17; in 2017 – 8;
– the second cluster includes in 2011 – 20 countries, in 2014 – 5; in 2017 – 15;
– the third cluster includes in 2011 – 23 countries, in 2014 – 29; in 2017 – 28.

So, the third cluster has changed the least in 2011-2017, but between first and second groups there were constant migration of countries in analyzed period. The distribution of countries between clusters is given in table 4. Comparison of clusters and their description is given in table 5.

The analysis of separate indicator – the indicator domestic credit to private sector by banks (% of GDP) – shows:
– the first cluster includes countries with high level of banking system development, in average it varies from 158% in 2011 to 128% in 2017, thus it

indicates a decline in private sector lending, but countries in this cluster are the readiest to implementation of digital technologies in banks;

Table 4. Distribution of countries between clusters

	2011	2014	2017
Cluster 1	Cyprus, Denmark, **Iceland**, **Portugal**, **San Marino**, **Spain**, **Switzerland**, **United Kingdom**	*Austria*, *Croatia*, Cyprus, Denmark, **Finland**, *France*, *Germany*, **Greece**, Iceland, _Ireland_, *Italy*, *Luxembourg*, **Netherlands**, **Norway**, **Spain**, **Sweden**, **Switzerland**	Cyprus, Denmark, Finland, **Greece**, **Netherlands**, **Norway**, **Sweden**, **Uzbekistan**
Cluster 2	*Austria*, *Belgium*, **Bulgaria**, *Croatia*, **Estonia**, **Finland**, *France*, *Germany*, **Greece**, _Ireland_, *Italy*, **Latvia**, *Luxembourg*, **Netherlands**, **Norway**, Russian Federation, **Slovenia**, **Sweden**, Canada, **United States**	Canada, **United Kingdom**, **San Marino**, Russian Federation, **Portugal**	*Austria*, *Belgium*, *Croatia*, *France*, *Germany*, **Iceland**, *Italy*, *Luxembourg*, **Portugal**, Russian Federation, **San Marino**, **Spain**, **Switzerland**, **United Kingdom**, Canada
Cluster 3	Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Czech Republic, Georgia, Hungary, Kazakhstan, Kosovo, Kyrgyz Republic, Lithuania, Moldova, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovak Republic, Tajikistan, Turkey, Ukraine, **Uzbekistan**	Albania, Armenia, Azerbaijan, Belarus, *Belgium*, Bosnia and Herzegovina, **Bulgaria**, Czech Republic, **Estonia**, Georgia, Hungary, Kazakhstan, Kosovo, Kyrgyz Republic, **Latvia**, Lithuania, Moldova, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovak Republic, **Slovenia**, Tajikistan, Turkey, Ukraine, **Uzbekistan**, **United States**	Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Czech Republic, **Estonia**, Georgia, Hungary, _Ireland_, Kazakhstan, Kosovo, Kyrgyz Republic, **Latvia**, Lithuania, Moldova, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovak Republic, **Slovenia**, Tajikistan, Turkey, Ukraine, **United States**

* **Iceland –** country change cluster one time; *Austria –* country change cluster two times; _Ireland_ – country change cluster three times
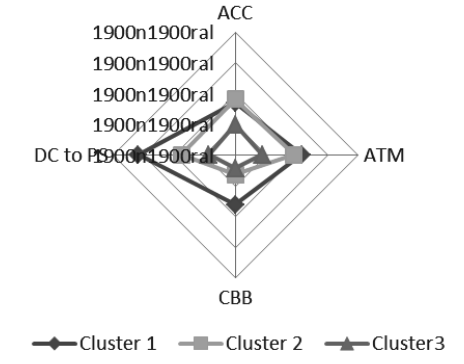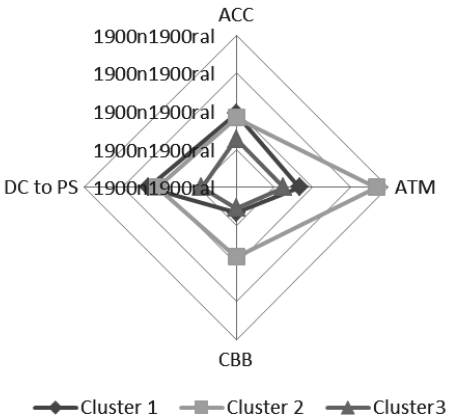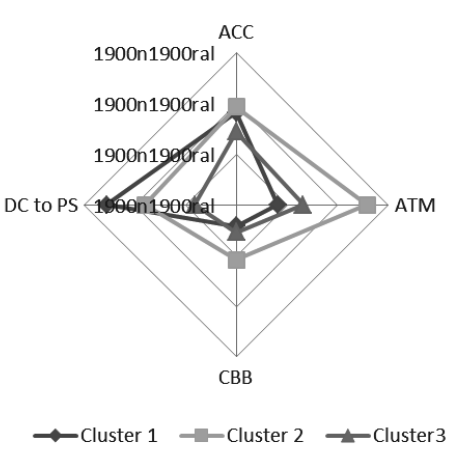
– the second cluster includes countries with average level of banking system development, it varies from 88% in 2011 to 90% in 2017, this trend is positive and indicates strengthening the role of banks in the financial market;

– the third cluster includes countries with low level of banking system development, but there can be two reasons: firstly, it is countries with developed stock market, secondly, it is developing countries, banking systems of which are only start their existing and are younger than 30 years.

Conducted analysis shows groups of countries where financial technologies are used by banks. In our opinion it is first step on the digital bank business model identification for their further regulation.

Therefore, the digital bank business model identification needs to work out the criteria inside the country, the necessary condition is availability of these indicators in the open access.

Table 5. Comparison of clusters and their description

Year	Characteristic of period	Comparison of clusters
2011	The difference between clusters is obvious. The more country developed, the higher are the indicators: there are more commercial bank branches, more automated teller machines and more mobile accounts. In most countries, banking systems are just starting to develop; therefore the analyzed indicators are relatively low.	
2014	The situation is changing: -countries in the first cluster start to reduce bank branches and ATMs, but mobile account are on the same level and even increase. This is evidence of financial technology implementation in banking activity. -countries in the second cluster continue to develop their banking systems by increasing the number of bank branches and ATMs. It gives some results as mobile accounts increase.	
2017	We can see that countries both of the first and the second cluster have approximately equal quantity of mobile accounts, but usage of the digital technologies gives advantages to the first one as the level of banking system development is higher. At the same time the countries of the third cluster start to increase mobile accounts without increasing the quantity of bank branches and ATMs and start to provide financial technologies in the banking sector.	

CONCLUSION

As a conclusion we have to underline that the evolution of information technologies during the last decade has significantly altered the business landscape on a worldwide scale. The integration of information technologies in the business processes resulted in numerous examples of enhanced organizational performance both in developed and developing countries. It is fact that the growth in access to ICTs is boosting economic productivity and banks that use information technologies grow faster, invest more, and are more productive and profitable than those that do not. The positive effects of Information technology integration brought up the issue of business model change for banks that wanted to stay ahead of the competition. But we have to underline the transition to a new business model can only be achieved, if there is a sound understanding of the current business model. However, creating and implementation of new business model is a high-risk strategy, as the probability of getting it right is acknowledged to be low. As technology evolves and new solutions emerge in the business practices, the necessity of business model change becomes greater and banks are faced with the dilemma of change versus their traditional business architecture.

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