

## RESEARCH ARTICLE

### THE EFFECT OF DIGITALIZATION ON BRANCH NETWORKS AND EFFICIENCY IN TURKISH BANKING

\***Mehmet Yazici and Erkut Baloğlu**

Inovasyon and Müşteri Deneyimi Direktörü, Yapı Kredi A.Ş., İstanbul, Türkiye

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#### ABSTRACT

In this article the relation between the digitalization of banking business model and customer behaviour is investigated giving special emphasize on the emergence of mobile branches. In this context a regression model is utilized to analyze the relation between the transactions in different channels, efficiency and branch network in Turkish Banking between 2005 and 2017. Two estimations on the possible size of the branch network is made assuming that internet penetration in Turkey will reach European Union or North Europe averages in future.

#### Keywords:

Digitalization  
Turkish banking

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## INTRODUCTION

Customer behaviour has been changing drastically with the new trends and technologies. The biggest impact came from the mobile phones which make internet banking available at any place and time. Mobile, especially the emergence of the next-generation mobile devices with broadband networks, caused a huge transformation on customer's habits and preferences (Gigov and Popska, 2017). Today, customers require more personalised banking services and require login to all services 24\*7 at any place. As an answer to customer expectations banking became available 24\*7 and mobile than ever. Customers are using self service channels for simple transactions like depositing and withdrawing money, their branch visits and human to human interaction is getting less frequent (Gigov and Popska, 2017). Human to application interface is now the backbone of banking services. The experience and brand perception in self service channels are effected by security, assurance, responsiveness, easiness, cost effectiveness (Kumbhar, 2011). These facts are affecting the operating models of the banks especially on the distribution channels and cash cycles. Cash usage is becoming less and thus teller activities (i.e. on November 8, 2016 the government of India ceased the usage of 500 and 1,000 banknotes of Mahatma Gandhi Series. This act targets to help remove black money from the system. The government is strongly supporting a cashless transaction society via using e banking systems (Joshi and Parihar, 2017).

On the otherhand, even though contemporary business in each sector struggling with digitalization phenomenon, yet we do not agreed on a certain definition of digitalization. So, what is digitalization at first?

According to Merriam-Webster digitalization is the process of converting something to digital form. But this definition is not sufficient because it is only defining digitization of something. Rather than that we prefer to define it as a transformation of doing business by using modern technologies. So, if we turn into a physical document into a pdf document on a computer is a digitization but if we transform our business from manpower to computerized processes is digitalization.

## METHODS AND METHEDS

The research process in this paper consists of three phases: data analysis, model construction and estimations about future. In the first step, we acquired data from Turkish Banking Association of Turkey and Banking Regulatory Services online platforms. In the second step relation between branch network and customer channel preferences is investigated by using per channel transaction statistics. In the third step estimations of possible Branch Network sizes are made assuming that Turkish internet penetration goes up to European Union levels. During the study, methodologies based on regression are used assuming that Banks are continuously reviewing Branch efficiency and there is no excess/under capacity in Branches. In other words Branch employment levels are assumed to fit exactly meeting the transaction demand from customers. By this way the changes in Branch numbers or employment

\***Corresponding author: Mehmet Yazici**

Inovasyon and Müşteri Deneyimi Direktörü, Yapı Kredi A.Ş., İstanbul, Türkiye

dependent on the digitalization of the business model, which means;

- The digitalization of the branch processes
  - i. reducing paper,
  - ii. reducing signatures, utilizing digital approval mechanisms
  - iii. gathering data from trusted sources to decrease data entry
- the migration of the transactions to digital channels.
- more utilization of cashless payment systems

### Bank Branch Performance Measurement

*Banks measure the efficiency* of all their branches periodically. The traditional methods of measurement are;

To define simple operational performance indicators like;

- transactions per teller,
- customer served per teller,
- number of sales per relationship manager,
- number of customer visits per relationship manager

To define financial ratios representing efficiency like;

- deposits to loans
- return on assets
- cost to income
- deposit volume per employee
- credit volume per employee
- fee&commission per employee
- fee&commission to cost ratio.
- To measure transaction times and calculate utilization
- Use comparative methods like Data Envelopment Analysis to distinguish best performers from the others. (Camanho& Dyson, 1999).

As a complementary to efficiency measures, regression models are utilized to predict performance based on a selection of independent efficiency measures (i.e. some of the performance indicators that are showing management's targets. With regression analysis the relation between efficiency indicators and other factors such as customer preference, demographics, location can be investigated. AsIoannou, Karakerezi and Mavriated in 2002 regression analysis;

- indicates the causes or remedies for the identified low-performing branches.
- provides the explanatory power of variables
- can be used for estimating the future actions

Since branches have a key position in the bank's organization, they consume a big portion of the resources reserved for distribution. As stated by Chelst, Schultz and Sanghvi in 1988 the common strategy on Bank Branch Networks are to develop flexible structured branches that are tailored to specific customer needs or to target micro markets with special design branches. Regardless of the strategy Bank Managements always keep an eye on the size of the branch network and the branch operating model effectiveness by mobilizing performance measurement teams. Bank Branch performance measurement teams believed that they were playing a balance game, actions taken to improve efficiency (i.e. merging two roles to improve utilization of the workload) has the potential

to deteriorate customer experience (as roles are merged and variety of the tasks done increase service level may decrease). Likewise an action to reduce operational risk (control of the data entered to the system with the original document) usually deteriorates efficiency. With the emergence of digital business model the rules of the game changed drastically. Digital business model is self service so it is extremely efficient, if a Bank focuses on customer experience and achieves to develop an application with good user experience, Efficiency and customer experience can be obtained at the same time without deteriorating each other. Similarly if a bank can obtain and maintain a secure login mechanism preventing cybersecurity attacks, operational risk is also out of question. With digital business models cybersecurity is gaining importance while operational risk is losing power. The Turkish Banking System went through changes between 2002-2018. These changes are driven by the recent developments in technology as well as the global crisis which started in 2008. There are studies (Yenice& Hazar, 2014) that are investigating these changes from financial perspective, while in this study the main focus will be the operating models of the banks.

### Model

*In this study we'll be utilizing regression analysis to figure out the relation between the channel preferences of banking customers and the banking branch networks. The details of the model are as follows;*

### The mathematical structure:

$$Y_t = C + \beta_1.X_{1t} + \beta_2.X_{2t} + \dots + \beta_n.X_{nt}$$

*Two models will be investigated. The difference between the two models will be the dependent variable;*

### Variables

#### Dependent Variable:

- *Turkish Banking Total Employee*

#### Independent Variables:

- *Turkish Banking Total Actives*
- *Turkish Banking Total Service Fee& Commissions*
- *Turkish Banking Profit*
- *GDP*
- *Turkish Banking Total Branch Number*
- *Turkish Banking Calls Received by Call Centers*
- *Turkish Banking Total Active Digital Customers*
- *Turkish Banking Total Digital Non Financial Transactions (mainly monitoring & administrative)*
- *Turkish Banking Total Digital Other Transactions (mainly sales)*
- *Turkish Banking Total Digital Credit Transactions*
- *Turkish Banking Total Digital Payments*
- *Turkish Banking Total Digital Money Transfers*
- *Turkish Banking Total Digital Investment Transactions*

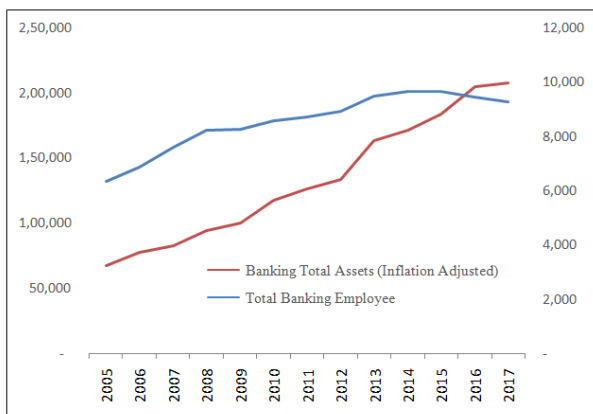
**Data Set:** Transaction figures are the quarterly data consolidated by Turkish Banking Association of Turkey from 46 banks operating in Turkey. The balance sheet figures are

taken from the online platform Banking Regulatory Services online platforms.

**Expectations:** One of the expectations is that the number of employees tend to increase as banking sector in Turkey develops. In this study the inflation adjusted total banking assets as taken as an indicator of Banking Sector growth. As can be seen from “Graph 1: Comparison of Inflation Adjusted Banking Total Assets with Total Banking Employees”, the increase in banking assets is much more than banking employees. The inflation adjusted asset growth between 2017 and 2005 is 10% annually whereas the growth in total number of employees in Turkish Banking is 3%.

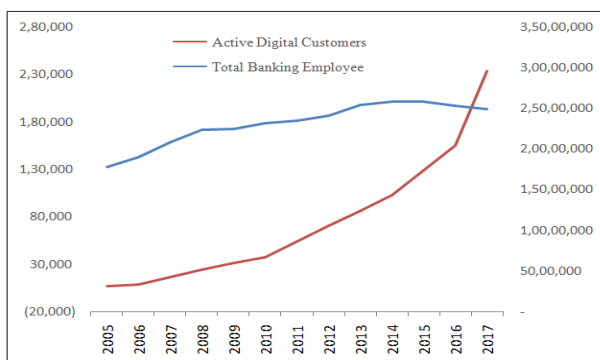
Actually there are two different periods to consider:

- **2005-2008:** The inflation adjusted asset growth is 10% annually while growth in total number of employees is 7%. The trend seems to related.
- **2009-2017:** The inflation adjusted asset growth is 10% annually while growth in total number of employees is 1%. Especially starting from 2012 the relation between Banking Sector Growth and employment level seems to be broken.
- It seems that the increase in business volumes in Turkish Banking Sector is not a major factor effecting employment level any more.



**Graph 1. Comparison of Inflation Adjusted Banking Total Assets with Total Banking Employee**

Digitalization may be another factor effecting employment levels negatively. As can be seen from “Graph 2: Comparison of Active Digital Customers and Total Banking Employee” Number of active digital customers in Turkish Banking is increasing exponentially, this fact seems to be hampering employment in Banking Sector.



**Graph 2. Comparison of Active Digital Customers and Total Banking Employee**

Two main factors, to give special attention during our regression analysis, are expected to be asset growth and active digital customers. After a series of trials, that backward methodology is utilized, adding dummy variable to distinguish 2008 crisis and test runs. The regression result table came out to be the following:

**Table 1. Regression Results 2006Q2-2017Q4**

Dependent Variable: LICALISAN				
Method: Least Squares				
Date: 05/04/18 Time: 19:22				
Sample (adjusted): 2006Q2 2017Q4				
Included observations: 47 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.500293	0.336261	4.461686	0.0001
LICALISAN(-1)	1.239640	0.125475	9.879603	0.0000
LICALISAN(-2)	-0.397490	0.112450	-3.534816	0.0011
LTDIJAKTIFMUST(-2)	0.053965	0.013419	4.021427	0.0003
LTDIJNONFIN(-1)	-0.008478	0.004093	-2.071545	0.0450
LTDIJDIG	-0.012515	0.004040	-3.097531	0.0036
LTDIJYAT(-2)	-0.024709	0.009118	-2.709849	0.0100
DUMMY	-0.003960	0.002245	-1.764386	0.0855
R-squared	0.997697	Mean dependent var	12.10072	
Adjusted R-squared	0.997283	S.D. dependent var	0.106438	
S.E. of regression	0.005548	Akaike info criterion	-7.397032	
Sum squared resid	0.001200	Schwarz criterion	-7.082113	
Log likelihood	181.8303	Hannan-Quinn criter.	-7.278526	
F-statistic	2413.382	Durbin-Watson stat	2.079896	
Prob(F-statistic)	0.000000			

### Suggested Model:

$$\begin{aligned} \text{Log}(\text{total number of employees})_t &= 1,5003 \\ &+ 1,2396\text{Log}(\text{total number of employees})_{t-1} \\ &- 0,3975\text{Log}(\text{total number of employees})_{t-2} \\ &+ 0,0540\text{Log}(\text{digital active customers})_{t-2} \\ &- 0,0085\text{Log}(\text{digital Non Financial Transactions})_{t-1} \\ &- 0,0130\text{Log}(\text{digital Other Transactions - sales})_{t-1} \\ &- 0,0250\text{Log}(\text{digital Investment Transactions})_{t-2} \\ &- 0,0040 \text{ Dummy (to distinguish crisis period from 2008 Q4 to 2014 Q2)} \end{aligned}$$

### Conclusion

Nearly all independent variables are affecting total number of employees in Banking with a one or 2 quarter lag. This is a representation of lagged capacity decision making in Banking. As the Banks are making capacity calculations quarterly or semi-annually the hiring/release decisions are taken with a lag as well. The employment in Turkish Banking Sector seem to be positively affected from active digital customers, which is not surprising since some of the increase in digital customers are also coming from customers that are new to bank and increase in digital customers is also an indicator for increase in total customers. After a customer is digitalized then he/she starts executing self servicetransactions in digital channels. Among these transactions 3 types come out to be affecting total banking employment in a negative way.

- Investment Transactions: like stock Exchange and fund transactions
- Non-Financial Transactions: monitoring of statements, balances and accounts
- Other Transactions: product applications and administrative transactions like changing definitions

Surprisingly self-service digital payments (i.e. credit card, utility) and money transfers doesn't come out to be significantly affecting total employment in Turkish Banking. This phenomenon may be due to short transaction times of these transactions or due to high level of automation in Core Banking Systems. This issue may be investigated with further research. Another area of interest for further studies may be the digitalization dynamics of individual customers and their effects on capacity planning of the Banks. Acquiring a digital customer at first tend to increase the employment but as customers start using self service channels it seems to decrease employment. This issue should be investigated figuring out the digitalization process (behaviour and channel preference changes) of the customers putting branch visits and branch usage into the equation as well.

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