

THE STATE OF ART IN ROMANIAN MOBILE-BANKING ACHIEVED BY WEB CONTENT MINING

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Abstract: *The paper presents a new perspective upon modern banking distribution channels. It offers an approach based on web content mining and documents analysis aimed to discover the state of art of mobile-banking in the Romanian banking industry.*

Key words: *mobile-banking, financial services, Romanian banks' IT strategy, web content mining*

1. INTRODUCTION

This paper aims to analyze the degree in which IT investments in Romanian banks are focused on new technologies. In order to illustrate this, let us consider the case of mobile banking, a challenging field from the technological point of view. It is an interesting subject to analyze how banks manage to keep pace with technological innovation, how they collaborate with IT suppliers and manage to embed their financial services in various communication devices.

2. PROBLEM STATEMENT

The communications industry registered a rapid diversification of services. While the first SMS service dates back from 1992, WAP protocol arose in 1997, 3G technologies were introduced in 2001, the first smartphone with full PDA capabilities got launched in 2002, the MMS history began in 2004, the iPhone entered the market in 2007 and the recently launched iPad provides laptop-like capabilities from January 2010. Given this dynamics in the offer of mobile services and an increasing demand for ubiquitous services, banks world-wide design their distribution channels strategy accordingly.

This article considers this problem from the Romanian perspective, but the research methodology can be applied to other countries as well for further analysis. Therefore, this paper aims to answer the following question: What are the Romanian banks' IT strategy and their approach to new technologies in the field of m-banking?

3. LITERATURE REVIEW

The literature predicted a decrease in the use of paper-based payments and their replacement with mobile and internet-banking services, according to (Jyrkonen & Paunonen, 2003). Still, further articles showed that the organizational issues and the lack of confidence coming from the customers' side formed serious bottlenecks in their adoption (Farhat et al, 2006). A large part of the literature read so far focused on understanding the acceptance factors for financial mobile services and the paradigm of branchless banking (Cheney, 2008; Mas, 2009).

Regarding the technological limitations that affect m-banking, Barnes(2003) identifies : power consumption, data input constraints, small screens of devices, low communication bandwidth. According to the same author, the use of m-banking is considered "more complex and less satisfactory" than online banking and is likely to bring smaller relative advantages in

countries saturated with multiple banking channels (online banking, telephone banking, etc). Instead, in developing countries with a higher mobile phone penetration rate compared to the computer penetration rate, m-banking can become a strategic delivery channel.

4. RESEARCH COURSE

In order to assess the state of art in the Romanian banking system regarding the offer of mobile banking services, the following steps have been employed.

Step 1. Identify the complete set of banks, both local and foreign representatives that run their business in the analyzed country. Let us note the set:

$B = \{b_j \mid b_j \text{ bank running its business in Romania, } j=1, \dots, n, n \in \mathbb{N}\}$

Step 2. For each element $b_j \in B$, enter its website and fill in the search area the keywords "mobile banking". This approach is pertinent as most of the technical terms are preserved in English (e.g. online banking, home banking, mobile banking) and are not translated in Romanian. If this search gives no results, then a translation could be tried as well, in this case, in Romanian, "bancare mobile".

Let us consider the set of results of the search query $R_j = \{r_{ji} \mid r_{ji} \text{ result about mobile-banking on } b_j \text{ bank's webpage}\}$ where $b_j \in B, j=1..|B|, i \in \mathbb{N}$. All documents (press releases, user guides, annual reports, etc) obtained in set R_j are saved and stored in separate files, i.e. a file for each $r_{ji} \in R_j$.

Step 3. Carry out a qualitative analysis on the set of documents obtained in Step 2. The documents are coded using the following categories of codes: Suppliers; Services; Target clients; Technical specifications. Under each of these categories, the codes are organized so that similarities and synonyms fall under the same code. The codes are highlighted for: words (in the case of supplier and clients) or small groups of words (expressing a technical specification or a service available). In the analysis, the codes represented in figure 1 were used.

Step 4. The coded documents represent the basis for quantitative analysis. First, let us consider the coding by variable analysis, which allows us to understand the degree in which various codes are spread over the variables. In this case, the variables are banks. This analysis is suggestive over two main directions:

- codes from the "tech specs" category distributed over the banks variable, will provide us with information regarding the degree (row percentages) in which various technologies are employed by Romanian banks in their mobile-banking strategy
- codes from the "service" category distributed over each of the bank variables (column percentages) allows an estimate of the weight of each service in the set of mobile-banking services provided by each bank.



Fig.1. Codes used in the qualitative documents analysis

Secondly, the coding co-occurrence is employed in order to cluster together codes based on Jaccard similarity index. Given two codes $c1$ and $c2$, the Jaccard index is computed as follows:

$$\text{Jaccard}(c1,c2) = \frac{N1}{(N1+N2+N3)} \quad (1)$$

where: $N1$ = number of documents with $c1$ and $c2$, $N2$ = number of documents with only $c1$, $N3$ = number of documents with only $c2$. It is important to underline that the bigger value the Jaccard distance, the closer are the two codes $c1$ and $c2$. This co-occurrence analysis provides us with an aggregate image, linking together codes from the four categories considered. Thus, it underlines how suppliers, clients, banking services and technical specifications of the services are inter-correlated in the mobile-banking strategy of Romanian banks.

5. RESULTS

The research is carried out on a total of 33 Romanian banks, out of which 11 offer financial services by means of mobile technologies. Applying the step 2 results in a set of 23 different documents, that represents the input to step 3 of the methodology. The documents are coded based on the categories of codes illustrated in figure 1. Then, the quantitative analysis is carried out and it offers an interesting view upon the state of art of mobile banking in Romania at the beginning of 2010. Thus, a limitation of this research is that the analysis is based on the information provided by the banks on their Romanian website in the period April-May 2010, and therefore it does not reflect an evolution over time. In figure 2 we can discover how various technology specifications come exploited by banks in their mobile banking strategy. While SMS is by far the leader among these technologies, some banks prefer providing their own applications that require a specialized SIM card. Also, it can be observed that WAP and 3G technologies are little represented, mostly because of the cost of the telephones and subscriptions supporting them, which might lower their acceptance rate.

From the point of view of the financial services provided by means of mobile phones, the analysis underlined that some services, such as balance, account statement, alerts over the transactions at ATM/POS, payment of bills, promotions about the bank's products and information about the bank's units disposal are common to all the analyzed banks. Still, there are some services that are little represented in the Romanian banking environment, and among these we can note the contactless payments, the payments at merchant and the possibility of making deposits via a mobile application. Also, the integration with the Internet-banking service is rare, generally the mobile banking distribution channel being a completely separate module in the Romanian banks' IT infrastructure. Using tuples (nodeID, element1, element2, similarity), where element1, element2 represent codes or node IDs and similarity represents Jaccard index computed for the two elements, and a number of five clusters, we obtain the following results in the dendrogram.

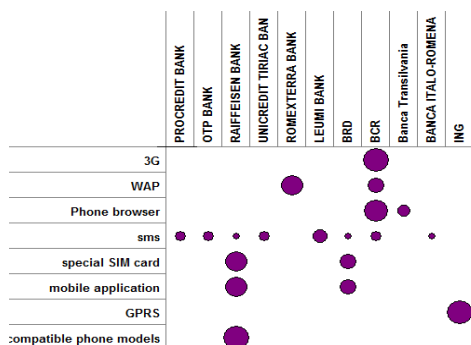


Fig.2. Technologies employed by banks in mobile-banking

The dendrogram contains: CLUSTER1: {(1, 3G, cosmote, 1.0), (2, node1, retail, 1), (3, node2, smarttel, 0.5), (4, phone browser, node3, 0.458), (5, node4, corporate, 0.433), (6, node5, block card, 0.417)}; CLUSTER2: {(7, interest rates, WAP, 0.750), (8, node7, Zapp, 0.583), (9, node8, transfer and exchange, 0.5), (10, node9, make deposits, 0.350), (11, node10, interoperates with Internet banking, 0.283)}; CLUSTER3: {(12, account statement, balance of card, 0.786), (13, node12, transactions ATM/POS, 0.591), (14, node13, SMS, 0.395), (15, exchange rate, Vodafone, 0.625), (16, node15, promotions, 0.479), (17, node16, Orange, 0.427), (18, operate transactions, pay phone bill, 0.556), (19, pay bills, units disposal, 0.0.556), (20, node18, node19, 0.472), (21, node20, node17, 0.322)}; CLUSTER4: {(22, mobile application, special SIM card, 1.000), (23, node22, compatible phone models, 0.250)}; CLUSTER5: {(25, GPRS, pay at merchant, 1), (26, node25, contactless payments, 0.5)}. Therefore we can conclude that the Romanian m-banking sector is driven by the telecommunication suppliers' offer of services. Therefore the five clusters generally group together combinations of suppliers, mobile technologies and financial services, as fragments that merged together cover the state of art in the Romanian m-banking.

6. FURTHER RESEARCH

In the near future the research will be extended with comparative studies between the Romanian banking system and other banking environments in order to gain a better insight of the trend of investments in modern banking distribution channels and to highlight the best practices in this field.

7. CONCLUSION

In Romania m-banking emerged as a new banking channel in 2000s and nowadays, in 2010, its underlying services are mainly adapted to those technologies available to a large mass of clients: most of the banks rely on SMS-based m-banking.

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