AN OPINION MINING AND SENTIMENT ANALYSIS APPROACH FOR EVALUATING CUSTOMER SATISFACTION IN A DIGITAL BANKING ENVIRONMENT

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ABSTRACT: In the highly competitive digital environment, building more unique relationships with customers is vital for banking institutions. The emergence of new technologies has caused customers to reset their digital banking expectations now they have experienced personalized digital relationships in other aspects of their life. Keeping pace with digital customers is a big challenge. When building relationships with customers, satisfaction represents the foundation. Therefore, banking institutions must offer to their customers a variety of digital services and products aligned with their needs. This entails understanding customers - their perceptions, influences and motivations and how they interact with every digital banking service or product. The objective of this paper is to present an approach based on opinion mining and sentiment analysis methods on evaluating customer's behavior in a digital banking environment.

KEYWORDS: Digital banking, customer satisfaction, consumer behavior, building relationships with digital customers, digital banking strategies

Introduction

The emergence of new technologies banking institutions has a major impact on customer expectations from a digital banking environment. The digital trend is changing the way consumers research, shop and buy products and services and how they share their experiences after purchase. Therefore, keeping pace with digital customers is a big challenge. The satisfaction of customers is the foundation of building strong relationships with digital customers. In this setting, the banking institutions must understand customers - their perceptions, influences and motivations and how they interact with every digital banking service or product. The overall objective of this research paper is to illustrate the role of opinion mining and sentiment analysis on analyzing customer's behavior in a digital banking environment.

Opinion mining (OM) is a computational technique to extract, classify, understand and assess the opinions expressed in various online news sources, social media comments, and other user-generated content. Sentiment analysis (SA) is often used in opinion mining to identify sentiment, affect, subjectivity, and other emotional states in online texts (Chen, H., Zimbra, D., 2010, pp. 74-80). OM and SA can help banking institutions to redefine the way they approach not only the design and development of the user experience, but also their digital banking strategies and initiatives. The role of OM and SA techniques has a major impact on digitalization of banking institutions by on understanding consumers and providing digital offerings and services tailored to them, improving their existing services and products, and then delivering compelling reasons for them to use the products and services.

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Literature review

Nowadays, new competitors from various industries and financial technology startups are creating more and more innovative products and services deviations from the traditional banking model. Also, customers are expecting from their banking institutions to bring new features, including anytime and anywhere banking, and ultra-fast response times. Digital is an irresistible trend which requires fundamental changes in the banking environment. Digital banking signifies completely new propositions: not only new products and services but also the possibility of a more digitally enabled cost savings through the digitization process.

For a decade now, Accenture Global Consumer Pulse Research company performed a study entitled *Accenture Banking Consumer Pulse* regarding actions and intentions of banking customers around the world. (www.accenture.com) The study shows that due to the digital impact most banking strategies for customers need to change accordingly. For instance, the research shows that banking customers between 18 and 34 years, those who are interacting easily with digital technologies, are two to three times more likely than customers older than 55 to want more interactions in a digital way. Also, the study shows that the older group is open to adding other digital channels to their portfolio in order to experiment with online interactions. The results from this study support that the number of overall interactions have increased significantly through digital channels. Comparing to the last year, in 2016 almost 58% of bank customers are using often mobile devices when perform operations with their bank. Accenture's research report argues that "*out of the average 17 interactions per month made by a customer with its main bank, seven are through on-line banking and three are through mobile/tablet.*" (www.accenture.com) The Figure 1 illustrates the interactions by channels - the average of total monthly interactions is 21, display an even higher propensity to use digital channels.
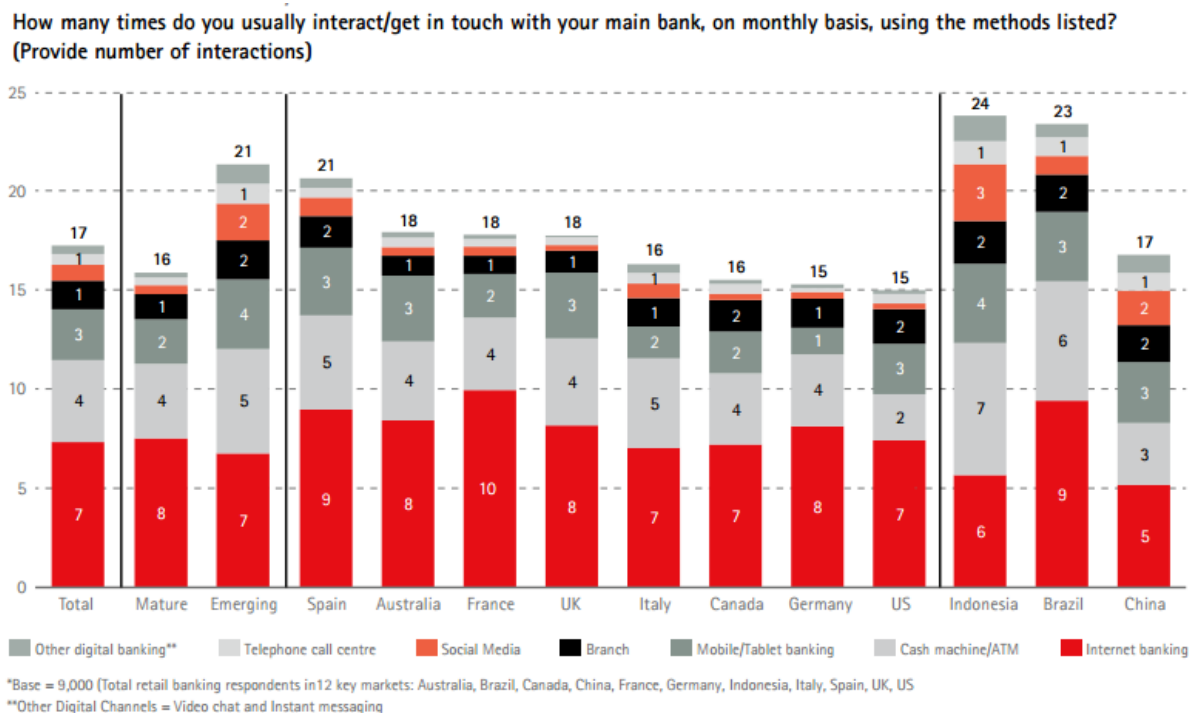

Figure 1. Interactions by channels
Source: www.accenture.com

Another research study with focus on digital banking customer strategies was developed by A.T. Kearney (www.atkearney.com). They defined two worlds for customer experience: outside and inside worlds. According to the study the focus of digital banking is on combining benefits of the two worlds: a new customer experience on the outside and an efficient, effective operating

model on the inside—both enabled by digitization and the underlying technologies, processes, and structures as illustrated in Figure 2.
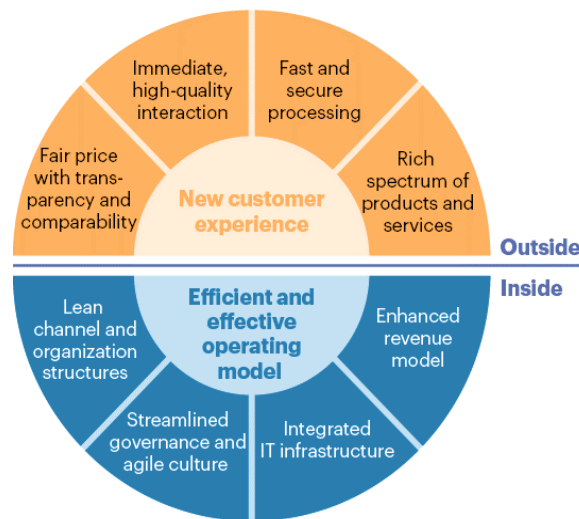

Figure 2. A digital banking perspective
Source: www.atkearney.com

From the outside perspective, customers benefit from fair prices with increased transparency and comparability. The transactions are performed quickly and securely with immediate, high-quality interactions and purchasing a product no longer requires 14 days. Customers are proactively informed about a rich spectrum of personalized products and services, including financial advice, new opportunities, and peer comparisons. Overall, customer service is one component of a much broader customer experience imperative that you can leverage to create a superior digital customer relationship (www.atkearney.ro).

Opinion mining and sentiment analysis in a digital bank

Most research analysis is performed by many companies through surveys. For instance, Accenture company recently surveyed over 4,000 consumers in the United States and Canada as part of a multi-year research initiative to understand who they are, how they bank - and how they expect to bank in 2020 (www.accenture.com). This research contributes to banking decisions regarding their reorganization to achieve digital challenges.

As a result of digital transformation, the customers experience more and more with internet channels and mobiles. The focus on customer experience is crucial for a banking institution. Banking institutions must offer to their customers a variety of digital services and products aligned with their needs. This entails understanding customers - their perceptions, influences and motivations and how they interact with every digital banking service or product. Therefore, research analysis based on surveys is not even more sufficient in order to analyze the behavior of the digital client.

Adopting computational techniques such as opinion mining (OM) and sentiment analysis (SA) could produce significant benefits for digital customers and banking institutions. OM and SA are used to express customers' opinions regarding products and services they are interested in. Before making a decision regarding a product or a service, the customers try to find out the reviews for example, what another person thinks about this product, from different sources such as blogs, social networks, comments, tweets, etc. SA is also called as OM. because it mines the information from various text forms such as reviews, news & blogs and classifies them on the basis of their polarity as positive, negative or neutral (Sharma, R. et al., 2014, pp.43-56).

There are mainly three components of Opinion Mining (Sharma, 2014), illustrated in Figure no.3:
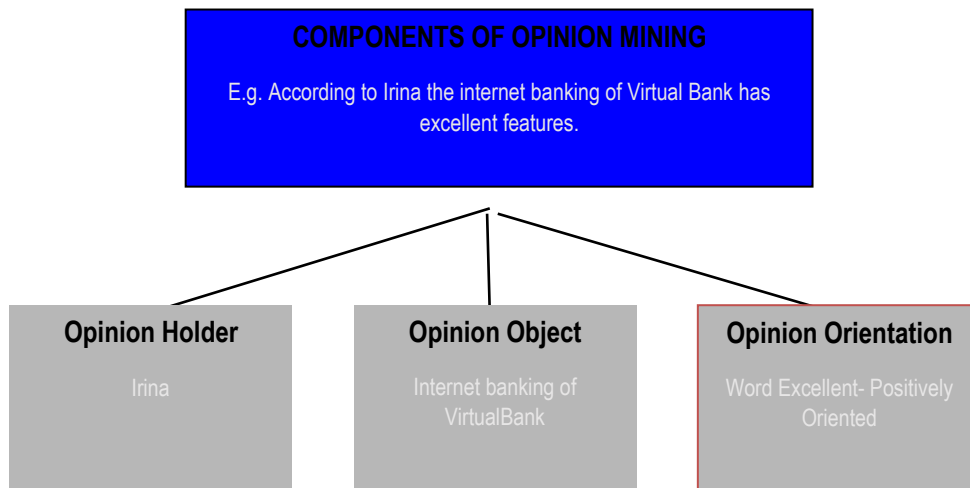
COMPONENTS OF OPINION MINING

E.g. According to Irina the internet banking of Virtual Bank has excellent features.

Opinion Holder	Opinion Object	Opinion Orientation
Irina	Internet banking of VirtualBank	Word Excellent- Positively Oriented

Figure 3. Opinion Mining components
Source: Sharma, R. *et al.*, March 2014 "Opinion Mining in Hindi Language: A Survey," International Journal in Computer Science & Technology (IJFCST), 4(2), p.43.

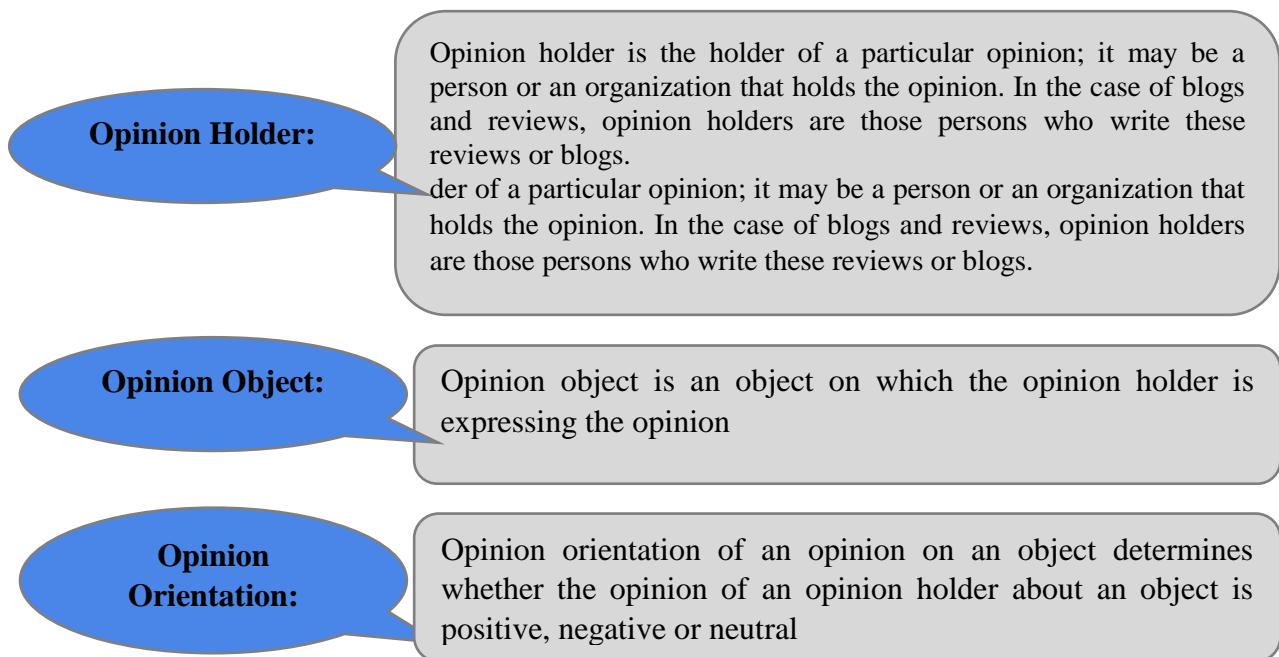The Figure 4 illustrates the details of each Opinion Mining component role.

Opinion Holder: Opinion holder is the holder of a particular opinion; it may be a person or an organization that holds the opinion. In the case of blogs and reviews, opinion holders are those persons who write these reviews or blogs.
der of a particular opinion; it may be a person or an organization that holds the opinion. In the case of blogs and reviews, opinion holders are those persons who write these reviews or blogs.

Opinion Object: Opinion object is an object on which the opinion holder is expressing the opinion

Opinion Orientation: Opinion orientation of an opinion on an object determines whether the opinion of an opinion holder about an object is positive, negative or neutral

Figure 4. The role of each Opinion Mining component
Source: www.computerworlduk.com

In their digital revolution, the banking institutions should benefit from OM and SA techniques in order to analyse the expectations of digital customers from their products and services. The identification of customer feelings regarding of a product or a service from a specific bank could be performed faster and easier using OM and SA by analyzing the interactions in social media, comments on blogs and forums, tweets etc. Therefore, both banks obtain a lot of advantages from OM and SA. For instance, OM and SA are a major aid in measuring sales and improving their marketing strategies as well. Also, these methods help banks to measure their overall performance, especially on their online presence.

However, finding and analyzing opinion sites on the Web and classifying the information remains a challenge task because of different sites. The human reader will have difficulty identifying relevant sites, extracting and summarizing the opinions in them. Thus, automated sentiment analysis systems are needed (Bing, L., 2012, pp.12-19). To accomplish this, the bank institutions have to develop their own tools or to rely on outsourcing companies that specialize in SA and OM.

Several tools were developed in order to automatise the process of extracting and summarizing the customer opinions. For instance, Thomson Reuters' Machine Readable News service is a tool designed to assess the positive or negative impact of news reports on industries and individual companies. According to (www.computerworlduk.com), a study was conducted by Deutsche Bank in order to determine the ROI of using a service like Thomson Reuters' Machine Readable News to pick stocks. The results of the study show that "*picking stocks for a portfolio based on the results of news SA and OM generated yearly returns of 5% for a low-risk strategy and 12% for a high risk strategy, after trading costs*" (www.cs.uic.edu).

Conclusions

With the emergence of new technologies, more and more banking customers become aware growth of web's popularity. Therefore, they experience new digital relationships. For instance, before making a decision regarding a product or a service, digital customers perform a research on free available online resources such as social media networks, blogs, news, reviews in order to explore others opinions regarding that product or service. Keeping pace with digital customers is a big challenge. The banks must confront the challenges of digital structural change and redesign their operating models. By connecting their businesses with the vast amount of data available to them in a strategically way, they can build intelligence on customers' evolving needs, which can drive value.

Analyzing customer's behavior has become very important for the banking institutions to better track public points of view, to find new market trends insights in their digital strategies or sales or other relevant data. For the potential customer it becomes really difficult to get the knowledge about a product in the presence of such huge number of reviews and to sort the useful reviews and make good decision. Therefore, creating new automated approaches based on sentiment analysis and opinion mining brings significant benefits to digital environment.

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