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Artificial Intelligence as an Enabling Tool for the Development of Dynamic Capabilities in the Banking Industry

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ABSTRACT

Banks are investing in artificial intelligence (AI) to develop more innovative business models in order to face competition. The main objective of this paper consists in analyzing bank experiences when they introduce AI from the theory of dynamic capabilities and the resource-based view approach. Documentary research enables the description of experiences in three companies from the financial industry. It has been considered of interest to include different international experiences. For that reason, a firm providing debit and credit card services has been included, MasterCard, along with international banks such as Royal Bank of Scotland and Caixa Bank. Results show that AI enables firms to promote new relationships with customers, detect their needs or experiences, and adapt the service given by firms to be more competitive. AI also allows them to speed up responses to customers answers and doubts through its value chain. This research also shows that the proper implementation of AI permits a reconfiguration of traditional banking scenario. Detection, absorption, integration, and innovation are capabilities that allow these firms to build the managerial skills oriented to save costs, increase efficiency, and be more competitive.

KEYWORDS

Artificial Intelligence, Banking, Business Strategy, Dynamic Capabilities, Innovation

INTRODUCTION

Although it has not been impacted in a negative way at the level of other industries by the global crisis, banking industry is immersed in a period of transition aimed to make the best of information technology (IT) because of fierce competition (Tang, 2019; Gallego-Gómez & De-Pablos-Heredero, 2017; Soley, 2015). There are some examples which illustrate how this started to happen (Chishti & Barberis, 2016). For example, in the United Kingdom, supermarket chains, as Texco, sold loans and could obtain financial services in places such as Amazon (Forbes, 2018).

This situation arises as a consequence of the emergence of new players in the banking industry (Gallego, 2018). As an example, a 63% of new players in this industry account 14% of returns in UK according to Accenture (2018). Traditional firms operating in the banking industry face this

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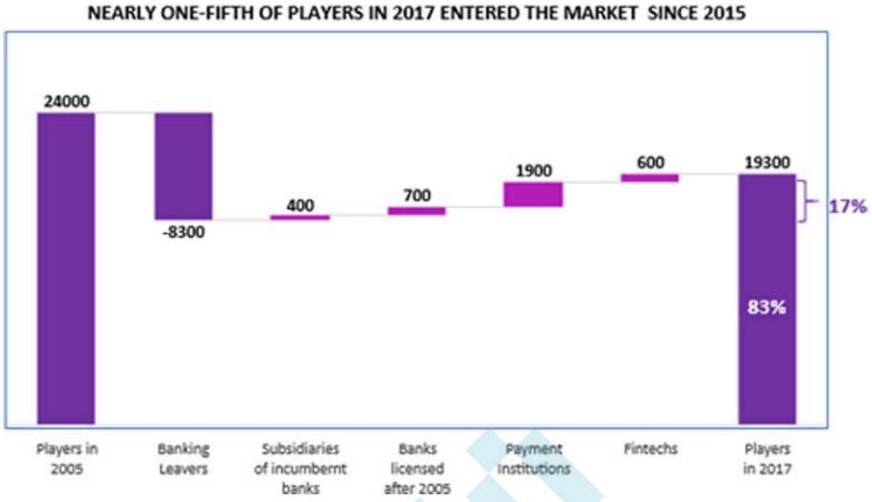
situation by fighting to reach a better position. Thanks to banking efforts, Accenture (2018) affirms that they will be able to recover customer trust in the next years. And the latter even though banking businesses have been diversified as it is shown in Figure 1, and the demands to become pioneers and competitive in the banking industry are being increased as they face higher competence each time.

Figure 1. Nearly one-fifth of players in 2017 entered the market since 2005 (Accenture, 2018)



Taking into consideration this context, the Spanish banking industry, especially after the merger and acquisition of savings, has become stronger from the economic perspective (Bernardino& Carrasco, 2014). Nevertheless, banks need to invest in technologies with the purpose of achieving more innovative status. Lichtenthaler (2019) explains the benefits that Artificial Intelligence can promote at organizations from the innovation perspective.

According to Funcas-KPMG (2017), Spain is the 6th biggest country in number of Fintech companies. More concretely, there are more than 300 firms with a turnover of more than 100 million euros.

As a proof of it, innovation centres have been created by all the Spanish banks and they have been integrated as part of their activity (Soley, 2015). Good examples of this are the BBVA Innovation Center and Bankinter (Weill, Woerner, & González, 2017). In this way, they can have a closer, more creative and innovative contact with society resulting in a more precise adaptation to the customer demands.

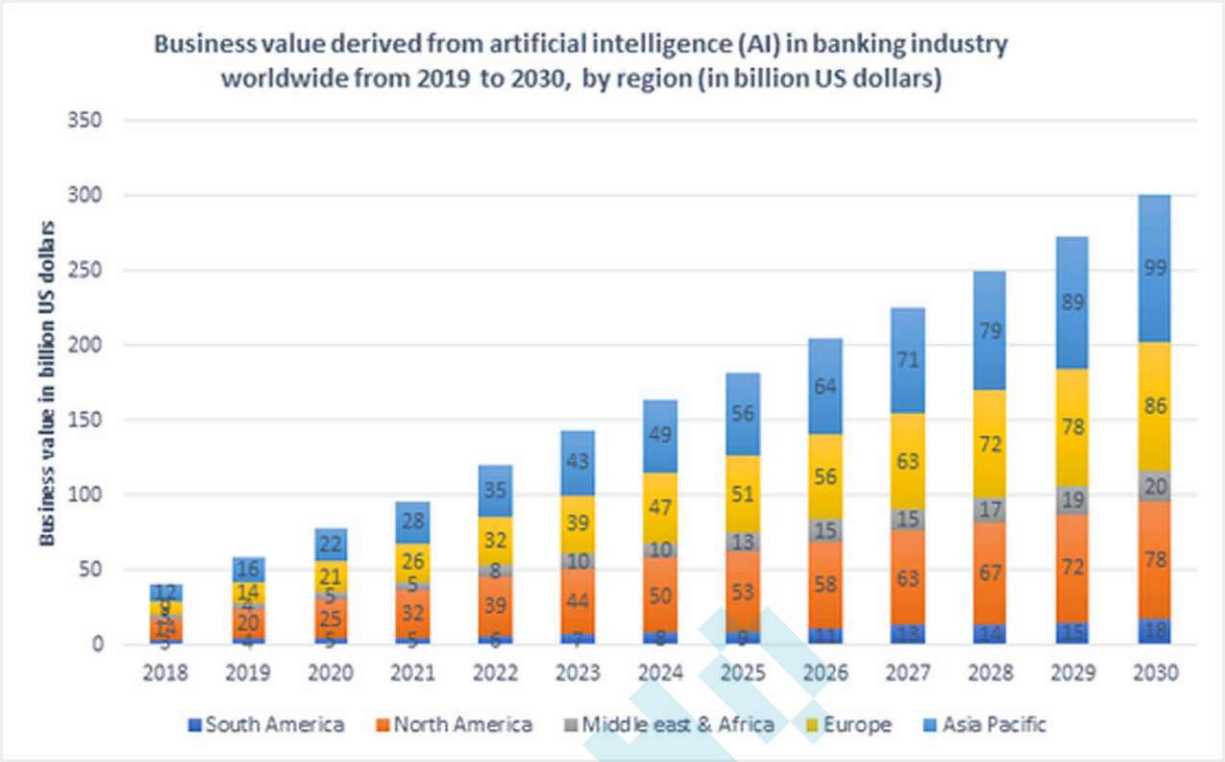
The transformation process in the banking industry requires from the support of technology to become competitive. This is the reason why more traditional organizations invest on implementing the digitalization of processes and exploiting data, which are indeed their main asset (Grab, Olaru, & Gavril, 2019; De Pablos Heredero et al., 2019). According to Statista (2019), forecasts suggest that for the year 2030 the use of artificial intelligence (AI) in the banking industry will generate 86 million US dollars in Europe.

In the concrete case of Spain, and following the words of Accenture (2019), 47% of banking leaders think that AI will be a technology with the ability to promote the highest impact in the next three years. In fact, 97% of Spanish banking leaders either are thinking about implementing AI or they have already integrated it in businesses.

Next, in Figure 2, a graphic showing the commercial value that could be obtained by using AI in the banking industry in the period from 2018 to 2030 is shown.

Resource Based View is an Organizational approach aimed to detect both weaknesses and strengths in a firm by analysing its resources and in order to find out to what extent, by properly combining them, the firm can reach capabilities liable to be sustained on time (Barney, 2001).

Figure 2. Business value derived from artificial intelligence (AI) in banking industry worldwide from 2019 to 2030, (adapted from Statista, 2019)



To provide a wider focus, this theory can be combined with the theory of Dynamic Capabilities (Teece, 1994; Teece et al., 1997), which supports the recombination of identified resources to generate new strategies oriented to value creation and new distinctive competencies (Prahalad & Hamel, 1990), or also exploit distinctive competencies that already exists. Teece (1997), on the other hand, stands for the increase of resources and their recombination as model of change.

This theory allows proving the effectiveness of recombining resources at firms. Firms can reach dynamic capabilities by properly combining resources (Blanco-Callejo & De-Pablos-Heredero, 2019). Authors have focused on four concrete dynamic capabilities related to firms in previous research: detection, absorption, integration and innovation (Gallego-Gómez & De-Pablos-Heredero, 2013; Gallego-Gómez & De-Pablos-Heredero, 2016; De-Pablos-Heredero, Fernández-Valero & Blanco-Callejo, 2017; Blanco-Callejo & De-Pablos-Heredero, 2019). Therefore, this study focuses on these dynamic capabilities too.

The main objective of this paper consists in analyzing the experiences of some financial services companies when introducing artificial intelligence (AI) in their business models through the perspective of the Theory of Dynamic Capabilities and the Resource Based View. The research question is the following one:

Can Banks and financial companies generate dynamic capabilities by implementing Artificial Intelligence (AI) within their processes?

Through a theoretical explanation, the situation of this industry in the last years is described. The theory of dynamic capabilities is explained afterwards. The method used to describe the cases is also presented. Later on, a detailed explanation of the three selected experiences is provided, and a discussion is offered to link the different firms' experiences with the achievement of dynamic capabilities.

Finally, main conclusions and potential future research areas are described.

THEORICAL FRAMEWORK

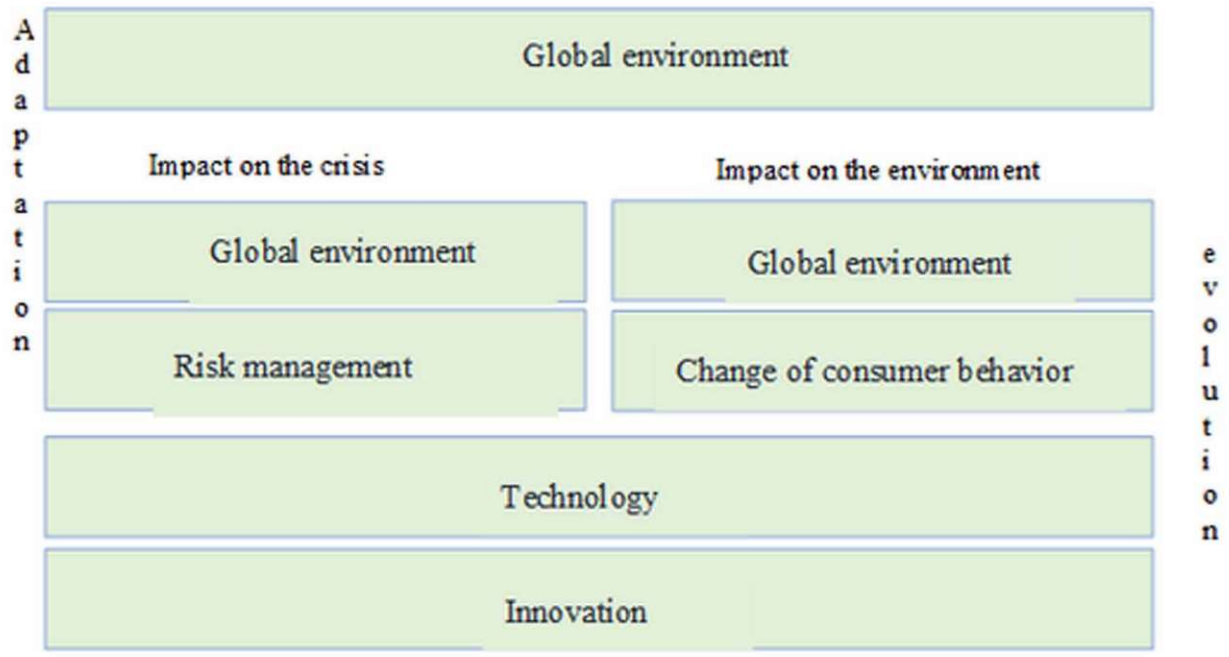
Many pieces of news and reports describe how Spanish Banks are investing huge amounts of money to be transformed and reinvented with the objective of being more competitive (IEB, 2015, KPMG, 2017). Big size Banks that operate in Spain such as BBVA, Santander, La Caixa, Bankia and Bankinterpursue growth by promoting the available digital channels. The Spanish Economy lived its best moment from 1996 to 2007 (González-Martin, 2011; PriceWaterHouseCoopers, 2013). Ever since, it has suffered from a recession period involving a decrease of consumption by firms and customers, as it happens with investment. This situation, joint to the spread of papers that try to explain the apparition of the crisis as a consequence of the banking opportunistic behavior (Casado, 2015), provoke, amongst other factors, a damaged reputation of the industry and a consequent lack of trust.

However, banks play a very important role in favor of the economic recovery which is not always acknowledged (Wang & Yang, 2019). To make it feasible, banks must keep closer to citizens (Kochukalam, Thomas, & Joseph, 2018). This issue is complex in most cases, as higher levels of financial culture are required to facilitate the relationship amongst the agents, based in the understanding of activities and available products in the market (Bedendo, Garcia-Appendini, & Siming, 2018).

All of this together with the changes produced in the environment and the lack of efficiency in the banking model, have facilitated the fact that financial services adopt a more active position in assuming the change from traditional to digital processes in which technology is known as part of the intrinsic working style (Pampurini & Quaranta, 2018). So, many big size firms have been replaced by big size technological firms recently born (González-Martín, 2011; IEB, 2015; Atkinson & Lind, 2018).

By considering all this, a change of paradigm in the traditional banking models is foreseen. Next years will be characterized by the intensive use of technology and change (PwC, 2013, 2018). Next, Figure 3, shows the factors that take part in the transition process. Mainly, the global environment influences the industry and, as a result of this, the activity often suffers from an adaptation to the established model in search of stability. However, when technology and innovation promote a change in the behavior of actors such as markets, providers and consumers an evolution on existent business models takes place (Teece, 2018).

Figure 3. Factors from the external environment (adapted from PwC, 2013)

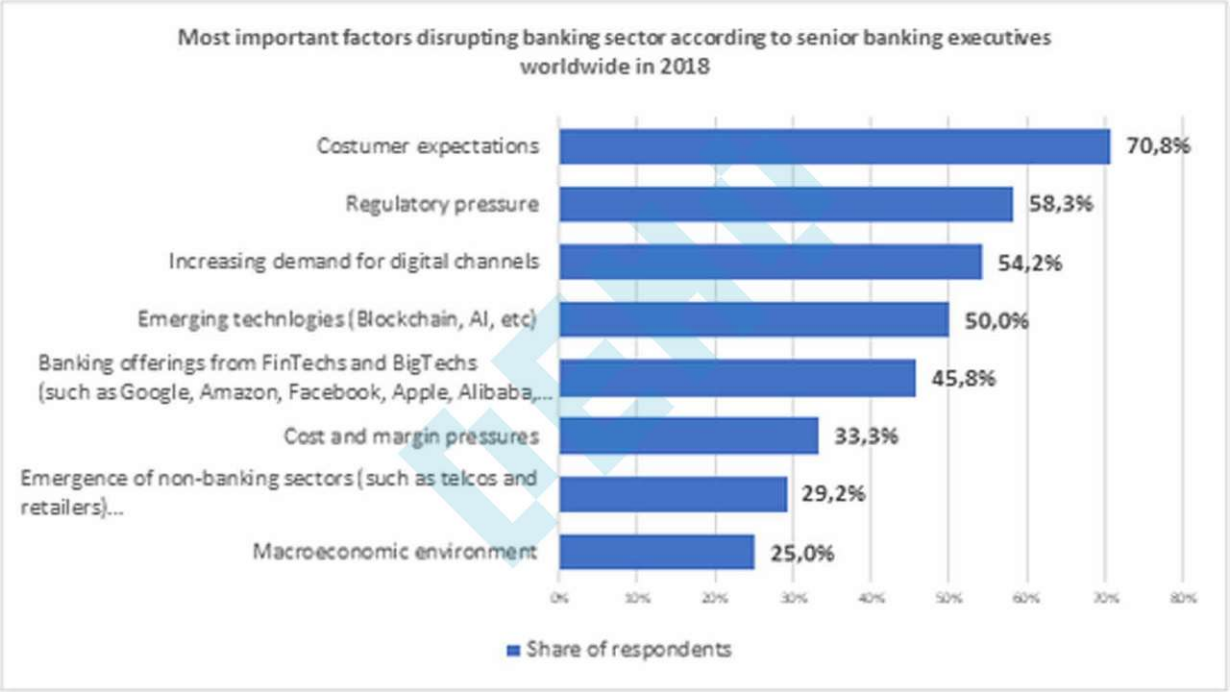


In reality, current financial services industry is more oriented to technological innovation than to any other moment in history; it presents also high levels of serious acquisition. Banks and financial firms have spent more than $ 485 million dollars in information technology in 2014, according to Gartner – more than any other industry (Accenture, 2014; IEB, 2017).

Nowadays, Spanish banking industry is immersed in huge investments on technology. Expansión (2019) affirms that Santander Bank will invest 20.000 million euros in technology and digital transformation in the next four years. Just in 2018, Santander, BBVA and CaixaBank spent 3.000 million euros to promote digital transformation.

According to Statista (2019), AI occupies the fourth place in terms of investment priorities referring to the banking industry. Figure 4 shows the most important factors considered by banking executives as more relevant to enable disruption in the banking industry.

Figure 4. Most important banking sector disrupting factors according to senior banking executives worldwide in 2018 (adapted from Statista, 2019)



The Resource Based View and the Theory of Dynamic Capabilities

As it has been explained, firms evolve as a response to market inertia. When they want to maintain and/or increase their competitiveness, they need to lead innovative actions (Christensen, 2013).

From a Business Organization perspective, more concretely Strategic Management, the Resource Based View can be applied to analyze the optimization of Artificial Intelligent Systems since it allows describing the work of firm in terms of essential resources and capabilities, on the one hand. On the other, it also allows identifying, understanding and locating the sources of sustainable competitive advantages in which the creation of value is based (García-Muiña et al., 2014).

The updated literature review shows how the general economic theory through Resource based View has paid little attention to the perspective of resources in the creation of value concept oriented to customer. Customer is the main asset for companies. Thus, high levels of satisfaction appear in case of firms managing in an efficient way resources and betting on new innovations in terms of products and services.

Both theories constitute an approach to know how firms get competitive advantages in dynamic environments, where changes take place in a continuous way (Teece et al., 1997; Teece, 2018), from the analysis of competitive forces.

Despite this, firms that have reached success in competitive environments are the ones that have shown good results in the area of the deployment of dynamic capabilities. These allow them to create configurations of resources to offer better levels of response in an instant way and are also flexible in the development of innovation aimed to the creation of new products (Blanco-Callejo & De-Pablos-Heredero, 2019).

The main capabilities applied in previous literature review (De Pablos Heredero & López Berzosa, 2012; Gallego Gómez & De Pablos Heredero, 2013; De-Pablos-Heredero, Fernández-Valero & Blanco-Callejo, 2017; De-Pablos-Heredero & Blanco-Callejo, 2019) can be summarized in the following ones:

- Detection capability, based in the analysis of the environment to understand the customer's needs better than rest of competitors (Amit & Schoemaker, 1993).
- Adaptation capability is understood as generator of the rest of capabilities since it allows identifying and making use of opportunities that appear in the market (Londoño, 2015).
- Absorption capability to improve processes and strategies applied to the organization. Absorption capability, as the ability to recognize the value of new things, digest information and apply it with commercial aims (Cohen & Levinthal, 1990).
- Integration of resources capability to formulate a strategy focused in firm's employees. The integration capability to combine different interaction patterns through the contribution, representation and interrelation (Okhuysen & Eisenhardt, 2002).
- Innovation capability to obtain data that can impact on sales. At the end, they change the experiences to generate changes in strategies where the innovation is the cause for development as it allows developing dynamic capabilities to reconfigure and improve the ones that exist through new resources.

Most recent literature on dynamic capabilities (Linden & Teece, 2018; Teece, 2009) propose to bring together all the capabilities in three differentiated phases: sense, seize and reconfigurate/transform.

Sense implies detecting opportunities and threads. Seize means having the chance to benefit from the opportunities and reconfiguration/transforming implies maintaining and increasing competitiveness through changes that must take place to respond to different environmental demands.

The following Figure 5 shows main dynamic capabilities considered in this research:

TOOLS AND METHODS

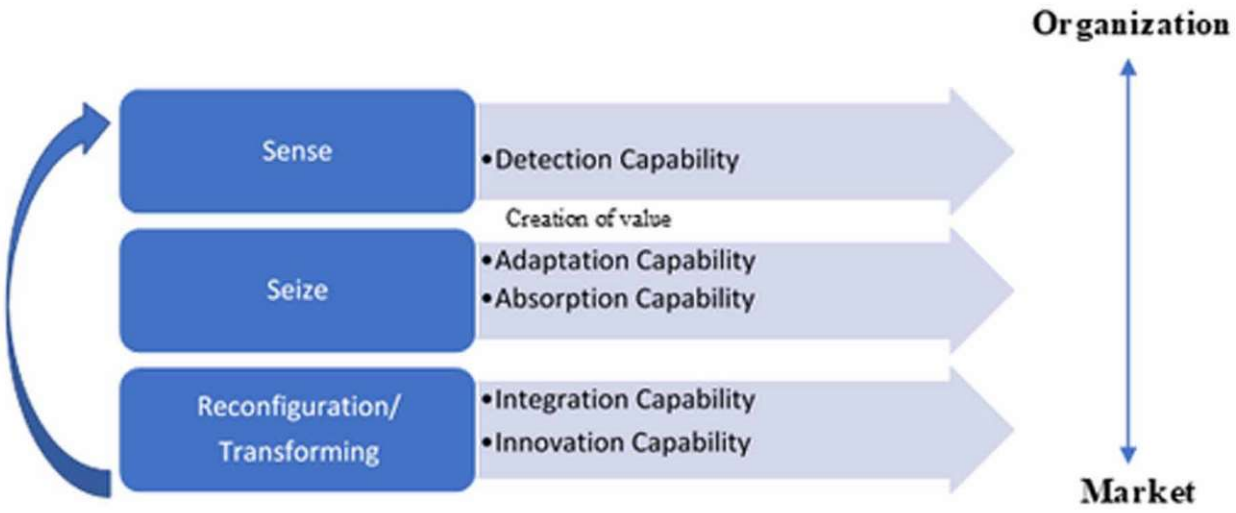
The methodology used to develop this research is based on a documentary research performance aimed to know experiences and relate them with theories of the firm. For that, documents coming from web portals as WoS, DIALNET, SciELO, Google and Google Scholar have been considered.

It is not a deep analysis. It intends to show how banks and other financial firms are adopting AI in processes. Three experiences are described according to three main common factors:

- These initiatives are very recent. However, they present a 3 years' long-term projection.
- They are all financial firms as main actors in the environment and promoters of social change.
- All the experiences come from internal initiatives, enabled by IT providers, although they are not based on the acquisition of knowledge from other firms.

Based on those criteria, the selected experiences have been the following ones:

Figure 5. Relationship amongst dynamic capabilities (own elaboration, 2019)



- Mastercard: Financial organization that provides credit and debit cards.
- Royal Bank of Scotland (RBS): As it has been explained in the theoretical framework, competitor diversification has grown and, therefore, it is interesting to analyze one experience in the UK.
- Caixabank: In the theoretical framework, the volatile situation in Spain and the banking efforts to be more competitive is explained. For it, the experience of a Spanish bank awarded in the field of AI is included.

For the description of these experiences, secondary sources of information have been used, such as specialized reports, pieces of news in mass media, and research articles where they are mentioned as study cases.

Concretely, databases such as EBSCO and Emerald have been used, through a boolean search. Harvard Deusto cases have also been consulted for the revision of the state of art.

For "Mastercard AND artificial intelligence", 18 results have been obtained. However, for the two following cases, the result has been "0". For this reason, corporative webs have been used as secondary sources of information

ANALISYS AND DISCUSSION

Following the experiences found in the literature review on applications derived from artificial intelligence, features such as customer attention, main element and collector of data in the banking industry are described.

Artificial intelligence included in the banking industry:

- Mastercard

As a consequence of banking industry rebuilding, Mastercard has noticeably bet on innovation by working in a joint way with different banking institutions where products and services innovation is offered. Payment does not just take place through credit or debit cards, but it is foreseen how all the potential payment options will co-live. Mastercard is working on making all the potential uses closer to the user so that this user can choose which one fits him better.

As an example of it, Mastercard provides users with a financial services specialized platform intended to manage user applications and solve incidences by means of instant messaging similar

to the chat used by Facebook. From this, it can be implied that the technological character that the banking industry is adopting is more similar nowadays to technological firms. Apart from using tools close to customers, they are used to having some similarities in the day to day with the use of routine applications.

This way, the acceptance in the use of these tools is guaranteed, as they are natural and simple to use.

Besides, a service has been opened to prevent fraud by means of artificial intelligence. Called "Supercharging Cybersecurity" (Fortune, 2018), it consists in capturing information from mobile phones or from the way people swipe their screens or hold their devices.

By correlating these data with information like people's handprint or other biometric data, financial services firms could verify in a better way clients' identity so as to do online payments (Fortune, 2018).

Additionally, in the area of customer knowledge, Decision Intelligence has been implemented, a service for detecting fraud and making decisions. This service uses information such as the segmentation of value for the customer, the risk profile, the location, commerce and other data from mobile phones, as the time of the day when the purchase takes place and the kind of purchase.

It compares data with consumption patterns of each customer to distinguish habitual or unusual behaviours (Mastercard, 2016).

However, this conversational tool (Levine, Locke, & Searls, 2009) must be based on the application of artificial intelligence, not just driven to final users, but to all type of consumers such as card holders –along with its interaction with financial decisions, firms-consumers through virtual assistants and retailers-consumers, who establish a relationship through the services of buying by using both messaging service and payment confirmation in a digital way.

- Royal Bank of Scotland (RBS)

The Royal Bank of Scotland (RBS)was founded in Edinburgh in 1727. It went on to become one of the biggest banks in Scotland. For a short period of time in 2008, RBS was the biggest bank in the world by number of assets.

In October 2008, after almost a decade of global expansion culminating in the takeover of ABN AMRO, RBS ran into significant financial difficulties and was bailed out by the UK government (RBS, 2019).

It has redefined its strategy and has implemented artificial intelligence as a mechanism to help customers' management. For this, a robot, Luvo, has been developed.

The provider in charge of the development has been IBM Watson.

Luvo is aimed at solving the simple doubts coming from customers through chats, web services and/or apps, and, in this way, it downloads all the tasks from the bank's staff. In case of the machine detects that it is not capable to solve a query, this is derived to any other staff member.

This pilot program for customers has passed a technological test of two months at the beginning of this year, and 1.200 employees of Royal Bank of Scotland and NatWest, mainly managing queries from customers on lost corporate cards or forgotten pins, have participated in it.

Luvo is the first robot to perform this kind of tasks, apart from having been programmed to learn from errors, and counting on with the required intelligence to forecast and respond with a certain degree of personality (IBM, 2016).

In 2017, RBS presents a new tool based on AI, Cora. It can answer 200 basic bank queries and now it maintains 100,000 mentions per month. It could be used to help releasing time, so that human advisors can answer more complex questions to customers, as well as to respond queries out of working time.

The proofs carried out up to now have suggested that customers that have avoided digital services in the past can be more decided to interact with digital tools as Cora and also be able to help blind

and visual disabled customers that cannot interact with visual contents. Nowadays, Cora is available and counts on knowledge enough to advise on mortgages (RBS, 2018).

- CaixaBank

CaixaBank is a financial group. It belongs to Ibex-35 from 2008. It is one of the most innovative firms in the banking industry in Spain. As a consequence of this, the firm has been awarded many times (Caixabank, 2013). Concretely, it has been awarded for building Chatbot of ImaginBank: Best technological project of the year 2017 in the category "Artificial Intelligence", offered by "The Bank".

Once more, the firm has gone ahead of competitors by including artificial intelligence in processes by means of IBM Watson. This project is the first application of cognitive computing. IBM Watson was promoted by a bank entity in Spain. For that, CaixaBank and IBM have worked together in order to train IBM Watson to understand Spanish language, given that it was not available in that language.

Besides, IBM Watson has been trained by Caixabank experts so that it can learn the terminology of the specialty and respond accordingly. Additionally, the Company has worked on the Digital Transformation LAB – IBM Studio device to improve the customer experience (Hassenzahl & Tractinsky, 2006) and facilitate the interaction. All this shows that a great part of business areas have long worked with the main objective to integrate the device in the company.

The way it works is as follows: when employees formulate questions, the application offers an answer once it has accessed to structured and non-structured data. Besides, according to the use and interaction, the tool evolves in the service offered by making it better.

In 2017, CaixaBank was the first Spanish bank in applying AI in the field of customer attention. First experiences with specialized chatbots were implemented by forerunners of Gina and Neo, virtual assistants of imaginBank and CaixaBank respectively.

With the creation of chatbots from imaginBank –the first AI platform in the financial industry in Spain-, the experience of the Company with tools based in AI was reinforced. In 2018, through these applications, CaixaBank has been the first bank in counting on a system that can maintain conversations with 450 questions through Alexa, from Amazon, and Google Home (CaixaBank, 2018). Today, Gina and Neo live and, although the first one was launched in 2017, its functionalities started later on (CaixaBank, 2019).

Relationship of Experiences with Theories and Related Firm Concepts

The described theories have a relation with the described experiences. Therefore, the following table puts into relation dynamic capabilities that are generated in each of the firms and how they are materialized through the strategies performed by using these tools.

Table 1 shows the relationship between dynamic capabilities and strategies.

Table 1. Relationship between capabilities and strategies

Firm	Dynamic capability	Main strategy
Mastercard	Detection, innovation, adaptation	Reconfiguration of products / services to be more competitive
Royal Bank of Scotland	Integration, innovation, Detection	Implementation of new resources to increase efficiency and reduce costs
CaixaBank	Detection, adaptation, absorption, integration, innovation	Integrate AI in the decision-making process, efficiency in processes, competitive advantage

MasterCard promotes a new relationship with customers (innovation capability) through its conversational application. This allows detecting customers' needs and experiences (detection capability) and also adapting its service to be more competitive (adaptation capability).

Through Luvo, an innovative application (innovation capability), Royal Bank of Scotland is able to speed up responses to customers answers and doubts in its value chain (integration capability) with the main objective to increase efficiency and reduce costs.

And by means of IBM Watson (innovation capability), Caixa Bank can improve efficiency in processes since it allows detection (detection capability) of questions coming from employees (adaption capability). At the same time, it improves knowledge management, since it makes all employees take part of the information accumulated in the system (absorption capability), and it combines different patterns of interaction through the contribution, representation and interrelation (integration capability).

Royal Bank of Scotland and Caixabank have in common the progressive use of chatbots as a way of relation with customers. This indicates the banking industry trend of redesigning their customer attention service. Although these tools present a "limited intelligence" nowadays, it seems that they will be able to replace financial advisors in the future, in a way similar to robotadvisors.

Apart from this, Mastercard shows other realities in the banking industry in terms of AI by working in different patterns to reduce fraud. Machine learning processes will allow warehousing data and nourishing the systems with enough intelligence to develop precise functions without the need of human supervision. Database systems will be so powerful that the information integrated by means of Robotics Process Automatization (RPA) will allow banks to obtain fintech capabilities. It will allow them to be more efficient in automated processes.

To sum up, the following dynamic capabilities have created value in the described experiences:

- Absorption of knowledge in the companies. This allows them to improve and expand their AI model in new functionalities.
- Detection of improvement opportunities through the development of new customer attention and fraud prevention services.
- Integration of resources aimed to help employees to automate repetitive work.
- Innovation in new services aimed to be more efficient in today's way of doing processes.

CONCLUSION

Nowadays, firms face important challenges such as the management of huge information quantities and the requirement of offering a fast response to customers, stakeholders, etc. People search for more humanized experiences and these can more easily be found where technology and mass customization converge, in artificial intelligence practices.

Taking into account the mentioned above, together with the banking restructuring and the adoption of strategies to make banks closer to citizens, it is more necessary than ever to invest in optimizing these variables able to offer a distinction and high levels of competitiveness. Therefore, artificial intelligence is being demanded with the main objective to help banking entities to increase efficiency. In this way, they will reach the capabilities that fintech companies have started to develop without the need to promote change management aimed to transform processes, people and knowledge.

After analyzing the situation from a theoretical point of view, the study has focused on describing how dynamic capabilities applied to experiences show that artificial intelligence allows the reconfiguration of the traditional banking scenario.

Beyond the three experiences described, it could be interesting to delve into this field of study in future research by encompassing new challenges such as describing more experiences;

for example, in relation to Santander or BBVA Bank, which have invested in the purchase of firms to acquire these capabilities within their assets.

The three experiences prove that not all the studied organizations, a priori, have developed same capabilities.

Therefore, on trying to answer the question Can banks and financial firms generate dynamic capabilities by implementing artificial intelligence in their processes? A priori, and from a theoretical analysis, it can be affirmed that the implementation of processes by using artificial intelligence has promoted innovation. Innovation, detection, adaptation, absorption and integration are capabilities that allow reaching in most of cases the managerial skills oriented to save costs, increase efficiency and achieve more competitiveness.

Experiences show that although the different initiatives have started only some years ago, new services have already been developed. The increasing investment of Banks in technology can provide good opportunities in terms of processes improvements.

As future research lines, it can be of interest to go in deep in experiences and know better their evolution. All of them have been recently created, in 2016. Three years later, it is difficult to analyze results as firms are very reluctant to provide information. This is an important limitation for this study.

For this reason, a follow-up of the implementation is required. It is also proposed to do research on other experiences that have taken place in other industries to know the degree of acceptance and the capabilities that are being generated.

This article can be a source of inspiration to include more organizational theories, like the behaviour theory, and analysing the factors that have become barriers for AI implementation.