



The External Technological Context of Artificial Intelligence in Financial Services

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Abstract

The purpose of this research is to improve the understanding of the external technological context of Artificial Intelligence applied in financial services, together with other technological solutions such as digitization, automation, cloud computing and licensing. The authors studied the external technological context by analyzing the technology providers that are represented by the companies with CAEN code 620 – Service activities in information technology. The purpose of this study was to obtain and analyze answers to six research questions, as follows: what is the role of service providers, what are the other technologies offered by them together with Artificial Intelligence, how can this technology be effectively implemented, what is the involvement users in application development, if there will be specific training and what is the level of implementation of Artificial Intelligence in financial services. The authors found that often the investigated companies use their technology services only for banks, Fintech and large financial companies. Therefore, for small and medium-sized companies, the service providers included in the study are not suitable, and further research should be carried out in this regard. An interesting result emerged from the study of long-term relationships between the technology company and the financial company to improve the solutions and provide the necessary maintenance services until the solutions provide results with close to 100% accuracy.

Key words: technological context; financial sector; AI solutions; digitalization; automation;

JEL Classification: M40, M41, M42, M15

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Introduction

Artificial Intelligence is a technology used with other technological solutions such as digitalization, cloud computing, automation.

Data availability in digital format helps the business to use other technological solutions which have the ability of reducing repetitive tasks. So, the digitalization is the first step a company needs to make before automation or AI solutions implementation (Hamdan et al., 2016).

Digital financial services rely on digital technologies when delivering their services to customers. Fintech refers to digital technologies that are intended to change the way a financial company operates. This term is used to describe digitized financial services: cloud services, web, mobile, digital ID, machine learning, APIs (World Bank Group, 2020).

Cloud computing in format of IaaS (Infrastructure as a service) which refers to the data backup or SaaS (Software as a service) which refers to also applications backup on service providers infrastructure, helps the financial services for which there are high volumes of data to store them on a safety place (Chaimaa et al., 2020).

Automation of repetitive tasks will help the financial specialists to focus more on consultancy and data analysis which will help them improve their work with their clients and to increase profit (ICAEW IT Faculty, 2018).

There are several questions a company must answer when it wants to implement a new technology. In this sense, several studies have been carried out in the field, but none of them has done extensive research on technology providers and their services. Also, most of them are not from recent years, which would lead to the need for new research (Hamdan et al. 2016).

The topics which were of interest for the majority of researchers were: managers involvement if the IT implementation process, involvement of the end users in the development and installation process, the existence of a robust training, the use of a strict planning methodology for applications development, the rate of IT specialist in organizations, the role of vendors and consultants (Hamdan et al., 2016). We have chosen some of these topics and together with topics from other researchers we have developed six research questions for our study.

At the base of this article stands the *The Technology-Organization-Environment Framework (T-O-E)* (Tornatzky et.al., 1990).

Technological context is represented by the existing technology in the company and the existing technology available on the market. The first one is the internal technology readiness and the second one is external technology readiness.

Internal technological readiness is represented by technologies which a firm is currently using (Collins et. al., 1988).

The external technological readiness is represented by the available technologies on the market, that a company can access (Tornatzky et.al., 1990).

This study contains four parts: the first part is a literature review studying the level of AI solutions in accounting and auditing and a SWOT analysis for AI; the second part addresses the description of the research methodology; the third part refers to the results, and the fourth part presents the conclusions of the study.

In this study we wanted to assess the ways in technological companies are offering their services to the financial companies. On this field there are already important studies but the focus is not only on financial sector but on other sectors such as: manufacturing, agriculture, retail (Hamdan et.al., 2016).

In this study we wanted to assess how technology companies impact the services offered to financial companies. In this field there are already important studies, but the focus is not only on the financial sector, but also on other sectors such as: production, agriculture, retail (Hamdan et al., 2016).

Literature review

Artificial intelligence in accounting and audit

According to Gartner (2019) AI in the present is among the fastest growing fields. In accounting and audit services company representatives declare that they found benefits such as faster data analysis, time savings, increased level of accuracy, enhanced client service and more in-depth data into the business processes. AI promises, to the adopting companies, competitive advantages by using mimic cognitive skills together with human judgement (Munoko et. al., 2020).

In case of repetitive activities, even if they are not the most important part of the business, they are important for taking more informed decisions. Audit and assurance relay on updated and comprehensive accounting information (Zemánková, 2019).

Artificial intelligence in audit:

- a) Analytical review procedures performed for obtaining audit evidence,
- b) Classification,
- c) Materiality assessment
- d) Decisions regarding going concern principle
- e) Bankruptcy prediction
- f) Audit process performed for the entire data existing in the company not only for a sample (Baldwin et.al., 2006).

- b) Business consulting services for clients
- c) Focus on relevant information for investors
- d) Reducing the risks generated by digital data security threats
- e) Development of accounting standards (CECCAR, 2019)

Artificial Intelligence solutions and SWOT Analysis

In order to have a clearer image of the impact of AI in business we have made a SWOT analysis (**Table no. 1**), based on literature review (Hamdan et. al., 2016; ICAEW IT Faculty, 2018; Chaimaa et.al., 2021; Li et al., 2018).

Artificial intelligence in accounting:

- a) Real time decision making

Table no. 1. SWOT Analysis for AI implementation

Strengths	Weaknesses
Increase turnover and number of clients Increased productivity Improve internal efficiency Improve quality Reduce administrative and operating costs Improve the company's image Reduced time spent on repetitive tasks Opportunities for growth Less errors and more reports for clients Increased consistency in decision making Process huge amount of data Improve business decision making Reduce transaction time	Lack of awareness on the potential of AI Perception of a small value for their business Lack of expertise, knowledge, and technical skills Lack of prepared human resources Lack of financial resources Lack of management planning and budget allocation Managers do not have a good perception of cost/ benefit of AI usage
Opportunities	Threats
An acceptable cost Enough resources on the market Technical support Available trainings Implementation and maintenance from the service providers More time for personalized reports for clients and also business consultancy Hire or contract a dedicated training staff The ability of leading client's growth	Cyber security threats Competitors which are already using AI have the capacity of attracting and serving more clients More valuable services for clients, from the companies which are using AI Hire costs for clients for the new services

Source: Authors' representation, based on Hamdan et. al.(2016), ICAEW IT Faculty, 2018

Research questions:

The questions we asked, also inspired by specialized literature, are presented in

Table no. 2, together with the corresponding concepts.

Table no. 2. Research questions

Research question	Authors	Concepts
RQ1. Which is the role of service providers in financial sector?	Hamdan et.al., 2016	Role
RQ2. Which are the other technologies the service providers are offering for financial sector, together with AI?	Clauberg, 2020	Technologies
RQ3. How can technology be implemented effectively in financial sector?	Berger et.al., 2013	Implementation
RQ4. Which is the involvement of users in the development and installation of AI solutions for financial sector?	Hamdan et.al., 2016	Collaboration
RQ5. Will there be a training?	Hamdan et.al., 2016	Training
RQ6. What is the level of AI implementation in financial services and the long-term vision?	ICAEW IT Faculty, 2018	AI future

Source: Authors' representation, based on literature review

RQ1. Which is the role of service providers in financial sector?

The use of technology is increasing productivity, improve management performance, increase competitive advantage, save operating costs and add value to the provided services. The role of technology was studied in various domains such as: education, healthcare, manufacturing, supply chain, accounting, audit. (Hamdan et.al., 2016) But there is still a need of studying the role of service providers in the technology implementation level in these fields. For this paper we are focusing on the role of service providers in the financial sector of activity.

RQ2. Which are the other technologies the service providers are offering for financial sector, together with AI?

AI solutions are used together with other technologies in order to offer the expected results. For a company to start implementing AI solutions that company needs to use digitalization and automation solutions and also cloud computing to save the high volume of data (Clauberg, 2020).

RQ3. How can technology be implemented effectively in financial sector?

For a technology to be effectively implemented the human factor is very important. The agents which are working directly with customers' needs to be prepared to work with technology. Also, the employees which are working with the technological solutions need to be prepared. Governmental regulations are also determining the level of technological implementation. Market conditions represent

another element of the way in which technology is implemented into a company. An undeveloped market will definitely influence the level of technology implementation in a negative way (Berger et.al., 2013).

RQ4. Which is the involvement of users in the development and installation of AI solutions for financial sector?

Employees need to be part of the technology development and implementation process, regardless of industry, because they know exactly what they need and they are the ones who will work with these technologies (Hamdan et al., 2016). For this study we focused only on the financial sector and wanted to see how financial specialists are involved in the development and implementation process.

RQ5. Will there be a training?

After the development of a new solution the technological service providers need to offer training for the employees which are working with that technology (Hamdan et.al., 2016). For this study we wanted to see if the technological companies are presenting these services on their websites as being an important step into a successful technology implementation process.

RQ6. What is the level of AI implementation in financial services and the long-term vision?

On a global online survey carried out by McKinsey in 2020 with 2395 companies from all the industries, almost half of them said that they implemented AI for at least one function.

The long-term vision for the employees working in financial services is to develop a new set of skills: think radically, to be adaptable, exploit powerful technologies, and focus on the purpose (ICAEW IT Faculty, 2018).

Methodology

At a 95% confidence level and 5% margin of error for a population of 19364 Romanian technological companies according to TopFirme.ro, a representative sample is based on 377 companies with CAEN Code 620: CAEN 6201 – Custom software creation activities (customer-oriented software); CAEN 6202 – Consulting activities in information technology; CAEN 6203 – Management activities (management and exploitation) of computing resources; CAEN 6209 – Other service activities regarding information technology (Hajian, 2011).

We have selected these companies from “TopFirme.ro” for Romania, having the following characteristics: over 10 million Ron turnover in 2021, with a website and offering services to financial sector. We have designed a list with: company name, CAEN Code, turnover from “Company list” and we completed from their websites with the other information.

In total we have selected 78 companies out of which we have 65 with globally headquarters, 12 only European headquarters and 76 are also present in Romania. Those 78 companies are in top 100 technological companies in 2021 according to the data from National Trade Registry Office from the Ministry of Public Finance, a ranking made based on annual turnover. These companies have on their portfolio solutions based on AI and they are offering their services to financial sector.

Cited 270 times, a study from Hall, Beecham and Rainer (2002), conducted on 12 IT companies and focusing on: organizational issues, project and product issues and development issues is in line with our research interest. More other studies are conducting literature review on the ways of error correction on technology implementation, or software improvements and maintenance (Ivarsson et.al, 2011; Walia et.al., 2009; Willson et. al., 2005).

No researchers did such an in-depth analysis of technological companies with the scope of understanding the available technological solutions only for financial sector of activity.

The selected sample is considered representative because it takes into consideration the first 200

technology development companies looking at the turnover. These companies need to have a well-developed web site and a blog together with case studies and testimonials from their clients from financial sector. We wanted to focus on the best technology providers for the financial sector because they offer the best services.

After we have analyzed the data from their websites, out of this list we have deleted the companies which does not have services for the financial sector. In the end we had 78 companies included in our study.

In order to study the data, a qualitative content analysis has been made. We reduced the data to concepts which describes the research phenomenon (Elo et. al., 2008). We choose to make a deductive analysis by collecting the data for content analysis, then making sense of the data and the last step selecting the unit for analysis (Neuendorf, 2011; Rourke & Anderson, 2004).

A qualitative approach of the data analysis is more appropriate for this study because in the financial sector there was no research on the external technological readiness and this is a first step. Here we wanted to understand which are the technological factors which are influencing the financial sector to implement new technologies. After this step a quantitative research based on survey will be conducted to study the way of external technology implementation.

We wanted to determine how many companies have in their list of available services the following terms for external technological context: “AI solutions”, “digitalization”, “automation”, “cloud computing”, “application development”, “cyber security”, “licenses”, “process auditing”, “development, installation and maintenance” and for blog, case studies, podcasts we have included them in the “knowledge sharing” category.

After we completed the list for all the companies with the respective key words we made a total and based on the computed scores we categorized the companies into advanced, medium and beginners.

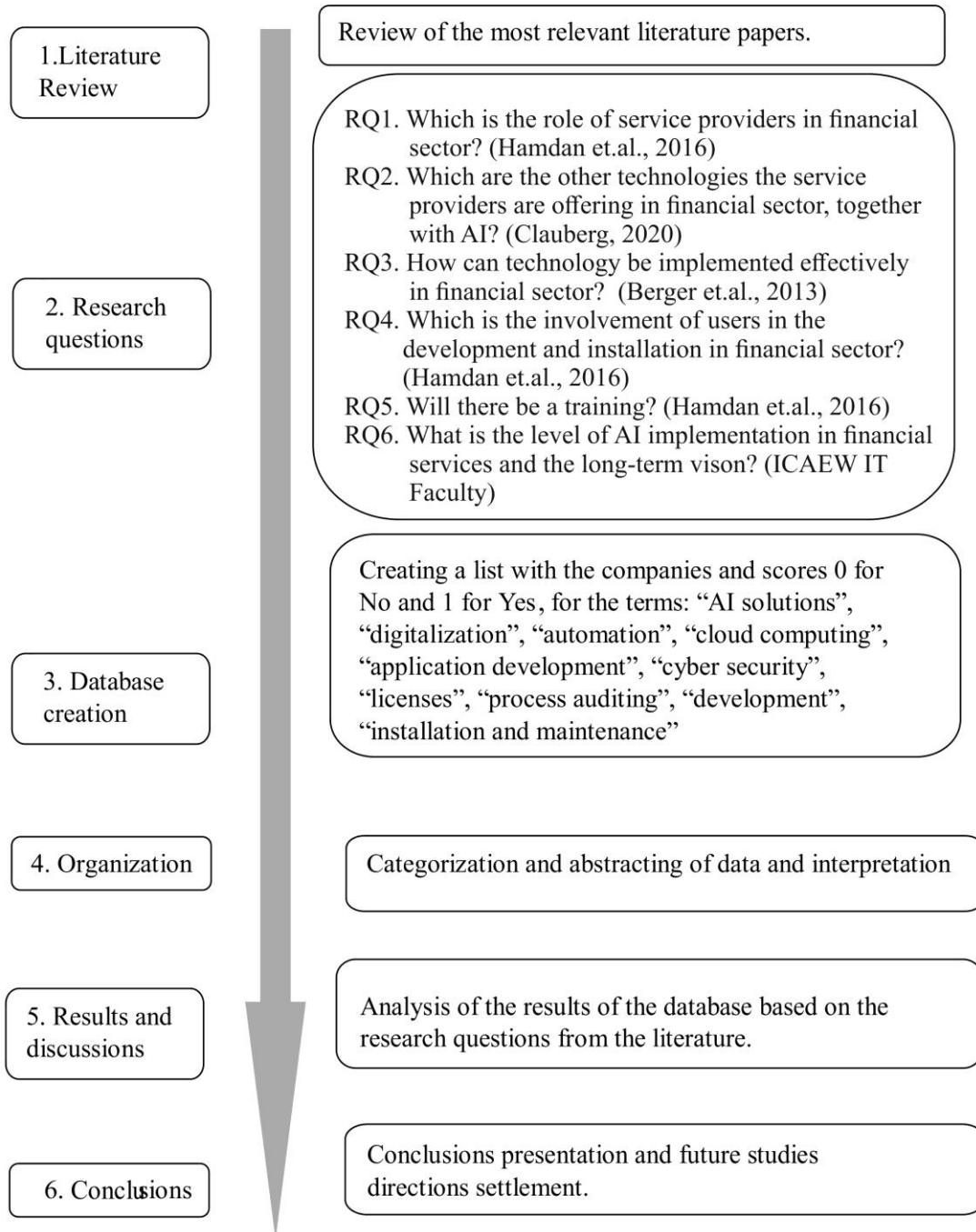
We also wanted to see if worldwide, on Europe and in Romania the companies are offering their services in the same percentage or there are some differences. And we can see that on worldwide level the companies have bigger percentages meaning that they are offering their services on a larger scale worldwide.

Then we answered to our research questions based on the information we found on the company’s websites: if they are offering a training, if they are working closely with

their clients to develop their services, which is the level of AI solutions implementation in financial services.

The specific steps which were followed in this study are presented in **Figure no. 1**.

Figure no.1. Description of the specific steps of the study



Source: Adapted after Kallio et al., (2016), Massaro et al. (2016), Stoica et al. (2022).

Results and discussions

Taking into consideration the research questions adapted from literature and analyzing our Excel manually made database having all the terms on the list, we managed to provide the following answer to the research questions:

RQ1. Which is the role of service providers in financial sector? – Role

The role of service providers is to develop all the necessary technology solutions that a company needs. As we noted in this analysis, even though the technology companies published the service packages on their website with all the necessary details, none of them communicated the prices. Companies have posted a form on their website for companies to fill in with their requirements and after that a process audit will be done by specialists. From here we arrived to the conclusion that there are no standard services for all cases, but companies offer customization of services for each client's needs.

RQ2. Which are the other technologies the service providers are offering for financial sector, together with AI?

AI is an emergent technology which started to replace human tasks, which implies repetitive operations, but AI solutions can also perform complex activities. Before the implementation of AI solutions into a company, there is the need for an already present digital solutions, automatization processes and also cloud computing backup, in order to sustain the high volume of data processed by AI solutions. Beside these services technological providers are also offering: licenses and application development for personalized solutions; audit process at the beginning of collaboration; installation services; maintenance which is needed for possible issues with the programs and also knowledge sharing which is done via blogs, podcasts, case studies, testimonials.

In **Table no. 3** there are mentioned how many companies have made available the listed solutions representing external technological context, on their websites.

Table no. 3. External technological context

Solutions	Acronyms	Worldwide	European	Romanian
Artificial Intelligence for Financial Sector	AIFS	94%	90%	90%
Digitalization services for financial sector	DSF	100%	100%	100%
Automation services for Financial Sector	ASFS	98%	98%	98%
Artificial Intelligence	AI	94%	90%	90%
Cloud computing for Financial Sector	CCFS	81%	79%	80%
Application development for Financial Services	APFS	97%	96%	93%
Cyber security	CS	90%	92%	90%
Licenses for Financial Sector	LFS	96%	96%	96%
Process auditing	PA	100%	100%	100%
Installation and maintenance, trainings	IMT	100%	100%	100%
Knowledge sharing	KS	100%	100%	100%

Source: Authors' representation

We can see that all the companies are offering digitalization services together with: process auditing, installation and maintenance and knowledge sharing via blogs, case studies. Digitalization is closely followed by automation services, licenses and AI services in 94% out of the worldwide companies and 90% for the ones present also in Europe and Romania.

RQ3. How can technology be implemented effectively in financial sector? – Implementation

In order for a technology to be implemented effectively, the IT teams need to work closely with the financial teams, even if they are in the same company or not. The providers of technology do not offer standard products and services for every potential client but

they personalize the services, in order to best serve every client's needs.

In **Appendix A** we have centralized the companies and their scores, 1 is for "Yes", meaning that the company has that technology or service and 0 is for "No", meaning that the company does not have that technology or service. Based on the scores we have splatted the companies into three categories: advanced, medium and beginners. In the

end we added the scores and the ones which have 11 and 10 we considered to be advanced in available technological solutions, 11 being the highest score. The ones with 9 and 8 we considered to be medium and the ones with 7 and 6 we considered to be beginners. As we can see in **Table no. 4**, which was made using the data from **Appendix A**, in 84% of the cases the companies are advanced in available technological solutions.

Table no. 4. The state of technological readiness

Technological state	Scores	Percentage of companies
Advanced	11 – 10	84%
Medium	9 – 8	15%
Beginners	7 – 6	1%

Source: Own representation

RQ4. Which is the involvement of users in the development and installation? – Collaboration

The user's involvement in development and installation is a very important one. Financial specialists need to work closely with the IT team in order to design the perfect solution for their needs. (ICAEW, 2018) On majority of analyzed companies which have case studies and blogs, we found highlighted the role of a closely relationship in between the companies and their clients. Even if these companies have standard services or cloud computing, we were interested on the personalized services and products which needs time to be completely delivered. And in these cases, from the process audit moment which is the first step, to programming, training, testing and implementation and maintenance it takes 1-2 years on which the IT team and financial teams needs to work closely.

RQ5. Will there be a training? – Training

After the technological provided has finished the development and testing part of the AI solutions the potential client decides to buy and use it and there will be a training from the technological providers for all the client's employees which will work with the solution. In all the cases training is available to all employees which will use this solution in the moment the company decides to implement the new solutions.

RQ6. What is the level of AI implementation in financial services and the long-term vision? – AI future

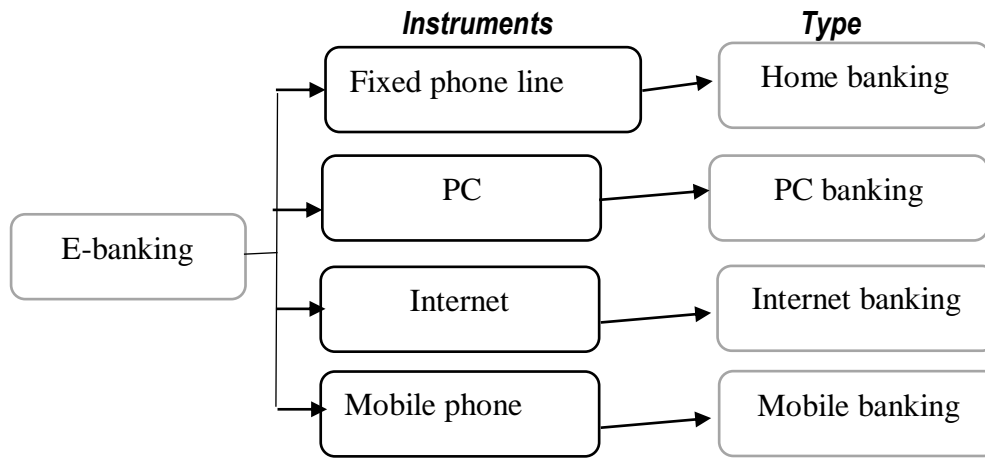
Based on our research, in 87% of the cases technological companies are offering AI solutions for financial services and they have case studies with success examples from banking and Fintech.

Some of the advantages of AI usage in financial services are:

- a. Faster fraud detection
- b. Customer experience personalization
- c. Data-driven decision making
- d. Data management
- e. Automated customer service.

Banking – Electronic banking (e-banking) appeared due to globalization, rapid growth of IT systems and competition (Chaimaa et.al., 2021) It is a self-service and help banks to deliver services to its customers via Internet and mobile phone. It was adopted by many banks to increase existing customer satisfaction or to gather new clients. As compared to traditional way, e-banking reduce costs. Using it banks and clients can exchange information, conduct banking business, and buy or sell goods. But the major disadvantage remains cyber-attacks (Bahl et. al., 2012) There are four types of e-banking as it is shown in the **Figure no. 2**.

Figure no. 2. E-banking type



Source: Chaimaa et.al., 2020

Financial Technology (Fintech) is defined as a cross-disciplinary subject, which combines Technology Management, Finance and Innovation Management. Its applications can be categorized into: advisory services, payments, financing and compliance (Leong et.al., 2018).

Success stories

From the analysis of the articles, testimonials and case studies highlighted by the companies' websites we have designed a list with the applications of digitalization, automatization and AI-based solutions, offered by these companies to financial sector (Table no. 5).

Table no. 5. AI based applications		
Application	Services	Industry
Paper-free banking loan application	Software development	Banking
Accounting info & payments platform using open banking APIs	Software Development	Fintech
Strategy & Security modules for financial app, Facilitating loan management	Software Architecture Software Development Software Testing	Fintech
AML Compliance reporting platform	Software Development	Big data
Cash management analytics tool, Making e-banking easy	Project Management Software Development Software Testing	E-banking
Data crunch application, powering an AI- Driven FinTech solution	Business Analysis Software Development Software Testing	Fintech

Source: Authors representation based on Fortech company

Other companies offer personalized Banking software development services such as: banking digital transformation, digital retail landing application, customized legacy core banking systems, digital onboarding, anti-money laundering and know-how customer, data engineering and predictive analytics.

Conclusion

Starting from six research questions based on the specific literature, we have provided answers based on the analysis of 78 technological companies in order to see exactly which are the available services on the market. In order to simplify, we allocated to each question a general

concept. The novelty of our research is provided by the terms we included in the study, looking at the technological part with AI and cloud computing for example, but also at the relation creation with clients realized with Knowledge sharing and constant support. There is no distance between suppliers and clients and their close collaboration is the key to success.

For the role of service providers, collaboration between developers and financial specialists and training, there is another research but it is not focused on technological companies which are offering services for financial sector (Hamdan et.al., 2016).

In this study we can see that service providers have all the necessary solutions and labor force and knowhow to serve properly the needs of financial services. We can see these from their success stories on their blogs, testimonials, case studies. Their role is to offer personalized solutions, to work closely with financial teams to understand their needs, to install the programs and to offer maintenance as long as their clients' needs it. They are not offering only AI solutions, but they started with licenses and digitalization, automatization, cloud computing.

In order to be effectively implemented a technology needs to be tested on a relevant amount of data and every time the input data will appear in a new template to improve the program. There is needed a continuous learning and a close relationship between financial and IT teams. Also, the financial teams need to make an audit of the generated data on a continuous way.

The users of AI solutions are closely working with the technology providers for testing, implementation and maintenance of the solution. Before the installation of a specific solution the financial company or team will receive a proper training from the service provider company.

AI solutions implementation will determine the financial

specialists to focus more on purpose, to think radically and to be adaptable. AI solutions are able to work with large volume of data with complex and changing patterns (ICAEW, 2018). In our study we can see that for now the service providers have posted success stories of Banks and other big financial institutions.

Companies using AI which registered a 20% increase of turnover noticed a change of the business in the following directions: better overall performance, better overall leadership and resource commitment to AI. High performers prefer to develop in house AI solutions and for this they need: data engineering, translators, data architects. They have the ability of producing and end-to-end AI based solution. The companies with the highest turnover generated by AI solutions tend to invest more on: business strategy, ways of working, talent and leadership, data, models, tools and technology and adoption (McKinsey, 2020).

This article represents a complex study of the most relevant questions from the literature which are important also in practice for the financial companies willing to implement AI solutions. Big companies' representatives can find here a list of the top 78 companies which are offering AI solutions and services for the financial sector.

Study limitations

One important limitation may refer to the sample dimension. This study took into consideration only the top IT companies, working with banks and big financial companies and for this reason this study is not useful for small and medium financial companies. For these, further studies will be conducted.

The scale is not sensitive enough to observe differences between the companies in the first half. This represent a limitation of this paper and will be discussed and addressed in future versions of the paper.

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Appendix A. List of companies and their scores: 1 for Yes, 0 for No

No.	Company	AIFS	DSFS	ASFS	AI	CCFS	ADFS	CS	LFS	PA	IMT	KS	Total
3	IBM ROMANIA SRL	1	1	1	1	1	1	1	1	1	1	1	11
4	ENDAVA ROMANIA SRL	1	1	1	1	1	1	1	1	1	1	1	11
5	ORACLE ROMANIA SRL	1	1	1	1	1	1	1	1	1	1	1	11
6	COGNIZANT TECHNOLOGY SOLUTIONS ROMANIA S.R.L.	1	1	1	1	1	1	1	1	1	1	1	11
7	NTT DATA ROMANIA S.A.	1	1	1	1	1	1	1	1	1	1	1	11
8	S & T ROMANIA SRL	1	1	1	1	1	1	1	1	1	1	1	11
10	STEFANINI ROMANIA SRL	1	1	1	1	1	1	1	1	1	1	1	11
11	FORTECH SRL	1	1	1	1	1	1	1	1	1	1	1	11
12	PENTALOG ROMANIA SRL	1	1	1	1	1	1	1	1	1	1	1	11
14	INTRAROM SA	1	1	1	1	1	1	1	1	1	1	1	11
16	CEGEKA ROMANIA SRL	1	1	1	1	1	1	1	1	1	1	1	11
18	AROBS TRANSILVANIA SOFTWARE S.A.	1	1	1	1	1	1	1	1	1	1	1	11
20	TREMEND SOFTWARE CONSULTING SRL	1	1	1	1	1	1	1	1	1	1	1	11
24	NESS ROMANIA SRL	1	1	1	1	1	1	1	1	1	1	1	11
25	INETUM ROMANIA S.R.L.	1	1	1	1	1	1	1	1	1	1	1	11
26	MHP CONSULTING ROMANIA SRL	1	1	1	1	1	1	1	1	1	1	1	11
27	K-BUSINESSCOM S.R.L.	1	1	1	1	1	1	1	1	1	1	1	11
28	WIPRO TECHNOLOGY SOLUTIONS S.R.L.	1	1	1	1	1	1	1	1	1	1	1	11
29	ACCESA IT SYSTEMS SRL	1	1	1	1	1	1	1	1	1	1	1	11
30	TOTAL SOFT S.A.	1	1	1	1	1	1	1	1	1	1	1	11
31	RINF OUTSOURCING SOLUTIONS SRL	1	1	1	1	1	1	1	1	1	1	1	11
32	OSF GLOBAL SERVICES SRL	1	1	1	1	1	1	1	1	1	1	1	11
33	FINASTRA ROMANIA S.R.L.	1	1	1	1	1	1	1	1	1	1	1	11
34	HCL TECHNOLOGIES ROMANIA SRL	1	1	1	1	1	1	1	1	1	1	1	11
35	ZITEC COM SRL	1	1	1	1	1	1	1	1	1	1	1	11
37	R SYSTEMS COMPUTARIS EUROPE S.R.L.	1	1	1	1	1	1	1	1	1	1	1	11
38	SOFTWARE IMAGINATION & VISION S.R.L.	1	1	1	1	1	1	1	1	1	1	1	11
39	SII IT & C SERVICES SRL	1	1	1	1	1	1	1	1	1	1	1	11
40	CRAYON SOFTWARE EXPERTS ROMANIA S.R.L.	1	1	1	1	1	1	1	1	1	1	1	11
44	B.B.H.M.M. S.R.L.	1	1	1	1	1	1	1	1	1	1	1	11
45	ACCESA IT CONSULTING SRL	1	1	1	1	1	1	1	1	1	1	1	11
46	ORION INNOVATION S.R.L.	1	1	1	1	1	1	1	1	1	1	1	11
48	THOUGHTWORKS ROMANIA S.R.L.	1	1	1	1	1	1	1	1	1	1	1	11
49	THALES DIS ROMANIA S.R.L.	1	1	1	1	1	1	1	1	1	1	1	11
50	PTC EASTERN EUROPE SRL	1	1	1	1	1	1	1	1	1	1	1	11
51	NTT DATA Romania SA	1	1	1	1	1	1	1	1	1	1	1	11
52	ING IT HUB	1	1	1	1	1	1	1	1	1	1	1	11
54	SS&C Blue Prism	1	1	1	1	1	1	1	1	1	1	1	11
55	Work fusion	1	1	1	1	1	1	1	1	1	1	1	11
56	Cyclone robotics	1	1	1	1	1	1	1	1	1	1	1	11
57	Samsung SDS	1	1	1	1	1	1	1	1	1	1	1	11
59	IBM	1	1	1	1	1	1	1	1	1	1	1	11
60	Liye	1	1	1	1	1	1	1	1	1	1	1	11

No.	Company	AIFS	DSFS	ASFS	AI	CCFS	ADFS	CS	LFS	PA	IMT	KS	Total
61	Pegasystems	1	1	1	1	1	1	1	1	1	1	1	11
63	DXC Technology	1	1	1	1	1	1	1	1	1	1	1	11
66	MSG Systems	1	1	1	1	1	1	1	1	1	1	1	11
67	Metro Digital Romania	1	1	1	1	1	1	1	1	1	1	1	11
68	ACCESSA IT SYSTEMS	1	1	1	1	1	1	1	1	1	1	1	11
70	Intel Software Development	1	1	1	1	1	1	1	1	1	1	1	11
77	Top it consult	1	1	1	1	1	1	1	1	1	1	1	11
2	Microsoft	1	1	1	1	1	0	1	1	1	1	1	10
9	DELOITTE TEHNOLOGIE SRL	1	1	1	1	1	1	0	1	1	1	1	10
17	ACCENTURE INDUSTRIAL SOFTWARE SOLUTIONS S.A.	1	1	1	1	1	1	1	0	1	1	1	10
22	ALTEN SI-TECHNO ROMANIA SRL	1	1	1	1	0	1	1	1	1	1	1	10
23	MICRO FOCUS SOFTWARE ROMANIA S.R.L.	1	1	1	1	0	1	1	1	1	1	1	10
41	SDL LANGUAGE WEAVER S.R.L.	1	1	1	1	0	1	1	1	1	1	1	10
42	NETROM SOFTWARE SRL	1	1	1	1	0	1	1	1	1	1	1	10
43	AXWAY ROMANIA SRL	1	1	1	1	0	1	1	1	1	1	1	10
47	CERTSIGN SA	1	1	1	1	0	1	1	1	1	1	1	10
62	Appian	1	1	1	1	0	1	1	1	1	1	1	10
65	Infosys	1	1	1	1	1	1	0	1	1	1	1	10
71	TRENCADIS	1	1	1	1	0	1	1	1	1	1	1	10
72	Yonder SRL	1	1	1	1	0	1	1	1	1	1	1	10
78	Smart soft power	1	1	1	1	1	1	1	1	1	1	0	10
1	Google	1	1	1	1	1	0	1	0	1	1	1	9
21	3PILLAR GLOBAL SRL	1	1	1	1	0	1	0	1	1	1	1	9
36	DENDRIO SOLUTIONS S.R.L.	0	1	1	0	1	1	1	1	1	1	1	9
53	Automation Anywhere	1	1	1	1	0	1	0	1	1	1	1	9
58	NINTEX	0	1	1	0	1	1	1	1	1	1	1	9
64	KEYSIGHT	0	1	1	0	1	1	1	1	1	1	1	9
69	Printed Group	1	1	1	1	0	1	0	1	1	1	1	9
74	N-able technologies	0	1	1	0	1	1	1	1	1	1	1	9
13	VEEAM SOFTWARE SRL	0	1	1	0	1	1	1	0	1	1	1	8
19	NAGARRO IQUEST TECHNOLOGIES SRL	0	1	1	0	0	1	1	1	1	1	1	8
73	Net Brinell	0	1	1	0	1	0	1	1	1	1	1	8
75	Amtech consulting	0	1	1	1	0	1	0	1	1	1	0	7
76	total expert	0	1	1	0	0	1	0	1	1	1	1	7
15	RASIROM RA	0	1	0	0	0	0	1	1	1	1	1	6
Total		68	74	74	68	61	72	69	71	74	74	73	