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**Impact of Adopting Artificial Intelligence as a Business Strategy in Service
Sector Companies**

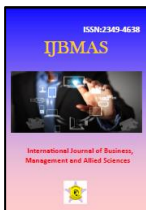
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ABSTRACT

Artificial intelligence (AI) is one of the technologies that is being leveraged by various economic sectors in different places around the world. This research is proposed to analyse the impact of the adoption of AI in the service sectors in Libya during the post-pandemic period (2022-23). Where it is proposed to identify the supported services and the applied tools, as well as the identification of the organizations that applied AI. The development of the research aims to expose the benefits, advantages, and applications of the use of AI and the impact generated from the technological and business aspects. The research methodology is based on a non-experimental, descriptive design with a qualitative approach. The data collection method used was quantitative surveys, directed to people who work in information technology geographically located in Metropolitan Tripoli. For the analysis of the information, it was reviewed that all respondents met the parameters required to be part of the research to guarantee that the information collected provides the expected value to meet the objectives of this work. According to the survey results, it was found that Companies in the banking and telecommunications subsectors have ventured more into the application of AI in their processes. 55.2% of the companies surveyed, between medium and very high level, implemented predictive analysis, with the banking and insurance subsectors being the ones that stood out in the use of this technology. Process improvement, Increased productivity, Greater proximity to their customers, Generation of greater knowledge, Improvement in decision-making, improved analytical capacity, Improved response times, Reduced expenses and frees up staff from operational activities. The conclusions of this research state that technology professionals from different sectors are increasingly betting on the use of AI in their companies,

which leads to being prepared to face new challenges and opportunities that arise.

Keywords: Artificial Intelligence, service sector, banking, telecommunication, insurance subsectors, Tripoli, survey.

1. Introduction

The growing adoption of Artificial Intelligence (AI) in business management has revolutionized the way organizations operate, offering a wide range of opportunities and outlining trends that shape the future of the corporate world. During the pandemic [1], Libyan companies in the service sector, which includes subsectors such as banking, insurance, retail and telcos, operated continuously despite the quarantine and health restrictions imposed by the Libyan government. It is known that many of these organizations use emerging technologies such as artificial intelligence to improve their processes, but it is unknown which branches are the most used or the degree of implementation in each of their subsectors. Likewise, the impact they achieved by using this technology in their companies is not known, a point that helps to establish the possible effects on their environment, as well as the benefits of its application due to its various technologies; Likewise, the business processes in which they apply AI have not been identified, which is important information to identify where they seek to maximize performance or evolve towards relevant improvements. Recognizing customers, coming up with better strategies, standing out from the competition, and improving decision-making are some of the main objectives that are part of any company and using artificial intelligence could play an important role taking into account the associated benefits, in this way, it would allow evaluating its implementation and the contribution it can have in any process at different organizational levels to maximize benefits and minimize damages. This information would be useful so that other companies that do not use AI technologies can use it as a reference and opt for its use to improve their processes and revolutionize them in the competitive market, where machine learning can help make better decisions. This paper explores the impact of AI on business management [2], highlighting its opportunities and emerging trends in the service sector. The relevance of this study lies in the in-depth understanding of the role of AI in business management and its potential to drive innovation, operational efficiency, and competitiveness in the global market. The increasing complexity of business environments demands a proactive and strategic approach to the integration of AI, and this study seeks to provide valuable insights for leaders and managers seeking to leverage the power of technology in their organizations [3].

1.1 Review of literature

In the study carried out on the use of deep learning for the recognition of retail products [4], the use of artificial product vision is mentioned, which was used for better management of products as well as improving the purchasing experience of users. Therefore, they indicate that the amount of investment in technology with artificial intelligence will increase in the following years to improve sales as well as improve customer satisfaction levels. The technology used allows for the management of a planogram of the products in the store, which notifies the replenishment of products in time, keeping the store stocked.

Another study by O'Reilly on the AI market [5] mentioned that image recognition is one of the areas where most companies are investing in the US AI investment. There are many use cases, including image tagging, which consists of extracting tags or keywords associated with images, to classify or search later with multiple applications in the tourism or retail sector [6]. The telecommunications industry has been one of the first to venture into the use of expert systems. Chen (2019) [7] mentioned that it was in the 1980s when expert systems were used to diagnose complex systems in off-line mode, which helped to optimize operations and provide facilities in the maintenance of telecommunications networks and facilities. The case of AllState [8] was presented, an insurance company that partnered

with Earley Information Science, an agency that improves results through data analysis; where together they developed a virtual assistant called Abie, which allows AllState agents to search for commercial insurance products from Allstate Business Insurance (ABI). Virtual assistants and chatbots are some of the main AI-based applications to optimize responses to specific queries; these applications allow customers to be guided about the products offered by financial institutions so they can make a decision. An example of a chatbot in a banking institution is Arturito from BCP, which uses natural language processing to recognize text, and according to Abdalbari Abdalbast Amar (2017) [9], it mentioned that the average communication time per customer is 6 minutes and after a year and a half of operation it served 109 thousand users, which is a large number of customers who managed to resolve their doubts through an AI application.

This research seeks to analyse the adoption of AI in organizations in the service sector, which includes subsectors such as banking, insurance, retail, and telecommunications, in addition to identifying which AI-based technologies were used and in which processes they were applied post pandemic between 2022 and 2023. Therefore, the main objective is to analyze the adoption of AI carried out by service organizations in their business model during the pandemic period, which allowed their sustainability in the market; in this sense, the economic sectors on which we will base the data collection will be banking, retail, telecommunications and insurance; this delimitation of sectors allows us to analyze the organizations that opted to apply AI in their processes and see the benefits they achieved by using AI-based technologies; also highlight that the purpose of the research is non-experimental since no manipulation of the variables was done.

2 Research Methodology

Research Design: A quantitative approach was used for the development of the research, as mentioned by Fernandez & Baptista (2014) [10]. This approach allows the use of data collection based on numerical measurement and statistical analysis in order to find behavior and trends in the use of AI. An informed consent form is prepared that will be described within the virtual survey to the participating people, explaining the objective and purpose of this research. With this statement, participants authorize being part of the research process and have knowledge about the use of the information obtained.

Sample selection: The sample used has a confidence level of 95% and the defined margin of error is 5%. In addition, the population includes 45 companies. For this, contact information was obtained through the Bloomberg platform, where it was filtered to top organizations at the national level corresponding to the service sector (banking, retail, insurance, and telecommunications). The aforementioned values are replaced in the TM function (sample size) and a result of 41 people to be surveyed is obtained. Of these 41 people, all responded to the survey, but 3 were not considered in the analysis, because they did not implement AI within their organizations. It is important to mention that the survey period was 3 weeks, the time that the access link to the survey was active through Google Forms. The sample selected for this research was made up of professionals such as Directors, managers, and coordinators of technologies in the sector of banking, telecommunications, retail and insurance located in Metropolitan Tripoli. In order to identify expected results, surveys were conducted and the population was considered to be information technology professionals and managers who have had interaction with the implementation of AI projects. This was done in order to obtain precise information from specialists who have interacted with AI technologies. The acceptance criteria of the professionals who were considered within the population by yes or no questions as bellow:

- Telecommunications, insurance, retail and banking (Yes/No)
- Work in Metropolitan Tripoli (Yes/No)
- Belong to the technology area (Yes/No)
- Have worked with an artificial intelligence (AI) project (Yes/No)

2.1 Measurement instruments or methods to collect data

The surveys had a structure designed by the research team of this work, which was modified and improved. For the development of the work, it is important to mention the type of survey that was carried out, according to the study by Carter (2018) [11] it is based on an electronic survey of 10 questions through the *Googleforms* platform to professional leaders in information technologies.

Initially, there were 19 questions, but it was possible to consolidate it to 10 questions since the survey aims to obtain relevant information on the use of artificial intelligence in the banking, retail, telecommunications and insurance sectors.

3. Results and Discussion

For the development of the research, a quantitative approach was used, which, based on the data collected, allowed us to identify the opportunities that are being exploited by organizations in the retail, telecommunications, insurance, and banking sectors. In this sense, the data analysis was carried out under a descriptive framework, identifying how to apply these AI technologies in the processes of service organizations to achieve a better competitive level.

The data obtained from the surveys carried out on information technology professionals and managers who have had interaction with the implementation of AI projects will be of utmost importance given that, based on their experience regarding the use of technologies in process improvement, the generation of new opportunities, or how it has been affecting the organization, they will be complemented with the data collected from research related to AI.

As determined that the population size was 45 companies in the service sector, from the banking, retail, insurance and telecommunications subsectors, from which a sample of 41 companies was taken. The questionnaires were directed to IT and operations managers and directors of said companies where the first questions validated whether their organizations had used AI technologies and if they had done so, they continued developing the questions to obtain information more focused on the use of AI technologies.

Below, the most representative results and the analysis of the responses obtained in each of the questions are shown in order to determine the adoption of AI in companies.

The sector to which the company belongs

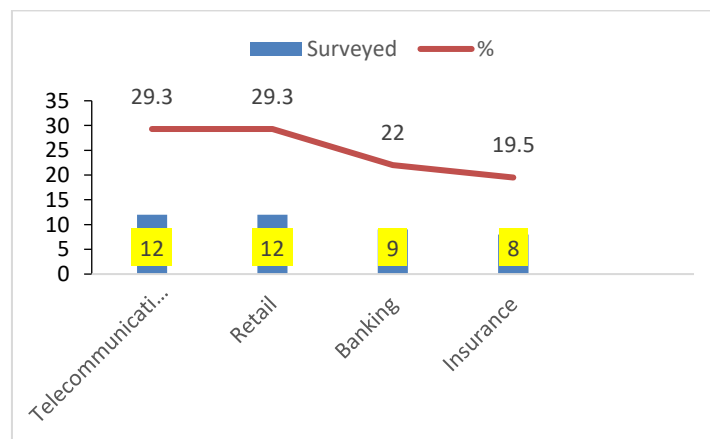


Figure 1: Companies by subsectors

Figure 1 shows the results regarding the sector to which the surveyed companies belong: 29% are from the telecommunications sector as well as the retail sector. On the other hand, 22% are from the banking sector and 20% are from the insurance sector.

Degree of knowledge of the concept of artificial intelligence (AI)

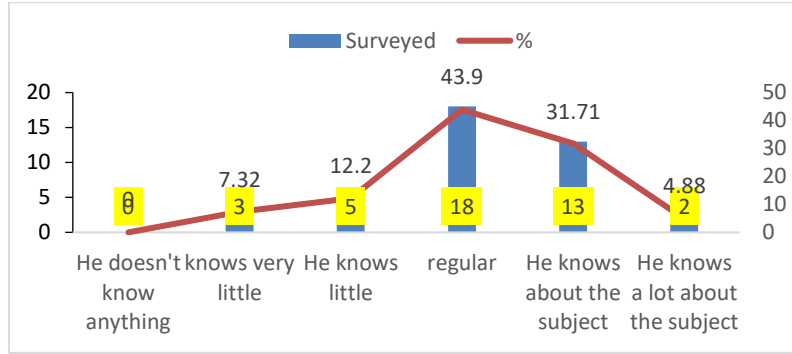


Figure 2: Degree of knowledge of the respondents

Regarding the degree of knowledge that companies have, Figure 2 shows that 4.88% of people know a lot about the subject. As well 31.71% know about the subject. In addition, 43.90% say they know a little about the subject. Also, 12.20% know little about the subject and 7.32% know very little about the subject. All respondents know about artificial intelligence and 80% of them have a greater knowledge about the subject. The other 20% know something about the subject.

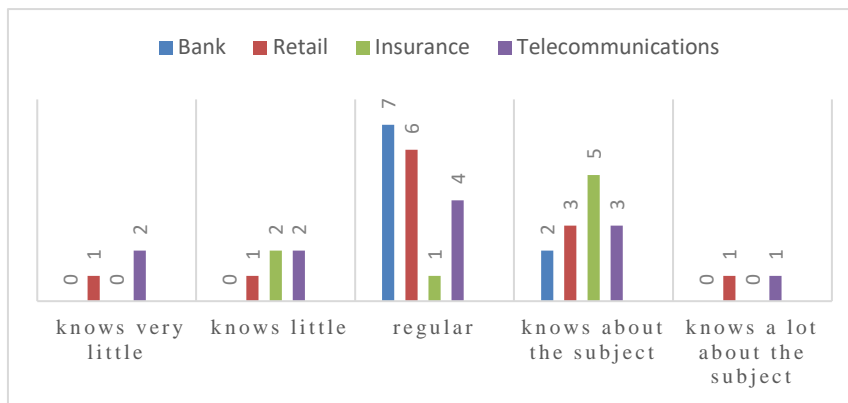


Figure 3: Degree of knowledge of respondents by sector.

On the use of artificial intelligence in one of its processes

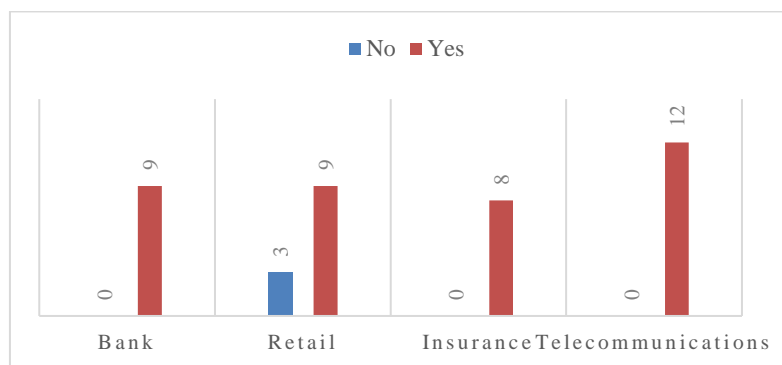


Figure 4: Use of artificial intelligence

Figure 4 shows the results of the use of AI in companies. 92.7% of respondents indicated that they do use it and 7.3% said the opposite, that is, that they do not use it. Likewise, it can be seen that respondents from the banking, insurance and telecommunications subsectors are all using AI in some of their processes and 75% of the retail sector uses it. This result can be corroborated by what was mentioned in literature [3] on the use of AI, which is already a reality and is seen to continue to increase since several implementations supported by this technology emerged during the pandemic.

On the degree of implementation in the processes

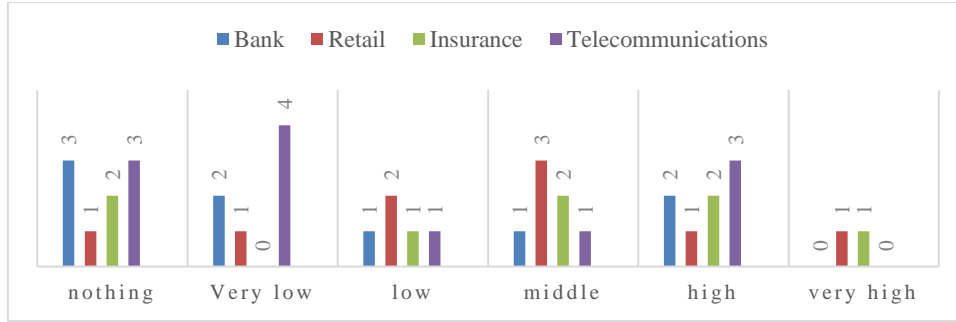


Figure 5: Degree of implementation of AI in Marketing processes

Figure 5 shows the degree of implementation for the marketing process, 23.7% responded that they have no implementations. Likewise, 18.4% have a very low degree of implementation, while 13.2% indicate that it is low. On the other hand, 18.4% present medium implementation. While 21.1% indicate that they have high implementation and 5.3% of companies have very high implementation. For this process, it can be observed in Figure 6 that all subsectors present medium to very high degrees of implementation. According to the data collected in a study carried out by IBM, few African companies have adapted to the current situation due to the pandemic by improving marketing processes with the support of AI, which is evidenced that all sectors have implementations in this process.

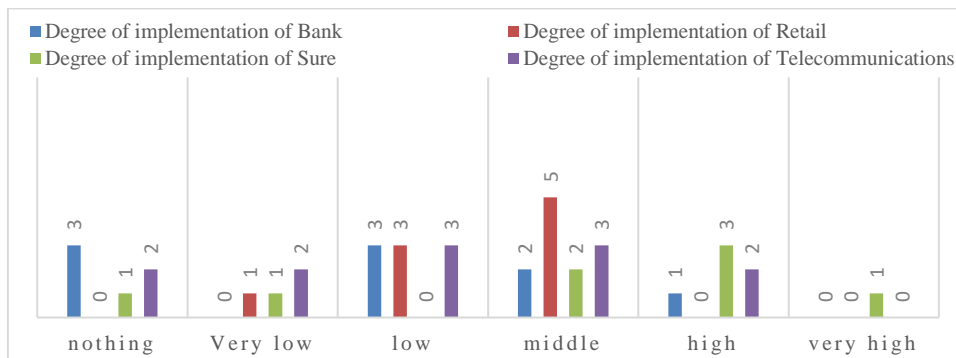


Figure 6: Degree of AI implementation in Sales processes

Figure 6 for the sales process shows that 15.8% of companies do not have implementations. 10.5% indicate that the degree of implementation is very low. Likewise, 23.7% mention that it is low. While 31.6% have a medium degree of implementation. On the other hand, 15.8% have a high degree of implementation and 2.6% are very high. It can be seen that all companies in the different sectors have implementations in their sales processes of a medium to very high degree. It can be concluded that the surveyed companies use AI in their sales processes as indicated by the study carried out by IBM [12], more than 80% of companies have implementations to support their sales processes.

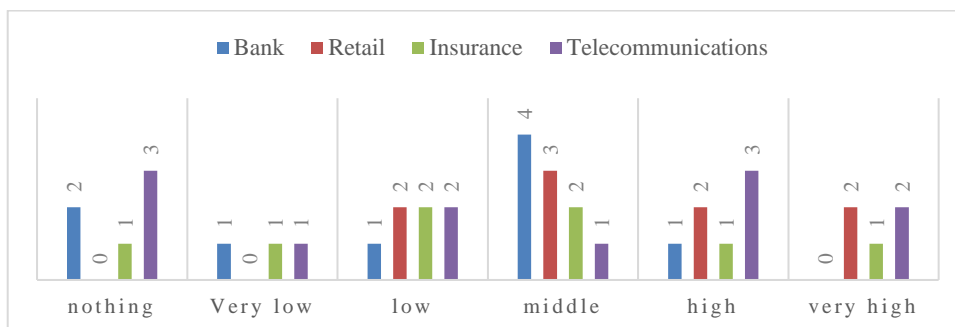


Figure 7: Degree of AI implementation in customer service processes

Figure 7 for the customer service process shows that 15.8% have no implementation. 7.9% indicate that it is very low. On the other hand, 18.4% say that the degree of implementation is low. However, 26.3% mention the degree at a medium level.

Likewise, 18.4% of companies indicated that they have a high implementation of this process and 13.2% with a very high degree. It can also be observed that the majority of companies in the different sectors present medium to very high degree implementations. Likewise, it can be confirmed by the statements of some experts who stated that the use of AI for this process is the most frequent in Libyan companies and that is why during the COVID situation, people used internet service channels from anywhere, since organizations have implementations developed in AI oriented to the customer service process.

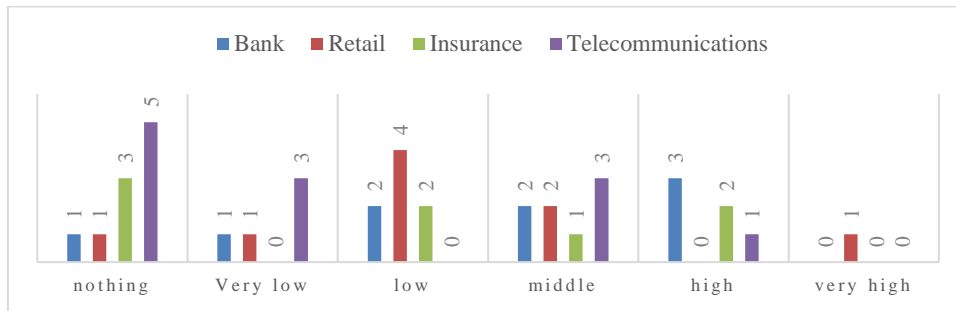


Figure 8: Degree of AI implementation in Research/Development processes

In Figure 8, for research/development processes, 26.3% of companies indicated that they do not have any implementation. On the other hand, 13.2% have very low implementation. While 21.1% indicate that their degree of implementation is low. Likewise, 21.1% have medium implementation. 15.8% have a high degree of implementation and 2.6% have a very high degree of implementation. With the information obtained, it can be seen that the degree of implementation for this process is relatively low in most of the companies surveyed; knowing the degree of implementation helps us determine at the end of the study the level of adoption of the processes that have more implementations with AI and the sectors involved.

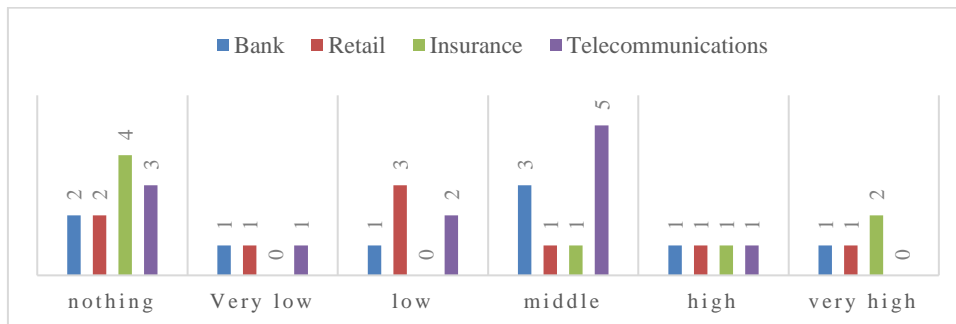


Figure 9: Degree of implementation of AI in Control/Monitoring processes

Figure 9, regarding control/monitoring processes, 28.9% of companies indicated that they have no implementation. 7.9% responded that the degree of implementation is very low. While 15.8% mention that there is a low degree. On the other hand, 26.3% indicate a medium degree of implementation. Likewise, 10.5% have a high degree and also 10.5% present a very high degree of implementation. It can be concluded that all sectors have implementations for this process from lowest to highest degree, especially in companies in the banking and telecommunications sector.

Degree of implementation in AI technology: Results show the degree of implementation of AI with Predictive Analysis technology, it is noted that 23.7% have not implemented it. While 10.5% indicate that the degree is very low, as well as 13.2% state that it is low. On the other hand, 15.8% mention that it is implemented at a medium level. While 31.6% have high-level implementations and 5.3% are very

high. The results show that more than 50% of companies have implemented this technology, especially in the banking, insurance and telecommunications sectors, since this technology allows knowing, for example, the sales of a product, customer behavior/patterns and this helps companies to create opportunities, improve services/products, identify risks through predictions.

Degree of implementation in Deep Learning: Results on the degree of implementation of AI with deep learning technology shows that 36.8% of respondents have not used this technology, likewise 13.1% of companies consider that they have a low and very low degree of implementation; on the other hand, 10.5% of respondents indicate that they had a medium degree of implementation; and another 18.4% consider that they have a high degree of implementation, finally 7.9% of respondents indicate that they had a very high degree of implementation. It can be concluded based on the objectives defined in the research that this technology has not been sufficiently used in the companies surveyed unlike others where the degree of implementation is higher in the different sectors.

Degree of implementation in Voice Recognition: On the degree of implementation of AI with voice recognition shows that 44.7% of respondents have not used this technology, likewise 10.5% of companies consider that it has a very low degree of implementation and another 7.9% consider that it had a low degree of implementation; on the other hand, 23.7% of respondents indicate that they had a medium degree of implementation; and another 7.9% consider that they have a high degree of implementation, finally 5.3% of respondents indicate that they had a very high degree of implementation. The results reflect that this technology has not been widely used, but it shows that there is progress in its implementation, especially in the telecommunications, banking and retail subsectors. This finding coincides with the literature [3], which indicates that voice recognition has more implementations in companies that seek to interact with a large number of users.

Degree of implementation in Facial Recognition: The results are shown for the question about the degree of implementation of AI in Facial Recognition. The survey of the degree of implementation of AI with facial recognition shows that 55.3% of respondents have not used this technology, likewise 15.8% of companies consider that they have a very low degree of implementation and another 10.5% consider that they had a low degree of implementation; on the other hand, 7.9% of respondents indicate that they had a medium degree of implementation; and another 5.3% consider that they have a high and very high degree of implementation. These results indicate that the implementation of facial recognition is lagging among Libyan companies in the service sector and agrees with what is found in the literature [3] which mentions that few countries are lagging in AI compared to advanced economies where it is widely used. However, it is seen that there are companies that use it and can serve as references for other companies in the service sector.

Degree of implementation in Character Recognition: The results are shown for the question about the degree of implementation of AI in Character Recognition. The degree of implementation of AI with character recognition shows that 44.7% of respondents have not used this technology, likewise 10.5% of companies consider that they have a very low degree of implementation and another 5.3% consider that they had a low degree of implementation; on the other hand, 15.8% of respondents indicate that they had a medium degree of implementation; and another 10.5% consider that they have a high degree, finally 13.2% of respondents consider that they had a very high degree of implementation. The results indicate that there are some companies from all the subsectors involved in this research with a need to use this technology, these in the future would be the pioneers and possible references as success stories. Likewise, it continues to be evident that the implementation of AI technologies is lagging in Libyan companies compared to other economies such as the United States, but its potential is being explored and implemented at an incipient level.

Degree of implementation in Image and Video Recognition: The results are shown for the question about the degree of implementation of AI in Image and Video Recognition. The degree of implementation of AI with image and video recognition shows that 42.1% of respondents have not used

this technology, likewise 10.5% of companies consider that it has a very low degree of implementation and another 15.8% of respondents consider that it had a low degree of implementation; on the other hand, 21.1% of respondents indicate that they had a medium degree of implementation; and another 5.3% consider that they have a high and very high degree of implementation. Similar to the technologies analyzed above, it can be observed that image and video recognition is being used by some of the companies participating in the research and most of them indicate a medium level of implementation, this indicates that there is a need for its use and an exploration of its potential in improving processes. This result contrasts with those mentioned in the O'Reilly study on the AI market where it indicated that image recognition is one of the areas where more companies are investing in the US within the investment in AI [13].

Degree of implementation in automatic translation: The results are shown for the question about the degree of implementation of AI in automatic translation. The degree of implementation of AI with automatic translation shows that 50% of respondents have not used this technology, and 21.1% of companies consider that it has a very low degree of implementation; on the other hand, 10.5% of respondents indicate that they had a medium degree of implementation; and another 13.2% consider that it has a high degree of implementation and another 5.3% of respondents consider that it had a very high degree of implementation. The results show that, like other AI technologies, it has a low degree of implementation among the companies participating in the research, but it can be highlighted that some companies in the banking and telecommunications subsectors are exploring its use to improve their processes.

Degree of implementation in Sentiment Analysis: The results are shown for the question about the degree of implementation of AI in sentiment analysis. The degree of implementation of AI with sentiment analysis shows that 50% of respondents have not used this technology, likewise 13.2% of companies consider that it has a very low degree of implementation and another 7.9% of respondents consider that it had a low degree of implementation; on the other hand, 21.1% of respondents indicate that they had a medium degree of implementation; and another 5.3% consider that they have a high degree of implementation and another 2.6% of respondents consider that they had a very high degree of implementation. The results indeed show that there is a high percentage of companies that do not use this AI technology, but it is clear that there is an incipient need for its use, noting that 29% of companies indicate a degree of implementation between medium to very high. This is what was mentioned by Yadav, Jyoti. (2023) [14] about companies using sentiment analysis to understand their audience and improve customer service.

Degree of implementation in Language Comprehension: The results are shown for the question about the degree of implementation of AI in language comprehension. The degree of implementation of AI with language comprehension shows that 55.3% of respondents have not used this technology, 7.9% of companies consider that it has a very low degree of implementation and another 10.5% of respondents consider that it had a low degree of implementation; on the other hand, 7.9% of respondents indicate that they had a medium degree of implementation; and another 15.8% consider that they have a high degree of implementation and another 2.6% of respondents consider that they had a very high degree of implementation. The results indicate that the lag in the use of AI, with respect to advanced economies, evidenced in other technologies analyzed previously is also shown in this case, but it is seen that the Telecommunications subsector has a higher degree of implementation compared to the rest of the subsectors investigated.

Degree of implementation in Speech Synthesis: The results are shown for the question about the degree of implementation of AI in Speech Synthesis: The degree of implementation of AI with speech synthesis shows that 57.9% of respondents have not used this technology, likewise 5.3% of companies consider that it has a very low degree of implementation and another 7.9% of respondents consider that it had a low degree of implementation; on the other hand, 18.4% of respondents indicate that they had

a medium degree of implementation; and another 7.9% consider that they have a high degree of implementation and another 2.6% of respondents consider that they had a very high degree of implementation. The lag in the use of AI technology is still evident in the results, despite this, the Telecommunications subsector being the one that indicates a greater tendency to its implementation. This indicates that this sector has a need for this technology and is exploring its potential.

Degree of implementation in Natural Language Generation: The results are shown for the question about the degree of implementation of AI in natural language. Regarding the degree of implementation of AI with natural language generation, it shows that 47.4% of respondents have not used this technology, likewise, 10.5% of companies consider that it has a very low degree of implementation and another 13.2% of respondents consider that it had a low degree of implementation; on the other hand, 15.8% of respondents indicate that they had a medium degree of implementation; and another 7.9% consider that they have a high degree of implementation and another 5.3% of respondents consider that they had a very high degree of implementation. The results on this technology continue to show the lag in AI implementation found in other technologies already analyzed. In this case, it is again observed that the Telecommunications subsector indicates a greater tendency in the implementation of natural language, showing a need for use and exploration of its potential.

Degree of implementation in Robot Automation: The results are shown for the question about the degree of implementation of AI in robot automation. The degree of implementation of AI with robot automation shows that 31.6% of respondents have not used this technology, 10.5% of companies consider that they have a very low degree of implementation and another 13.2% of respondents consider that they had a low degree of implementation; on the other hand, 13.2% of respondents indicate that they had a medium degree of implementation; and another 21.1% consider that they have a high degree of implementation and another 10.5% of respondents consider that they had a very high degree of implementation.

Degree of implementation in Chatbots: The results are shown for the question about the degree of implementation of AI in chatbots. In the degree of implementation of AI with chatbots it shows that 15.8% of respondents have not used this technology, also 7.9% of companies consider that it has a very low degree of implementation and another 10.5% of respondents consider that it had a low degree of implementation; on the other hand, 23.7% of respondents indicate that they had a medium degree of implementation; and another 13.2% consider that they have a high degree of implementation and another 28.9% of respondents consider that they had a very high degree of implementation.

Results to the question about the degree of implementation of AI in Control of other systems through API by sector: In the degree of implementation of AI with Control of other systems through API shows that 23.7% of respondents have not used this technology, also 5.3% of companies consider that it has a very low degree of implementation and another 15.8% of respondents consider that it had a low degree of implementation; on the other hand, 26.3% of respondents indicate that they had a medium degree of implementation; and another 10.5% consider that it has a high degree of implementation and another 18.4% of respondents consider that it had a very high degree of implementation. Because they are standards that organizations must use in their implementations, this technology has been highly accepted, since more than 50% of respondents considered it important between organizations, such as in the case of payment of services through bank applications.

The results are shown to the question about the degree of implementation of AI in Natural Language Processing: The degree of implementation of AI with Natural Language Processing shows that 44.7% of respondents have not used this technology, likewise 10.5% of companies consider that they have a very low and low degree of implementation; on the other hand, 13.2% of respondents indicate that they had a medium degree of implementation; and another 10.5% consider that they have a high and very high degree of implementation. The results reflect that this technology is entering the service sectors accompanied by other technologies such as neural networks and RPA, this beginning of the use of

natural language processing technology is what a report by Elliot et al. (2021) [15] requires, achieving a joint work that generates more benefits since it carries out a more detailed process of the information, which is why more solutions incorporate it in their development. The results show that the majority of respondents have not implemented it in their organizations, however, there is a small group of respondents who have already implemented it and the retail sector is the one that is most involved in this technology due to the number of ways of buying or selling that it handles through mobile and web channels.

The results are shown for the question about the degree of implementation of AI in real-time translation: The degree of implementation of AI with Real-Time Translation shows that 55.3% of respondents have not used this technology, likewise 10.5% of companies consider that it has a very low degree of implementation and another 13.2% of respondents consider that it had a low degree of implementation; on the other hand, 5.3% of respondents indicate that they had a medium degree of implementation; and another 10.5% consider that they have a high degree of implementation and another 5.3% of respondents consider that they had a very high degree of implementation. The results show that it is telecommunications companies that are venturing into this technology.

The results are shown for the question about the positive contribution of AI in your company: In how AI contributes positively to the company, it shows that 44.7% of companies consider that AI has a very high contribution in their organizations, and 26.3% of companies consider that AI has a high contribution, in addition 21.1% of companies consider that it contributed medium; finally 7.9% of companies consider that it was a low contribution; in addition, in figure 15 it can be seen that the four sectors consider that AI had a very high contribution in their organizations. From the results it can be seen that more than 50% of companies consider that AI did have a high contribution in the organizations. where it mentions that companies must assimilate these technologies in order to improve their processes and not be left behind in the use of new technologies.

The results are shown for the question about the degree of impact of AI on greater knowledge: Regarding the degree of impact related to Greater Knowledge, 2.6% did not present any impact. On the other hand, 7.9% indicate that the degree of impact is very low and 18.4% specify that it has a low degree of impact. 13.2% of respondents consider that the impact is of a medium degree; likewise, 28.9% indicate that it has a high impact and also 28.9% perceive that there is a very high impact with reference to this benefit. With the above, it can be affirmed that AI contributes positively by generating greater knowledge in employees. Thus, greater knowledge leads to greater adoption in companies, as mentioned in the article Islam (2021) [15] on the implementation of Artificial Intelligence, 41% of IT professionals and most of their companies plan to invest in AI for the next 12 months.

The results are shown to the question about the degree of impact of AI on the customization of products and services: In relation to the degree of impact referred to the Personalization of products and services, it shows that 5.3% had no impact with respect to this benefit. 5.3% consider that the impact is very low. While 18.4% considers that the impact is low; likewise, 18.4% indicates that the degree of impact is medium. On the other hand, 36.8% consider a high impact and the other 15.8% very high. Therefore, it is considered that AI has a great impact that allows the customization of products and services offered by companies, as mentioned in the research by Cutiva & Espitia (2018) [17], the use of appropriate technologies such as artificial intelligence will allow companies to compete in the current panorama, to respond to customers who demand high quality products with personalized attention, which requires permanent innovation.

The results are shown for the question about the number of processes automated with AI during the COVID-19 pandemic: The results are shown on the use of AI in companies during the COVID-19 pandemic and 7.9% of respondents indicated that they did not automate processes during the health emergency. On the other hand, 44.7% expressed the opposite, that more than 3 processes were implemented. Likewise, 92.1% of companies implemented at least one process using AI. This trend is

similar to what is stated in Musa, (2023) [18], since due to the COVID-19 pandemic companies had to reinvent themselves to stay in the market.

The results are shown for the question about the number of processes automated with AI before the COVID-19 pandemic: The number of processes automated with AI in companies before the pandemic shows that 31.6% of companies did not use AI in their processes, then 18.4% of the companies surveyed mention that they used AI in one of their processes, another 15.8% of companies indicate that they used AI in two processes of the organization, then 7.9% of companies used AI in three of their processes. And finally, 26.3% of companies indicated that they implemented AI in more than 3 processes before the pandemic. With these results, it can be seen that few companies invested in AI to improve their processes, coinciding with the article by Zhao (2018) [19], which mentions that some developing countries are still far behind countries with advanced economies.

3. Conclusions and Recommendations

The use of artificial intelligence (AI) in Metropolitan city in Libya Tripoli is a reality since the study found that 68.4% of companies in the banking, retail, insurance and telecommunications subsectors already used AI in some of their processes before the COVID-19 pandemic. Likewise, during the pandemic, the adoption of AI increased to 100% since the number of companies that used AI in their processes increased, as well as the number of processes that were implemented with AI technologies.

Similarly, by identifying the processes that have been implemented by organizations in the service sector nationwide based on AI, it has been recognized that customer service processes supported by AI technologies were implemented in the banking, retail and telecommunications subsectors, possibly due to the situation caused by COVID-19, which forced people to make purchases and transactions from their homes. This change in lifestyle and the use of different purchasing channels in addition to the traditional one generated a trend towards omnichannel where all these channels need to be connected and digitized. In turn, marketing processes supported by AI were implemented in the retail and insurance subsectors, possibly to be more efficient and due to changes in consumer behaviour due to the pandemic, thus seeking to offer better products that meet these new customer expectations. On the other hand, in the insurance subsector, control-monitoring processes and sales processes with AI were implemented, possibly for better monitoring of their clients, generating forecasts of sales results or analysis of policy risks and better-managing claims in an environment where there is less access to traditional channels and an increase in customer contact through digital means. This result stated that organizations in Asia and the Pacific used technologies that helped in the areas of customer service, which according to the results obtained from the research that has been carried out, AI is also being used in Libyan companies to support customer service processes, as well as marketing processes and monitoring processes.

To know the AI-based technologies that have been most used to support and improve their processes, it is concluded that the subsectors that have ventured most into the application of AI in their processes are companies in the banking and telecommunications subsectors. This was possible because they are sectors that provided services despite health restrictions and due to an increase in contact with their users through digital or non-traditional means. It is worth mentioning that retail and telecommunications implemented chatbots, this being one of the most used technologies to support and improve the company's internal processes, probably to serve a greater number of users and expand service channels in a pandemic situation, where social distancing is important and where a greater number of users used digital means - based on data from research on service and customer experience in times of pandemic; Just like system control through API in the banking and telecommunications subsectors, likewise, it can be concluded that the banking and insurance subsectors implemented predictive analysis technologies to create new opportunities and reinvent their customer experiences, similar to what was concluded by the consulting firm KPMG in its report on banking automation where

it concludes that banks link automation with predictive analysis to think of new forms of future growth, customer experience and investment in technology.

Finally, about the objective of identifying the benefits offered by the use of AI-based technologies that can be applied in organizations in the service sector, it is concluded that companies in the banking, retail, insurance and telecommunications subsectors obtain benefits after the implementation of AI in their processes, the most notable being process improvement, increased productivity, greater proximity to their customers, generation of greater knowledge, improvement in decision-making, improvement in analysis capacity and improvement in response times. It is deduced that all subsectors present reduced expenses and free personnel from operational activities after the implementation of AI, being very similar to what was concluded, which indicated the advantages associated with the implementation of AI, having as a statement that AI is a necessary strategy in any company to obtain efficiency, income opportunities, customer loyalty, customization of products/services and analysis capacity.

Future research is recommended based on a more in-depth study of process improvements after using AI, since organizations will have information generated by the use of these technologies, thus it will be possible to establish milestones based on results; comparisons can also be made between the way customer service was carried out and the way products and/or services offered were improved based on the information collected by AI applications.

Based on the most used technologies mentioned in the research on AI applications in companies, future research is recommended based on a comparative analysis of the technological infrastructure necessary for the adoption of the different technologies, in addition to the costs required for their implementation.

It is advisable to identify national success stories resulting from applying artificial intelligence, because in this pandemic period more and more organizations are venturing into applying AI-based technologies to improve their processes, and thereby generating information that can be used to show the impact of applying AI and the profitability produced in the company, which would lead to knowing the economic advantages within each organization in the different service sectors.

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