The role of artificial intelligence and big data on loan decisions

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C H R O N I C L E	A B S T R A C T
	The aim of the present research was to identify the influence of Artificial Intelligence and Big data on loan decisions in Saudi Arabian banks. The study used a sample of thirteen banks located in Saudi Arabia for data analysis. The data was gathered using some questionnaires distributed to bank staff. The results indicate a significant connection among loan decisions and AI and Big data. Moreover, it was found that there was a statistically positive and significant relationship between the artificial intelligence and the quality of loan decision-making. There was also a positive association between experience, educational qualification and using big data and AI. In conclusion, the results show that AI and Big data could enhance innovation which could be applied in the banks of Saudi Arabia for loan decisions assessment. © 2021 by the authors; licensee Growing Science, Canada

1. Introduction

Banks use technological activities to promote business operations through applying artificial intelligence to prevent deceptive activities, improve client service, provide standardized client support, allow virtual assistants providing online solutions (Doan, 2020). Sufficient number of tests have been carried out efficiently by artificial intelligent to assist loans decisions. The Safety Pacific Bank is the first bank declaring a program of neural networking (Goonatilake & Treleaven, 1995). The massive change in banking and financial services focused systematically towards development in recent years (Hawser, 2018). Artificial intelligence is being applied widely in a range of areas, such as advertising, finance, communication and management systems control of production (Cao & Parry, 2009). Hence, banks use big data collection to gather customers' data such as profits, job specification, demographic information and ability to repay, hence, provide a range of bank services such as loans. Usually large levels of automated processes exist in the large data. Big data is now the international subject mostly on web combined with the increase in predictive artificial intelligence (AI) for making a decision in information technology despite huge developments. The fast expansion and steep decline throughout the costs of electronics in smart devices had been an initial driving. Sustainable growth of banks relies on its capability to design, derive insights and implement new information throughout the decision process via massive amounts of information. The smart, artificial intelligence-based information technology can supply managers with value-added data, decrease the vulnerability of decision-making, but increase the efficiency of the operation (Mitchell & Pavur, 2002). The use of modern innovation can therefore give a company a market advantage and a superior efficiency. Apart from evolutionary algorithms frameworks, like neural networks, genetic algorithms, AI incorporates other machine learning methods, concept perception, reasoning, and theory of probabilities (Duch et al., 2007).

This paper discusses and explains the principles of AI and big data in accounting specially for loan decisions. However, Loans are indeed the backbone of the banking system. Responsibility and continuity are ensured by the success of high loan agreements. Verifying the financial past of clients prior to actually taking a lending decision seems to be important issue and a massive credit cost containment method. Loan confirmation should be granted to qualified candidates with reduced systemic risk, while high-risk applicants will be ignored (Limsombunchai et al., 2005). The goal of this paper is to improve, handle and accomplish further performance and effectiveness through the use of the Artificial Intelligence in deciding on loans (Curry & Moutinho, 1993; Dang, 2019; Pendar et al., 2019).

1.1 Research Problem

Saudi Arabian financial institutions, are mostly reticent to be using artificial intelligence throughout their decision-making roles due to increasing customer loan default and competitiveness mostly on financial sector. Bank loan staff typically use conventional approaches to determine the interest of loan applicants (Carter et al., 2007). For the evaluation with loans applicants, a set of guidelines of bank regulations, standard analysis with personal opinion are used. In addition, the financial judgment or loan suitability advice about a loan staff is personal. Following certain practice, they build their best expertise or insight to assess the value of a loan judgment. Without objective reporting this evaluation has a selective, vague, not-international, and person's capacity, based on global amounts of past records, to find beneficial relationships and trends (Handzic et al., 2003). In addition, the difficulty of lending decision-making instruments as well as the variance among implementations offer the chance for AI and big data to have support abilities. Throughout the decision-making process in banks for loan permissions, AI becomes a value-added analysis technique.

1.2 Research Objectives

The research objectives are listed as the following points:

1. To identify the impact of Artificial Intelligence on loan decision,

2. To identify the impact of Big Data on loan decision.

2. Research Model and Hypotheses

2.1 Model

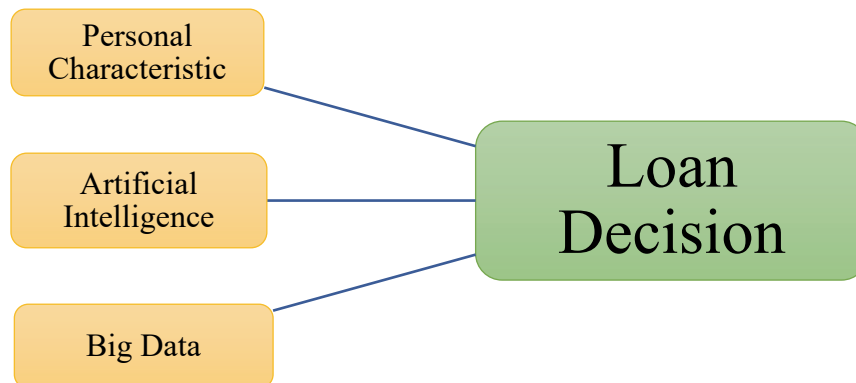The relationship among Artificial Intelligence, Big Data and Loan Decision are as shown in Fig. 1:

Fig. 1. Research Model

2.2 Hypothesis

The research hypotheses between are as the following:

H_1: There is no statistically significant relationship between the effect of applying artificial intelligence methods on the quality of the loan decision taken.

H_2: There is no statistically significant relationship between the effect of Big Data methods on the quality of the loan decision taken.

H₃: There is no variation in Loan decisions in commercial banks and the degree of their AI observance and Emotional Intelligence methods.

3. Research methodology

The analytical method was used in this research to suit the nature of the study and to achieve the desired goals. This approach is based on data linking and classification and the quality of the variables with each other. As the descriptive analytical approach is considered one of the most widespread research methods and as long as the analytical descriptive approach depends on studying natural, social, economic and political phenomena on how to explain the characteristics of the phenomenon, as well as the amount, size, changes and degree of its relationship to other phenomena (Ash'ari, 2013).

3.1 Community of research

The community is defined as the entire individuals, observations, events or things that are the subject of research (Douri, 2000). The research community consists of the banks of Saudi Arabia (The National Commercial Bank– The Saudi British Bank - Saudi Investment Bank- Alinma bank- Banque Saudi Fransi- Riyad Bank- Samba Financial Group - Alawwal bank- Al Rajhi Bank – Arab National Bank- Bank AlBilad- Emirates NBD- National Bank of Bahrain).

3.2 Data collection

The data was gathered through the conduct of the questionnaires to bank staff who are the primary method of data collection. The number of questionnaires distributed to the branches' employees was 102 with six missing questionnaires.

3.3 Statistical Methods and Tools

This research used the following methods:

(1) Percentages to examine the community study,
(2) Alpha Cronbach coefficient to determine the stability,
(3) Regression analysis to test the impact of independent variables,
(4) The arithmetical averages and the standard deviations,
(5) Pearson correlation,
(6) T test.

3.4 Characteristics

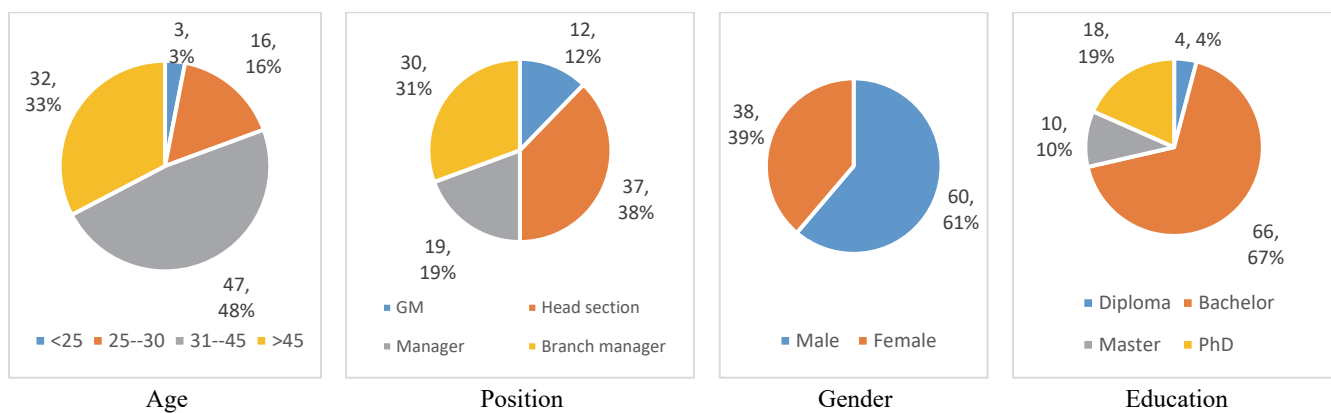In this paper, the characteristics are shown in Fig. 2:

Age   Position   Gender   Education

Fig. 2. Personal characteristics of the participants

3.5 Instrument Stability

In this research, the Alpha Cronbach test scale was used to find and test the answers of the research sample chosen from the study community, where the value of the Alpha Cronbach was 0.946. This indicates that there is a high stability of the research paragraphs and their answers. Table 1 shows details of the results.

Table 1
Cronbach α

Variables	Cronbach α
AI	0.946
Big Data	0.95
Loan Decision	0.944
Total	**0.946**

4. Results

4.1 Descriptive Statistics and Correlations

The results of the simple regression analysis for hypothesis 1 in Table 2 indicate that the independent variable of artificial intelligence explains the decision-making process by 50%. There is a correlation between these two variables where the value of F is shown. 97.4 and with a significant level of 0.00. The value of the regression coefficient reflects the importance of artificial intelligence in making loan decisions.

Table 2
Simple Regression Hypothesis 1

R^2	**0.5**	
T-test	4.9	10.1
F	97.4	

Table 3 shows the results of the simple regression analysis for hypothesis 2 that Big Data explains the loan decision process by 0.60 and this ratio maintains a meaningful t-value and the value of F also indicates that there is a strong link between the use of big data and the loan decision.

Table 3
Simple Regression Hypothesis 2

R^2	**0.60**	
T-test	2.99	13.3
F	200.6	

The use of the Pearson correlation has been used to explain the third hypothesis as shown in Table 4. The Pearson correlation is used for the case of identifying the strength of the relationship between two continuous variables, and this correlation gives an indication of both the direction of the relationship, whether positive or negative and its strength, and the positive correlation indicates that in the case of an increase of one variable the other variable increases, while the negative correlation indicates the increase of one variable and the decrease of the other variable.

Table 4
Pearson Correlation

Variable	AI	Big Data	Loan Decision
Gender	0.082	0.102	0.148
Age	0.110	0.146	0.091
Experience	0.174	0.208	0.187
Education	0.385	0.439	0.330
Managerial level	0.101	0.20	0.339

The above data indicate that there is a strong and positive correlation between the educational qualification and the use of the method of artificial intelligence, while the value of Pearson correlation is equal to 0.0385 and the level of significance is 0.00. As for using Big data, it has a positive relationship with the variable of experience, so that Pearson's correlation is equal to 0.208. At a level of significance of 0.38, and Pearson's correlation coefficient with the managerial level 0.20 with a significant level of 0.039. The results also show that the educational qualification had a positive correlation with the loan decision-making process, and the Pearson correlation coefficient is 0.330.

Table 5 with the arithmetic mean and standard deviations of using artificial intelligence shows that the answers of the division managers in banks were positive and the big data variable show high degree. This gives a strong indication that there is a large trend by the section managers in banks towards the applications of artificial intelligence in a large way in the process of loan decision.

Table 5
Means and Standard Deviation

Variable	SD	Mean
AI	1.39	3.80
Big Data	1.47	3.72
Loan decision	1.30	3.60

4.2 Paired Samples T-Test

Using SPSS 20 the paired samples T-test was applied to test the relationship between loan decision and artificial intelligence and also the relationship between loan decision and big data.

Table 6
Paired Samples T-test AI and Loan Decision

Variable	Mean	SD	T
Loan Decision	3.60	1.30	
Artificial Intelligence	3.80	1.39	1.40

Table 6 shows that the relationship between loan decision and artificial intelligence is significant (0.204). Hence, whenever the system has a high ability, there is a high quality in loan decision-making, and this would help in developing the decision-making process in a way that maximizes its importance. The previous results indicated that there was a statistically significant relationship between the AI and the quality of decision-making, as this relationship indicated that the AI would generate higher-quality management decisions than any other traditional method.

Table 7
Paired Samples T-test Big Data and loan decision

Variable	Mean	SD	T
Loan Decision	3.60	1.30	
Big Data	3.72	1.47	1.45

Paired samples T-test has been done to check the relationship among loan decisions and big data. The relationship between them is significant (0.290) according to the data in Table 7, the results have shown that big data have impact on loan decision and will generate more accurate decision for loans. The research results can be defined as the following:

There is a positive correlation between the application of artificial intelligence and the quality of loan decisions, which can be explained by *F*-value where the result of a simple regression analysis indicated by the value of this relationship. This is due to the fact that the loan officers cannot take the administrative decision in isolation from the use of artificial intelligence and big data tools and methods in light of the multiple levels and administrative functions. There is a positive correlation between the application of big data and the ability to make loan decisions, and this was demonstrated by performing a simple regression analysis test and from the value of F and the value of R-Square and this is due to the fact that big data is of great importance in the quality of decisions. Through the Pearson Correlation procedure, it is found that there is a positive correlation between the educational qualification and the artificial intelligence variable. It was found that there is a positive association between experience, educational qualification and using big data and AI. The results have shown a positive correlation between the variables and the field of decision-making. After conducting a Paired Sample T - Test for the applications of artificial intelligence with the quality of loan decision-making, it was found that there is a positive statistically significant relationship between the applications of artificial intelligence and the quality of loan decision-making.

5. Conclusion

In this research, it has been obtained that AI and Big data affect the relationship among loan decision. In addition, this research has shown that there is a significant relationship among them according to the results. Although approving loan decision in Saudi's banks are discretionary and mostly the loan director is responsible, banks may use artificial technology to enhance the loan analytical techniques. The proposed model aimed at reflecting a very relevant element in Saudis banks loan decision. The recent research has been utilized to determine loan choices with the effects of two variables. The research objectives are identifying the impact of Artificial Intelligence on loan decision and to identify the impact of Big Data on loan decision. Although banks should utilize more effective applications in the systems to improve the effectiveness of the model, to develop the confidence in such innovations. The research findings recommend that the banks should improve or include AI and Big data in their loan decision process. There are many banks with various tactics. A full collection of information from these banks was

really hard to acquire. Since, this data is held confidential by the bank and should be protected. The concept can be applied to include several forms of lending as a guidance for more research.

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